



CEDEFOP

European Centre for the Development
of Vocational Training

Skills for green jobs

Country report

France

Preface

The world is coping with a host of environmental problems and an urgent need to reduce carbon emissions. A greener future also provides enormous potential for much needed employment growth. However, without suitable skills, this potential cannot be realised. Today, skills gaps are already recognised as a major bottleneck in a number of sectors, such as renewable energy, energy and resource efficiency, green building and retrofitting, environmental services, and green manufacturing. Training response measures are successful where they are coherent across policy domains, systemic and systematic, and targeted at disadvantaged groups. These training measures can only be effective if based on timely identification of skills needs.

The European Centre for the Development of Vocational Training (Cedefop) and the International Labour Organization (ILO) worked together in carrying out the project ‘Skills for green jobs’, identifying skills needed for greener economies with respect to structural shifts, and new, emerging and changing occupational profiles. The ‘Skills for green jobs’ study is embedded in the green jobs initiative, a joint initiative of the United Nations Environment Programme (UNEP), the ILO, the International Employers Organization (IOE) and the International Trade Union Confederation (ITUC), to assess, analyse and promote creation of decent jobs as a consequence of the needed environmental policies.

The Skills for green jobs - European synthesis report (Cedefop, 2010) covers six EU Member States: Denmark, Germany, Estonia, Spain, France and the UK, and Annexes 1-6 are summaries of the country reports. The ILO global synthesis report, Skills for green jobs: a global view (Strietska-Ilina et al., forthcoming), analyses the situation in all 21 countries involved in the study (Australia, Bangladesh, Brazil, China, Costa Rica, Denmark, Egypt, Estonia, France, Germany, India, Indonesia, the Republic of Korea, Mali, the Philippines, South Africa, Spain, Thailand, Uganda, the UK and the US). The reports are available at: <http://www.cedefop.europa.eu> (Cedefop’s website; under ‘Identifying skills needs’, ‘Skill needs in sectors’) and: http://www.ilo.org/skills/what/projects/lang--en/WCMS_115959/index.htm (the ILO website).

Country reports benefited from major contributions from Kurt Vogler-Ludwig, Luisa Stock, Ida Bayer, Hanne Shapiro, Olav Aarna, Elvira Gonzales, Fernando del Rio, Cristina Castellanos, Cecile Mathou, Steph Charalambous, Michael Lawrie and Shane Beadle. The list of country experts is provided in each full country report.

NB:

The six full country reports are unedited and available only electronically. They were used as background information for Cedefop’s *Skills for green jobs - European synthesis report*. Citations from the country reports are not permitted. They can only be taken from the synthesis report itself, available from Internet: <http://www.cedefop.europa.eu/EN/publications/16439.aspx> [cited 17.8.2010].

Table of content

Preface.....	2
Table of content.....	3
List of tables and figures	6
1. Policy context	7
1.1. Key challenges and priorities for the green economy	7
1.2. The response strategy	8
1.2.1. General environmental strategy	8
1.2.1.1. The French strategy for sustainable development	8
1.2.1.2. National adaptation strategy to climate change	9
1.2.1.3. Grenelle Round Table	10
1.2.1.4. Grenelle: state of play	11
1.2.2. Green response to the current economic crisis	13
1.3. The skills development strategy in response to greening.....	16
2. Anticipation and provision of skills.....	20
2.1. Green structural change and (re)training needs	20
2.1.1. Green restructuring and its impact on the labour market.....	20
2.1.2. Identification of (re)training needs	26
2.1.2.1. Sectoral (re)training needs	26
2.1.2.2. Company level (re)training needs.....	27
2.1.2.3. Regional (re)training needs.....	28
2.1.2.4. National (re)training needs	29
2.1.3. Skills response.....	30
2.1.3.1. Company level skills response.....	30
2.1.3.2. Regional skills response.....	31
2.1.3.3. National skills response	32
2.1.4. Case study	33
2.1.4.1. Heuliez: production of new electric vehicles.....	33
2.2. New and changing skills needs	39
2.2.1. New green collar occupations	40
2.2.1.1. Renewable energy sector occupations	41
2.2.1.2. Energy efficiency sector occupations	42
2.2.1.3. Built sector occupations.....	42
2.2.1.4. Waste sector occupations.....	43

2.2.2.	Greening existing occupations	43
2.2.2.1.	Greening existing occupations in the built sector	43
2.2.2.2.	Greening occupations in the agriculture sector.....	45
2.2.3.	Identification of skills needs	46
2.2.3.1.	Ministry level skills needs identification	47
2.2.3.2.	Regional skills needs identification	48
2.2.3.3.	Pôle emploi skills needs identification	49
2.2.4.	Skills response.....	50
2.2.4.1.	Initial education and training – creation of new qualifications and overhaul of existing qualifications	50
2.2.4.2.	The development of continuing training provision.....	53
2.2.5.	Case studies on new green collar occupations.....	55
2.2.5.1.	Energy performance experts: energy assessments and energy performance certificates.....	55
2.2.5.2.	Qualit’EnR: renewable energy training centre	60
2.2.5.3.	Waste recycling operator	67
2.2.6.	Case studies on greening existing occupations.....	73
2.2.6.1.	FEE Bat	73
2.2.6.2.	Vocational baccalaureate in farm management	80
2.2.6.3.	Training in ecodesign.....	89
3.	Conclusions.....	96
3.1.	Main ‘greening’ shifts in economies and labour markets	96
3.2.	Skills implications and developments.....	98
3.2.1.	Anticipation and identification of skills needs.....	98
3.2.2.	Response policies and programmes	99
3.2.3.	Effective delivery mechanisms	99
4.	Recommendations.....	101
4.1.	Policy recommendations	101
4.2.	Recommendations for education and training.....	101
4.3.	Recommendation for further research and data collection.....	103
	Annexes.....	104
	Annex 1: Greening occupations in key sectors of the green economy.....	104
	Annex 2: Synthesis of the work of the sectoral committees (mobilisation plan for green jobs).....	108
	Annex 3: Vacancies for green jobs identified by Pole Emploi, January 2010	115

Annex 4: Initial vocational education and training in France	117
List of key resource people	119
Acronyms and definitions	120
Bibliography.....	125

List of tables and figures

Tables

Table 1:	Public investments for speeding up the Grenelle measures in 2009 and 2010	14
Table 2:	Renewable energy jobs by sector (2009-12)	22
Table 3:	Main impacts of the green economy on the automobile sector (MEEDDM, 2010).....	25
Table 4:	Companies and employees in the automobile sector in Poitou Charentes (AFNA, 2009).....	34
Table 5:	New green occupations in key sectors of the economy	40
Table 6:	Unit components of the CAP operator of the recycling industries.....	71
Table 7:	Module MP2 – Objective 4 Impact of human activities on eco-systems	88
Table 8:	Average annual growth rate of eco-products (ADEME, 2001).....	91
Table 9:	Strengths and weaknesses of the provision of ecodesign training in 2006 ().....	92
Table 10:	Sectoral scenarios in terms of net employment trends ().....	97

Figures

Figure 1:	Breakdown of investments for each major area dealt with by the Environment Round Table over the period 2009-20, in billion euro	16
Figure 2:	Key sectors with green potential	23
Figure 3:	Wind energy sector analysis in the Nord-Pas-de-Calais	29
Figure 4:	Environment-related jobs by activities, 2007	39
Figure 5:	Audits of solar thermal equipment installed in 2008.....	66
Figure 6:	Trend in the number of people employed in the built sector, 2000-08.....	75
Figure 7:	Age pyramid of exploitation managers in 2007	81
Figure 8:	Level of initial training in 2007	81
Figure 9:	Units of the licence professionnelle Eco-Conception en produits industriels, energie, environnement (E.C.2 E) ().....	93

1. Policy context

1.1. Key challenges and priorities for the green economy

In France, estimates based on simulations and scenarios elaborated by the Intergovernmental Panel on Climate Change (IPCC) show that by the end of the 21st century temperatures will increase much faster than in the past century (summer temperatures might increase by 4 to 7°C). Consequently, the heat wave that hit the country in the summer 2003 might not be exceptional by the end of the century. Therefore, the main priority, as set out in the national adaptation strategy to climate change, is to mitigate negative impacts by adopting adaptation and anticipation measures. This means increasing efforts to reduce CO₂ emissions and implementation adaptation policies to face climate change (ONERC, 2007).

With a large proportion of its electricity derived from nuclear power, France has the advantage of a low-carbon power base. Nuclear power plays a vital role in France's green economy. France has two world-leading companies in nuclear power, Areva and Electricité de France (EDF). Among the ongoing nuclear power projects, the EPR nuclear power plant receives the most attention. The French government anticipates huge benefits from developing and transferring the plant's advanced technology.

However, the country is still expected to exceed its Kyoto GHG target by 10% in 2010, due to increasing emissions from buildings and transport.

The main challenges and priorities are to reduce energy use by improving efficiency in buildings and transport, as well as to increase renewable energy generation. In 2002, a national debate on energy emphasised the importance of developing renewable energy in addition to the value of rationalising the use of energy. France is now extremely dependent on imported fossil fuels, which are by no means an unlimited resource. Soaring oil prices would severely impede economic competitiveness.

Four major challenges are set within the scope of France's energy policy. These include managing energy demand, extending its range of technological sources of production and supply, developing research in the energy sector, and guaranteeing the provision of energy transportation and storage infrastructures adapted to consumption requirements. Waste disposal, biodiversity, and urban planning are also environmental priorities.

The main government department responsible for the implementation of France's environmental strategy is the Ministry of Ecology, Energy, Sustainable Development and the Sea (MEEDDM). The Ministry of the Economy, Industry and Finance (MINEFE) is also involved in stimulating the growth of eco-activities.

The Agency for the Environment and Energy Management (ADEME) implements France's national policy on the rational use of energy. Public authorities have vigorously promoted

policies to help France on its way to reducing its greenhouse gas emissions in the fight against climate change. The energy bill proposes to reduce France's energy intensity, i.e. the ratio of energy consumption to gross domestic product (GDP) by 2% each year until 2015, and then by 2.5% until 2030. This involves promoting the national energy efficiency policy, which, since the first oil slump, has enabled France to save nearly 15 million TOE (tonnes of oil equivalent).

1.2. The response strategy

1.2.1. General environmental strategy

1.2.1.1. The French strategy for sustainable development

The first national strategy for sustainable development (SD) was adopted by the government in June 2003, and was the main driver behind the actions of public authorities. The strategy aims at providing a framework and ensuring consistency between the different actions and measures implemented in France. Local and regional authorities were involved in the preparation of the strategy. France devotes particular attention to the 'territories' in its sustainable development strategy. France has also developed a methodology for national strategy peer reviews for sustainable development involving civil society, international organisations and other countries, which make recommendations on the process, content, indicators and implementation approaches (OECD, 2006).

The new strategy for sustainable development 2009-12 seeks to reconcile a dynamic economy, a high level of education, health protection, social and territorial cohesion, as well as the protection of environment, while preserving cultural diversity (¹). The orientation for the strategy 2009-12 reflects the conclusions and engagements taken during Grenelle Round Table (described below), adding economic and social dimensions. The strategy is organised along nine key challenges, following the European strategy for sustainable development:

- (a) climate change and energy – paying attention to consumption, renewable energies development, adaptation of territories, and vulnerable people and activities;
- (b) sustainable transports and mobility – encouraging change in transport means, complementarity and less polluting transports, and developing innovative systems;
- (c) sustainable consumption and production – acting on the entire lifecycle of products and service;

(¹) <http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=13347>.

- (d) sustainable management of biodiversity and natural resource – relying on better knowledge of their contribution to necessary needs and on eco-innovative economy, urbanisation and organisations;
- (e) public health, prevention and management of risks – paying attention to the quality of social environment and potential social inequalities;
- (f) demography, immigration, fight against poverty and social inclusion – fighting against a range of exclusions (e.g. due to age, poverty, education, etc);
- (g) international challenges of sustainable development and poverty in the world while supporting the reinforcement of international governance;
- (h) knowledge society – development of information, training, lifelong learning and access to culture;
- (i) governance, which should make adaptation to change easier and support the evolution of society, while cooperating with stakeholders.

The strategy elaboration was divided in two phases: the first was inter-ministerial cooperation and framework preparation with strategic orientation. During a second phase, a large consultation was launched targeted at institutional partners, Non-governmental organisations (NGOs) and civil society, the general public and decentralised services of the ministry. The consultation was followed by three days of debate and exchange before approval by the Inter-ministerial committee on sustainable development (CIDD).

1.2.1.2. National adaptation strategy to climate change

The national adaptation strategy to climate change was published by the National Observatory dedicated to the effects of climate change (ONERC, 2007) ⁽²⁾, after its adoption by the inter-ministerial committees for sustainable development in November 2006. ONERC was created in 2001 to collect and disseminate information, studies and research on risks linked to global warming and extreme events and to formulate recommendations on prevention and adaptation measures. This strategy highlights the key priorities for adaptation in France: in particular, public security and health; social aspects, including inequality of risks, costs and opportunities and preservation of natural heritage. It includes 43 specific recommendations and focuses mainly on mitigation efforts, reflecting current policy priorities in France. In parallel, the Grenelle Round Table was launched in 2007.

The current national adaptation strategy was the result of a large consultation led by the National Observatory on the effects of global warming: it involved several sectors and civil society. The strategy is articulated around nine priorities:

- (a) developing growth;

(²) http://www.ecologie.gouv.fr/IMG/pdf/Strategie_Nationale_2.17_Mo-2.pdf.

- (b) strengthening the observation system;
- (c) informing, training, and raising awareness of all actors;
- (d) promoting an approach adapted to territories;
- (e) funding adaptation actions;
- (f) using legal and regulatory instruments;
- (g) encouraging voluntary approaches and dialogue with private actors;
- (h) taking into account the specificity of overseas territories;
- (i) contributing to international exchanges.

The action points presented in the strategy serve as the basis for a future national adaptation plan, which will define a series of precise measures to be taken at different levels of decision.

1.2.1.3. Grenelle Round Table

The Grenelle de l'Environnement (Environment Round Table) process was set up in 2007, and brought together government, unions, employers, NGOs and local authorities for the first time to discuss France's environmental policy. The first Grenelle set of measures were adopted by the senate, and became law in July 2009. The 13 measures focus on:

- (a) the built environment;
- (b) planning;
- (c) transport;
- (d) energy;
- (e) biodiversity;
- (f) water;
- (g) agriculture;
- (h) R&D;
- (i) risks, health and the environment;
- (j) waste;
- (k) an exemplary government – integrating sustainable development within all civil servant training from now to 2012;
- (l) governance, information and training;
- (m) overseas territories.

As part of the Grenelle Round Table process, France has committed to a 'factor four' reduction in GHGs by 2050. Key measures to implement this goal include a 'bonus malus' tax system for CO₂ emissions from cars. A recent study by Boston Consulting Group, however,

has shown that the ‘factor four’ reduction will not be possible under the current Grenelle measures, and that additional measures to achieve this target will need to be implemented soon.

The measure adopted in France during the Grenelle Round Table made the built environment the number one priority in the fight against climate change by reducing energy use in both new and existing buildings. Improving energy efficiency takes centre stage in the revitalisation plan. In France, the building industry uses 70 million tonnes of oil equivalent, making it the biggest consumer of energy across all sectors of the economy. This energy consumption represents 25% of France’s national emissions. All of these figures must be reduced by 75% by 2050.

Developing renewable energies and materials is the key priority of France’s energy policy. France has to double its renewable energy capacity from 10.3% in 2005 to 23% by 2020 under the European Union (EU) Renewable Energy Directive. Developments in this area aim to meet a dual objective:

- (a) reduce France’s energy dependency (in the medium-term, renewable energies and materials represent precious strategic alternatives to traditional means). They are essential in allowing France to broaden its range of energy solutions;
- (b) contribute to meeting global greenhouse gas emissions reduction commitments (as part of the Kyoto Protocol), as well as European commitments within the scope of several significant directives.

These objectives form the basis of the targets set by France’s national energy policy (ADEME):

- (a) expand the use of biofuels, in line with a European directive stipulating that biofuels should account for 5.75% of road fuels in EU countries by 2010 (compared to a current 1% in France);
- (b) increase the proportion of France’s national electricity consumption produced by renewable sources from 15% to 21% (a further EU directive). This will involve recourse to wind energy, biomass and, to a lesser extent, hydroelectricity;
- (c) step up the amount of heat produced from renewable energies and materials by 50% by 2015.

1.2.1.4. Grenelle: state of play

The MEEDDM published the annual report on the implementation of the Grenelle commitments in October 2009. It reviews the legislative texts resulting from the Environment Round Table. In particular:

'Grenelle 1': Law on implementation of the environment round table commitments

- (i) fighting climate change, mainly by speeding up the energy-efficient renovation of buildings, harmonising guideline and planning documents relative to urban areas, developing renewable energy sources and alternatives to road transport;
- (ii) protecting biodiversity, ecosystems and natural environments thanks to the development of the green and blue belt networks, designed to facilitate the circulation of natural species all over France, and reducing the use of pesticides by half within the next ten years provided that alternative solutions are available;
- (iii) preventing environmental and health risks, and developing tighter policy on reducing waste.

'Grenelle 2': The bill on the national commitment to the environment

- (i) Section I: buildings and urban planning, makes the renovation of public buildings and service sector buildings obligatory, with works to commence as of 2012 and to be completed within eight years. A number of tools have been made available to improve energy efficiency in buildings: an obligation to supply a certificate attesting that energy efficiency regulations have been taken into account upon application for a building permit and upon completion of the works; change to the legislation applicable to co-ownership to facilitate the organisation of energy-efficiency renovation works; an obligation to provide information regarding a building's energy efficiency to its future occupants; an obligation to publish energy efficiency information in property advertisements; urban planning restrictions lifted on the use of energy systems, vegetated rooftops and renewable materials;
- (ii) Section II: transportation, defines the powers of local authorities more clearly (i.e. development plans, transportation and urban planning) in a bid to improve planning and management of all modes of transport;
- (iii) Section III: energy, introduces regional climate, air quality and energy plans. These plans set out guidelines to alleviate the effects of climate change or to adapt to it, manage energy demand and, at the same time develop renewable energy sources and reduce air pollution. Every company with more than 500 employees operating in a greenhouse gas emitting sector must draw up an audit of its emissions. The same applies to municipalities with a population of over 50,000 inhabitants, which must also draw up a regional climate and energy plan – Plan Climat Énergie Territorial – (PCET) aimed at reducing emissions;
- (iv) Section IV: Biodiversity, deals primarily with of agriculture, providing a framework for controlling trade and advisory activities related to plant protection products;
- (v) Section V: risks, health and waste introduces waste assessments before demolishing certain types of building; imposes capacity limits on the elimination or burial of household waste in a bid to encourage prevention, recovery and recycling; sets up mandatory selective collection of organic waste by major producers and introduces

plans at 'département' level to manage waste produced by public building works, giving priority to the use of recycled materials;

- (vi) Section VI: governance, extends the requirement to present a social and environmental accountability report to management and investment firms and to the majority of companies with over 500 employees. Local authorities of areas with over 50,000 inhabitants will draw up a sustainable development report before adopting their budgets. Local agenda 21 and regional sustainable development programmes are harmonised on the basis of the national reference framework.

The report concludes that the implementation of all these commitments will lead to sustainable modes of production and consumption that will be at the heart of a new growth model, on condition that all of the following are achieved:

- (a) implement vigorous and coordinated public policies, that include supply (e.g. investment in research, industrial policies, new infrastructure development) and demand to support green channels for creating new businesses and jobs;
- (b) invest in production capacity: this is the role of industry, but public institutions will participate in these projects;
- (c) manage professional transitions: many employees will see their jobs change and others will have careers that do not exist today. For these workers, this will require a major effort to adapt as well as initial and ongoing training. The needs are being defined in the framework of the Mobilisation Plan for green jobs, launched following the Council of Ministers meeting in September 2009.

1.2.2. Green response to the current economic crisis

In December 2008, the French government announced its €26 billion economic revival plan, costing the equivalent of 1.3% of GDP in 2009 ⁽³⁾. The 2009 Budget amendment act No.2009-122 of 4 February 2009 provided for a recovery package worth €26 billion over two years, including €10.5 billion of public investment (state, local authorities and public enterprise). The majority of these appropriations are set out in Programme 315 of the 'Economic Recovery Package', known as the 'exceptional public investment programme'.

The package consists of:

- (a) €11 billion to boost business cash flows through the reimbursement of taxes;
- (b) €11 billion for direct state investment;
- (c) €4 billion from public companies to improve rail infrastructure, the postal service and energy services.

⁽³⁾ http://actualites.relance.gouv.fr/pdf/CIACT_020209_CartesTransport_OUT.pdf

The package also included help for the ailing auto industry, with incentives to scrap older vehicles and buy new, more environmentally friendly models. The climate-relevant portions of the plan amount to more than 20%, the highest in the EU.

Of these €10.5 billion of public investments shared between the state (€4 billion), public enterprise (€4 billion) and local authorities (€2.5 billion), €1.1 billion in 2009 and 2010 (i.e. 11%) are for speeding up implementation of the Grenelle Round Table through the following actions:

Table 1: Public investments for speeding up the Grenelle measures in 2009 and 2010

	Million €
Alternatives to road transport	470
Energy efficiency renovation of public buildings	200
Instituting a scrapping premium	220
Subsidies to the National Agency for Housing Renovation (ANAH) and for energy system renovation in private homes	100
Overseas investment	50
Decontaminating industrial wasteland	20

In addition to the environment, sustainable development is a recovery package priority: of the package's €14.5 billion for 2009 and 2010, excluding measures in support of company cashflow, €4.96 billion are for investment within the sectors covered by the MEEDDM, i.e. nearly 35% of the total. The French government thus confirms that it sees the development of green growth as a priority that will boost business and create greater balance between the regions.

Improving energy efficiency and alternatives to road transport are the key sectors of the revitalisation plan.

Building efficiency: €200 million is being allocated to housing renovation in 2009 and 2010. In addition, public buildings such as post offices will be upgraded at a cost of €600 million, with €160 million as additional funding to improve existing public structures. For new housing development in 2009-10, €1.5 billion will be invested.

In France, the building industry uses up 70 million tonnes of oil equivalent, making it the biggest consumer of energy across all sectors of the economy. In other words, this represents 43% of total energy consumption and 1.1 tonnes of oil equivalent consumed every year by every French citizen. This energy consumption produces 120 million tonnes of CO₂ emissions, representing 25% of France's national emissions and 32.7 million tonnes of coal. This quantity is of the same magnitude as the amount of building-site and household waste generated annually, and is equivalent to one-half tonne of coal emitted into the atmosphere for every French citizen. All of these figures need to be reduced by 75% by 2050.

While the industry's sluggish growth and inertia have long been considered handicaps compared to more dynamic sectors like industry and transport, the building sector is now considered in a much more favourable light.

In the building sector, 15,000 zero interest rate eco-loans were granted by the end of July 2009 for an average €18,000 per beneficiary. By the end of September 2009, the zero interest rate eco-loan had financed 35,000 energy efficiency renovation projects undertaken by private individuals. In practical terms, all the banking networks have set up this loan scheme. The existing home improvement sector has developed with respect to energy efficiency, especially in the context of an economic slowdown.

Rail: to help shift travel away from carbon intensive aviation, additional high-speed railway lines will be constructed at a cost of €0.95 billion. The national railways company (SNCF) will also be investing €20 billion in new energies and sustainable development.

The package is projected to create 80,000–110,000 new jobs compared with a possible loss of some 90,000 jobs in 2009. This is based on the estimate that 75% of the €26 billion package will be used in 2009. In February, the government announced that roughly €10 billion out of the €26 billion stimulus package will be immediately injected into 1,000 projects, mainly in infrastructure development such as railway networks and water management projects.

Low-carbon vehicles

The package announced plans to promote low-carbon cars through a premium of €1,000 for vehicles emitting less than 160g/km of CO₂. In total, €500 million will be allocated to 'scrappage' and the 'bonus malus' scheme in 2009. However, 160g/km CO₂ is the average for cars manufactured in 2005 and significantly higher than levels agreed to be met by manufacturers in 2008 of 120g/km of CO₂.

Biodiversity

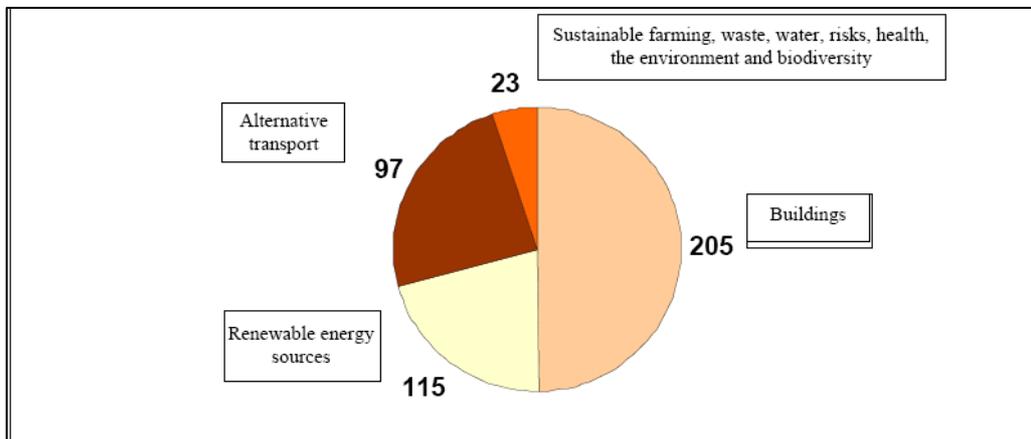
Funding for actions within this area has also been significantly increased: from €26 million (commitment authorisations = payment appropriations) in 2009 to €45 million in 2010, in other words, an additional €1 million compared to forecasts for 2010, and €62 million in 2011.

Future investments foreseen by Grenelle

Major Environment projects (buildings, transportation, energy and waste) will account for nearly €440 billion worth of investments by 2020. These projects could generate around €15 billion of added value a year (0.8 of a GDP point) and affect nearly 500,000 jobs by 2020. The Boston Consulting Group (BCG) study confirms this, estimating the value of activity generated over a twelve-year period by the 15 major Environment programmes at €450 billion, with 600,000 jobs created over the period 2009-20.

The building sector represents the major investments area. Investment will be focused on energy–efficiency retrofitting on existing buildings.

Figure 1: Breakdown of investments for each major area dealt with by the Environment Round Table over the period 2009-20, in billion euro



Source: Annual report to Parliament on implementing France’s Environment Round Table commitments, 2009.

1.3. The skills development strategy in response to greening

Following the Grenelle Round Table, a full-fledged skills development strategy has recently been launched with the Mobilisation Plan for green jobs ⁽⁴⁾.

In spring 2009 the MEEDDM commissioned the Boston Consulting Group to look at the potential effects of the Grenelle Round Table on employment. The study concluded that the measures taken under Grenelle could potentially lead to the creation of more than 600,000 jobs (mostly in renewable energy, transport and the built environment) and generate €450 billion of economic activity by 2020. Responding to the BCG study conclusions, the MEEDDM announced the launch of a plan to mobilise the relevant sectors of the economy and the regions to develop occupations for green growth in September 2009. This represents a major effort in identifying the skills requirements and sectors that should be the focus of a competitive green economy, and fulfil the economic and environmental potential of the Grenelle Round Table.

The objective is to adapt existing training programmes and qualifications and create new ones where necessary, in line with the 600,000 green jobs that the Grenelle Round Table could generate by 2020. The corresponding jobs created should be accessible to all levels of education.

This plan is articulated along four themes:

⁽⁴⁾ Plan de mobilisation des territoires et des filières sur le développement des métiers de la croissance verte.

- (a) identifications of the relevant professions – this includes setting up a national observatory in order to understand the new professions and relevant fields and to quantify these;
- (b) definition of training needs and setting up training and qualification pathways – this will enable professional skills to be recognised. An assessment of the available initial training, lifelong learning and recognised acquired experience will allow the creation of a reference system of the relevant professions and skills in SD as required by employers and to set up measures required for skills adaptations;
- (c) recruitment for SD jobs – actions to help job seekers meet the requirements of the numerous jobs currently on offer cannot to be taken up due to lack of skills;
- (d) promotion and development of the professions for green growth – announced by the French President, a national event on green professions will be organised for early 2010, during which the green growth plan will be detailed.

The plan is considered necessary, as the lack of adequate skills, notably in the construction industry, has already been shown to hinder new job growth. Companies are struggling to recruit qualified technical staff. Graduates are rarely trained in energy efficiency and professionals are not always familiar with new technologies ⁽⁵⁾.

The Grenelle Round Table highlighted the importance of implementing new forms of governance favouring the mobilisation of key players in preparing green policies and programmes. The Mobilisation Plan is an illustration of collaborative work between stakeholders at all levels: ministries, regions, training providers, advisory bodies, social partners, and employment agencies.

A steering group was structured along the principle of ‘governance of 5’ that was successfully implemented during Grenelle – including social partners, companies, elected representatives, NGOs, government. The steering group is composed of stakeholder representatives concerned with training and employment: Pôle Emploi, Alliances Villes Emplois, Conseil national des missions locales, Association nationale pour la formation professionnelle des adultes (AFPA), ADEME. It also includes local authorities (Association des régions de France), social partners, economic actors and relevant Ministries (Sustainable Development, Education, Higher education and research, Employment). Steering group work was also supported by the Centre d’analyse stratégique (CAS) ⁽⁶⁾.

The steering group was supported by the Conseil d'orientation pour l'emploi (COE), which was entrusted with identifying the conditions necessary to ensure that green growth will lead to the quality jobs creation. The COE interviewed around forty experts, company managers, and social partners, and reviewed all the recent studies on the theme of green growth.

⁽⁵⁾ http://www.actu-environnement.com/ae/news/economie_verte_boston_borloo_7631.php4.

⁽⁶⁾ formerly known as the High Authority for Planning and Forecasting.

11 Sectoral Committees (comités de filières) were set up, representing the sectors considered most promising in terms of green economy jobs creation. These are:

- agriculture and forest industries;
- automobile industry;
- biodiversity and ecosystem services;
- built sector;
- electromechanics, electric construction and networks;
- fuel and green chemistry;
- renewable energies;
- sea trades;
- transports;
- tourism;
- water, sanitation, waste and air.

The Sectoral Committees began their work in October 2009, and their mission was to carry out a quantitative and qualitative analysis each sector's needs in terms of skills needs, training and employment policy. They were also commissioned to propose concrete measures adapted to each trade (e.g. overhaul of qualification standards). The creation of these Committees ensured a feedback mechanism between employers, social partners and decision makers at government level. As an illustration, no fewer than 24 organisations participated in the working groups of the committee in charge of the renewable energy sector⁽⁷⁾. The Committee highlighted the added value of the cooperation mechanism, which brought together stakeholders that do not usually work together.

A main finding of the Committees is that the overall provision of initial education and training adequately covers the skills needs of the labour market insofar as the green economy has not fundamentally transformed existing occupations and is unlikely to do so in the future. Green growth corresponds to existing occupations for which adaptations in terms of skills will be necessary. However, important needs in terms of continuing training were highlighted, considering the number of people who need to upgrade their skills, as well as massive efforts in terms of the training of trainers. Continuing vocational education was therefore identified as the priority to address immediate skills needs.

The most pressing issue concerns the training of trainers. The number of trainers and teachers able to train to new techniques and who are aware of SD issues is clearly insufficient. In the

⁽⁷⁾ ADEME, AFPA, ARENE IDF, ARF/Conseil Régional Ile-de-France, CAS, CEREQ, CFE-CGC, CFTC, CLER, Conseil Régional Rhône-Alpes, Dalkia, ENSA Paris La Villette, FEDENE, FF3C, FFIE, INES, MEEDDM, Ministère de l'éducation nationale, Observ'ER, Pôle Emploi, SER, SERCE, UCF/FFB, UPA/CAPEB.

context of public spending cuts, and in particular in the education sector, there are concerns that where part of the retiring staff is currently not replaced, the teaching staff needs will not be addressed. This would be a major obstacle hampering skills development for a green economy transition.

The main conclusions of sector committees and the future mandate for the Mobilisation Plan were presented during the National conference on green jobs that took place on 28 January 2010 ⁽⁸⁾. Synthesis of the findings for each sector in terms of current situation and future needs is presented in Annex 2. The conclusions and findings of the Committees are presented throughout the remainder of the report. The work carried out under the Mobilisation Plan represents the most updated and comprehensive body of research on green occupations and skills needs in the French economy.

Following publication of the Sectoral Committees' results, the MEEDDM announced the next step of the Mobilisation Plan, which will consist in adopting the necessary measures to ensure the education and training system adequately cover the needs identified. Jobs creation and preservation will be clearly conditioned by major adaptations: evolution of competencies, in particular capacity to provide training for green jobs and competencies), management of skills transitions between regions and sectors (restructuring), development of new economic activities and new jobs.

⁽⁸⁾ Conférence nationale sur les métiers de la croissance verte, Janvier 2010
http://www.environnement.gouv.fr/IMG/pdf/plan_mobilisation_filieres_vertes_cle01b5f9.pdf

2. Anticipation and provision of skills

2.1. Green structural change and (re)training needs

In terms of major employment shifts, the COE estimates that the green economy can potentially create a significant number of jobs, for the following reasons:

- (a) increased activity in a number of sectors;
- (b) some of these activities are labour-intensive;
- (c) aspects of jobs created cannot be relocated;
- (d) new occupations will emerge.

The COE partly based its analysis on the work carried out by the Sectoral Committees commissioned by the government. However the Committees privileged a qualitative rather than quantitative approach to labour market changes. Therefore most of the available data (except in the water, waste and electricity sector) do not quantify the effects of the green economy on the volume of jobs.

The CAS also produced a report analysing the impact of green growth on jobs and occupations. The report highlights the very strong uncertainties at macro-economic level regarding future performance in terms of job creation. Reallocations within and between sectors of the economy will be important.

Regardless of the net volume of jobs created, the green economy will not create substantially new occupations but will rather impact existing occupations. In the built and transport sector, fundamental know-how and professional trade practices will continue to be at the occupational core.

2.1.1. Green restructuring and its impact on the labour market

Sectors with major employment growth potential

Based on the most recent and reliable studies and forecasts, it appears that the sector consistently identified as having the highest potential in terms of job creation is the renewable energy (RE) sector. Even studies that do take into account indirect effects and job losses still identify the RE sector and energy efficiency as having the largest potential for job creation.

The BCG study (2009) concluded that the measures taken under Grenelle could potentially lead to the creation of more than 600,000 jobs and identified transport, the built environment and renewable energy as sectors that would potentially lead to the most job creation within the environmental economy through implementation of the Grenelle measures. This is

reflected in the investment in environmental measures within France's revival plan and the National innovation and research strategy (see above).

The work undertaken by the Committees in these three sectors under the Mobilisation Plan only partially confirmed these estimates:

- (a) in the renewable energy sector, the Committee confirmed the figure of 200,000 jobs calculated during Grenelle. Further work is being undertaken to refine this estimate;
- (b) in the built sector, the Committee remains prudent and estimates that the impact will be mostly in maintaining the current volume of jobs rather than creating additional jobs; the Grenelle measure will foremost help to counteract the effects of the economic crisis;
- (c) in the transport sector, no precise estimation was made, however the Grenelle measures should create 67,000 jobs for infrastructure realisation.

In addition, the other Committees that quantitatively addressed job creation estimated that:

- (a) 90,000 jobs should be created in the agriculture sector by 2020, of which 25,000 would be in the wood sector, 22,500 in natural resource management, 10,000 in agro-business, and 10,000 in organic farming and eco-counselling. This is higher than the Grenelle estimates;
- (b) in the electromechanics, electric construction and networks sector, the Committee looked at the 'greening' of existing jobs rather than job creation; it estimated that 225,000 jobs (out of a total of 400,000) will become greener by 2015;
- (c) in the water, sanitation, waste and air sector, precise estimates have been produced: 43,000 jobs could be created by 2020 as a result of Grenelle;
- (d) in the automobile sector, job creation and job destruction should cancel each other out; Grenelle measures should help to maintain the current job volume.

A 2009 study by the General Commission for Sustainable development looking at employment in the environmental sector between 2004 and 2007 identified very rapid growth within the renewable energy sector (approximately 30%).

Additionally, a study by ADEME (2009) investigated the effect on the economy and employment of the main activities relating to energy efficiency and RE in France. Predictions based on meeting the Grenelle objectives and forecasts are made for 2012. The study indicated that jobs in these sectors could double between 2007 and 2012, to reach more than 490,000 jobs. This figure could reach 610,000 by accounting for indirect job creation.

The energy conservation and renewable energy sectors grew by 28% and represent a market worth €50 billion. They could grow to up to €90 billion by 2012.

Table 2: Renewable energy jobs by sector (2009-12)

Sector	2009 (estimate)	2012 (objective)
Improvement of energy efficiency	214 960	358 270
<u>Residential</u>	117 380	207 440
Construction interventions	98 390	175 160
Heating (condensing boiler)	10 450	14 880
Specific electricity	8 540	17 390
<u>Transport</u>	97 580	150 840
Rail Infrastructure and tramways & rolling stock	62 850	107 530
Classes A and B private vehicles	34 720	43 310
Renewable energy	79 290	134 070
<u>Equipment for renewable energy</u>	50 940	90 990
Solar thermal energy	4 360	13 570
Photovoltaic	8 470	11 890
Wind power	9 650	15 150
Wood heating systems	12 260	24 080
Heat pump	12 060	21 140
Biofuel production units	730	-
Hydraulics	1 620	2 340
Geothermal power	270	1 630
Biogas	1 420	980
Domestic waste incineration plants	100	210
<u>Sale of renewable energy</u>	28 340	43 080
Solar thermal energy	500	5 270
Photovoltaic power	40	100
Wind power	920	2 280
Wood power	8 870	13 910
Heat pumps	950	2 150
Biofuels	7 460	9 150
Hydropower	8 200	8 200
Geothermal energy	660	1 150
Biogas energy	200	290
Energy from the incineration of domestic waste	540	570
Total	294 240	492 340

Source: ADEME 2009

A study conducted by the Comité de Liaison Energies Renouvelables (CLER) in 2005 also indicated that the largest potential for job creations in the RE sector was related to solar energy, followed by biomass and biofuel.

More recently, the government launched a consultation on the most promising job creation and green growth sectors in the economy. In February 2010 the government presented the preliminary results of the consultation and broad outlines of an industrial policy based on green development. Operational objectives will be further determined in May 2010 (MEEDDM, 2010). The government identified 18 key sectors of the green economy, as summarised in Figure 2.

Figure 2: Key sectors with green potential



Occupations in sectors negatively impacted by the current context

Whilst a wealth of studies have explored the impact of greening the economy on the sectors directly related to the environment, most studies do not take into account substitution effects and the potential job losses in other sectors. In particular, the ADEME and BCG studies cited above do not account for substitution effects and competitiveness losses from polluting sectors.

WWF France’s impact study (Quirion and Demailly, 2008), which estimates a 30% CO₂ reduction by 2020, concludes that job gains outnumber job losses. Some 316,000 renewable energy jobs and 564,000 energy efficiency jobs will be created in France, while 138,000 jobs in the conventional energy sector and 107,000 in the automobile industry could be lost. Redirected spending from energy savings could induce an additional 48,000 jobs if oil prices are \$100 per barrel (and 467,000 jobs at \$150 per barrel), for a net gain of 684,000 jobs. The study also accounts for indirect jobs created through the increase in household purchasing power resulting from the cut in expenses related to energy bills. These indirect jobs depend on the price of energy, however, which is difficult to predict. The study clearly shows that ‘greening’ the economy will lead to job destruction in some sectors.

According to the latest National Union for Employment in Industry and Commerce (UNEDIC) labour force demand forecast (Pôle Emploi – Unistatis, 2009), the sectors that show the strongest decrease are found in industrial activities (metallurgy, transport material fabrication, electric equipment). Growth in the construction sector is also slowing down, though it still attracts an important share of the workforce.

The metallurgy sector in France is comprised of 45,000 companies and 1,800,000 employees. Its range of activities is very wide, including automobiles, shipbuilding, aerospace, and electricity. Sector representatives (IUMM – metallurgy sector representative) believe that although the metallurgy sector will experience job losses due to the economic slowdown, the notion of ‘obsolete’ or ‘declining’ occupations does not accurately describe the transformations affecting the sector.

Every occupation represents indispensable industry skills and know-how, and all occupations constantly undergo changes. The primary trend observed in this sector is towards increasing occupational polyvalence. For example, welders historically performed a limited number of repetitive tasks in traditional sectors of the industry. This occupation has evolved over time and is now better described in terms of ‘operators’ who carry out a multiplicity of tasks. This has created the need for multi-competencies (e.g. welding and logistics).

Another visible impact is the increasing importance of skills related to energy efficiency and ecodesign affecting a wide range of occupations including operators, technicians and maintenance personnel.

The automobile sector has been identified as the most affected by the current economic crisis. According to the Institut National des Statistiques (INSEE) report on the French economy the added value of the industry has fallen by 2.3% (€241.2 billion). The automobile sector accounts for most of this drop (-15.4%). In 2008 automobile production fell by 9.3%. This can be attributed to internal market saturation, declining exports, rising oil prices and increased environmental regulations for vehicle production.

In February, the government promoted a Pact with the automobile sector, which included €6.5 billion of financial support in the form of loans, reflecting the importance of the automobile sector (INSEE, 2009) to the French economy. Direct jobs in the automobile sector for 2008 are estimated around 250,000, and represent more than one million jobs when indirect jobs are included. Electric engine manufacturing changes will impact activities related to manufacturing and product assembly, which are currently based on heat engines. This process should evolve gradually, however.

The Sectoral Committee for automobiles confirmed the unprecedented crisis affecting the sector (MEEDDM, 2010). Important redundancies and temporary job suppression characterise the situation in 2009. The Committee estimated that job losses related to the decrease in the heat engine production in France could reach 8,000 jobs losses. These losses could be compensated, however, by electric and hybrid vehicle creation (between 15,000 and 30,000 jobs by 2025-30). Low energy consumption vehicles and clean technologies are very

promising, but their diffusion will be slow and progressive given that fleet vehicle renewal takes approximately fifteen years.

The Committee differentiated between occupational types, as illustrated in Table 3. Overall, green growth will not create new jobs for the automobile sector. The key challenge will be to accompany the mutations and activity reallocation. This is already underway in most parts of the sector.

Table 3: Main impacts of the green economy on the automobile sector (MEEDDM, 2010)

<p>New product design activities</p>	<p>No major changes are expected in terms of job numbers (25,000 jobs) and occupational content. These occupations are mostly ‘green’ already insofar as they are geared towards energy efficient design and clean vehicles. Economic and regulatory reasons (European standards) drive these changes. Some existing occupations will be redeployed. Designers will have to integrate ecodesign principles at all qualification levels. Retraining (skills upgrades) will be necessary for operators to integrate sustainable development parameters.</p> <p>Engine design simplifications for electric cars make them less complex than heat engines. Battery production development in France could potentially lead to jobs creation.</p>
<p>Vehicle and sub-parts manufacturing activities</p>	<p>No major changes are expected for vehicle assembly. Job reductions are expected in 2010 for the manufacturing sector.</p> <p>Manufacturing activities currently focus primarily on heat engines. Electric and hybrid engine manufacturing will entail important changes, but these will take place gradually. Factors indirectly related to the sector will affect these developments. The share of electric vehicles should reach two to five % of world sales by 2020.</p> <p>A decrease in heat engine production volume could result in 8,000 job losses in France. Creating a new sector that produces electric engines and batteries could compensate for this loss (accounting for 15,000 to 30,000 jobs by 2025-30). The necessary skills already exist for this transition, but this sector has low production capacity. Developing the battery sector could therefore maintain job volume. Electric vehicle production in the assembly sites currently used for heat engine production has already been announced by some manufacturers.</p> <p>Electronics and electricity competencies should improve. Occupations related to quality checks, control of production, energy audits should progress.</p> <p>Notable impacts will occur through hybrid vehicle development, which requires the assembly of additional parts. New occupations will need to be created or existing ones adapted through re-training and redeployment.</p>
<p>Vehicle usage (maintenance, distribution, and services) and recycling activities</p>	<p>No major changes are expected for vehicle usage activities. Technological changes should help maintain job volume. Maintaining jobs will require new competencies training for workers. The branch observatory is an efficient mechanism to identify these needs.</p> <p>Recycling activities will positively affect jobs creation: by 2015 the target for the share of recycled vehicles is 95%.</p>

Ultimately, the labour force will be reallocated within the sector. Demand will shift from manufacturing towards design, maintenance and recycling. Labour force reallocation will also be cross-sectoral if household demand shifts towards different or less carbon intensive

transport services, requiring very different skill sets. For example, environmental constraints will encourage more fuel-efficient vehicles, which require occupational adjustments. Even if jobs creation outweighs jobs destruction, shifting employees from one activity to another, including within the same sector of activity, will not be easy (AS, 2010).

2.1.2. Identification of (re)training needs

France is characterised by the existence of a broad network of occupational forecasting ‘observatories’, which bring together labour market players with the aim of reaching a common diagnosis. These research and monitoring centres most often work at the national level, taking a sectoral (industry observatories) or regional view (regional industry observatories), and combine macro-economic projections and quantitative surveys with qualitative information.

2.1.2.1. Sectoral (re)training needs

Social partners can access a qualification requirements forecasting tool: the Agreement for the development of employment and skills (Engagement de développement de l'emploi et des compétences (EDEC)). Concluded between the State and organised labour, this sectoral contract is jointly-financed and designed to provide an economic, technological and industrial overview of changes underway in a given sector. The study analyses the concrete consequences of modifications on the development of labour, qualifications, and the jobs and skills required to fulfil them (Cedefop, 2008).

Every sector is legally required to create an Observatory for employment and training forecasts⁽⁹⁾. Branch Observatories⁽¹⁰⁾ deliver a prospective view on skills and jobs at sectoral level. The objective is to help ‘branch’ (or sector) social partners take decisions regarding their employment and training policies. The observatories primarily serve an information function: their studies aim to facilitate shared forward thinking and promote understanding of the links between training and employment.

Prospective studies have been carried out by different actors in the automobile sector, including federations, branches, trade unions, and a joint collecting organisation (Organisme Paritaire Collecteur Agréé (OPCA)). The branch observatory created a national catalogue of qualifications and services in the automobile sector (RNQSA), and carried out an inventory of all qualifications in an initial VET to identify necessary changes (particularly in electronics).

⁽⁹⁾ Observatoire prospectif des Metiers et des qualifications (OPMQ) was an obligation of the National Training Agreement (2003) and became law in May 2004.

⁽¹⁰⁾ Formally called Prospective Observatories for Jobs and Qualifications.

In the automobile sector, key retraining needs include ecodesign integration to replace traditional industrial models, particularly designing energy efficient products with reduced environmental impacts. Training related to electric vehicles will also be required.

Diversification and redeployment opportunities for traditional sectors of the economy have been identified, for example, through renewable energy activities. The Syndicat des Energies Renouvelables, which represents the renewable energy sector, was extensively involved in the Grenelle consultations and identified a number of such possibilities (Sireme, 2009). Diversification is already taking place in a number of regions, particularly Aquitaine, Brittany, Nord-Pas-de-Calais and Provence, where the potential for wind energy is important. Wind power should also enable jobs maintenance in traditional sectors, including:

- (a) metallurgy (e.g. Eiffel Construction, Inc. are building a wind turbine factory in Provence);
- (b) mechanics, particularly in the automobile sector (e.g. Ford in the Aquitaine region);
- (c) aeronautics, aerospace engineering and defence (e.g. EADS-Astrium in Aquitaine region);
- (d) shipbuilding (e.g. DCNS group in Brittany).

2.1.2.2. Company level (re)training needs

The Social Cohesion Law of 18 January 2005 directly involved companies and social partners in skills needs identification. Participation in the Forward Employment and Skills Management scheme (GPEC) (European Employment Observatory, 2008) is mandatory for all companies with more than 300 employees. GPEC is designed to enable companies to anticipate their future skills needs; participation should lead to the establishment of training programmes for improving employee skills⁽¹⁾. The scheme should aid a company in determining the full complement of initiatives required over a three-to-five-year period to meet its employment and skills needs.

GPEC encourages social dialogue and negotiation, and has a forecasting component at its core based on in-depth analysis of the company's strategy and the economic environment of the sector in which it operates. The methodological approach is divided into steps including:

- (a) diagnosis, requirements, and bases;
- (b) jobs and skills evolution identification (based on impact factors);

⁽¹⁾ Counselling and financial supplies are provided by the Ministry of Employment, to help companies launch GPEC. The Financial Act for Social Security has drawn a fiscal and social incentive framework to encourage GPEC implementation through a zero-rating of voluntary employee departure indemnities under specific conditions.

- (c) quantitative and qualitative statements on job structure and skills, identifying weaknesses, strengths and risk factors (including attributes and position within the company);
- (d) targeted jobs structure and skills identification;
- (e) professionalisation plan development elaboration;
- (f) redeployment scenarios elaboration (i.e. vocational retraining).

Implementing GPEC can result in measures to address skills needs for years to come. Some limitations were highlighted by the State Planning Commission in 2005:

Whereas, in the 1980s, GPEC seemed like a way of rehabilitating the long- and medium-term in decisions on human resources, this approach has most often, in practice, remained a mere technique. Occupational forecasting procedures have consisted in a description of the existing situation, centred solely on job trends, and have produced largely disappointing results, particularly with regard to their low impact on mobility. We must start out, then, from the finding that companies, particularly small and medium-sized companies, are often bound by external constraints and time-scales that do not allow them to anticipate their future in the medium term (European Employment Observatory, 2008).

2.1.2.3. *Regional (re)training needs*

Devolution has transferred power to the regional level, where the tools for determining and forecasting training needs in vocational education and training (VET) can be found. Regional responsibility for this issue has resulted in a draft policy to coordinate initial and continuing VET. Each region creates a plan for vocational training development (PRDFP), which defines medium-term objectives for VET targeting young people and adults. PRDFPs take into account the regional economic situation to ensure that these groups can enter or re-enter the job market and have appropriate vocational development (Cedefop, 2008).

The Regional Councils can utilise a number of tools in the identification process:

- (a) research carried out by the Regional Training and Employment Observatories (Observatoire Régional de l'Emploi et de la formation (OREF)). These Observatories bring together a number of different offices at the regional level: the Regional Council, Ministerial departments in charge of employment and training, departments at the National Institute for Statistics and Economic Studies, departments under the Ministry of National Education, and occasionally consular chambers and industrial partners;
- (b) studies that may have been carried out by the National Vocational Lifelong Learning Board (Conseil national de la formation professionnelle tout au long de la vie (CNFPTLV)).

At the sub-regional level, some Chambers of Trade, Commerce and Industry have equipped themselves with employment and occupational observatories. At the local level, Job Centres

(les Maisons de l'emploi) also fulfil an observational role, anticipating and adapting to employment in the geographical area. The network formed by these monitoring centres represents a range skills forecasting knowledge at the local level.

Regional authorities can play an active role in redeployment plans. The DRIRE (Directions Régionales de l'Industrie, de la Recherche et de l'Environnement) carry out retraining needs identification research based on employment shifts at the regional level. For example, the DRIRE in the Nord-Pas-de-Calais undertook a study to analyse regional retraining needs and employment opportunities in the wind energy sector, given regional workforce competencies and skills (see sector analysis in Figure 3). This sector could provide regional opportunities for competencies diversification in boiler manufacturing, mechanics, and foundry, which could be utilised in wind turbine components construction (DRIRE Nord-Pas-de-Calais, 2006).

Figure 3: Wind energy sector analysis in the Nord-Pas-de-Calais

Strengths	Weaknesses
Strong wind energy potential in the region, obligation for the region to buy wind energy, elaboration of Regional Wind Energy Schemes.	Electrical network limitations in some remote rural areas, lack of industrial know-how in the wind energy sector.
Opportunities	Threats
Strong industrial competencies in pole turbine boiler manufacturing, foundry, mechanics and components, large number of companies in the maintenance sector, electrical installation and consulting, potential for commercial diversification and the creation of a new industry in the region.	Administrative difficulties encountered by project promoters, strong local opposition, high potential costs to investing in electrical network for certain zones, industrial know-how well advanced in Germany, Denmark, and Spain, slow sector development, which can discourage potential investors.

Research conducted by the Institut français de recherche pour l'exploitation de la mer (IFREMER) confirms that France has significant potential for wind energy production and predicts that several wind farms will be created on the three maritime facades (IFREMER, 2008).

2.1.2.4. National (re)training needs

France has implemented a number of programmes to anticipate qualification and training needs. These programmes, however, largely rely on data provided at sectoral or regional level.

The General Planning Commission carries out studies to gauge developments in trade areas and qualifications. It deals with short and medium-term changes in labour resources, such as the impact of information and communication technologies on work methods and professional mobility.

Forecasting Study Contracts developed by public authorities in the late 1980s provide an overview of the economic, technological and social changes that a given sector might undergo. In 2005, these contracts were replaced by the EDEC. The State, representative organisations within a trade sector and one or more external operators participate in the study, which is intended to better anticipate sectoral changes. These studies generally involve three phases: diagnostics, change scenarios and recommended actions. Between 1988 and 2005, more than 50 contracts were signed by industry and the services sector. The most recent contracts cover fisheries, the non-profit and medical social sector, aeronautics and plastic-works.

2.1.3. Skills response

This section presents some of the key measures and initiatives that have been adopted in France to meet green restructuring challenges. It focuses on the automobile sector, where important job losses are anticipated.

2.1.3.1. Company level skills response

In the private sector, vocational education and training (VET) is managed by both companies and social partners. VET is characterised by the distinction between the training plan, established at the company's initiative, and individual training leave, undertaken at the employee's initiative⁽¹²⁾. Training plans have been carried out in car manufacturing companies such as Heuliez for electric vehicle production conversion, and First Aquitaine regarding activity diversification for wind turbine production. As a result, Heuliez restructured its assembly facility for heat engines in 2009 (see case study).

The employer group for integration and qualification (GEIQ) also plays a major role in re-integrating jobseekers into the job market. GEIQ is intended to help mainstream and secure qualifications for disadvantaged people through a work contract based on alternating job-study training programmes.

Additionally, employees working under a fixed-term contract enjoy entitlement to vocational training, in the form of individual training leave and/or skills review leave. Employees with a certain level of seniority who lose their job during a mass redundancy are offered a 'convention de reclassement personnalisée' or a 'contrat de transition professionnelle'. These provide such employees with special unemployment benefits, training, and access to support from the Pôle emploi to help them to find another job (Cedefop, 2008).

⁽¹²⁾ French employers are not required to train their employees, but they are legally obligated to contribute funds to continuing vocational training, providing a strong incentive. The financial contribution of companies to CVT development is the combined total of a number of smaller contributions (Cedefop 2008).

Another tool used by an increasing number of companies to accompany staff retraining and redeployment is the validation of experience procedure (VAE) ⁽¹³⁾. The VAE system is an individual right that allows any person in the active workforce to earn partial or full credit to obtain a diploma, a vocational certificate, or other professional qualification. This can be salaried or volunteer experience and must last at least three years (Cedefop, 2008).

The VAE system has been implemented across a number of companies undergoing restructuring in sectors affected by major employment shifts, particularly the automobile sector. At First Aquitaine (previously Ford), where a mass redundancy procedure was anticipated, an extensive VAE plan set up in collaboration with AFPA Aquitaine resulted in 200 employees being awarded a qualification. When the VAE procedure operates in concert with the GPEC scheme, it can enable the company to identify potential competencies and train employees accordingly.

The National Association for Training in the Automobile sector (ANFA) was created in 1952 to collect and distribute a branch levy tax for apprenticeship development. ANFA implements the automobile services branch policy, which focuses on increasing qualifications and continuous employee adaptation to technological advances within the sector. ANFA's responsibilities include:

- (a) anticipating skills needs;
- (b) investigating professions and jobs in the sector;
- (c) analysing the training system;
- (d) implementing appropriate training measures for trainers, tutors and apprenticeship masters;
- (e) updating state diplomas;
- (f) managing branch certificates;
- (g) developing re-qualification systems for employees;
- (h) providing support for training institutions.

ANFA is currently implementing measures for the automobile sector to support workers and companies, with the objective to raise staff competency levels.

2.1.3.2. Regional skills response

Regions have become a fundamental actor for education, training, and job market integration provision. They define and implement the regional vocational training policy for young and adult learners (2004 law). For example, regions are responsible for managing public funds dedicated to AFPA training delivery for adult learning.

⁽¹³⁾ Law no. 2002-73 of January 17th 2002 relating to social modernisation

Faced with the economic crisis and its impact on jobs, regions have to determine the most appropriate interventions and training provision. A number of regions have elaborated charters of mutual commitment (*Chartes d'engagements reciproques*) between regions and training providers, which strengthen the link between training providers and companies.

Regional authorities are strongly involved in restructuring plans. For example, the Aquitaine region provided funding for employee training in the car making company First Aquitaine. A German industrial company took over the former Ford Aquitaine site and is planning to diversify activities towards wind energy. The region's first priority was to increase employee competencies by focusing on traditional automobile industry occupations (e.g. welders and electricians). The second step will be training staff for wind turbine production, which begins in 2011. Following the restructuring plan, the region looked at the potential for creating an eco-parc that would gather companies involved in renewable energy, including wind turbines, blades and solar panels production. The project was recently adopted, and already the jobs creation potential is estimated at 2,000. The eco-parc will include a training centre focusing on wind energy and eco-construction.

Similarly, the Provence-Alpes-Cote-d'Azur region (PACA) financed employee training at the Eiffel site (i.e. metallic construction) for the wind turbine factory constructed in 2008. AFPA provided training in welding and boiler manufacturing through the *Priorité Emploi* scheme. The Eiffel group installed a new production unit at their Fos-sur-Mer site to build wind turbine towers, which will complement other wind turbine-related supply activities of the group. Job seekers received training within the scheme *Priorité Emploi*.

In Poitou Charentes, the region carried out a proactive policy to develop electric vehicle production and thus avoid mass redundancies that could arise from closing a heat engine car manufacturer. The region also supported re-training plans for companies such as Heuliez (see case study).

The Automobile Committee highlighted the regions' crucial role in cushioning the effects of restructuring and implementing skills development programmes. Automobile sector training schemes are critical to sustainable jobs creation and to creating jobs that cannot be relocated abroad (e.g. maintenance).

2.1.3.3. National skills response

Vocational training reform in France, coupled with a growing concern over snowball effects in the labour market from the economic crisis, have led French social partners to call for increased efforts to turn the crisis into an opportunity to improve workers' employability. They advocate implementing training measures for the most vulnerable groups in the workforce and creating a 'crisis fund' dedicated to financing these measures.

This request led to the implementation of the Social Investment Fund (*Fonds d'investissement social (FISO)*), which will coordinate short-term and temporary anti-crisis measures with training measures aimed at increasing employability in the affected workforce (EEO, 2009).

The fund is financed by the State, the European Social Fund (ESF) (€1.5 billion) and social partners (€400-500 million). FISO was agreed at the February 2009 social summit and launched in April 2009.

FISO's overall objective is to pool finance sources from the French government and social partners, thereby coordinating their efforts to combat labour market effects of the economic crisis. FISO aims to maintain employment and secure professional transitions through rapid implementation of concerted measures between the state and social partners. A flexicurity approach underpins FISO and goes beyond the response to the economic crisis. As such, it is expected to contribute to greater professional mobility and increased matching in the labour market over the long term.

Regional representatives, however, are absent from FISO's management. Regions have been the main actors in vocational training policies since 2003: effective coordination with regional initiatives will be difficult without regional representatives involved in FISO's management.

2.1.4. Case study

2.1.4.1. Heuliez: production of new electric vehicles

The Heuliez Friendly is an electric vehicle designed to conform to the French environmental law Grenelle de l'Environnement. The vehicle will be produced in a modern assembly facility in Cerizay (600 employees) starting with a production target of 10,000 units per year. Heuliez plans to market the Friendly in early April 2010, initially addressing the electric vehicle needs of regional/municipal governments and rental car fleets before opening to the private owner market in 2012. Established in Cerizay, France in 1920, Heuliez employs more than 1,100 people in France, Spain and Slovakia.

In 2003, Heuliez joined with Dassault to create SVE (Société de Véhicules Electriques) in order to develop a new generation of environmentally friendly electric passenger cars. The two partners brought their complementary know-how to product development, including energy management (e.g. drive train control and on-board energy optimization), vehicle development and production. This led to fabrication of 40 electric vehicle prototypes, produced by Heuliez, which are currently being tested throughout France in a government supported programme.

Overview of the automobile sector

The automobile sector has been impacted by falling export levels and reduced national demand. In 2008, automobile production fell by 9.3%. Rising oil prices and increasing environmental regulations imposed on vehicle production also help explain this decline (INSEE, 2009).

Direct jobs in the automobile sector are estimated at approximately 250,000 in 2008, and close to one million jobs when including indirect jobs. Activities related to manufacturing and product assembly, which are currently based on heat engines, will undergo important evolutions with the manufacturing of electric engines. The automobile Sectoral Committee estimated that job losses related to decreases in the production of heat engines could reach 8,000. Job losses could be compensated through the creation of an ‘electric motopropulseurs’ (engine + battery) sector intended for electric vehicles and hybrid vehicles (between 15,000 and 30,000 by 2025-30). Therefore the volume of jobs could remain stable if battery production is developed in France.

The sector in Poitou Charentes represents 2,801 companies and 13,478 employees. The number of regional companies and employees in the sector are presented in the table below.

Table 4: Companies and employees in the automobile sector in Poitou Charentes (AFNA, 2009)

Activities	Companies	Employees
Sale and maintenance	1,941	10,305
Driving school	219	565
Trade, repair	204	498
Petrol stations	109	669
Trade-ins	116	603
Vehicle inspection	122	291
Demolition	37	200
Car rental	46	202
Parking lot management	-	144
Cleaning	7	-
Total	2,801	13,478

Jobs are mostly carried out by men; women represent 21.4% of the workforce in this region in 2006 (compared to 20.6% for France as a whole). But this corresponds to a 4.7 % increase when compared to 2003 levels (and a 2.3% decrease for France as a whole). Additionally, the majority of employees (62.8%) were aged between 25 and 49, whereas 19.6% were younger than 25 years-old and 17.6% were older than 50. It must be noted that an increasing number of workers is currently retiring, whereas few young people are being trained for this sector (AFNA, 2009).

Grenelle measures affecting the automobile sector.

In 2007, the targets set by Grenelle included lower average CO₂ emissions for the entire car population currently in use – from 176g CO₂/km to 130g CO₂/km in 2020, through a combination of regulations and incentives:

- (a) for new vehicles: France supports increasingly stringent EU regulations concerning CO₂ emissions from new commercial vehicles (120g compared with 130g in current conditions);
- (b) development of highly energy-efficient vehicles, rechargeable hybrids and electronic cars;
- (c) competitive advantage for least-polluting vehicles (i.e. yearly bonus-malus green disk) ⁽¹⁴⁾.

Following the measure adopted by Grenelle in the transport sector, of the 1,131,314 new private cars registered during the first six months of 2009, 614,049 emit at most 130g CO₂/km and are therefore eligible for the bonus. The combination of these schemes, which are based on the principle of a financial incentive to purchase and produce energy-efficient vehicles, has had a significant effect in changing the structure of private car sales in France since 2008, compared with figures observed prior to 2008. Consumers and manufacturers have responded beyond expectations to the price signal. According to a survey carried out by the Department of the Commissioner General for Sustainable Development, the scheme will help to avoid the emission of 1.8 Mt CO₂ over the lifetime of the vehicles sold in 2008. The effect on jobs in the automotive industry is still hard to precisely assess, but a review carried out by the CGDD estimates, as an initial approximation, that the bonus-malus scheme has made it possible to maintain around 5,000 jobs in the automotive industry (MEEDDM, 2009).

The national strategy for infrastructure deployment to recharge electrical and hybrid cars should reach 100,000 cars produced by 2015 in order to launch the market. These cars will be allocated between the public fleet and the fleet of the most important French groups (ADEME, 2009).

The regional measure to support eco-industries and car manufacturers

It is part of the policy of the Poitou Charentes region to support eco-industry investments in green growth with innovative and competitive sectors. More than 550 companies, research laboratories, and universities, as well as research centres specialised in technology transfer are gathered in a competitiveness cluster (pôle de compétitivité) created by the region. It is a way to familiarise and mobilise local companies on issues related to eco-industries.

As part of this initiative, the region initiated a plan in 2008 to invest in the production of innovative electric and low cost cars. A call for proposals was launched to create autonomous and performing electric cars in 2007. Three prototypes were selected and subsequently presented at the Paris Motor Show in 2008.

The region will be directly involved in the production of the new *friendly* prototype. The region has already invested five million euro (out of a total of €31 million) in the future

⁽¹⁴⁾ Summary report on Round Table discussions, October 2007.

production of the electric car. The first Heuliez vehicles are expected to be sold by the end of 2010, with regional and state support, for a price of €5,000.

Retraining needs and skills gaps/weaknesses

Heuliez has more than 130,000 m² of covered production area on a 70-hectare industrial park and is equipped with all the necessary production means for car manufacturing. Heuliez employees contribute to every step of an automobile manufacturing project:

- (a) styling and concept studies (e.g. design studies, modelling, and the realisation of concept cars);
- (b) engineering and product development (e.g. CAD design, CAE simulations, prototyping, testing, and homologation);
- (c) industrialisation;
- (d) body parts stamping for medium and large series cars;
- (e) production of painted and all-equipped BIW modules or sub-assemblies;
- (f) welding of sub-assemblies and complete car bodies for small and medium series cars;
- (g) anti-corrosion treatment (E-coat), painting of body parts and complete car bodies in small and medium series cars;
- (h) final assembly of BIW modules and complete vehicles for small and medium series cars.

Heuliez entered a recession period in 2009. The company faced serious financial issues and employees were at risk of being made redundant: employee placements were needed. Additionally, the skills required to produce electric cars, although not widely different from the production of traditional cars, had to be adapted. Core activities carried out by staff working on assembly lines were not expected to fundamentally change. Assembling heat and electric engines entail very similar tasks. But important skills upgrades were needed in electricity competencies and the skills of most employees required upgrading more generally ⁽¹⁵⁾.

The company also risked facing the loss of qualified workers through retirement. An urgent need to qualify younger workers therefore became apparent.

Identification of skills needs

⁽¹⁵⁾ Interview with Heuliez.

Different actors were involved in the restructuring of Heuliez and identifying skills needs. The company faced a restructuring period in 2009 and had to address the loss of competences incurred by the retirement of some qualified workers. In addition it foresaw the need for skilled employees when the peak of car production would begin in 2010.

Employee representatives also expressed the need to receive extra qualification for specific tasks related to the production of electric cars. Based on one-to-one interviews with employees, individual needs in terms of skills upgrades were defined.

Existing provision of education/training for the occupation

Manufacturing activities are currently focused primarily on heat engines. The manufacturing of electric and hybrid engines will entail important changes and will be affected by factors that are indirectly related to the sector. The share of electric vehicles should reach two to five % of world sales by 2020.

Very limited schemes existed in the company to train employees to the specific needs of the electric car manufacturing because the basis for electric car manufacturing was considered to be the same as for other types of manufacturing in the automobile industry.

The skills response

An agreement was signed in 2009 between Heuliez, the state, the region, the UIMM (Union des industries et métiers de la métallurgie) and the prospective buyer at the time of the agreement⁽¹⁶⁾ to finance employee training and maintain their jobs. As stated by the ‘Convention for securing professional pathways in the framework of Heuliez recovery plan’, the situation of the automobile sector led to the intervention of public authorities and social partners in view of improving competences and staff employability⁽¹⁷⁾.

Given the economic crisis affecting workers in the metallurgy sector, social partners negotiated an agreement on innovating solutions to take advantage of periods of under-activity to develop staff competencies (May 2009). Through their main training body, the Organisme paritaire collecteur agréé des industries de la métallurgie (OPCAIM), social partners mobilised 50,000 million euro to ensure remuneration funding for staff undergoing training.

The company established a training plan (plan de formation) in September 2009. Training was partly financed by the company, and partly by the region. Establishing a training plan is one way in which employers may fulfil their legal obligations to train employees. The training plan is made up of all training and skills surveys conducted for employees in order to further

⁽¹⁶⁾ At the time of writing this report, the region and the state are still looking for a suitable company to take over part of Heuliez’s capital.

⁽¹⁷⁾ Convention-cadre de Financement de la sécurisation des parcours professionnels des salariés relevant du plan de reprise de Heuliez S.A., Septembre 2009.

the company's own development objectives. These training programmes are provided under the employer's authority and at the employer's expense (maintaining salaries, training costs, etc) ⁽¹⁸⁾. An employee taking part in training under the training plan is considered 'on assignment', since training is seen as one way of executing a work contract. Therefore, the employee continues to receive remuneration throughout the duration of the time spent in training. Many short training courses were organised in order to target the largest number of employees ⁽¹⁹⁾.

The plan was also devised in close collaboration with trade unions. It must be noted that in addition to the training, the convention supported partial unemployment.

Funding

The training activities were undertaken by OPCAİM on the following basis (2009).

- (a) 80% for training activities (maximum of €40/hour of training), i.e. more than €800,000;
- (b) staff remuneration: 200 hours per individual (maximum €173,000).

The region contributed 20% toward training activities (€660,000) and more than €1,300,000 for staff remuneration ⁽²⁰⁾.

Assessment of the effectiveness and organisation of this response

The training plan took place from September to December 2009 and mostly consisted in internal training sessions. Training will also continue in 2010.

The training programme initially concerned 220 employees (those who were directly threatened with redundancy), and a total of 132,000 hours of training (representing more than €3 million). In practice, however, training was provided to the 620 company's employees. All occupations needed additional training, since all activities were impacted to a greater or lesser extent by new production ⁽²¹⁾.

One of the training modules concerned sustainable development and aimed at raising staff awareness of environmental issues, clean energies, and eco-citizenship. The module was delivered in three-day sessions to all employees.

⁽¹⁸⁾ The company may decide to fulfil its obligation by paying all or part of its mandatory contribution to a special body: an approved joint collecting organisation (OPCA), which has authority at the trade or professional level.

⁽¹⁹⁾ Training provided as part of company training plans tends to be short-term (40 hours on average) and does not tend to result in the employee obtaining formal qualifications.

⁽²⁰⁾ Convention-cadre de Financement de la sécurisation des parcours professionnels des salariés relevant du plan de reprise de Heuliez S.A., Septembre 2009.

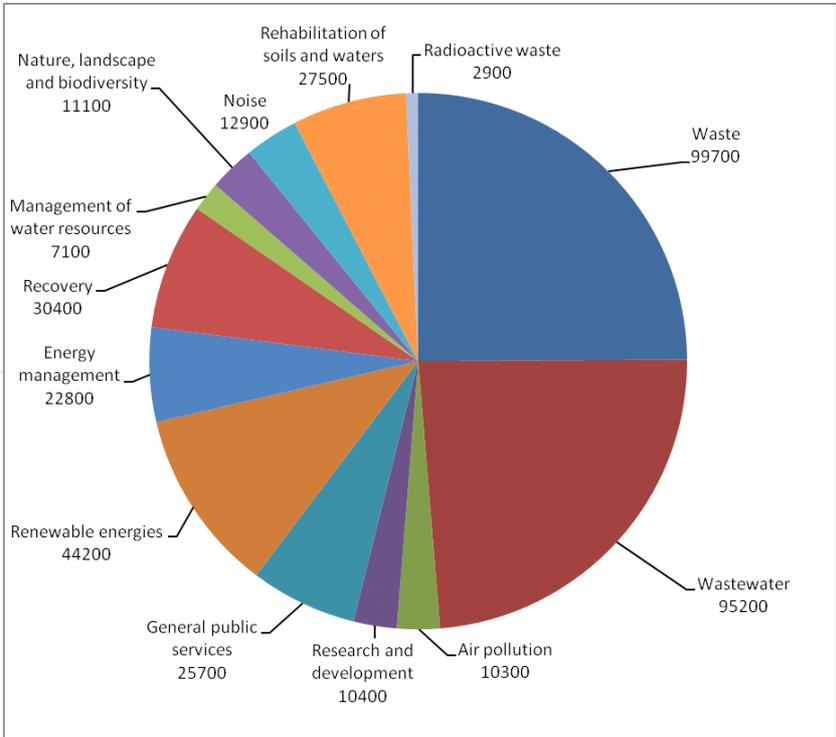
⁽²¹⁾ Interview with Heuliez.

Training was assessed positively by the Region according to the level of employee participation. Workers, who can sometimes perceive training activities as an indicator that they might be made redundant, willingly took part in the training. The company is now in a good position to face future needs that will arise when the production of the new car will start ⁽²²⁾.

The Automobile Committee, Mobilisation Plan report, highlighted the crucial role played by the regions in terms of cushioning the effects of restructuring and implementing skills development programmes. Training schemes in the automobile sector are crucial as they can lead to the creation of sustainable jobs. They support the re-training of job seekers in the framework of redeployment schemes. Training schemes supported by the regions should be strengthened as they represent sustainable investments in terms of labour market.

2.2. New and changing skills needs

Green jobs (i.e. jobs related to the environment) currently represent between 400,000 and 450,000 jobs in France. Waste and used water management represent nearly half of green jobs, followed by the renewable energy sector (44,000 jobs). Other important employment sources include energy efficiency (23,000) and organic farming (20,000). The Service de l’Observation et des Statistiques (SOeS) reported 4.2% annual growth in the number of green jobs between 2004 and 2007, particularly in jobs related to water management and renewable energies (+ 30% p.a.).



⁽²²⁾ Interview with Poitou Charentes region.

A thorough qualitative analysis of the Mobilisation Plan was carried out to identify whether these green jobs correspond to new occupations, and to determine occupations that are becoming 'greener'. All Sectoral Committees highlighted that in the next ten years there will be few 'new' green occupations related to green growth. Green growth will not create a large number of new occupations, regardless of increases in the net volume of job creation, but it will contribute to the evolution of existing occupations.

2.2.1. New green collar occupations

There is no consensus around the concept of 'new' green occupations in France. This is due to the difficulty in demarcating the 'greening' of occupations and 'new' occupations that do not correspond to an already existing occupation. According to key stakeholders at industry and Ministerial level, the term 'new' job is being overused to describe green jobs for which some additional skills are required but remain based on the core activities of existing occupations⁽²³⁾.

When new occupations have been identified, they are mostly related to audit and consulting in the energy sector, protection of bio-diversity, or eco-mobility (see Table 5). New occupations largely require high qualification levels. They are particularly linked to new technologies expertise (e.g. measurement and metrology), or related to organisation and coordination (e.g. transport flow management, logistic chain optimisation, major buildings project management). The COE further identified new occupations related to diagnosis, auditing and consulting. Public authorities also need new types of expertise.

Table 5: *New green occupations in key sectors of the economy*

Sector	New green occupation / field	Qualification/education level
Renewable energy	<ul style="list-style-type: none"> • quality control, diagnostics, auditing, • project developer, • engineer, • consulting and research, • coordinator, • maintenance technician (wind energy), • sales and marketing, • legal experts. 	Managerial Require high qualification level
Built sector	<ul style="list-style-type: none"> • company organisation or project management approaches (e.g. construction), • works coordination and steering before commissioning, • diagnosis, control, and performance measurement related to regulatory requirements (e.g. energy performance, air 	Require high qualification level related to green technologies or complex project management

⁽²³⁾ The Ministry of Education launched a study to determine exactly which new occupations are emerging. The result of the research will be available at the end of the first semester 2010.

	<ul style="list-style-type: none"> quality, acoustic measurement), • interdisciplinary skills (e.g. regulatory impacts of low currents, metrology and software), • renewable energy systems (solar, wind, geothermal). 	
Energy efficiency	<ul style="list-style-type: none"> • engineer (ingenieur thermicien), • auditing and consulting. 	Medium and high qualifications
Waste	<ul style="list-style-type: none"> • waste prevention management, • recycling industries operators. 	Medium and high qualifications
Transport	<ul style="list-style-type: none"> • flow management, • logistics / ICT, • transport systems coordination, • carbon audit. 	Medium and high qualifications

2.2.1.1. *Renewable energy sector occupations*

Renewable energy (RE) represents the most dynamic sector for newly emerging green occupations. The RE Sectoral Committee estimated that 72,640 jobs were directly related to renewable energy in 2008 (46,000 for the equipment production and sale and 26,000 renewable energy sales).

New RE jobs include:

- (a) project development;
- (b) engineering;
- (c) ecodesign;
- (d) consulting;
- (e) research (e.g. clean energies);
- (f) diagnostics, auditing and quality control (contrôleur qualité).

These occupations are all characterised by high added value and high qualification levels. In the wind energy sector, maintenance technicians are also considered to be ‘new’ occupations, although some required competencies already exist in other sectors. Occupations that could develop in future may include lawyers specialised in renewable energy legislation.

A recent study carried out by Michael Page Consulting identified several new managerial level job profiles in the green economy sector (Page, 2009). The most sought-after RE occupations in 2009 include:

- (a) project manager;
- (b) sales and marketing;
- (c) carbon balance experts;
- (d) energy efficiency engineer (built sector).

Project manager positions are increasingly attractive to people with backgrounds such as engineering, sales and marketing, finance. For example, project managers create and manage

wind turbine parks. People in these positions often have technical training backgrounds (e.g. engineers) or sales and marketing experience. These occupations require high education levels, and offer high salaries, as illustrated below.

Box 1: Example of new green occupation in the renewable energy sector (Page, 2009)

Carbon balance expert – Expert bilan carbone : the carbon balance method requires trained engineers with specialist knowledge in lifecycle analysis tools (LCA) and significant experience in conducting energy diagnostics or greenhouse gas reduction projects. Other skills required for this burgeoning post: good drafting skills and a good level of English competency, which enable it to reach gross salaries of 35 000 to 50 000 euro per year. This job profile, one of the most recent of the green wave, is also paid with bonuses, representing 20% to 30% of income.

2.2.1.2. Energy efficiency sector occupations

Energy efficiency specialists are also in high demand. They can work in construction sector consulting firms, or in a company responsible for maintenance or exploitation. This occupation can be referred to as energy engineer (*ingenieur thermicien*), and it usually requires a qualification type ‘Bac+5’ (Master level), with a specialisation in energy and environmental building quality.

Energy auditing and consulting are newly emerging occupations, and often a direct result of greening the economy (e.g. ‘*technicien de la renovation technologique*’, which was proposed in the Grenelle initiative). The European Directive 2002/91 on the energy performance of buildings resulted in energy auditing obligations for the built sector. In 2006, the market for building surveys was estimated around €200 million. In 2008, this figure rose to approximately €400 million. The number of accredited energy performance expert (DPE) in France is estimated to be around 7,800 (see case study). A mix of competencies, some traditional and others related to RE are necessary to carry out this role.

These occupations are expected to play an increasing role as new RE regulations will impose additional constraints.

2.2.1.3. Built sector occupations

The sectoral committee identified the following new areas for occupations:

- (a) renewable energies (solar, wind, geothermal);
- (b) company organisation or project management (e.g. construction);
- (c) works coordination and steering prior to commissioning;
- (d) performance-related regulatory requirements related to the diagnosis, control, and performance measurement sector (e.g. energy performance, air quality, acoustic measure);
- (e) interdisciplinary skills (e.g. those impacted by regulation dealing with low currents, metrology and software).

2.2.1.4. Waste sector occupations

The waste sector represents €14.1 billion, and is dominated by waste management activities. Waste reduction at the source will be strongly incentivised, reuse and recycling facilitated, and producer waste responsibility extended. A number of new occupations emerged in the waste management area. According to ADEME, the development of waste management activities led to new jobs creation. For example, waste prevention managers and operators in recycling industries are usually employed by local authorities or waste management bodies. ADEME signed a number of regional partnership agreements on waste prevention. Implementation of these schemes is conditioned on the development of these occupations and adequate training provision.

FEDEREC (federation of recycling industry businesses) highlighted recruitment difficulties within the sector for public authorities. Key recruitment obstacles identified include inadequate training and the poor image recycling-related operations, which are often associated with garbage collection.

Technicians and operators in the waste management sector are currently in high demand. The ‘waste recycling operator’ case study provides additional information.

2.2.2. Greening existing occupations

Existing occupations will become greener because:

- (a) specific competencies are currently lacking;
- (b) some occupational tasks will require global approaches;
- (c) sustainable development constraints will be increasingly taken into account.

The ‘core’ competencies of most existing occupations will not fundamentally change. Nevertheless, it is clear that sustainable development principles will increasingly underpin occupations and that new skills will be necessary to adapt professional practices.

Annex 1. presents the eleven key sectors of the economy where the potential for greening occupations is important, based on conclusions reached by the Mobilisation Plan Sectoral Committees. Breakdown by occupational types and number of affected jobs is provided in some cases. Two sectors with the highest greening potential and representing high employment volumes are presented below.

2.2.2.1. Greening existing occupations in the built sector

The built sector represents four million jobs in France (a breakdown is presented in Annex 1). Greening existing occupations in the built sector will require additional competencies, which are primarily a result of a shift to approaches that integrate RE technologies and energy efficiency. This is particularly true for the 260,000 craftsmen who now work with eco-

materials and integrate energy efficiency techniques for the construction and maintenance of sustainable buildings. A study conducted by ADEME concluded that the following light work occupations 'second oeuvre' ⁽²⁴⁾ will be significantly affected:

- (a) carpenters (for insulation work);
- (b) plumbers;
- (c) heating engineers;
- (d) painters / plasterers (e.g. insulation, roofs, and walls);
- (e) roofers (solar PV and thermal installation);
- (f) electricians.

Improving the current building stock is at the core of the Grenelle objectives. A large-scale plan to overhaul energy use and heating in buildings will reduce energy expenses over the long term, increase household buying power and help reduce carbon dioxide emissions. These improvements entail the development and application of new technologies in future construction and implementation of a programme to accelerate renovations for existing buildings.

The construction sector already faces major recruitment challenges for qualified personnel and with regard to training (Economic and Social Committee, 2006). For example, out of 220,000 energy efficiency-related jobs in 2007, nearly 100,000 were related to retrofitting existing buildings (of which 87,000 were only for insulation). Annual built sector recruitment needs for companies to develop energy efficiency capacity have been estimated at approximately 15,000 per year over the next 12 years (i.e. 180,000 jobs) (Actu-environnement, 2008).

Job demand currently outstrips job offers, particularly for jobs related to electricity, plumbing, joinery, and masonry. In the residential and commercial building retrofitting area alone, sector turnover will likely double by 2012.

Skills gaps in the construction sector are mostly related to a lack of combined competencies in the building trades ('corps d'état'). Energy efficiency initiatives require companies to work across trades (i.e. simultaneous interventions by several trades). Initial training pathways do not yet integrate energy efficiency issues, and companies are struggling to recruit adequately qualified personnel. New skills requirements include:

- (a) knowledge of new technologies and energy efficiency-adapted technical solutions;
- (b) cross-cutting knowledge of energy issues;
- (c) understanding other occupations related to building renovation;

⁽²⁴⁾ Concerns activities such as roofing, sanitary equipment, carpentry, floors, heating, and electrical installations.

(d) client counselling / advice to meet new market demands.

Each trade will require sound knowledge of retrofitting-related occupations and need to be able to advise clients on how to meet new demands. Built sector training needs will emerge around the following skills:

- (a) project contracting: reduced and more efficient consumption. Department leaders should be mobilised and competencies updated to account for energy constraints. Contracting authorities (e.g. local authorities) are not always familiar with evolving environmental standards and new techniques. Consequently, contracts and terms of reference are not always aligned with environmental objectives;
- (b) project management and engineering: this is a strategic sub-sector. Training must be intensified and implemented over the next three years. Estimates suggest that 50,000 people should be trained per year (7,500 architects; 6,500 energy experts; 27,000 engineers);
- (c) company training standards: Training should reach 1.3 million employees and craftsmen through Continuing vocational education and training (CVET) by 2020 (130,000 people per year). Standards should be established to deliver short and simple training courses in environmental building quality (Qualité Environnementale du Batiment (QEB)) and made available to all sector trainers.

2.2.2.2. *Greening occupations in the agriculture sector*

France has the largest agriculture sector in the EU. Agriculture-related activities (including agro-business) represent 3.9% of GDP and more than 1,600,000 jobs in France. Greening occupations is mostly occurring through organic farming, biodiversity management, and eco-advice (e.g. sustainable development advisers, eco-energy engineers, and eco-certifiers).

Grenelle objectives aim to gradually move toward 20% organic production in public catering services orders by 2012. As a result, 10,000 agriculture-related jobs, of which 7,600 will be for organic farming and direct local supply, are expected by 2020.

Transitioning to organic farming entails important changes. Firstly, organic farming is much more labour intensive, requiring a 20 to 30% larger workforce compared with conventional farming, particularly during harvest and conditioning of fruits and vegetables. New technical skills are also needed for organic farming, including:

- (a) fertilizer and chemicals-reduction techniques;
- (b) understanding the requirements to meet environment-friendly objectives;
- (c) mechanical weeding techniques;
- (d) organic waste management.

In 2007, Grenelle working groups highlighted the need for introducing biodiversity, environmental input effects and soil function modules into training curricula. Improved

agricultural sciences education in secondary schools, and strong research links in continuing training were also highlighted as ways to guarantee the rapid spread of new methods.

The agricultural education system trains 172,000 pupils, 32,000 apprentices and 118,000 adults each year. An additional 15,500 students are trained in higher education institutions. Upgrades to existing training programmes will be needed, particularly for teacher training (20,000 teachers in the agriculture school system).

2.2.3. Identification of skills needs

Systematic employment and skills needs forecasting is fully integrated into economic planning in France. In a recent report Cedefop (2008) stressed that France has established one of the most comprehensive sets of such tools in Europe.

Employment and occupational forecasting tools aim to identify labour market dynamics, including the consequences of demographic trends on the numbers of people going into various occupations. Governments carry out these forecasts themselves and the tools were conceived as an operational aid to decision-making.

At the national level, three institutions – UNEDIC, CAS and the BIPE consultancy – regularly publish reports and studies aimed at anticipating occupational and skills needs, including:

- (a) quantified macro-economic trend projections on the environment and labour market;
- (b) statistical studies on labour supply and demand matching for each occupational group;
- (c) broad surveys of studies (e.g. economic, sociological, geographical and foresight) relating to various themes: work organisation, labour market adjustment mechanisms, and possible trends within the different sectors.

Social partners, company heads, local authorities, the state and the public employment service are involved in anticipating needs at all levels. Despite the existence of robust tools, however, the French labour market has suffered recurrent matching problems, particularly in the building and public works sectors (EEO, 2008).

It is important to note that the mechanisms described in Section 1.3 (i.e. sectoral and regional observatories, GPEC, and prospective branch studies) contribute to identifying new skills needs, in addition to re-training needs and employment shifts. The following subsections describe how the key mechanisms through which future skills needs for the green-job labour market are identified.

2.2.3.1. *Ministry level skills needs identification*

Although devolution has transferred a number of training responsibilities to regions, state government has retained a number of prerogatives in defining regulation, controlling continuing vocational training, and organising and funding certain actions for target groups.

Several Ministries can design and award qualifications. Most qualifications in initial education and training (85%) are delivered by the Ministry of Education and the Ministry of Agriculture ⁽²⁵⁾. Since 1986, the state has also authorised branches to provide a dual training qualification process for young people (Certificats de qualifications professionnelles: CQP) ⁽²⁶⁾.

Qualifications are increasingly designed to match labour market needs. The process for designing and modifying qualification standards takes place through Committees in consultation with social partners, Commissions Professionnelles Consultatives (CPC) ⁽²⁷⁾. The CPCs define core occupational standards or activities, and identify corresponding competencies ⁽²⁸⁾. Qualifications are generally overhauled every five years.

Creating new qualifications or overhauling existing ones is a bottom up process that is generally requested by employers' organisations. Large companies can also request the creation of a new diploma to respond to structural needs, but this occurs less frequently. CPCs can take the initiative in creating a new qualification when sectoral branches are not well structured or slow to react.

In the waste sector for instance, the sectoral representative (FEDEREC) requested a new qualification to address important skills gaps. Professionals in the recycling industry were consulted to design training standards specifically tailored to sectoral needs (see case study).

Vocational licences – Licences Pro ⁽²⁹⁾ also illustrate how skills needs identification by professionals on the ground feeds back into institutional decision-making. The process for designing vocational licences aims to ensure that the qualification responds to industry's needs. These qualifications are overhauled every four years with the Ministerial authorisation renewal (see the ecodesign case study for a more detailed analysis).

⁽²⁵⁾ Other Ministries include: Health, Social Affairs, Employment, Youth and Sport, and Defence. Chambers of Commerce also deliver qualifications.

⁽²⁶⁾ More than 30 branches have created slightly more than 350 CQP (e.g. the Metallurgy sector validated 200 CQP).

⁽²⁷⁾ Four Ministries use the CPC mechanism: Education (17 CPCs for 700 qualifications); Agriculture (1 CPC for 150 qualifications); Employment (5 CPC for 300 qualifications); Sport (1 CPC for 100 qualifications).

⁽²⁸⁾ Occupational standards outline the activities for which the qualification provides preparation, knowing that these activities and their combination can apply to several professions. Each activity is divided into tasks which are also the object of a standard description.

⁽²⁹⁾ The vocational licence, created in 1999, is a diploma equivalent to three years of post-Baccalaureate training.

In relation to green occupations, the Ministry of Education has so far adopted a prudent approach towards creating 'new' occupations. They consider that there are today very few jobs purely based on new competencies (e.g. renewable energies). Given the RE sector's rapid evolution, more time is needed to determine how new standards and techniques will impact built sector occupations. The Ministry of Education recently launched a study to identify the consequences on existing qualifications from a burgeoning green economy, sustainable development and energy efficiency (Ministère de l'Éducation Nationale, 2010). The main issue is to determine how new economic and environmental contexts impact existing qualification standards, training pathways and creation of new qualifications. Study results are expected by mid-2010.

On a broader scale, the MEEDDM launched the Mobilisation Plan to identify green occupations. The Sectoral Committees were tasked with conducting a quantitative and qualitative analysis of sectoral skills needs. Finally, the MEEDDM has created a National Observatory for Green jobs which should be operational in 2010.

2.2.3.2. Regional skills needs identification

Whilst national institutions focus on the macro-economic level, regions look at the micro-economic level and identify on-the-ground needs through a range of mechanisms. Regions are now pivotal actors in education, training and job market integration. Regional observatories (OREFs) have published a number of studies on green occupations. An increasing number of initiatives focus on green jobs and green growth.

The Ile de France region has recently launched an inter-regional initiative to exchange good practices and experiences in providing green jobs training and anticipating needed competencies⁽³⁰⁾. Sectoral branches and key employment stakeholders (Pôle emploi) supported the initiative.

Additionally, the TEE Network (Territoire Environnement Emplois) in Ile-de-France set up an 'Observatory on green jobs and occupations' in 2009 that brings together all relevant public and private stakeholders. This analytical tool should support policy makers and businesses in providing, for example, important information regarding future professionals in the field. TEE will also pilot the development of a green jobs database.

The regional level appears to be the most relevant for identifying skills needs and corresponding training provision, The Mobilisation Plan Sectoral Committees noted, however, that the absence of a centralised body to collect these observations poses a number of problems, such as a lack of coherence and the absence of consolidated national level findings.

⁽³⁰⁾ *Ecocitoyenneté et développement durable: quel soutien régional pour les emplois de demain*, October 2009 http://www.centre-inffo.fr/IMG/dossier_doc_1910paris.pdf.

2.2.3.3. *Pôle emploi skills needs identification*

Pôle emploi is the national employment agency charged with monitoring labour market changes, and providing counselling and accompanying workforce training in sectors where jobs creation potential has been identified. This organisation works at regional level in direct collaboration with companies to promote green jobs. For example, statistical data enable jobs identification related to renewable energies such as thermal systems maintenance. Pôle emploi identifies transferable competencies, and works with companies to encourage internal training efforts and competencies adaptation.

Pôle emploi recently produced a mapping of green growth occupations (³¹). The inventory lists three occupational categories, including:

- (a) green occupations (i.e. ‘new’ occupations);
- (b) greening occupations (i.e. traditional occupations that will evolve to account for environmental aspects);
- (c) occupations that will not be modified, but that will be impacted by green growth dynamics.

The Sectoral Committees took this mapping into account in a recent report.

As part of a ‘day for employment’ on 25 January 2010, Pôle emploi announced that 16,000 jobs vacancies were immediately available in green economy sectors. The new categorisation is used by Pôle emploi to identify jobs directly or indirectly related to the Grenelle Round Table, and thus to leverage these occupations in making them more visible. Current green job offers have the following characteristics:

- (a) diversity: directly or indirectly related to the environment, these jobs correspond to occupations in almost all sectors of the economy;
- (b) most sought-after occupations, including plumber/heating engineers, masons, electricians, and roofers, which are mostly found in the built sector and related to energy efficiency;
- (c) involve all qualification types, from upper secondary education levels such as BAC Pro (vocational baccalaureate) and professional skills certificate (CAP), to higher education degrees (although 75% of the vacancies target the first group and only 25% target higher education degrees).

There are thus 2,352 jobs offers in occupations specifically dedicated to the environment and 10,990 job offers in occupations impacted by Grenelle Round Table. A more detailed overview is provided in Annex 3.

(³¹) Présentation par Pole Emploi d’un outil de cartographie des métiers de la croissance verte (MEEDDM, January 2010).

2.2.4. Skills response

2.2.4.1. *Initial education and training – creation of new qualifications and overhaul of existing qualifications*

It takes one and a half years, on average, to create a new qualification; diplomas are generally updated every five years. Evolution of the existing ‘stock’ of qualifications aims to reflect economic transformations and labour market needs (OECD, 2003).

The Ministry of Education is currently opting for a prudent approach, privileging the addition of complementary units (new modules or ‘mention complémentaire’) to existing qualifications, rather than the creation of new ones. This corresponds with the position of built sector federations that insist on preserving core trades and building new competencies into traditional activities.

Nonetheless, a number of qualifications have been overhauled⁽³²⁾. Adding new ‘mentions’ or units to existing qualifications can be a slow process. The French federation of electricians have worked on integrating a new mention – ‘Renewable energies’ – to the existing ‘Bac Pro Electrician’ for the past three years. The objective update the qualification by 2010, however, has not been reached.

The creation of entirely new qualifications in initial VET is a less common skills response. Requests for the creation of new qualifications at the BTS (Higher technician’s certificate) or DUT level mostly concern the built sector.

The recent creation of Licences Pro has played an important role in the improvement of initial training provision. Licences Pro currently capture 8% of students in environment-related initial training, with particularly rapid progression since 2002. For example, new vocational licences have been created in ecodesign (see case study). The number of training programmes specifically dedicated to ecodesign and enrolled students has steadily increased.

Apprenticeship training has also progressed in relation to green jobs. The number of apprentices in ‘green’ training pathways has increased by more than 5% per year from 1997 to 2005. Apprenticeships offer alternating training provided by both a company and an apprentice training centre.

Renewable energy sector skills response

Few training programmes are specifically dedicated to renewable energy and energy efficiency. The French training system appears to lag behind in the field of renewable

⁽³²⁾ This is the case for the BTS fluids, energy, and environment, which now replaces the former BTS Technical equipment (since 1999). The DUT hygiene, security, and environment now replaces the former DUT hygiene and security, in order to integrate a strong environmental dimension to respond to the new requirements of the labour market.

energies. In particular, qualifications are lacking related to energy efficiency, wind power and installation of solar PV. France was forced to bring in expertise from abroad when the first large wind turbines were installed. In the wind sector, it is expected that 1,500 maintenance technicians will need to be trained over ten years. Hydropower (e.g. wave power, tidal power, off shore wind turbines, and biomass) is an emerging sector in France. Grenelle measures foresee the installation of a wind turbine park of 25,000 MK in 2020.

Initial training provision in the renewable energy sector is increasing. Higher education qualifications are growing in specialised RE, and RE modules are being integrated in more traditional training programmes at all levels, including DUT and BTS licences, and engineering degrees. A qualification for ‘technicians in renewable energies’ (one year after baccalaureate) has just been created, following requests from the professional branches.

Training programmes dedicated to renewable energies are mostly vocational licences (the first one was created in 2000)⁽³³⁾. The creation of vocational licences is progressing (10 were created in 2003, one in 2004, six in 2005, and five in 2006). But some programmes have also disappeared (e.g. four licences were abrogated in 2003).

Built sector skills response

Sectoral Committees also estimate that there is an urgent need to integrate the competencies needed for the implementation of the Grenelle measures in the qualification standards of the diploma delivered by the Ministry of education. This concerns particular qualifications at level III (BTS or DUT) in the construction sector.

The priority for the built sector is to overhaul existing qualifications standards. Initial training for architects has integrated sustainable development modules for a number of years already.

In the built sector, educator training needs will need to be addressed. Training efforts have been undertaken with the support of ADEME and INES (Institut National de l’Energie Solaire) since 2006 to support education for ‘trainers of trainers’ in the use of solar energy – about 250 teachers in vocational secondary schools. But the trickledown effect of this support is insufficient due to the limited budgets dedicated to continuing educator training.

A recent estimate of sectoral training needs indicate that the number of persons to be trained per year will be as follow (Plan Bâtiment Grenelle (2010):

70,000 young people in initial training (against 50,000 today), of which:

- (a) 15,000 will be related to construction and retrofitting;
- (b) 5,000 will be for renewable energy integration.

⁽³³⁾ Licence pro sciences et technologies des énergies renouvelables.

Training 20,000 additional young people each year (from 50,000 to 70,000) will require considerable efforts in terms of adapting the education and training system. Concretely, this means creating an additional class of 20 students in each of the 1,000 vocational high schools to provide training for these qualifications. Skills and competencies identified above will also need to be integrated in initial training programmes.

Agriculture sector skills response

The Ministry of Agriculture has begun renovating its qualifications to integrate green issues, particularly organic farming and phyto-protection. Many agricultural training programmes have already been overhauled thanks to the work of the CPC ‘Occupations in Agriculture, Transformation, Services and Land use management’, which integrated sustainable development issues in the relevant qualifications.

The ‘Agriculture biologique, horizon 2012’ Plan adopted by the Ministry of Agriculture in 2007 therefore proposed a strategy for developing organic farming, focusing on research, development, training, territories and collective catering. In the context of the Plan and the Grenelle conclusions, the orientations for the school year 2009-10 are characterised by the integration of organic farming modules across all agricultural education.

In parallel, the Ministry of Agriculture launched a large modernisation programme in 2007 for its 17 Vocational Baccalaureates (from a two year programme to three years). One of the key qualifications delivered by the Ministry is the ‘Vocational Baccalaureate Farm Manager’ (the overhaul of this qualification is described in the case study in Section 2.2.6).

Part of the Action plan Ecophyto 2018 launched in April 2009 focuses on the changes needed in qualification standards related to phyto-protection, in collaboration with the relevant sectors. The plan foresees the creation of a network of pilot schools that will experiment and validate new practices in terms of sustainable development and environment protection.

One aspect of the plan focuses specifically on training, with the following aims:

- (a) strengthening training related to the use of phyto-pharmaceutical products;
- (b) adaptation of diploma and training related to agriculture.

A Grenelle objective is to have all secondary school farms high environmental value (HVE) certified by 2012 and to introduce biodiversity, environmental effects of inputs and soil function modules into the curriculum. It has set the target of 20% of farmers to have undergone training linked to new environmental techniques by 2012 (new low-input farming methods). To support these changes, the Ministry of agriculture has set up the Network Formabio, which supports education institutions to integrate organic farming in existing curricula and create specific training pathways.

Overall, training needs in the agriculture sector are well covered and identified. No new qualifications are needed, but the overhaul of existing qualifications must be continued. The main priority is educator training (20,000).

Waste sector skills response

In the waste and recycling sector, a number of new qualifications have been created over the past ten years. In 2000 the CAP Operator of recycling industries was created to address the lack of training dedicated to recycling methods and technologies (see case study) ⁽³⁴⁾.

Overall, no fewer than 128 environmental vocational licences, 25 environmental degrees of the MEN and 20 of the MAAP were identified in 2005 in the waste sector. These degrees are in constant evolution: from 1997 to 2005, 21 departments were created and 25 terminated. The sector highlighted the need for clarifying the current provision of training in initial VET.

Qualification needs at higher levels has already been identified by the sector. A vocational baccalaureate (Bac Pro) ‘waste management’ will be launched next September. Recruitment is difficult in this sector and the image of qualifications have been improved, with higher qualification levels corresponding to higher remunerations.

2.2.4.2. The development of continuing training provision

Overall, CVET has rapidly evolved to address the most urgent skills needs resulting from the green economy.

Companies are important sponsors for continuing vocational training (€10.5 billion in 2005, 41% of the total budget). In relation to green occupations, the built sector has been particularly active in funding continuing training for their staff.

Regions are pivotal actors in the provision of CVET. The approach chosen by the Ile de France region aims to foster synergies between all stakeholders. This includes a September 2009 regional contract for professional engagement (CREP) in green jobs and sustainable development. Additionally, the regional programme of vocational training in environment for 2010 was elaborated to address the needs that had been identified on the ground ⁽³⁵⁾. New training programmes proposed by the region in 2010 focus on three areas:

- (a) ecological land use and agriculture;
- (b) pollution and nuisance prevention and reduction, waste management, application of standards and social and environmental corporate responsibility;

⁽³⁴⁾ The CAP, which is today the most frequently awarded vocational diploma, is designed to give pupils direct access to employment.

⁽³⁵⁾ Programme Régional Sectoriel de Formations dans l’Environnement 2009-10.

- (c) energy efficiency and renewable energy development and management (e.g. wood energy, geothermal, biomass, solar, and heat inversion).

Several regions have elaborated mutual commitment charters (chartes d'engagements reciproques) with training providers to strengthen the link between training providers and companies.

Renewable energy continuing training provision

Overall, continuing training is more advanced than initial training in the area of renewable energy. Whilst specific training courses focusing on renewable energies were rare in the early 2000s, the number of training programmes in this sector has increased.

Short training programmes have been created for architects, engineers and installers. The Qualit'EnR scheme which started to develop training standards for the installation of renewable energy equipment in 2006 is a key initiative set up by the main federations and business associations of the sector. Since the creation of the Qualit'EnR scheme in 2006, training provision has considerably improved in renewable energy equipment installation, both from a quantitative and qualitative point of view. A recent study carried out by ADEME with training centres for continuing education revealed that a number of training centres now offer training in photovoltaic equipment (see case study).

Amongst longer training programmes, the CAP for installation/maintenance of solar systems (1050 hours) is targeted to professionals such as roofers, heater engineers, and electricians with a BEP (Professional studies certificate) qualification level. The Compagnons du solaire provide this training.

A concern expressed by business representatives, training providers and public authorities is a lack of coherence between the multiplication of training programmes and the absence of clear standards. The market for training provision is lucrative and risks developing 'green' training programmes of poor quality or that are poorly-adapted to the labour market.

Built sector continuing training provision

Continuing training leads initial training concerning adaptation to the green economy. The wealth and diversity of CVET in the built sector has been highlighted by the Sectoral Committee. 5,000 training courses have been identified in 2009. They address diverse audiences, and include short and long training pathways.

Sustainable development constraints require the development of global approaches to buildings, from the contracting stage to the management of construction projects and the maintenance of new and existing buildings. A number of important initiatives aim to bring new competencies to sector professionals. FEE Bat is a key initiative in the built sector, and aims to train 50,000 professionals (entrepreneurs, craftsmen and employees) by 2010 (see case study). The profession has been reactive due to the necessity of immediate responses

from companies to the emergence of new needs. The adaptation of existing diplomas is much slower.

Important efforts for the ‘training of trainers’ will be necessary to ensure coordination between the different building trades and the adaptation of services provided to new practices. The number of persons to be trained per year will be as follows (Plan Bâtiment Grenelle, 2010).

360,000 professionals receiving continuing training, of which:

- (a) 130,000 will be entrepreneurs, craftsmen and employees;
- (b) 100,000 will be individuals re-training within the sector (re-deployment);
- (c) 60,000 will be in industrial and trade sectors;
- (d) 50,000 will be project managers.

The Sectoral Committee estimates that 1.3 million employees and craftsmen will need continuing training by 2020.

2.2.5. Case studies on new green collar occupations

2.2.5.1. Energy performance experts: energy assessments and energy performance certificates

The Energy Performance Certificate (EPC) was created in France following the implementation of European Directive 2002/91 on the energy performance of buildings in July 2005 (European Parliament and Council, 2002). Energy performance certificates are delivered by experts (diagnostiqueurs en performance énergétique) whose competencies must be certified by an accredited body.

In France, the DPE is a professional whose role is to:

- (a) inform the future owner or tenant regarding the energy consumption of the building and its average cost;
- (b) raise awareness regarding the consequences of consumption on the environment (using a label showing this energy consumption on a scale);
- (c) provide advice to control energy consumption, with recommendations on energy efficiency renovation work.

The number of accredited DPE in France is currently estimated to be around 7,800, and this number is expected to increase ⁽³⁶⁾. Accredited DPE are independent workers or employees in SMEs or large auditing companies.

Since November 2006, energy performance certificates must be made available to the owner (or by the owner to the prospective buyer or tenant, as the case may be) when buildings are constructed, sold or rented out. Building certification and inspection must be carried out by qualified and independent personnel.

The law transposing the Directive in 2004 ⁽³⁷⁾ is one of various incentives to improve building energy efficiency. The law is reinforced by the adoption of Grenelle laws, which include:

- (a) an obligation to supply a building permit upon application and completion of the works, and a certificate attesting that energy efficiency regulations have been taken into account;
- (b) changes to the legislation applicable to co-ownership to facilitate the organisation of energy-efficiency renovation works;
- (c) an obligation to provide information regarding a building's energy efficiency to its future occupants, prior to occupancy;
- (d) an energy performance label must be provided in all real estate adverts (sales and rentals) from 2011.

Prior to the transposition of the Directive and the creation of the official certification of DPE, other types of building surveys were in place since 1996 concerning asbestos, lead and termites. Therefore building surveys are now mainly conducted by those building surveyors who were already carrying out other types of inspections. Since 2007, all sellers must provide future homebuyers with a single report covering asbestos, lead, termites, gas and electricity installation, geotechnical conditions, and energy performance (dossier de diagnostic technique) ⁽³⁸⁾. DPEs can, however, work in consulting firms specialised in energy performance of buildings. These firms mainly provide their services to companies and public authorities, rather than private owners.

In 2006, the market for building surveys was estimated around €200 million. In 2008 this figure rose to around €400 million as a result of the increase in the number of building surveys to carry out, and the extension of EPCs to the rental market. In 2008, the number of companies providing building surveys was 4,500. Many of them had only one building surveyor. 40% of these companies were created after July 2007. Because EPCs are mandatory

⁽³⁶⁾ Interview with FIDI (Fédération Interprofessionnelle du Diagnostic Immobilier).

⁽³⁷⁾ Loi n°2004-1343 du 9 décembre 2004 dite de simplification du droit, modifiée par l'ordonnance n°2005-655 du 8 juin 2005 relative au logement et à la construction.

⁽³⁸⁾ http://www.logement.gouv.fr/article.php3?id_article=6004.

sales and rentals, the theoretical number of EPCs to be carried out is equal to the sum of sales and rental transactions in the real estate market (ADEME, Nov. 2009).

Skills gaps/weaknesses

This new occupation will require a combination of traditional competencies and new competencies in renewable energy and energy auditing. The Economic and Social Committee⁽³⁹⁾ highlighted the importance of training needs resulting from the implementation of the new energy certificate regulations. A 2006 study carried out through the European IMPACT project addressed these training needs as well. The study concluded that more than two million energy certificates would need to be delivered each year from July 2007. There were not enough energy consultants at the time to respond to the needs.

A similar occupation emerged in 1996 with mandatory asbestos inspections. Additional mandatory lead and termite inspections have since been added. Building surveyors are now called DI experts (diagnostiqueurs immobiliers amiante-termites-plomb). The IMPACT Project⁽⁴⁰⁾ concluded that DI experts, who are not specialised in energy, could be trained in the necessary calculation methods using simplified tools, and that they were able, under certain circumstances, to carry out a number of energy performance diagnoses.

Difficulties arose, however, when the DI had to formulate recommendations on how to improve energy efficiency, showing that additional training was needed. The project conclusions observed that DI experts could deliver energy certificate provided they were given at least a three day training programme on energy, a guide for the recommendations, a guide to inspect the buildings, and a list of cost-investments.

Skills needs

The competencies required for the persons that wish to acquire the certification of Energy Consultant were legally defined in 2006⁽⁴¹⁾. In particular, the legal text lists the knowledge to be tested during the theoretical exam. Required knowledge for this certification includes:

- (a) different construction types, techniques and their evolution;
- (b) buildings, construction material, technical equipment and their insulation properties;

⁽³⁹⁾ Habitat and town planning policies in the face of climate change, 2006.

⁽⁴⁰⁾ One of the objectives of the IMPACT project is to develop a European model for energy performance certification 'best practices'. In France, the actors involved in the IMPACT project included: (a) – National stakeholders such as the DGUHC, ADEME and the Ministry of energy (DGEMP); (b) Experts: LAT-experts, energy consultants and companies who provide energy certificate training; (c) Energy companies (EDF, GDF, etc.). http://www.senternovem.nl/mmfiles/WP2.3%20National%20Test-FR%20final_tcm24-209380.pdf.

⁽⁴¹⁾ Arrêté du 16/10/2006 définissant les critères de certification des compétences des personnes physiques réalisant le diagnostic de performance énergétique et les critères d'accréditation des organismes de certification
<http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000823413&dateTexte=>.

- (c) key elements of energy efficiency, improvement, retrofitting, climate change effects, regulatory frameworks, and renewable energy implementation.

It also defines the content of the practical exam that the candidate will have to pass ⁽⁴²⁾.

Existing provision of education/occupational training

Prior to the legislation and the implementation of specific DPE training courses, building surveyors existed since 1996 but their training did not include any specialisation on energy related issues. As very specific methods need to be used for the calculation of energy consumptions (these methods are designated by public authorities), the job of energy consultant cannot be exercised without specific training on the use of the applicable methodologies and the legal rules. This occupation is strongly regulated in France. Many building surveyors subsequently undertook the necessary training to obtain the certification in energy performance and be officially accredited.

The skills response

The conditions and modalities for energy consultant accreditation are defined in a 2006 decree ⁽⁴³⁾. Energy consultant training providers (public and private) are numerous. Some of them are listed by ADEME on their website ⁽⁴⁴⁾. There is no official list of all the providers for this specific training.

Training typically includes modules on regulatory frameworks, the principles of thermal physics and energy efficiency applied to the built sector, calculation tools and applicable methodologies (e.g. 3CL annual calculation method for dwellings, with simplified input data). Report writing and practical cases illustrating real life situations are also included. Most existing training comprises around 30 hours of training, and costs between €1,200 and 1,500. Training should prepare the participants for accreditation.

Training prerequisites include knowledge of building techniques and basic knowledge of thermal physics.

The training course is not compulsory by law, but is strongly recommended given the degree of expertise required by the DPE. Training also highly increases the chances of passing the accreditation exams. Vocational license holders (licence pro) are the only category of worker exempted from the theoretical exam. These workers are licensed in the building and construction sector, and specialise in building surveys (licence professionnelle bâtiment et

⁽⁴²⁾ Representatives of the building survey sector were not involved in the drafting of the law.

⁽⁴³⁾ Décret n° 2006-1114 du 05/09/2006 relatif aux diagnostics techniques immobiliers et modifiant le code de la construction et de l'habitation et dans l'arrêté définissant les critères de certification des compétences des personnes physiques réalisant le diagnostic de performance énergétique et les critères d'accréditation des organismes de certification.

⁽⁴⁴⁾ <http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=15028>.

construction, spécialité diagnostics techniques de l'immobilier et pathologies du bâtiment). This license is recognised by the Ministry of Education and delivered by a university.

A limited number of bodies are authorised to assess the energy consultant and deliver accreditation. This certification process ensures consumers safety.

Energy consultants are assessed on the basis of a theoretical and practical exam, structured as follows:

- (a) theory: competencies related to building, materials, processes, equipment, regulatory frameworks, risks and safety;
- (b) practice: the candidate must carry out an energy audit. The exam, as defined in the regulatory texts, assesses whether the candidate is able to carry out an energy efficiency audit, use the new methods, interpret and present the results, assess the energy consumption of a building, propose solutions adapted to the case and produce a report containing the audit analysis.

The certification lasts for a five-year period. Energy consultants are evaluated after two years, including an assessment of the auditing reports he produced.

Assessment of the effectiveness and organisation of the response

Current estimates of the number of accredited DPEs suggest that the levels are sufficient to satisfy energy performance certificate requirements. Training provided by different organisations is also considered adequate by the sector. Certifications awarded by competent authorities guarantee that trainees have adequate competencies.

Initial estimates produced by public authorities when the law on EPC was adopted appear to slightly exceed actual needs, as 10,000 experts were estimated. One reason for this is that the number of transactions in the real estate sector has decreased because of the economic crisis. Another reason is that an EPC is valid for ten years, and therefore the initial demand for EPCs slowed down once the existing stock of buildings was surveyed.

Finally, a third reason is the emergence of another type of expert – energy auditors, or experts in energy renovation. Following Grenelle II, 15,000 zero interest rate eco-loans had already been granted by the end of July 2009 in the building sector. By the end of September 2009, the zero interest rate eco-loan had financed 35,000 energy efficiency renovation projects undertaken by private individuals.

Energy renovation is at the centre of the Grenelle II laws, which aim to reduce energy consumption in existing buildings by at least 38% by 2020. To achieve this, the new policy focuses on energy renovation experts, whose role is to determine the right energy renovations for a home, determine work priorities, and provide costs for all the building works to be carried out. They provide more specific recommendations than DPEs.

This sector is not as strongly regulated as the energy performance certificate sector, however, as no official accreditation is needed to become an expert. In addition, the independence of these experts is not guaranteed, as a company carrying out the energy audit can also provide energy renovation solutions (e.g. boiler installer), thereby jeopardising the transparency and objectivity of the audit.

According to DPE representatives and the building survey sector in general, DPE roles could be extended, particularly in terms of the advice and information provided to clients. The recommendations currently provided by DPEs are very general overall, and do not clearly identify priorities. The software used by DPEs also limits the scope of what they can produce in an audit.

Additional training would also be necessary to enlarge the range of activities carried out by DPEs. The sector is currently examining what additional competencies could complement the services DPEs provide.

Finally, there is a real need for clarification in terms of roles and functions of the different experts, auditors, and surveyors operating in the energy efficiency market. The multiplication of labels and certifications in the past decade has created a complex environment that lacks transparency and legibility for the consumers who have to request the services of various professionals. More transparency and clarity is needed to define the roles and competencies of each type of experts.

2.2.5.2. Qualit'EnR: renewable energy training centre

According to the latest ADEME study (2009) the number of jobs directly related to the renewable energy and energy efficiency sector is estimated around 260,000 FTEs (+27% since 2006). The renewable energy sector could create 200,000 new jobs by 2012.

Qualit'EnR was founded by five professional bodies (e.g. CAPEB which represents SMEs in the construction sector) as an association for the quality of renewable energy systems installations. It stems from the Quali'Sol initiative, a charter created by ADEME in 2000 to ensure that solar boilers installers adhere to demanding professional requirements.

Private users, companies in the construction sector and contracting authorities increasingly request construction and rehabilitation projects to be certified with green labels. Qualit'EnR helps consumers find a skilled professional able to provide advice and install a renewable energy system in their house.

Since 2006, this initiative targeting companies in the renewable energy sector has focused on quality training standards for renewable energy installers. Based on consultation with the main actors on the market, generic standards were created for each type of installation (e.g. solar boiler and photovoltaics).

The training programmes developed by Qualit'EnR are delivered by certified training centres. Once employees have been trained and assessed, green labels are given to the companies participating in the scheme (e.g. Quali'Sol).

Policy context

The framework act on implementing the environment round table confirmed France's renewable energy target of 23% of total final energy. France expects to produce an additional 20 million TOE in renewable energy per year by 2020.

Buildings, which consume more than 40% of final energy and produce more than a quarter of national greenhouse gas emissions, offer the main opportunity for energy savings in the short term.

The government has implemented a number of measures to stimulate renewable energy development. The 'national solar building plan' launched in 2000 consisted of the following ⁽⁴⁵⁾:

- (a) subsidy attribution for solar equipment purchases, in partnership with Regional Councils;
- (b) implementation of a scheme for installer professionalisation, with the quality charter Quali'Sol;
- (c) innovative and quality materials selection proposed by industry;
- (d) awareness-raising actions for project managers and commissioners;
- (e) implementation of a national communication campaign.

The plan was tailored to the specific needs of each region. In Alsace for instance, the target was the installation of 2,000 solar hot water systems by 2006.

A 2000 law requires companies to purchase electricity produced by renewable energy. EDF and other energy providers are obligated to purchase renewable energy produced by various installations ⁽⁴⁶⁾. This measure has considerably contributed to the development of the market, particularly for solar energy, insofar as it has transformed the installation of renewable energy systems by private owners into profitable and secure investments.

Finally the 'sustainable development' tax credit subsidises the purchase of renewable energy equipment by individuals, including: solar water heaters, heat pumps, and photovoltaic panels. The credit has been extended until 2012. Additionally, local authorities subsidise private owners when they purchase solar thermal equipment (€700 on average). Powerful new incentives to support building energy efficiency, including ecological bank loans at a zero

⁽⁴⁵⁾ Plan Soleil 2000-06, Avril 2003 : Premier bilan national.

⁽⁴⁶⁾ Obligation d'achat de l'électricité produite à partir des énergies renouvelables et de la cogénération et l'obtention d'un certificat donnant droit à l'obligation d'achat, loi n°2000-108 du 10 février 2000.

percent interest rate, and property tax exemptions, will also promote the use of renewable energy.

Skills gaps/weaknesses

Occupations in the renewable energy sector require very specific competencies. The installation of photovoltaic panels for instance requires competencies in water tightness and connections. Establishing electrical connections requires installers to work with very high electric currents, which have correspondingly high temperatures, and pose important risks for poorly trained people. Professionals must also be able to provide information on electrical network connections, financial subsidies and incentives for undertaking the installation of renewable energy, and electricity provision contracts.

Confronted with the urgent need to provide training programmes, this sector was also concerned about haphazard training development by opportunistic providers. The regional association for training in the built sector (AREF) highlighted the need for quality assurance to ensure that the training programmes offered adequate training ⁽⁴⁷⁾.

Skills needs identification

The Quali'Sol initiative was initially set up in the context of the 'national solar building plan', which was launched in 2000. The initiative focused on solar thermal energy integration into buildings (e.g. individual solar boilers and combined systems), by overcoming obstacles – particularly regulations – concerning the integration of solar energy into buildings.

As a result, there were nearly 800 jobs related to the solar thermal sector in 2002. By 2007, this figure rose to more than 3,000. Jobs in the solar thermal sector are expected to reach 13,000 by 2012.

In 2006 ADEME decided to take the Quali'Sol initiative further: it would be extended to other types of renewable energy, and the quality label would be completed by a full-fledged training scheme. The initiative was entrusted to an association of business representatives that adopted the name Qualit'EnR.

The association consisted of five professional entities representing the built sector, renewable energy manufacturers and consultants : Confédération de l'Artisanat et des Petites Entreprises du Bâtiment (CAPEB), Association professionnelle de l'énergie solaire (Enerplan), Union des Entreprises de génie Climatique et Energétique de France (UCF-FFB), Union Nationale des Chambres Syndicales de Couverture et de Plomberie de France (UNCP-FFB) and Syndicat des énergies renouvelables (SER). It set up working groups to identify sector competency needs, which were used to design the content of the training standards corresponding to different energy types (e.g. solar thermal, photovoltaics, biomass and geothermal).

⁽⁴⁷⁾ http://www.actu-environnement.com/ae/news/formation_metiers_verts_8718.php4.

Existing provision of education/training for the occupation

In terms of initial education, no training programme dedicated to the installation of renewable energy systems existed at the time when the Qualit'EnR training scheme was set up. There exist very few training pathways specifically dedicated to renewable energy. The French training system seems to be lagging behind in this sector, compared with other countries.

Overall, continuing training was more developed, but it remained at an embryonic stage. Specific training courses focused on renewable energy were rare in the early 2000s. ADEME provided two training courses focused on photovoltaics, but these were targeted at specialised professionals, with a high level of expertise, and the programmes were not delivered to more than a dozen individuals per session. These courses were therefore not adapted to the broader needs of the entire sector in terms of building construction and rehabilitation projects.

Considering the ambitious objectives set by the French governments in terms of renewable energy in the built sector, it was clear that these targets could never be achieved if a large scale training scheme was not launched (⁴⁸).

The skills response – Qualit'EnR training standards

Created by five professional entities: CAPEB, Enerplan, UCF-FFB, UNCP-FFB and SER, Qualit'EnR is an association for renewable energy system installation quality, operating since 2006.

One of the strengths of the initiative is that it is supported by key actors including ADEME and local authorities grouped in the Consultation and Orientation Committee, as well as supported by energy operators (e.g. EDF, GDF Suez, and Primagaz).

The scheme brings together more than 14,000 companies. It has been approved by ADEME and local authorities, and is used by professional organisations (e.g. CAPEB and FFB) and industry manufacturers. Qualit'EnR manages four quality schemes:

- (a) Quali'Sol for solar thermal (i.e. solar domestic hot water systems and combined solar systems);
- (b) QualiPV for solar photovoltaic (i.e. grid-connected photovoltaic generators);
- (c) Qualibois for bioenergy (stoves, boilers and inserts);
- (d) QualiPAC for aerothermal and geothermal energy (heat pumps).

The quality scheme labels from each of these schemes help draw attention to companies skilled in renewable energy system installation. Applicant companies must demonstrate the following:

- (a) activities such as the installation of relevant renewable energy systems;

⁽⁴⁸⁾ Interview with ADEME.

- (b) requisite insurance for the activities and installations performed, including general and decennial liability insurance;
- (c) at least one 'reference' person in the company who has significant installation experience or has completed Qualit'EnR-recognised training.

Training is a key pillar of the Qualit'EnR quality process.

Box 2: *Quali'Sol training – solar domestic hot water systems*

Quali'Sol training for domestic hot water systems lasts three days. The first two days are dedicated to the following topics:

- solar hot water systems;
- providing advice to clients and justifying the usefulness of solar hot water systems;
- bringing relevant technical advice;
- needs assessment;
- implementation;
- drafting and presenting a quote;
- knowing and explaining to clients financial support and administrative procedures;
- assisting the client in the reception of the system;
- preparing after-sales services;
- diagnosing failures;
- following up on solar hot water system installations;
- managing building sites in an environmentally-friendly way manner.

The last day of the training is dedicated to practical work dealing with safety aspects in getting on the roof, putting in service and maintaining as well as regulating the system.

Training is validated by a test: the participant needs at least 25 points out of 30 to receive a certificate.

To strengthen the quality of the training delivered, Qualit'EnR has formalised a certification process for the centres delivering the training programmes. Training providers must fulfil quality standards (e.g. fulfilment of training equipment specifications) and specific training delivered by Qualit'EnR is mandatory for trainers employed in the certified centres. Twenty-one training sessions were organised in 2008. The success rate for the exam validating the training is relatively modest, between 52 and 63%, suggesting that the knowledge and competencies of trainers are strictly assessed.

Today hundreds of skilled trainers cover the entire country to deliver high-quality training to installers. Qualit'EnR now represents:

- (a) 293 recognised trainers (54 training providers for module Quali PV Bat);
- (b) 96 approved training centres and 27 EFIQUA manufacturers;
- (c) 6 'general' training manuals;

(d) Over 5,000 labels delivered in 2008 following completed training programmes.

The initiative is funded by ADEME, regional councils, and members of Qualit'EnR association (representatives of the built sector and the renewable energy sector). Companies finance employee training through the mandatory financial contribution required from enterprises collected by organisations established and run by the social partners ⁽⁴⁹⁾.

Assessment of the effectiveness and organisation of this response

A sophisticated audit system ensures that the training provided by the certified centres is of consistent quality and responds to the needs of the market. Qualit'EnR arranges audits of systems that have been installed for individuals and are operating. Sites may be selected at random, to reach the goal of having each installer audited once during the three-year commitment period, or may be targeted (so-called 'triggered' audits) following the receipt of complaints received from regional authorities, ADEME, Espace Info Energie information centres, or individuals, for example.

The quality audit process provides:

- (a) an opportunity to assess the quality of installation work and whether the installer has upheld the commitments made in the Quali'Sol, QualiPV or Qualibois charter;
- (b) a learning opportunity for installers, since they may discuss with auditors possible ways to improve their installation practices;
- (c) an opportunity to update training manuals, taking into account defects that are commonly observed;
- (d) a tool to measure the effectiveness of public spending on renewable energy, since every audited site has received aid from a regional authority.

In 2008, 4,000 audits were carried out, which have contributed to ensuring that the training has been well assimilated by the professionals, and that learning exchanges can take place on the job, to further improve the quality of the service provided by the trained installer. Indeed, during the audit, the auditor advises the installer on possible improvements in the installation practices. The focus is on learning rather than control.

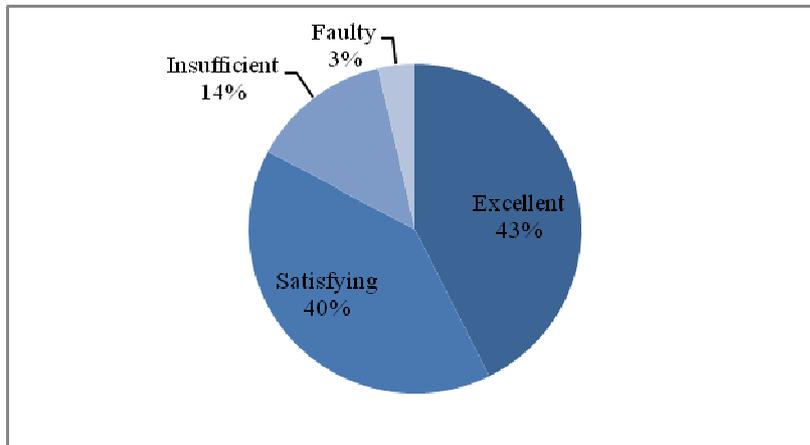
Audits from 2008 revealed that the level of service provision was excellent or satisfactory in the majority of cases.

The audits are also used to feed back into the design of training standards, depending on the identification of the most frequent errors and defects observed in the installed equipment. In

⁽⁴⁹⁾ The amount of the contribution and the calculation methods used vary depending on the type of enterprise involved and its staffing levels. The law requires that companies with less than 10 employees have to pay 0.55% of the gross annual wage bill (MSB); companies with 10 to 19 employees 1.05%, and companies with a minimum of 20 employees, 1.60%.

February 2008, Qualit'EnR gathered all the certified trainers to collect observations made on the ground. These elements were used to update training standards and ensure that they reflect market changes. Thus, the training for solar boiler systems was modified in 2009.

Figure 5: Audits of solar thermal equipment installed in 2008



Qualit'EnR is the first training programme to use the audit system. The advantage is to ensure that the training is relevant to companies, and it corresponds to needs on the ground. The training programmes are enriched with practical advice and concrete examples illustrating various aspects of installations techniques, including photographs that have been taken during the audits. As it is very easy to put in place such a system, and given its added value, ADEME considers that such a bottom-up process should be generalised to a wide range of training programmes in continuing education (⁵⁰).

In addition, the fact that manufacturers of renewable energy equipments are part of the association managing the Qualit'EnR training scheme ensures that the training programmes include the latest innovations in terms of materials, equipments and processes.

The initiative has created the conditions for a dynamic market for solar thermal, and an efficient training provision system. Since the creation of the Quali'Sol initiative and the wider scheme Qualit'EnR, the training provision in the installation of renewable energy equipment has considerably improved, from a quantitative and qualitative point of view. A recent study carried out by ADEME with training centres for continuing education revealed that around half of the training centres now offer training in photovoltaics equipments. However it seems that efforts should now focus on the production of energy based on wood, which is still underdeveloped in France (⁵¹).

(⁵⁰) Interview with ADEME.

(⁵¹) Interview with ADEME.

Recognising the success of the initiative, the Sectoral Committee working on Renewable energies in the framework of the Mobilisation Plan for Green Jobs recommended that companies' efforts to train their employees and adhere to quality labels should be rewarded by the state. Today these companies that invest in training are not particularly benefitting from their actions, since the market is also taken by less serious companies (MEEDDM, 2009).

If the training offer now seems adequate to cover the needs of the market, the real challenge will be the training of trainers. Indeed, the number of adequately trained staff in education institutions and training centres is currently not sufficient to ensure that the training programmes will be delivered. ADEME is providing training to teacher of the national education system; however this alone will not be sufficient. Important efforts in terms of human resources still need to be done, if the ambitious targets of the government regarding renewable energies are to be met.

Outlook

Qualit'EnR initiative is now viewed as a model for the rest of Europe. The first round of the European project 'QualiCert' (Common quality certification and accreditation for installers of small-scale renewable energy systems) which aims to define a qualification system for renewable energy installers in Europe by 2012, has been launched. Anticipating the obligation for all Member States (article 4 of the RES Directive) to develop certification schemes for installers of small-scale renewable energy installations, QualiCert proposes a concerted action among different Member States on the certification and accreditation of these installers.

2.2.5.3. Waste recycling operator

The qualification for the occupation 'Operator in the recycling industry' was created in 2000, following the joint work carried out by the recycling sector and the Ministry of Education to address the need for qualified staff specifically trained in recycling techniques in the growing recycling industry. This qualification is a Professional Skills Certificate which corresponds to a high school vocational diploma.

Since the 1992 law on waste, important efforts have been made to reduce waste disposal and develop the sorting and recycling of waste. The production of home waste doubled between 1960 and 2000 and only stopped increasing in 2002.

The recycling rate is steadily increasing in France, for all types of waste. However, figures are still below the rates of some other European countries, in particular concerning packaging (9th position in EU 15).

The recycling sector represents in France (⁵²):

(⁵²) <http://www.federec.org/docs/pdf/rapports-statistiques/2008/rapport-2008.pdf>.

- (a) 42.2 million tons of waste per year are recycled and transformed into 37.2 million tons raw material;
- (b) annual turnover: €11.3 billion;
- (c) annual investment : €615.5 million;
- (d) exportations : 7.8 million tons;
- (e) 2,400 companies, employing 33,450 staff. The workforce has increased by 2% annually in the past ten years;
- (f) the workforce is dominated by male employees (78%);
- (g) 81% of the staff is workers and employees. Managers represent 10% of the workforce.

The prospects for 2010 show positive developments, with more than 10% of companies anticipating to recruit new staff before the end of the year (FEDEREC, May 2009).

Recycling: a key objective set by Grenelle

The key objective set by Grenelle in terms of waste is the reduction in the production of household and assimilated waste and increasing the recycling rate of household and related waste (35% in 2012 and 45% in 2015 versus 24% in 2004) (MEEDDM, October 2009).

The reduction of waste at the source will be strongly incentivised, reuse and recycling facilitated and producer responsibility for waste resulting from their products extended. In parallel, the amount of waste destined for incinerators or for storage will be reduced overall; the new tools for processing residual waste (energy evaluation and storage) must strictly justify the extent of their use, and meet increased environmental and energy requirements for incineration. ‘The priority will no longer be incineration but waste recycling’.

For the period 2009-15, forecast tax revenue related to the Environment Round Table’s Commitment 24,528, revenue that will come from the local community and business should provide around €1 billion to fund prevention and recycling initiatives implemented by local authorities and other economic players. Regarding new investment (sorting centres, composting facilities, etc.), local authorities will be required to invest around €1.5 billion (compared with €1.9 billion for companies). The objective of a 7% reduction in household and similar refuse will serve to curb an increase in the amount of household and similar waste caused by population growth in France, as well as the related costs of collection and treatment. As of 2015, the gains in terms of avoided costs will come to over €200 million a year.

Local authorities will also get additional support through the increased rate charged for managing packaging, the development of the selective recovery systems recently set up (textiles, electrical and electronic appliance waste, newspapers and magazines, etc.) and the development of new sectors in the coming years.

In combination with all partners (the State, communities, economic stakeholders, recycling and processing professionals, environmental associations and consumers) a Waste management plan will be adopted to specify the actions to be taken between 2009 and 2012 to implement the decisions of the Environment Round Table.

Skills gaps and provision of education/training for the occupation

In the recycling sector, sorting out waste requires solid competencies to be able to separate and create homogeneous lots. Before the creation of the CAP ‘Operator in the recycling industry’ no specific training existed for recycling-related activities. Workers did not have the specific knowledge which was afterwards provided in the CAP. Specialised knowledge in sorting out waste was however in high demand in the sector ⁽⁵³⁾.

Staff working in the recycling sector would typically have a general CQP or would be trained on the job. The certificate was composed of 450 hours of training on general issues ⁽⁵⁴⁾. It was delivered by the sector and by certified organisations only. This certificate was very general and recognised within the sector only.

In addition, an important part of the training of workers in the recycling industry was done on the job, provided internally by each individual company, but this was considered as consuming in terms of time and financial resources. In addition, young people had limited opportunities to evolve within the company.

Because of the development of recycling in the past years in France, many jobs were created in the sector. Today, one ton of recycled waste creates more jobs than one ton of incinerated waste. Therefore it is anticipated that recruitment needs will increase.

FEDEREC highlighted the difficulty of the sector in terms of recruitment to the public authorities ⁽⁵⁵⁾. The sector also recognised the need to work with the Ministry of Education to create qualification that would provide specific training for the needs of this position. It was also important to work on a qualification that would be recognised by all institutions.

The skills Response

The CAP ⁽⁵⁶⁾ Operator in the recycling industries ⁽⁵⁷⁾ was created in 2000. The qualification was created with a twofold objective: to bring to a sufficiently high education level young

⁽⁵³⁾ Interview with FEDEREC.

⁽⁵⁴⁾ It must be noted that since then the CQP was diversified in nine specialised CQP.

⁽⁵⁵⁾ <http://www.cleantechrepublic.com/2009/11/17/un-nouveau-bac-pro-pour-les-operateurs-des-industries-du-recyclage/>.

⁽⁵⁶⁾ CAP corresponds to Level V in the national framework.

⁽⁵⁷⁾ Opérateur des industries du recyclage.

people who had a low education level, and to provide them with specific knowledge for the job of operator in recycling.

It was designed by FEDEREC, who negotiated its creation with the help of its training body, FORMAREC, together with the Ministry of Education. Professionals in the recycling industry at local were consulted to create a training programme specifically tailored to the industry, to address the absence of qualification in this sector.

At Ministry level, the design of the qualification was coordinated by the Committee ‘Sanitary and social sector: services to companies and local authorities’⁽⁵⁸⁾. CPCs gather social partners, employers and employees, to define the activities that are at the core of the qualification, and identify the necessary competencies needed to carry them out.

According to the description of the qualification in the national catalogue of occupations, the qualification holder will carry out activities in companies or public bodies specialised in sorting out waste and collecting material to be transformed in raw material for the industry. Once the waste has been collected, his/her role will be to identify, control, sort out and monitor the site. He/she will take part in processing the stock (conditioning). He/she will ensure the maintenance of the machinery and equipments used⁽⁵⁹⁾.

The components of the qualification are the following:

- (a) techniques for sorting out material;
- (b) reception techniques – conditioning and storing techniques;
- (c) French and history/geography;
- (d) mathematics and science;
- (e) physical education and sport.

The qualification is usually awarded after a two-year training programme, usually delivered by vocational schools (lycée professionnel) or apprentice training centres (CFA). A traineeship is to be carried out by students during the first and second year (between six and eight weeks per year).

The CAP, which is today the most frequently awarded vocational diploma, is designed to give pupils direct access to employment. In general, training programmes that correspond to this qualification are structured along 33 hours per week with 45% of professional and technological courses (Cedefop, 2008).

⁽⁵⁸⁾ ‘Commissions Professionnelles Consultatives’ are committees which define the activities that are at the core of the qualification, and identify the necessary competencies needed to carry them out. For the genealogy of qualification see: http://mimosa.cereq.fr/ReflWeb2006/index.php?lien=educ_fiche_dip&num=50022004.00#.

⁽⁵⁹⁾ <http://www.cndp.fr/archivage/valid/brochadmin/bouton/b065.htm>.

Since September 2002, the CAP has been set up in units, like the vocational baccalaureate, the vocational certificate and the advanced technical certificate. Table 6 describes the main unit of the qualification (Unit 1 – techniques for sorting materials).

Training programmes for this CAP are currently only provided in four regions in France, by the Centres for Social Promotion (MPS). Since 2005 the Aquitaine region has funded the provision of training for this qualification in Bordeaux. The other regions in which the training is provided are Oise, Nord Pas-de-Calais, and Rhone-Alpes. Seven sessions of the CAP have already been launched, six of which are already completed. Around 50 young people have received the qualification so far.

In general, classes have no more than ten students. In Bordeaux, the CFA delivering the training hosts young people between 16 and 25, usually coming from all over the country. The region is particularly active in supporting the students and is covering all their travel costs.

Table 6: Unit components of the CAP operator of the recycling industries

Unit 1 : techniques for sorting materials		Related technological skills		
C	Capacities	S1	S2	S3
C11	Collecting information which is useful for the activity	x	x	x
C12	Decoding technical information		x	x
C13	Processing information		x	x
C21	Analysing a request or an instruction			x
C22	Identifying material to be kept or discarded		x	
C23	Identifying dysfunctions and assessing their impacts			x
C24	Assessing the possible impacts of interactions between activity, work conditions and environment	x		x
C31	Managing a workstation			x
C32	Managing the supply in material and end products			x
C41	Controlling equipments before they are put into service			x
C43	Sorting material	x	x	x
C45	Ensuring maintenance of equipment and sites			x
C46	Conducting sampling, measures, controls and recording the results			x
C47	Implementing prevention measures for the adapted protection in case of danger	x		x
C51	Disseminating a message with appropriate means			
C52	Receiving clients and external partners at workstation			
C53	Debriefing on undertaken operations or on collected data			

S1: science applied to environment

S2: science applied to materials and products

S3: technology

Assessment of the effectiveness and organisation of this response

Companies that are members of FEDEREC are hosting the students during their compulsory in-company training period ⁽⁶⁰⁾. Success rate to the exams are close to 100%, and after being awarded the qualification the young graduates usually find jobs easily as skilled workers. Many of the young people who received the training became team leaders. Companies are very satisfied with the apprentices they have worked with within the scope of this CAP. They were limited examples of companies dissatisfied because the apprentice would not be adapted to the needs of the company.

Since the sector is suffering from a serious shortage of qualified technicians, the newly employed usually progress well within the companies where they work with the support of continuing training. In addition, the CAP is slowly entering the habits of the companies who now consider this option to recruit new staff.

The training centres work closely with companies which are in need of qualified workers. Cooperation with companies is usually good; however this requires a large amount of work. Indeed, contacts are often made with a single company managing several sites, which do not have the same needs in terms of staff. A long time can elapse between the first contact with the company and the signing of the contract between the young trainee and the company.

It must be noted though that because of the economic crisis, it can be difficult to find companies which are willing to receive apprentices. Indeed, they sometimes have to cut down their own staff and apprentices can be considered as an additional financial burden. Another reason is that the CAP takes place over two years and it can be difficult for a company to make a long term commitment.

Another difficulty highlighted by the sector representatives is the profile of the trainees. Indeed, their profile is sometimes inadequate, with a background in fields such a bakery or sanitary and hygiene. In addition, during the preparation of CAP itself, it also appeared that the apprentices, mostly those aged 23-25 and with prior working experience, sometimes lacked professional and financial motivation: some of them lost their interest in the qualification, whereas others were deterred by the low salary attached to the job ⁽⁶¹⁾. Therefore a limited number of apprentices do not complete the training ⁽⁶²⁾.

Outlook

⁽⁶⁰⁾ Apprenticeships are offered within a framework of an employment contract, between the 16-25 year-old (the apprentice), and an employer.

⁽⁶¹⁾ The scale of salary rates for apprentices is the following: 16-18 years-old: 25 %; 18-20: 41%; +21-26 : 53% of the minimum social wage.

⁽⁶²⁾ Interview with MPS Aquitaine.

The Grenelle Round Table workgroup on Waste highlighted the need to develop adapted training standards for specific occupations in the recycling sector, as well as the need for better recognition of experience of employees in the sector (VAE procedure), to improve the match between supply and demand on the labour market. The group also suggested ways to improve the image of occupations in the recycling sector with the general public (e.g. notion of ‘valoriste’ used in Quebec) (MEEDDM, Sept. 2007). Indeed a key obstacle identified by the profession in terms of recruitment is the poor image of occupations related to recycling, and the confusion with occupations in the garbage collection sector. This confusion makes young generations stay away from undertaking training geared towards the recycling industries. There is a clear need to valorise these occupations and inform the public on the nature of the recycling activities.

Therefore the Grenelle conclusions called for the business federations to continue their work towards updating training pathways and providing adequate training. It also highlighted the need to improve information and sensitisation of all actors involved in training to waste management issues, in particular recycling.

The recycling sector concluded a Contract of Prospective Studies (⁶³) with the Ministry of Employment, the conclusions of which will be published at the end of the first semester of 2010. This detailed report on the state of the sector and on the recommendation on the potential developments will provide the sector with useful information.

The need for qualifications at higher level has already been identified by the sector. Therefore a vocational baccalaureate (Bac Pro) will be launched next September in the CFA dealing with environment-related jobs in Artigues-près-Bordeaux. Whereas the CAP was created following the demand expressed by representatives of the sector, the idea of a vocational baccalaureate was suggested after the interest expressed by the apprentices in acquiring higher qualifications in this field. Indeed, the vocational baccalaureate was a logical continuation and complementary degree to the CAP for apprentices.

2.2.6. Case studies on greening existing occupations

2.2.6.1. FEE Bat

The FEE Bat training is targeted at all the occupations in the built sector: craftsmen, project managers, employees, and to a lesser extent architects. The broad coverage of the training reflects the fact that most occupations in the construction sector are affected by greening the economy and the main government measures adopted after Grenelle.

(⁶³) After an analysis of technological and economic evolutions of a professional sector/activity/branch, the Contrats d’études prospectives aims at giving a comprehensive vision of the needs in terms of employment and skills in enterprises, at analysing human resources management, organisation and labour conditions issues; and therefore to provide orientations in terms of training for future professionals and of life-long learning.

In France, the building industry uses up 70 million tonnes of oil equivalent, making it the biggest consumer of energy across all sectors of the economy. This energy consumption represents 25% of France's national emissions. All of these figures need to be reduced by 75% by 2050. The introduction of energy efficiency measures will impact all occupation of the sector, at all levels. The additional recruitment needs for enterprises of built sector to develop energy efficiency activities will be around 15,000 jobs per year for the next 12 years (i.e. 180,000 jobs). The development of the energy efficiency market relies on the availability of qualified manpower, in the building trades, in particular the occupations related to light work (second oeuvre), i.e. like electricity, plumbing, joinery, masonry.

A large-scale plan to overhaul energy and heating in buildings will reduce energy expenses over the long term, improve household buying power and help reduce carbon dioxide emissions. Improving the current stock of buildings (nearly 31 million residences representing 2.7 billion m² and over 814 million m² of heated commercial buildings) is at the core of the Grenelle objectives, which aim to reduce the energy consumption of the existing stock of building by 38% by 2020. This improvement entails the development and application of new technologies in future construction and implementation of a programme to accelerate renovation of existing buildings.

According to the Regional agency for environment and new energies Ile de France (ARENE), the most urgent needs concern the existing stock of building. The targets set by the Grenelle measures should give an incentive to the sector to quickly adapt their services. The launch of a zero-rate loan which encourages private owners to perform renovation work has already created opportunities for the market in terms of retrofitting and energy efficiency⁽⁶⁴⁾. 15,000 zero interest rate eco-loans had already been granted by the end of July 2009 for an average €18,000 per beneficiary.

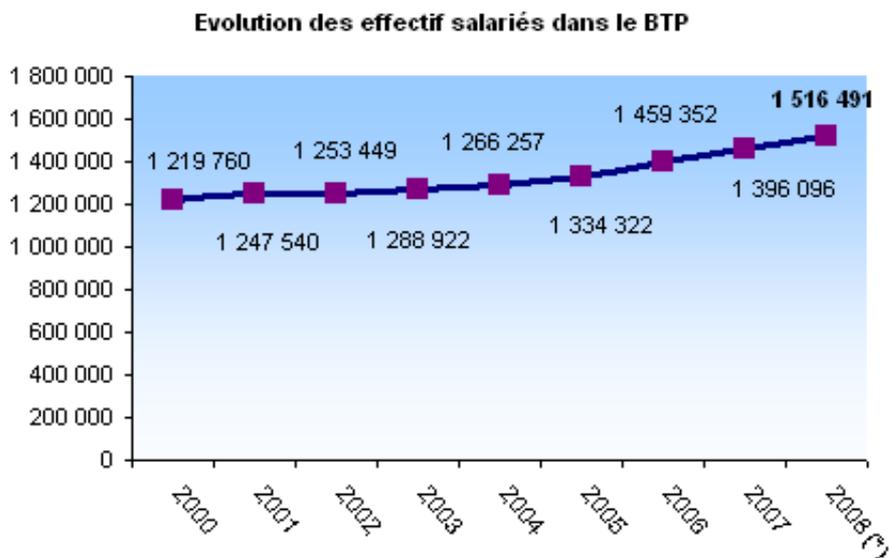
The built sector in France

The built sector is characterised by a strong increase in the number of people employed in the sector: + 24 % between 2000 and 2008. It represented 1,516,491 jobs in 2008⁽⁶⁵⁾.

⁽⁶⁴⁾ In 2009 the government launched the Plan Bâtiment (Built sector Plan) to respond to the energy efficiency objectives set by Grenelle. The Zero-rate loan is one of the key measures of the Plan.

⁽⁶⁵⁾ Observatoire Prospectif des Métiers et des qualifications, Métiers du BTP, <http://www.metiers-btp.fr/liens-utiles/Pages/vos-conseillers-formation-btp.aspx>

Figure 6: Trend in the number of people employed in the built sector, 2000-08



Source : Observatoire Prospectif des Metiers et des qualifications, Metiers du BTP ⁽⁶⁶⁾, 2009

More than 70% of the people working in the sector are building workers (ouvriers). Managers and engineers represent 12.2% whilst administration staff represent 16.6% of the workforce of the sector. The proportion of the sector workforce likely to be affected by the greening of their occupation is therefore substantial.

The age pyramid of the of the sector shows that the workforce is getting younger: the average age was 38.2 years in 2007, with workers under 25 representing more than 14%, whereas they represented only 7.7% in 2000. Women represent only 10% of the workforce in the sector, however this share is increasing.

Job creations in the future are expected to be more important in activities related to electricity and plumbing. Concerning the retrofitting in the residential and commercial building only, the turnover of the sector should double by 2012 and the net gain in terms of jobs is estimated to be 120,000 jobs.

Skills gaps/weaknesses

All occupations in the built sector are impacted by the changes described above.

Most job creations will concern retrofitting and energy efficiency. Needs are most important in the rehabilitation of existing buildings, rather than constructing new ones. The Grenelle measures will require a profound mutation of the sector, and an important efforts still needs to be done to adapt the labour market to future demands. Most training pathways do not

⁽⁶⁶⁾ Buildings and public works

integrate yet issues of energy efficiency and companies are struggling to recruit adequately qualified personnel. Young graduates entering the labour market have usually not acquired the necessary skills during their initial training.

The built sector is therefore confronted with major problems with recruitment of qualified personnel and with training, in both quantity and quality (Conseil Economique et Social, 2006). ‘Technician’ Levels (CAP/BEP) and BTS are considered as the most suitable for these new activities. However there is generally a negative image of these short vocational training pathways, strongly oriented towards professional skills.

The employers of the built sector estimated that, to train the workforce currently working in the sector (continuing training) and young people currently undergoing initial training, this would represent an effort of 212,500 people per year undergoing continuing and initial training. This would in turn require the training of 10,000 teachers⁽⁶⁷⁾.

The following new competencies are needed: knowledge of new technologies and technical solutions adapted to energy efficiency, cross-cutting knowledge of energy issues, understanding of other occupations related to building renovation and ability to advise clients in energy efficiency to adapt to new market demands.

A key challenge to skills development is the way the sector is structured. Currently the construction sector is structured along separate, independent building trades (‘corps d’état’). But energy efficiency efforts require a cross-cutting approach to energy efficiency across the built sector, combining competencies from traditional occupations⁽⁶⁸⁾.

Skills needs identification

A report by the Economic and Social Committee in 2006 on habitat and town planning policies related to climate change highlighted initial and ongoing training measures that demand a twofold approach to residential sector energy savings:

- (a) initiating and training people for occupations in environmental quality across three essential areas: prior diagnostic techniques, knowledge of all renewable energies and their specific conditions of use and installation in the light of their respective performance;
- (b) reorienting or revising the content of vocational training programmes to emphasise certain areas for which demand will increase: insulation and ventilation, heating grids, and interior equipment.

Sector professionals were extensively involved in the Grenelle working groups. They highlighted the need for a more global approach from the various occupations in the built

⁽⁶⁷⁾ Grenelle de l’environnement: l’enjeu de la formation; www.actu-environnement.com.

⁽⁶⁸⁾ Interview with CAPEB.

sector, privileging exchange and cooperation between the trades rather than the compartmentalised approach prevailing today. This is due to the fact that all the aspects of a building (plumbing, electricity, roof, etc.) need to be taken into account for energy efficiency purposes.

Existing provision of education/training for the occupation

More than 200,000 young people are undergoing initial training in the built sector. Most training pathways do not integrate the energy efficiency dimension. This has important repercussions for companies when recruiting these newly trained workers.

The average worker age was 38.2 years in 2007, and workers under 25 represented more than 14% of the workforce. Most built sector workers therefore completed their initial training long before energy efficiency and RE techniques were used in the sector. These techniques were not part of existing qualifications at that time. Even today, employers estimate that young graduates were not trained for these specific techniques, although that situation is changing. Considering that qualifications in the built sector are updated every three years (for level five and four), changes are slow to take place ⁽⁶⁹⁾.

Companies in the built sector are also increasingly providing continuing training to their employees: the share of workers undergoing training increased by 11% in 2008. Since 2000 the number of these trainees has doubled. In 2008 the sector spent €317 million on continuing training ⁽⁷⁰⁾. Workers undertake 62% of all training hours.

The skills response

Built sector professionals initiated various programmes to provide continuing training to equip their staff with energy efficiency knowledge. One of the main initiatives is the training body FEE Bat, which supports all built sector trades.

FEE Bat Training was set up in early 2008 to respond to the objectives laid out in Grenelle in terms of energy efficiency (i.e. a goal of 180,000 jobs related to energy efficiency and retrofitting in the next 12 years). This is a national initiative, launched by the built sector Federations in 2008, to train company managers, employees and craftsmen with a global approach to retrofitting (e.g. insulation and new heating systems), and providing them with competencies and tools.

The novel feature of this training effort is that it gathers professionals from different occupations (e.g. insulation and equipment) and encourages exchange of experiences to raise awareness regarding the changes needed in their occupation in terms of work methods and organisation.

⁽⁶⁹⁾ Interview with CAPEB.

⁽⁷⁰⁾ Observatoire Prospectif des Métiers et des qualifications, Métiers du BTP, 2009.

There are 90 centres authorised to deliver the training programme. Training is based on three short modules (with an average of two days per module).

Module 1 – competencies to advise and present the client with an overview of all the techniques and processes for heating, insulation and ventilation.

Module 2 – ability to use software to calculate energy waste (to carry out estimates of possible impact of the renovation work according to different options).

Module 3 – good command of all the techniques for the installation, maintenance and respect of norms and standards (e.g. ACERMI), focusing on specific technologies (insulation, heating etc.).

Another notable feature is that it is based on a voluntary scheme, whereby companies choose to register and support employee training, and funded by the voluntary contribution of energy providers. The costs for the beneficiaries are therefore very low (5% of the training costs), since 95% is covered by the ‘Certificats d'economie d'energie’ (Energy Saving Certificates) scheme, which is supported by public authorities and the professional bodies of the sector.

The Energy Saving Certificates scheme, introduced by Framework Act 2005-781 of 13 July 2005, aims to save energy in the residential and service sectors. It relies on energy providers to encourage their clients to be more energy efficient. It requires sellers of electricity, gas, domestic heating oil, liquefied petroleum gas and heating and cooling networks to reduce energy consumption. Energy sellers are therefore incentivised to encourage their clients to reduce their energy consumption.

Conducted under the patronage of public authorities (e.g. ADEME, DGEC, and DHUP), the initiative is piloted by a range of built sector organisations (e.g. ATEE, CAPEB, FFB, FF3C, la FG3E, FNSCOP, AFG and l'UFE), and coordinated by the Club ‘Certificats d'Economie d'Energie’. It was set up with the support of EDF, a major energy provider, which participates in the Energy Saving Certificates scheme.

The objective of FEE Bat is to train 50,000 professionals by 2010.

Assessment of the effectiveness and organisation of this response

The initiative has been remarkably successful. FEE Bat has already trained 18,000 craftsmen and entrepreneurs to recognise overall building energy performance and energy efficient techniques. The objective initially set for 2009 was only 9,000 trainees. Instead, the number of companies taking part in the scheme doubled between 2008 and 2009.

The breakdown is the following:

Module 1 – 8,611 trainees

Module 2 – 6,525 trainees

Module 3 – 2,589 trainees

This corresponds to approximately 250,000 hours of training ⁽⁷¹⁾.

Energy-related occupations represent 50% of trained professionals (electricians and plumbers-boiler), followed by insulation. They are mostly workers (artisans) but there are also project managers, employees, and a limited number of architects (whose companies are not part of the scheme and therefore attend on their own initiative).

During the three modules, all the participants learn about other occupations and are therefore able to provide global solutions to their clients. ADEME is currently carrying out an evaluation of the FEE Bat scheme. Surveys conducted with participants revealed a very high satisfaction rate, mostly due to enriching exchanges between the different trades, and also to competencies gained from a technical and commercial point of view. For more than half of the trainees, FEE Bat helped them to understand the necessity of a global approach to energy efficiency and the interaction with other occupations ⁽⁷²⁾.

Trainee satisfaction is very high with respect to the length of the training and the organisation of the modules. Possible adjustments will be examined related to adapting the modules' duration depending on the initial knowledge of the trainee.

Initial evaluation results revealed that difficulties are mainly encountered in relation to the assimilating legal and commercial aspects of the training (e.g. provision of advice regarding tax exemptions, fiscal advantages, and precise estimates of economic gains). Module 2 (i.e. software use) also emerges as the most difficult to assimilate, because of the problems related to software costs, reliability issues, and questions related to market readiness (i.e. private owners) for the use of this software type.

The FEE Bat scheme, based on short modules, is currently considered adequate at equipping the sector's workforce with needed skills. The creation of new diplomas does not seem urgent, as occupations ultimately remain centred on core trades (métiers), including builders, masons, plumbers, and roofers. The core trade notion is considered more important than the emergence of 'new' occupations ⁽⁷³⁾.

According to ADEME, it will be necessary to include a 'sustainable techniques' module (techniques durables) in built sector training pathways (initial vocational education). To assess the mismatch between initial training and the skills needs in the sector, the Ministry of Education has launched a vast study on labour market needs and new competencies needed in the built sector. The Ministry must determine how these new issues should impact the existing

⁽⁷¹⁾ Interview with CAPEB.

⁽⁷²⁾ Interview with ADEME.

⁽⁷³⁾ Interview with CAPEB.

training standards, and if it is necessary to create a new diploma at Ministry level. They have so far adopted a prudent attitude, as time is needed to confirm the need for a new diploma.

Ultimately, initial training standards will probably be updated to integrate these new competencies. Techniques constantly evolve, however, and sector representatives believe that continuing training will remain indispensable to quickly updating worker's skills in line with market demand and changes related to the green economy.

Another element to consider is that new retrofitting demands can be addressed by the joint intervention of two different occupations (electrician and roofer for photovoltaics), provided they have the adequate skills. The creation of a new qualification that would cover these double sets of competencies would also entail a longer training pathway.

The built sector committee in the mobilisation plan for green jobs launched in 2009 recommended the extension of FEE Bat, and training for 120,000 persons by 2012. The financial support mechanism should be extended to other sponsors beyond energy providers. Additionally, the scheme should be extended to other built sector trades (e.g. architects, construction sector economists, technical auditors, and trainers) (MEEDDM, Janvier 2009).

2.2.6.2. *Vocational baccalaureate in farm management*

Farm managers tend animals, raise crops, plan maximum yield strategies, organise farm administration, work machinery, organise associated businesses, and manage staff. They need to have technical and practical competencies, coupled with the ability to make sound business decisions.

The agriculture sector developments have transformed the conditions under which farm management activities are carried out. Social demands in terms of environment, quality and traceability have become increasingly important in the daily activities corresponding to this occupation. Production related activities must be carried out within regulatory frameworks and norms, but beyond that they must also take into account good practices in terms organic farming, sustainable development, and quality standards.

In France the 'farm manager' qualification has existed since 1998, with four specialisations according to four systems of agricultural production: crops, stockbreeding, horse breeding, and vineyards. The vocational baccalaureate in farm management⁽⁷⁴⁾ – baccalauréat professionnel conduite et gestion de l'exploitation agricole – (CGEA) was reformulated in 2008⁽⁷⁵⁾.

⁽⁷⁴⁾ Level IV in the National Qualification Framework.

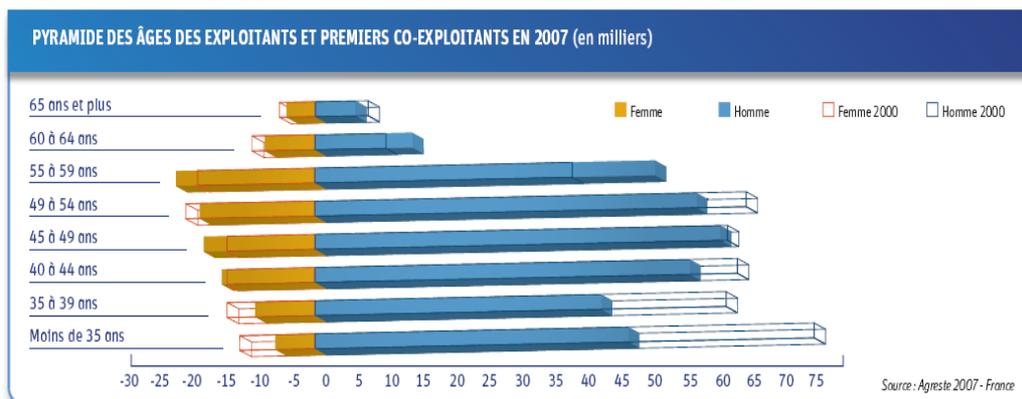
⁽⁷⁵⁾ <http://www.cncp.gouv.fr/grand-public/visualisationFiche?format=fr&fiche=1916>.

Sector overview

The agriculture sector in France represented 335,233 farms in 2007, and 1,187,350 employees (FNSEA, 2009). Around 25,000 individuals work in organic farming.

The workforce is dominated by men, and is rapidly ageing. The age structure shows that the ‘baby-boom’ generation (now aged 50-65) is about to retire, creating important job opportunities in the short term.

Figure 7: Age pyramid of exploitation managers in 2007

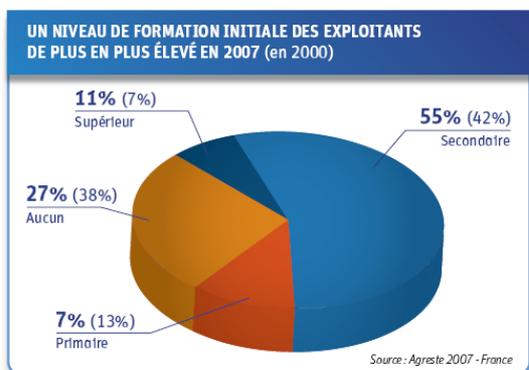


Source: FNSEA 2009

The agriculture sector workforce is also characterised by increasing education levels in terms of qualifications held by people employed in the sector. Recruitment prospects are positive for 2009-10, particularly for qualified workers (47% of planned recruitments). In 2008, 21% of employers declared that they had encountered difficulties recruiting a sufficient number of people in 2008.

In 2009 the number of students in vocational agricultural education was nearly 173,000. Female students represent 51.7% of the total.

Figure 8: Level of initial training in 2007



Source: FNSEA 2009

Organic farming in France – the policy context

Grenelle Round Table conclusions (MEEDDM, Nov. 2007) highlighted that climate change is raising difficult issues for farmers and demanding that they adapt, diversify and contribute to the global reduction of greenhouse gas emissions. Agriculture contributes to approximately 19% of greenhouse gas emissions in France. Intensive production methods often pose a high risk to the environment, even threatening the sustainability of agriculture itself.

Important changes in farming practices have taken place in the last ten years or so. A deeper transformation will also be required in all aspects of farming, revisiting the bases of conventional agriculture in order to reconcile demand for quantity and economic efficiency with resistance to climate change and environmental realities.

Grenelle defined the following objectives in terms of achieving sufficient organic agricultural production:

- (a) supporting the structure of the sector: gradually moving to 20% organic production by 2012 in orders placed by public catering services (20% organic produce by 2012) and evaluating that policy with a view to its extension to all collective catering through multi-year supply contracts;
- (b) consequently, switching 6% of farmland to organic farming by 2010, 15% by 2013 and 20% by 2020; organic farmland could be preferentially sited in the 700,000 hectares around drinking water collection points to protect this water resource and reduce treatment costs by preventing pollution at source. To achieve this objective, it is essential to restructure the farming sector. €3 million per annum will be allocated to the organic agency to do this. In addition, tax rebates for organic farming will be doubled from 2008, and if necessary, additional resources can be found;
- (c) extending the use of ecologically productive farming practices to all areas:
 - setting up a voluntary environmental certification scheme for farms in 2008, with grades up to A for HVE based on a simple reference system of results indicators;
 - allowing the integration of environmental requirements for AOC from 2008, for products on a voluntary basis;
 - having 10% of products HVE-certified from 2012;
 - negotiating multi-year contracts with supermarkets to develop HVE and organic produce.
- (d) achieving certification for 50% of farms by 2012:
 - providing a bonus to young farmers who set up HVE or organic farms from the outset;
 - public support for new farms (% fulfilling public orders);

- two approaches regarding the separation of roles between vendor and prescriber have been suggested over the next three years:
 - (i) more or less total separation,
 - (ii) or, as proposed by FNSEA, an obligation for a written recommendation by the seller.
 - having all secondary school farms HVE certified by 2012 and introducing biodiversity, environmental effects of inputs and soil function modules into the curriculum;
 - developing training courses as an alternative to disciplinary action;
 - increasing funding for rural development and the agricultural environment during the CAP health check in 2008.
- (e) promoting the organisation of agricultural and non-agricultural players: when a qualified majority of players agrees on advanced farming practices, these practices are by extension of the rules applicable to other operators in the whole of the area concerned;
- (f) target train 20% of farmers in new environmental techniques by 2012 (e.g. low-input farming methods).

The Committee working on agriculture and forests as part of the mobilisation plan for green jobs estimated that the Grenelle measures should lead to the creation of around 10,000 jobs in the agriculture sector by 2020. Of these, 7,600 jobs will be created in organic farming and direct local supply (MEEDDM, 2010). 600 new jobs should be related to training needs.

Organic farming and reductions in the use of plant protection products are inseparably linked to objectives regarding water quality and the more complex objectives of enhanced biodiversity and health. The first and second Environment Round Table impact studies carried out by the MEEDDM set a target of 6% for organic agriculture relative to useable agricultural area by 2012. The costs of developing organic farming (€79 million/year) are largely offset by gains related to water quality, reducing the harmful effects on health through lower nitrogen use and rehabilitated aquatic environments (€61 to €65 million/year). It should be mentioned that France is a net-importing country of organic farm produce (Commissariat General for Sustainable Development, Oct. 2009).

A cost transfer may be operating within the sector: agro-suppliers' losses in terms of sales mean savings for farmers. Plant protection products cost €1.7 billion a year, which is paid by the users. This represents a 10% reduction in their use, implying savings of €170 million for users. In practice, savings made by farmers on their consumption of plant protection products should be redirected to other farming techniques related to greater diversity of production and redeployed to agricultural machinery and creating new jobs. The agro-supplies sector is comprised of companies that cover a range of different areas, making them likely to offset a drop in sales in one area (i.e. plant protection products) by developing growth in another area

or areas (e.g. agronomic consulting services, agricultural machinery, and production diversity).

Consolidating French farm production geared to products that meet high environmental standards and developing a certification procedure with the same objectives are factors conducive to improving the market share of French enterprise.

Skills gaps/weaknesses

In the farming sector, measures expected to have the most significant economic impact include:

- (a) reductions in the use of plant protection products, together with the professional training development;
- (b) development of organic farming products;
- (c) development of an environmental certification procedure for farms;
- (d) development of research in the field of sustainable farming;
- (e) increased energy-generation autonomy for farms, through the development of renewable energy sources.

The impact on the labour market entailed by the policy measures taken since 2007 are higher levels of qualification for operators, both at the level of farm work, as well as upstream and downstream of this sector.

The following factors will play a varying role in job volume, but are likely to result in an overall rise in the number of agricultural sector jobs:

- (a) fewer jobs in the plant protection products sector;
- (b) stable or higher number of jobs in research and development in areas related to agro ecology, in developing new sectors fostered by the diversification of production, and in the agricultural machinery sector, among others;
- (c) growth in training professions, from agricultural consulting to agro-supplies;
- (d) increased demand for farm labour, in place of chemical inputs;
- (e) development of activities related to renewable energy generation on farms.

At this stage, it has not yet been possible to assess composite effects. The Ministry of Food, Agriculture and Fisheries has, however, estimated that a million people need training. The cost of these training measures for everyone involved in the distribution, consulting and use of plant protection products is estimated at €200 million over the period 2008-11.

Identification of skills needs

The Grenelle Round Table identified the need for professional and continuing training. In particular, improved science teaching in agricultural secondary schools, and strong links with research in continuing training to guarantee the rapid spread of new methods are needed. Grenelle also recommended the introduction of ‘agriculture and biodiversity’ modules in agriculture, agricultural science, horticulture and park management courses.

The ‘Agriculture biologique, horizon 2012’ Plan, adopted by the Ministry of Agriculture in 2007, therefore proposed a strategy for the development of organic farming, focusing particularly on research, development, training, territories and collective catering. In the context of the Plan and the Grenelle conclusions, the orientations for the school year 2009-10 are characterised by the integration of organic farming modules in all agricultural education.

In parallel, the Ministry of Agriculture launched a large modernisation programme in 2007 for its 17 vocational baccalaureates (representing a change from a two year programme to three years). Therefore, the driver behind the Baccalaureate reformulation was both political and regulatory.

The Ministry of Agriculture, Transformation, Services and Land Use Management CPC was consulted on the necessary transformations needed for qualifications under reform, including the ‘Baccalauréat professionnel CGEA’. Through the CPC, all of the partners from the agriculture sector were involved (e.g. employers, employees, public authorities and qualified experts). During the analysis phase, a preliminary study was undertaken to determine whether it would be appropriate and how to revise the existing qualification. The study was conducted in the field, with direct sector professional consultations to review their expectations, their needs, and necessary competencies ⁽⁷⁶⁾.

Farm managers’ activities have undergone important changes, particularly in relation to the integration of social demands related to environment, quality and traceability. Production must adhere to applicable regulations, but also account for good practices in terms of organic farming, sustainable development, and quality standards. The occupation has also evolved in terms of management skills, which are increasingly important, as being a farmer today means managing a business that is integrated into collective organisations (e.g. cooperatives).

Existing provision of education/training for the occupation

The vocational baccalaureate ‘farm manager’ has existed in France since 1998, with four specialisations according to four systems of agricultural production: crops, stockbreeding, horse breeding, and vineyards.

⁽⁷⁶⁾ Interview with Ministry of Agriculture.

Diplomas are generally revised by the Ministry every five to ten years, because after ten years the content of the training standards might need to be updated, or the occupation profile modified, to reflect changes affecting the sector.

In 2007, the Ministry launched a large-scale revision programme for diplomas, which was related to the following factors:

- (a) modernisation of vocational baccalaureates to align the duration of the vocational training programme with general education and training programmes (three year degrees);
- (b) a decision to integrate green issues across all qualification standards under the responsibility of the agriculture ministry so that organic farming curricula are systematically integrated in particular.

The June 2008 circular entitled ‘Emergence and diffusion of sustainable farming practices’ established the systematic integration of biodiversity in technical agricultural education. It stated that approaches to organic production techniques should be part of the training standards for existing qualifications and integrated in qualifications in the process of being reformulated. For example, before its reassessment in 2008, the vocational baccalaureate in farm management did not clearly integrate a reference to organic farming.

The skills response

The vocational baccalaureate in farm management was reassessed in 2008 ⁽⁷⁷⁾. It is one of the most important qualifications delivered by the Ministry of Agriculture. A total of 3,555 students obtained the qualification in 2008 (DGER ⁽⁷⁸⁾, 2009).

Vocational baccalaureates were created as part of a large-scale undertaking to improve the image of vocational training in the 1990s. In general this qualification corresponds to:

- (a) 46% time devoted to general instruction;
- (b) 30% time devoted to technical instruction;
- (c) 24% time devoted to enterprise-based apprenticeships.

The main changes made to the qualification in 2008 include (Ministère de l’alimentation, de l’agriculture et de la pêche, 2008):

- (a) redefinition of the occupation ‘farm manager’:
 - production activities are still at the core of the occupation;
 - services and transformation of activities are further emphasised;

⁽⁷⁷⁾ <http://textes.droit.org/JORF/2008/02/21/0044/0023/>.

⁽⁷⁸⁾ Directorate General for Education and Research

- a collective dimension to the occupation is highlighted (cooperation, common activities etc.);
- emphasis on complex issues related to ‘piloting’ agricultural exploitation (local, national, international level);
- a clear framework for carrying out agricultural activities, including regulatory frameworks, contracts, and quality standards;
- stronger integration of the social dimension and new requirements related to health, environment, and safety.

(b) training standards:

- some modules are unchanged (i.e. mathematics, data processing, chemistry and energy);
- some modules are partially rewritten: MP2 Knowledge of living systems, and MP11 and MP12 Economics and Management. The MP2 Module is presented in Table 7;
- one module is modified (MP4 Piloting the exploitation).

(c) periods of professional training include a 12 week individual traineeship, and a collective traineeship on ‘Reduction of the risks related to the use of phytosanitary products’ (two days). During the two days, the focus is on:

- evaluation of risks related to the manipulation and use of these products for the user and for the environment;
- solutions aimed at reducing the use of phytosanitary products and existing alternative solutions.

The new vocational baccalaureate focuses particularly on:

- integration of issues related to environment and health, in the context of sustainable development, and particularly in the use of phytosanitary products;
- decision-making and adaptation / readjustment capacities;
- the notion of ‘piloting’ a business rather than managing;
- adaptation to local contexts.

Additionally, new components added to qualification training standards ensure that the future farm manager is equipped with:

- a solid knowledge of production cycles and good practices from the perspective of sustainable development;

- (b) the ability to control interactions between exploitation and the environment for the best use of natural resources, landscape and renewable energies, with a good awareness of sanitary safety issues ⁽⁷⁹⁾.

Table 7: Module MP2 – Objective 4 Impact of human activities on eco-systems

Module MP2 – Knowledge of living systems (70h)		
Objective 4: Impact of human activities on eco-systems (29h)		
<i>Content</i>	<i>Competencies</i>	<i>Teaching Recommendations</i>
<i>4-1 Identify the impacts of production systems on the territory, from a sustainable development perspective</i>		
Impact of the production system on the landscape, biodiversity, soil, and water	Acquire methods to collect data, establish correlations between collected data, carry out a synthesis/review	Implement this objective early enough so that the methods learnt can be applied to MP4 (Piloting the exploitation)
<i>4-2 Identify and understand the impacts of human activities on the environment</i>		
Climate change: greenhouse effect, consequences of modifications for the planet	<ul style="list-style-type: none"> understand the mechanisms of the greenhouse effect. identify effects of human activities at a local, regional, and global level 	Carryout an experiment on the greenhouse effect, based on concrete data and knowledge of the carbon cycle
Biodiversity	Understand the impacts of human presence on biodiversity	Based on observed facts and information collection in the field
Other impacts		Another theme to be identified based on local context / opportunities

Assessment of the effectiveness and organisation of this response

The first session for the renovated baccalaureate started in 2008, and the first graduates should be qualified in 2010. It is therefore too early to present an assessment of the overhaul of the qualification, and its impact on the labour market. Considering the mechanism in place in the Ministry for the identification of skills needs and thorough consultation with sector representatives, the updated qualification is expected to respond to sector needs ⁽⁸⁰⁾.

The flexibility provided by adjusting or updating training standards ensures a high degree of responsiveness on the Ministry's side in relation to evolving skills and competencies. Indeed, the adjustment of training standards (référentiel de formation) can be easily accomplished through simple memoranda to be circulated within the Ministry. This process is both easier

⁽⁷⁹⁾ See Qualification standard from <http://www.chlorofil.fr>

⁽⁸⁰⁾ Interview with Ministry of Agriculture.

and faster than reformulating the qualification standards and job profile whereby the diploma has to be modified by a new law, after consultation with all stakeholders (CPC).

The Sectoral Committee on agriculture and forests estimates that training needs are well covered overall since many qualifications have been recently updated to integrate sustainable development issues. They did however highlight the urgent need to educate trainers, i.e. approximately 20,000 teachers in the agricultural education system (MEEDDM, 2010).

2.2.6.3. *Training in ecodesign*

Ecodesign aims at reducing the environmental impact of products, including energy consumption, throughout their entire life cycle. It integrates environmental issues from the initial design stage, assesses impacts using various tools and methodologies, and minimises impacts by identifying adequate measures (e.g. use of different materials, energy efficiency, and recycling).

Information concerning the product's environmental performance and energy efficiency must be as visible as possible for the product itself, thus allowing consumers to compare before purchasing. Ecodesigners can improve the technical, energy, ecological and economic performance of products, whilst minimising negative environmental impacts.

Ecodesigners' main competencies include the ability to:

- (a) integrate environmental criteria in the product design process, together with technical and economic dimension – this will improved the image of companies and consumers' confidence;
- (b) encourage companies to integrate environmental dimensions in their products and systems to comply with European regulations – improving environmental management;
- (c) prevent environmental risks related to a product to better control consequences – improving the environmental quality of products;
- (d) account for the 'greening' of administrations, social demands and the evaluation of consumption habits – Adding value to products, and creating new opportunities and innovation;
- (e) use in a rational way energy production installations and intervene in their selection in order to ensure continuity and quality of services – decrease production costs.

Ecodesigners work in a wide range of sectors, e.g. the built sector, mechanics, energy production, transformation industries, agro-business, hospital sector, local authorities and consultancies. Ecodesigners' competencies have become increasingly important for various job profiles, including project manager, responsible for qualifications, eco-product designer, energy consultant and waste manager.

The following job profiles can be distinguished (APEDEC ⁽⁸¹⁾, 2006):

- (a) job profiles with explicit ecodesign content: these include ecodesign consultants (80 to 100%); lifecycle analysis engineers (50 to 100%); ecodesigners (10 to 50%); support to companies and local authorities (10 to 50%);
- (b) other job profiles where ecodesign training is an added-value but not a fundamental component: design engineer; ‘quality, safety, environment engineer’; environment auditor; conception and development project manager; financial analyst; communication manager; and NGO manager.

Economic and policy context

Ecodesign is one of the key priorities of the national sustainable development strategy since 2003. The Integrated product policy focuses on the continuous improvement of products and services in a lifecycle approach. It covers all the stages from the natural resources extraction, through design, manufacture, assembly, marketing, distribution, sale and use to their eventual disposal as waste. It also involves many different actors such as designers, industry, marketing people, retailers and consumers. IPP attempts to stimulate each of these individual phases to improve their environmental performance.

European Directive 2005/32/EC of 6 July 2005 establishes a framework for setting requirements for environmental design of energy-consuming products ⁽⁸²⁾. The Directive, updated in 2009, now applies to a wider range of products.

Several government initiatives aim to fulfil the potential of the Grenelle measures, and encourage the growth of eco-activities in France. These are defined as the production of goods and services relating to environmental protection and natural resource management (Commissariat General for Sustainable Development (Jul. 2009). This includes environmental protection activities within companies and those which represent a cost rather than an income source. In 2008, a Strategic Council for eco-industries was developed as part of the Ecotech 2012 strategic plan.

In addition to regulatory incentives, more and more companies adopt ecodesign approaches and integrate environmental dimensions in product conception and services, in order to anticipate market developments, convey an eco-friendly image, and ensure that they remain innovative. According to a study carried out with companies, 50% of ecologically designed products did not previously exist, 40% replace older products, and 10% are added to a range of existing products (Chambre de commerce, industrie et services et al., 2008). It is also

⁽⁸¹⁾ French Network of Ecodesign Experts

⁽⁸²⁾ The Directive applies to heating and water heating equipment; electric motors; lighting in the residential and tertiary sectors; domestic appliances; office equipment in the residential and tertiary sectors; consumer electronics; and HVAC (heating, ventilation and air conditioning) systems.

important to note that consumer demand is also driving this trend, as they increasingly favour the purchase of ‘green’ products.

Since 2001, ADEME has developed a policy to support research and development activities related to ecodesign. In 2007, Areva, Steelcase, SEB, Plastic Omnium, Renault, and Veolia Environnement decided to join efforts in research related to ecodesign and recycling by creating the club Créer (Cluster Research : Excellence in Ecodesign & Recycling)⁽⁸³⁾. Demand for products with low environmental impact is constantly growing, as illustrated below.

Table 8: Average annual growth rate of eco-products (ADEME, 2001)

Eco-labelled products	24%
Fair trade product with the Max Havelaar label	44%
Organic cosmetics with the Cosmebio label	37%
Eco-labelled cleaning products	210%
Sales of class A, B and C cars	6%
Balance of socially- responsible investment funds	47%
A and A+ cold appliances	42%
Solar water heating (m ²)	69%

Skills gaps/weaknesses

It is expected that industry needs in terms of staff trained in ecodesign will increase in the coming years. These needs are due in part to increasing regulatory pressure (e.g. European Directives ROHS, DEEE, and REACH), which clearly focuses on ecodesign. Additionally sustainable development reports encourage companies to communicate their environmental performances. According to APEDEC, jobs related to ecodesign consulting and ecodesigners are expected to show the biggest increase.

According to a metallurgy sector representative⁽⁸⁴⁾, some ecodesign principles such as energy consumption reduction have been industry preoccupations for a long time, insofar as efforts to minimise costs are part of the concerns of every company. The need for new skills and competencies has been created by the emergence of new technologies and better knowledge on environmental issues that can be applied to the modes of production. These additional competencies require adaptation of existing qualifications and the creation of new training pathways in certain cases.

Existing provision of education/training for the occupation

⁽⁸³⁾ http://www.actu-environnement.com/ae/news/ecoconception_oree_entreprises_label_ademe_etude_8520.php4.

⁽⁸⁴⁾ Interview with an IUMM representative.

In the past decade, a number of initial training programmes have integrated ecodesign in their curriculum. According to the APEDEC, the key drivers behind the rise of ecodesign are (APEDEC, 2006):

- (a) new ecodesign-related legislation, and the recognition of ecodesign as an innovation and competitiveness factor;
- (b) teachers willing to develop the ecodesign theme, in the context of the higher education LMD (Licence-Master-Doctorat) reform;
- (c) increasing student demand.

A 2006 APEDEC study identified 22 training courses (initial training) related to ecodesign (at least 20 hours of training), with varying degrees of training specialisation: from one structured ecodesign component ('basic notions'), to courses entirely dedicated to ecodesign ('expertise' level). For most of the training programmes identified, ecodesign is only a component in the curriculum, and comes as an addition to the main area of specialisation (conception, design or environment).

The number of training programmes specifically dedicated to ecodesign has clearly increased. Before 2005, only four qualifications were dedicated to ecodesign. A second wave took place after 2005 with the creation of five new qualifications, including the vocational Licence in Ecodesign, Energy and Environment (E.C. 2E) in University Nancy 2 (Epinal).

Consequently, the number of students trained in ecodesign has dramatically increased since 1996 to approximately 500 in 2007. More than 100 of these received training completely dedicated to ecodesign. At the time of the study (2006), the Licence E.C. 2E had just been created.

Finally, the study highlighted the lack of continuing training in ecodesign, as well as a number of training programme weaknesses, as highlighted in Table 9.

Table 9: *Strengths and weaknesses of the provision of ecodesign training in 2006* ⁽⁸⁵⁾

Strengths	Weaknesses
<i>Training programmes fully dedicated to ecodesign</i>	
Sustainable offer of quality training pathways dedicated to ecodesign	Lack of continuing training
<i>Training programmes including ecodesign</i>	
Multiplication of ecodesign training courses in engineering and design schools	Lack of ecodesign training in business schools Insufficient training in engineering schools
Initiatives to integrate ecodesign approaches in other subjects	Optional courses provided to a minority of students
Student satisfaction	Uncertain sustainability of the training

⁽⁸⁵⁾ Based on the APEDEC/AADEME study.

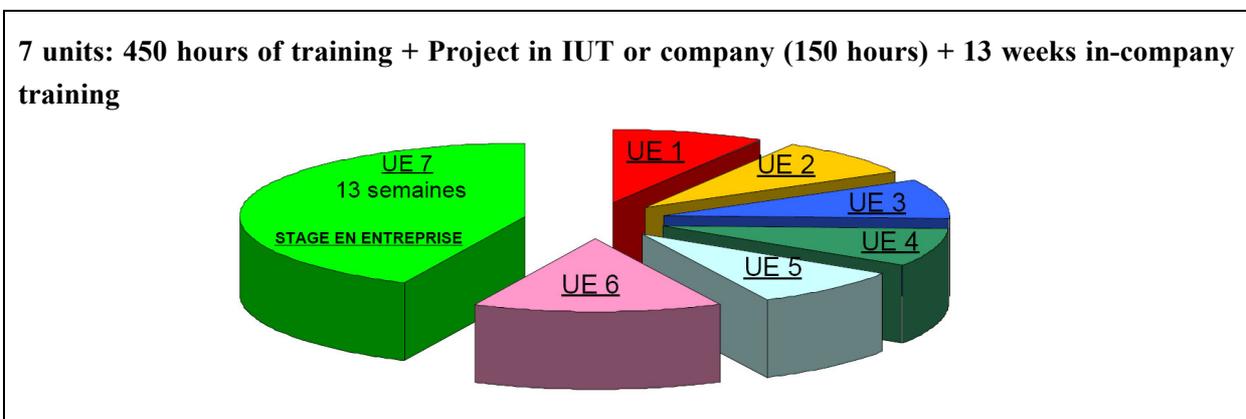
Diversity of approaches (designer/architects, engineers, managers) Cooperation initiatives	Lack of dialogue and exchange of experience on training
---	---

The skills response

The vocational licence in Ecodesign, Energy and Environment (E.C. 2E)⁽⁸⁶⁾ at University Nancy 2 was created in 2006⁽⁸⁷⁾. It was specifically designed to address industry needs stemming from increasing end-user expectations related to environment and sustainable development from the initial design phase of industrial products⁽⁸⁸⁾. The qualification was designed to have a broad scope in terms of competencies, and to open onto a wide range of job profiles (e.g. project manager, consultant, waste manager, and public authority officer). This licence was the first to integrate such diverse aspects as energy production, industrial product design, waste recycling and ecodesign methodologies.

The vocational licence in ecodesign, energy and environment was designed by the IUT (Institut universitaire de technologie) Epinal of University Nancy 2, in collaboration with: companies (i.e. SEB, Steelcase, Decouvelaere, Rexnor, TRW France, Daillot, EDF-GDF, Papeteries Grégoire, and AOP); business representatives (i.e. ATEE, UIMM, Fédération de la plasturgie, UNTEC); and public bodies (ADEME, AREL, Promotech, CCI Vosges, and Epinal city).

Figure 9: Units of the licence professionnelle Eco-Conception en produits industriels, energie, environnement (E.C.2 E)⁽⁸⁹⁾



⁽⁸⁶⁾ The vocational licence (licence professionnelle), a diploma equivalent to three years of post-Baccalaureate training, was created in 1999. Set up in partnership with companies and social partners, the qualification was created to facilitate the integration of young people into the labour market. The training includes 12 to 16 weeks of traineeship in a company. Social partners have a consultative role in the National Expert's Board for vocational Licence

⁽⁸⁷⁾ Répertoire National des Certifications Professionnelles (RNCP) <http://www.cncp.gouv.fr/grand-public/visualisationFiche?format=fr&fiche=4752>.

⁽⁸⁸⁾ http://mimosa.cereq.fr/RefletWeb2006/index.php?lien=lp_fiche_dip&num=2005914.

⁽⁸⁹⁾ <http://www.iut-epinal.univ-nancy2.fr/lp-ecoconception.htm>.

UE1 – Ecodesign methodology	<ul style="list-style-type: none"> • Requirements related to environment • Advantages • Role in companies • Tools • Implementation in companies 	90 hours
UE2 – Energy	<ul style="list-style-type: none"> • Energy production • Renewable energies • Energy production processes 	90 hours
UE3 – Communication tools in companies – Environment legislation	<ul style="list-style-type: none"> • Oral and written communication • Commercial and technical English • Company management • Environment management • Risk management • Business law 	90 hours
UE4 – Ecodesign of industrial products	<ul style="list-style-type: none"> • Life cycle of products • Ecodesign in the mechanics industry • Conception/Material/Ergonomy/Manufacturing/Distribution 	90 hours
UE5 – Ecodesign of buildings	<ul style="list-style-type: none"> • Positive energy buildings • Construction typologies • Materials/ Maintenance • Waste upgrading 	
UE6 – Industrial project		150 hours
UE7 – In-company training		

The process for designing vocational licences aims to ensure that the qualification responds to industry needs. New qualification requests are based on consultations with business representatives and social partners, which are then transferred to the rectorat (education authority). The rectorat then examines the rationale for the creation of the qualification. Finally the Ministry authorises the new qualification, which has to be renewed every four years. Renewing the ministerial authorisation provides an opportunity to re-examine the content of the qualification, the organisation of the training programme (in terms of workload, time etc.) and to make any necessary modifications.

Prior to requesting the creation of the licence E.C 2E, the IUT Epinal carried out a survey with all the relevant professional branches. The survey revealed a need for a more global approach to ecodesign, which would integrate a sustainable development approach and ecodesign concepts at all levels of the company.

Assessment of the effectiveness and organisation of this response

The creation of the Licence Pro E.C.2E allowed a greater number of students to pursue a training programme entirely dedicated to ecodesign directly after A-levels, as it was the first Licence Pro (qualification at Bachelor level) with such a specialisation. The Ministerial authorisation for the qualification was renewed in 2009.

Three sessions took place since 2006, with a total of 62 students obtaining the qualification. Each session has 20 students on average. The number of students is limited to ensure that the labour market is not saturated, as these qualifications are extremely specialised and correspond to niche markets ⁽⁹⁰⁾.

According to the IUT Epinal, the licence is now widely recognised by businesses. Companies have recently made a request to the IUT for the creation of a second vocational licence dedicated to ecodesign, based on a similar structure but focused on SMEs, and integrating the Human Resource dimension into a cross-cutting approach.

Initial training in ecodesign is now provided by a growing number of training providers: engineering schools, business schools, institutes and universities have developed curricula dedicated or related to ecodesign.

The study carried out by APEDEC highlighted the quality of training programmes specifically dedicated to ecodesign, based on the analysis of the content of the courses and the number of hours dedicated to each subject, among other things. These training programmes include in-company training or traineeships as well as projects consisting in field work related to company or research body needs.

⁽⁹⁰⁾ Interview with IUT Epinal.

3. Conclusions

3.1. Main ‘greening’ shifts in economies and labour markets

Green growth will generate labour force transfers between sectors stimulated by green growth and sectors that will be negatively affected. Major employment shifts will concern job creation in green sectors of the economy such as renewable energy and energy efficiency, whilst the automobile and conventional energy sectors might be affected by job losses.

For most existing occupations, the ‘core’ competencies will not fundamentally change. Nevertheless, it is clear that sustainable development will become a common ‘backdrop’ that will make training necessary for people to adapt their professional practices or to gain additional competencies, without fundamentally changing occupations.

Skills needs for green growth are the following:

- (a) for the whole labour market, cross-cutting competencies related to general awareness-raising for eco-activities, ecodesign, eco-citizenship etc.;
- (b) for most occupations, skills needs related to new standards and production processes (e.g. built sector, electro-mechanics, and renewable energy). Occupations will therefore evolve without changing core technical skill sets. Additional modules to core training standards will be needed;
- (c) for some ‘green’ occupations, very specific ‘green’ skills in highly specialised fields;
- (d) for a minority of occupations, no new skills will be needed because certain occupations already integrated sustainable development (e.g. waste and recycling) or have limited green growth impacts (e.g. catering).

Expectations in terms of new jobs creation should not be exaggerated, as they are based on a number of assumptions (e.g. conditions to be met, such as the realisation of Grenelle objectives).

Analysis of the CAS shows that depending on different scenarios, effects in terms of job losses and gains are substantially different.

Table 10: Sectoral scenarios in terms of net employment trends ⁽⁹¹⁾

<p>Scenario 1: slow growth Environmental cost begins to slow down growth and employment. The decline of the intensive CO₂ sectors outweighs dynamic growth sectors</p>	<p>Construction Steel, nonferrous metals Renewable energies Other energy sources Durable goods Intermediate goods Equipment goods Transport Services to business Trade Services to private persons Care professions Health and education Other administered services</p>	<p>+ + = - - - - = = - = - - -</p>
<p>Scenario 2: neutrality Sectoral reallocation without net job creation: jobs in CO₂ intensive activities shifted to low-intensity activities (intra-sectoral redeployment)</p>	<p>Construction Steel, nonferrous metals Renewable energies Other energy sources Durable goods Intermediate goods Equipment goods Transport Services to business Trade Services to private persons Care professions Health and education Other administered services</p>	<p>++ + + - - - = = = = - + = =</p>
<p>Scenario 3: sustainable and durable growth A new potential for growth and employment; new services and new 'inclusive' functions</p>	<p>Construction Steel, nonferrous metals Renewable energies Other energy sources Durable goods Intermediate goods Equipment goods Transport Services to business Trade Services to private persons Care professions Health and education Other administered services</p>	<p>++ ++ + + - = + + ++ + + + = =</p>

The assumptions behind scenario 3, as identified by CAS, are the following:

⁽⁹¹⁾ CAS, La croissance verte : quels impacts sur l'emploi et les métiers ? Janvier 2010.

- (a) reduced credit constraints for low revenue households;
- (b) strong support to green R&D;
- (c) rapid adaptation of competencies and mobility between and within sectors;
- (d) generalisation of environmentally responsible behaviours;
- (e) positive income effects related to an increase in average qualifications and improved energy efficiency;
- (f) complete realisation of Grenelle objectives on the side of companies and households;
- (g) development of new services related to economy of use and economic proximity.

3.2. Skills implications and developments

3.2.1. Anticipation and identification of skills needs

Overall, the mechanisms for anticipating and identifying skills needs in France can be considered efficient. The elaborated system of sectoral, regional and national observatories, and skills forecasting at company level, ensure that the needs identified on the ground are taken into account by the education system. The regional level seems to be the most relevant for anticipating and planning training needs.

Diversified instruments that bring together all labour market actors ensure a virtually exhaustive collection of the data necessary for anticipating skill needs, together with a reliable perception of future needs. The diversity of methodological approaches may also mean that findings are not precisely comparable between one sector and another, or one area and another.

A key asset of the French system is the active participation of social partners (employers and employees representatives) in anticipating initial training mechanisms, and managing continuing training.

All Sectoral Committees estimated that overall skills needs were properly identified (initial and continuing training) and covered in their sector.

As part of the next step of the Mobilisation Plan the MEEDDM has announced the following measures:

- (a) inventory of green skills and green occupations: creation of a unique directory of qualifications for green occupations;
- (b) creation of a national observatory under the responsibility of the Ministry of environment;
- (c) revision of occupation titles to make them understandable and marketable.

3.2.2. Response policies and programmes

A full-fledged skills development strategy is now being developed, following the results of the work carried out by the committees of the Mobilisation Plan for Green Jobs. The government announced in January 2010 that €369 million would be dedicated to training for green jobs. The strategy will include the following actions:

- (a) communication campaigns at national and regional levels, and within each sector;
- (b) awareness-raising of job and training advisers: creation of a guidebook in 2010;
- (c) guarantee of training quality through the creation of labels for initial and continuing education;
- (d) expansion of the Fee Bat approach to 120,000 building professionals by 2012;
- (e) for each sector, defining an adaptation programme of employees' skills to support green growth;
- (f) in the building, automobile, and chemistry sectors, as well as in occupations related to renewable energies, transports, sea, agriculture, waste, and electricity, support for employee qualification and reconversion when business activities are affected by green growth-related changes;
- (g) facilitating the recruitment of young people through 'alternance' contracts and contracts supported by the state, which foresee company traineeships;
- (h) creating a convention with volunteering regions that would include all stakeholders: the state, regions, professional sectors, enterprises, social partners, associations, training organisations, etc. This will help coordinate efforts to mobilise territories and create a bridge between national and regional activities.

Future actions will also include renewal of the Sectoral Committees' mandate to elaborate action plans adapted to each sector.

3.2.3. Effective delivery mechanisms

The training provision in France is diversified and delivered by a variety of actors who include: the national education system, agricultural education bodies, CFAs, training centres managed by the branches, the network of commercial chambers, the private sector, and AFPA.

Stakeholders highlighted the relative flexibility of initial training with the regular overhaul and modification of qualifications through the CPC process. The bottom-up process whereby requests from the professional branches feed into the work of the Committees reviewing qualification and training standards is considered to be effective.

The main weaknesses of the current training provision concern:

- (a) the lack of adaptation of the current training provision to reach green growth objectives and address labour market needs, particularly in the built sector (as described in more detail below);
- (b) mismatch between the types and levels of qualification needed by companies (surplus of over-qualified graduates). Pôle emploi recently announced that 16,000 ‘green’ or ‘greening’ jobs were on offer; however, vacancies are difficult to fill. 75% of the job offers concern qualifications at upper secondary education levels of education;
- (c) the process for the overhaul of existing qualifications and for the creation of new ones is sometimes too slow;
- (d) lack of visibility and coherence in CVET provision, with the multiplication of training programmes in certain sectors without established quality standards.

Sectoral Committees estimate that overall existing qualifications and training pathways adequately cover professional needs. In the majority of cases, there is no need to create new qualifications, but rather a need for ‘greening’ existing qualifications. In most cases the process has already started, however it could be accelerated.

The most pressing issue concerns the training of trainers. The number of trainers and teachers able to train to new techniques and who are aware of SD issues is clearly insufficient, in particular in agriculture and the built sector. There are concerns that in the context of public spending cuts, particularly in the education sector, where part of the retiring staff is currently not replaced, teaching staff needs will not be addressed. This would be a major obstacle hampering skills development for a transition to a green economy.

Whereas skills needs are usually identified in a timely and effective manner, and qualification standards modified accordingly, the government objectives will not be achieved if investments in human resources are not made to ensure a sufficient number of trainers. At a minimum, the green economy will require increased employee awareness of sustainable development issues. This will in most cases mean training to acquire new competencies and learning new know-how. Built sector representatives estimate that 360,000 individuals (including 70,000 young people) will need to be trained each year.

4. Recommendations

4.1. Policy recommendations

The conclusions of the Mobilisation Plan for green jobs confirm that the potential for green growth will only lead to jobs creation if public policies for environmental protection are implemented. This is the objective of the Grenelle II measures. Government objectives for sustainable development will have significant impacts on production and consumption. Traditional market mechanisms will not be sufficient to trigger the indispensable changes that the current growth model needs to undergo. State and social partner interventions will be essential. The COE recommends the implementation of a ‘Marshall Plan’ for green skills training.

The assumptions behind a scenario for sustainable and durable growth, as identified by the CAS analysis, show that a number of active measures will have to be adopted and public intervention will be necessary to ensure that the green economy has a positive impact on the labour market. Public support for innovation is one of them, to encourage the emergence of new products (e.g. the development of low carbon vehicles) and the diffusion of green technologies.

Today, public spending on environmental protection represents only 7% of R&D spending ⁽⁹²⁾. Polluting sectors have made particularly large investments (e.g. the automobile sector has spent more than €5 billion). Current uncertainties related to market opportunities mean that environmental innovations have not really taken off in France, or indeed in most countries. Public spending will be required to ensure the emergence of new markets.

4.2. Recommendations for education and training

The need for greening existing occupations concerns all sectors of the economy.

Overall, green skills will become core competencies of existing occupations. Therefore, there is a need for initial VET to integrate sustainable development issues with training standards, rather than creating new qualifications. Many stakeholders warn against the risk of creating new qualifications entirely based on sustainable development or green skills that would be too narrow or poorly suited to the labour market.

Ultimately, most occupations will remain centred on core trades. SD could be integrated as one of the core components of all technical and vocational training. This is already being

⁽⁹²⁾ Commission des comptes et de l'économie de l'environnement (2009).

done by the Ministry of agriculture. Cooperation between building trades should be increased to develop cross-cutting competencies (e.g. joint training such as FEE Bat).

The provision of continuing training is a pressing issue. Less than 50% of young people find a first job that corresponds to their initial training. The number of workers that need to be trained in order to reach green growth targets is significant, particularly in solar PV, water sanitation and the built sector. Adequate CVET funding in the built sector will require the extension of the FEE Bat scheme to train 120,000 people by 2012, and include additional building trades as well as trainers in the scheme.

Reaching these objectives will require additional efforts in terms of training of trainers. Priority should be in occupations where tensions are high in the labour market. Sustainable development should be integrated into teaching staff training plans, particularly for overhauled qualifications.

Quality labels should also be further developed. ADEME recommends that quality charters such as Format'Eree⁽⁹³⁾ for training providers in the renewable sector developed by CLER should be further developed in other sectors, to avoid the risk of over-developing continuing training programmes. Quality charters ensure the quality of the training delivered by training providers. Initiatives such as Qualit'ENR have also successfully provided green labels to companies that invest in staff training and do so in certified training centres.

Diversification of training tools should be encouraged, particularly for e-learning. In the built sector, the E-energy Bat initiative – an online library and interactive tool dedicated to energy efficiency training – is being tested. It should help to disseminate key competencies related to new green occupational tasks to wider audiences, considering that the number of people to be trained currently outweighs the capacity of the education and training system, mostly due to the lack of trained trainers⁽⁹⁴⁾.

Finally, efforts should be made to improve the image of occupations related to green jobs, to make them more attractive (also in terms of remuneration): the majority of green and greening occupations correspond to low levels of qualifications, at the bottom of the salary scale (e.g. professional skills certificate and CAP), creating recruitment issues (e.g. in the waste sector).

Annex 2 provides specific findings and recommendations for the training system, and for the content of qualifications and training programmes as identified by the Sectoral Committees.

⁽⁹³⁾ <http://www.cler.org/info/spip.php?article6183>.

⁽⁹⁴⁾ EnergieBAT (Formation à la rénovation énergétique) was set up by ADEME and the Club de l'Amélioration de l'Habitat (CAH) www.energiebat.fr.

4.3. Recommendation for further research and data collection

Findings from the working groups for the green jobs Mobilisation plan highlighted that available data on green jobs is fragmented and limited. All the Sectoral Committees estimated that the work carried out should be pursued further.

Additional research is needed to more precisely identify competencies needed for green jobs, and to ensure worker mobility between sectors by identifying transferable skills. Further research is needed to identify not only new jobs created, but also potential job losses. Redeployment strategies should enable workers to change sector within the same region. Improvements could include promoting the emergence of a common methodological frame of reference wherever possible. This could include the work of the observatories, in order to enhance cross-sectoral analyses and occupational mobility, and the creation of a synthesising procedure and/or space for exchange and information pooling between the various levels involved in forecasting studies (European Employment Observatory, 2008).

The impacts of green growth still have to be measured quantitatively. More information is needed on the factors which will affect the way it will spread through the whole economy. To assess these factors, all sectors of the economy must be involved, not only those directly affected by environmental protection. The creation of new observatories for green jobs, as announced by the government, should improve data collection.

The identification of competencies and vocational qualifications is the responsibility of the national Commission of vocational certifications (CNCP), which manages the national directory of vocational certifications or RNCP. Since November 2009, competencies related to sustainable development that correspond to cross-cutting competencies can be listed by the CNCP in a specific inventory. Many of these competencies already exist in the labour market and these could be better identified, particularly with employees in sectors negatively impacted by environmental constraints.

Annexes

Annex 1: Greening occupations in key sectors of the green economy

Sector	Current employment situation	Expected changes – greening existing occupations
Agriculture and forest industries	<p>More than two million jobs:</p> <ul style="list-style-type: none"> • one million in agriculture; • one million in food, forest and wood industries 	<p>Key greening occupations mainly concern organic farming and eco-advisers (advisers in sustainable development, eco-energy engineers, eco-certifiers); management of remarkable biodiversity.</p> <p>By 2020 creation of 70,000 to 80,000 direct jobs, 10,000 to 15,000 support jobs:</p> <ul style="list-style-type: none"> • in agriculture: 10,000 job creations: 7,600 for organic farming and direct local supply, 600 for training activities, 2,700 eco-advisers (advisers in sustainable development, eco-energy engineers, eco-certifiers); • in agro-business: 600 eco-energy engineers (energy management, optimisation of carbon footprint), 10,000 job creations in the distribution sector, 250 trainers to sustainable development in enterprises, 2,400 eco-advisers; • in forest industry: logging, wood processing: 23,620 jobs amongst which 290 trainers and 1,200 technicians facilitating and mobilising wood resources; • in nature industry: 800 new jobs in the next five years in management of remarkable biodiversity, 4,000 in the next 10 years in the management of ordinary biodiversity, 22,500 jobs by 2020 in the management of landscapes, green urban spaces and green dependencies of infrastructures; • need for the reinforcement of public and private staffs with 3,000 researchers within the framework of the national strategy for research and innovation on food industry, biotechnologies, environmental emergency caused by climate change and eco-technologies. <p>5% need to be added to those figures to take into account overseas territories.</p>
Automobile industry	<p>Slightly more than 1 million jobs amongst which 257,000 direct jobs in automobile construction and first raw equipment manufacturer;</p>	<p>Automobile sector will face technological mutation: less polluting vehicles, hybrids vehicles, electric vehicles. At all qualification levels, designers will have to integrate the principles of ecodesign.</p>
Built sector	<p>4 million professionals:</p> <ul style="list-style-type: none"> • 1.6 million employees in project contracting; • 115,000 project managers and engineers, amongst which around 30,000 architects; • 1.192 million employees, 260,000 craftsmen and 	<p>The main transformation affecting occupations in the built sector will be the shift to global approaches taking into account of all building trades and complementarities arising from the use of RE technologies and energy efficiency.</p> <p>Mutations will affect all categories of employees:</p> <ul style="list-style-type: none"> • employees in local production of eco-materials or of energy renovation;

	<p>100,000 temporary workers in general contracting enterprises;</p> <ul style="list-style-type: none"> • 650,000 employees in material suppliers; • 34,000 employees in service providers, exploitation and maintenance. <p>The sector was hit by the crisis at the beginning of 2009.</p>	<ul style="list-style-type: none"> • technicians and engineer in the maintenance or diagnosis sectors; • built sector will attract new skills at the margin of its competencies: e.g. regulation, energy performance assessment, maintenance intelligence in the IT and electronic sectors; or in services (administrative or financial procedures, legal support, follow-up of contracts) integrated to global provision of energy renovation by companies; • construction and maintenance of sustainable building integrate occupations related to waste recycling and to the management of natural risks; • the development of eco-materials transforms traditional occupations. Collective heat production involves managers of networks which are more complex to exploit; • the sector will also need to contribute to solving the problem of energy insecurity and will need to provide social workers with knowledge related to buildings which would be useful for their missions.
Water, sanitation, waste and air	<p>340,000 jobs with one third in the public sector, two thirds in the private one:</p> <ul style="list-style-type: none"> • 160,000 jobs in water, soils and wastewaters; • 170,000 jobs in waste and recycling; • 10,000 jobs in air sector. <p>Two thirds of the jobs correspond to qualifications which are not specific to the sector (administrative tasks, drivers)</p> <p>Between 70 and 80% of the jobs correspond to qualification levels VI and V, with a majority of men.</p>	<p>Key sectors in development are</p> <p>The most traditional activities of the sector, such as treatment of wastewater, collection and elimination of waste by storage of incineration, will be slowly reduced. It will however be more than compensated by the emergence and development of new activities – detection of leaks, fight against waste, quality of sanitation, measure of flows, and education of consumers – which will require a higher level of training.</p> <p>By 2015 it is expected that jobs will increase between 39,000 and 43,000: 17,000 job creations in the water and biodiversity sectors – with a peak in 2010/11- , 17,000 job creations in the waste sector – and 5,000 job creations in the sector of air pollution, where the staff could increase by 50% by 2020.</p> <p>Because of the observed turnovers, 5.5% for waste and recycling jobs, 13.5% for water and sanitation, the sector will need to renew around half of its staff by 2015, which corresponds to around 175,000 recruitments which will be added to the new jobs.</p> <p>The total of the recruitments to be foreseen by 2015 is close to 220,000, of which more than 70,000 will be on jobs which require a specific training: 600 recruitments per year in air sector, 5,800 in water and water decontamination and 5,800 in waste and recycling sector.</p>
Electromechanics, electric construction and networks	<p>Total staff around 400,000 (stable in the past ten years).</p>	<p>No new occupations will be created but occupations will evolve towards in the increasing integration of ICT and economic sciences.</p> <p>Future recruitment needs are estimated around 225,000 between 2010 and 2015.</p> <p>Smart grids development is a key stake for the future in the context of the liberalisation of the electricity market.</p>
Renewable energies	<p>260,000 full time equivalents:</p> <ul style="list-style-type: none"> • 110,000 in energy efficiency improvement of the residential sector; 	<p>The renewable energies will provide more jobs in traditional occupations which will be modified with new competencies. Some competencies are lacking in some fields, such as in large wood heats and biogas for engineering.</p>

	<ul style="list-style-type: none"> • 72,640 directly related to the renewable energies market, of which around 46,000 for the production and sale of equipment and 26,000 for the sale of renewable energies. <p>The sector could reach around 300,000 full time equivalents in 2009, which would make a difference of 90,000 jobs as compared to 2006.</p>	<p>The market was over 50 milliards of euro in 2008, and should reach 57 milliards euro in 2009.</p> <p>The growth is driven by renewable energies and the improvement of energy efficiency in transports.</p> <p>In the built sector, workforce is in high demand.</p> <p>The renewable energy sector (SER) estimated that 200,000 jobs could be created by the sector by 2020.</p>
Fuel and green chemistry	<p>400,00 direct jobs:</p> <ul style="list-style-type: none"> • 10,000 in oil refinery; • 125,000 in fuel; • 100,000 in installation and engineering; • 20,000 in transport and distribution; • 5,000 in liquid biofuel and LPG; • 265,000 in green chemistry (100,000 in non bio-based chemistry, 85,000 in pharmacy, 50,000 in cosmetics, and 30,000 in bio-based chemistry). <p>There are 25% of managers and engineers, 34% of technicians, 41% of workers and employees. 6.5% are employed in research activities.</p>	<p>No new job has been identified for the short-term. However, taking into account sustainable development will affect a certain number of competence and conditions to use those competencies.</p> <p>The chemistry sector is affected by workforce shortage because of the lack of attractiveness of the sector. Competencies are needed in toxicology and eco-toxicology (Level I).</p>
Tourism	<p>One million direct jobs and one million indirect jobs.</p> <p>There are many seasonal, part-time and double jobs in this sector. Many jobs are poorly qualified. A job in the tourism industry is often a door to enter professional life, notably in the following sectors: accommodation, catering, organisation and sport.</p>	<p>No major changes will affect this sector. However, it will be necessary to adapt occupations to consumer demand as well as to environmental constraints. Also, all the jobs will need greening, either by raising awareness of by training: eco-skills will be developed.</p>
Transports	<p>In the field of development of transport infrastructure, there are 1,500,000 jobs amongst from which 1.1 million are concerned with transport services and 260,000 jobs in public works.</p>	<p>Greening of occupations in the sector will mostly consist in the global integration of environmental concerns in the activities of the sector.</p> <p>Jobs for the management of the network.</p> <p>Logistics: this sector will play an important role in the objectives to reduce gas emissions.</p> <p>Rail transport: 80,000 jobs will be created between 2010 and 2020. 50 urban projects will be developed which involved the creation of at least 5,000 jobs for the management of the network.</p> <p>Road transport: there will be high levels of staff replacement.</p> <p>Water transport: 9,000 for the construction of the canal Seine Nord.</p>
Sea trades	<p>500,000 jobs:</p> <ul style="list-style-type: none"> • tourism: 242,558; • sea products: 43,835; 	<p>There are no new occupations foreseen. Work organisation will need to change, taking into account a less intensive fishing, more selective methods, less energy consuming, and eco-labelled practices.</p>

	<ul style="list-style-type: none"> • shipbuilding: 48,429; • public services: 55,944; • ship transport and inland navigation: 54,704; • national navy: 49,279; • oil services: 27,800; • electricity production: 6,539 	<p>Shipbuilding: Grenelle projects could create many jobs. The sector is already developing eco-friendly ships.</p> <p>Sea wind energy represents an important potential source of new jobs.</p>
Biodiversity and ecosystem services	<p>Around 20,000 persons contribute to knowledge, management protection, valorisation and restoration of biodiversity or contribute to biodiversity to be taken into account in other economic activities. 500 of them act in a protected or Natura 2000 zone.</p> <p>Those activities for the moment are the responsibilities of different sectors and different types of employers.</p>	<p>Amongst the jobs which are being developed are those related to IT tools, particularly geomatics which is applied to knowledge and management of biodiversity. Lawyers in the field of environment in general and of living species in particular might also increase.</p>

Annex 2: Synthesis of the work of the sectoral committees (mobilisation plan for green jobs)

Sector	Findings and recommendations for the training system	Findings and recommendations for the content of courses and diplomas
Agriculture and forest industries	<p>The training system for the agriculture and forest sector is substantial, both for initial and continuing education.</p> <p>The agricultural education system trains each year: 172,000 school pupils, 32,000 apprentices and 118,000 adults, amounting to 15 million hours in 845 schools, 365 training centres and 152 apprentices training centre (CFA). The 21 schools of higher education train 15,500 students.</p> <p>The issues at stake for the support of green jobs:</p> <ul style="list-style-type: none"> • training staff in activity (20,000 teachers), • development of training systems for working adults in order to meet the needs for new skills. <p>The Committee recommends in priority actions targeted at trainers in mobilising actors of research and development for ecologically intensive agriculture, quality food and food safety and sustainable development of agricultural, forest and natural environments.</p> <p>Some agricultural technical schools integrate the theme ‘sustainable development’ in their curricula and learning modules of local initiative (e.g. carbon balance approach).</p> <p>A national network of contact points for ‘sustainable development’ is in charge of the implementation of innovative projects in the regions.</p> <p>The Committee for the Agriculture and forest industry has placed great emphasis on training activities addressing a wide range of actors in the fields of agriculture, food processing, forest / wood or nature and landscape. These short-term and local actions are often organised at the initiative of professional organisations or by their insurance funds for training (VIVEA for farmers, the AGEFAFORIA for food industry, FAFSEA for agriculture and landscape and, FAFCE for employees of agricultural cooperatives, etc. ...) or by public or private training centres.</p>	<p>Training needs are well identified in this sector, and they are well addressed. Further concerns updating existing qualifications.</p> <p>The system of agricultural training includes:</p> <ul style="list-style-type: none"> • Level V (CAPA, BEPA EPS): 29 qualifications in different specialisations, of which 40% have been recently overhauled, 60% still to be overhauled. • Level IV (Vocational Baccalaureate and BP): overhaul of 22% of vocational qualifications. All vocational baccalaureates will be overhauled. A specialisation ‘management of natural habitats and wildlife’ was created (implementation scheduled for 2010). <p>Technical Baccalaureate STAV ‘Science and Technology of agronomy and of the living environment’, overhauled in 2006, already incorporates SD concerns.</p> <ul style="list-style-type: none"> • Level III: 16 options of the Certificate of agricultural technician BTSA (50% overhauled or process started). <p>Short adaptation courses as close to the field as possible should focus on:</p> <ul style="list-style-type: none"> • fundamentals of agronomy, • agricultural technical practices with low inputs, • management in organic farming, • training in the use of phyto-sanitary products, • protection of natural resources and biodiversity, • Energy plans and carbon balance. <p>Some recommendations:</p> <ul style="list-style-type: none"> • no need to create new qualifications, except at the margin; • updating existing ones; • enhancing vocational aspects; • monitoring flows in emerging sectors to avoid creating over-qualification. • use Eco-phyto Plan 2018 to change practices and professionalise professional users, suppliers and advisers and develop a system of continuing education for teachers and trainers of technical agricultural education.

Automobile industry	<p>Three devices for vocational training coexist:</p> <ul style="list-style-type: none"> • the diplomas of Ministry of Education (MEN) for youth in the areas of maintenance and repair of vehicles: Level V (4 CAP, BEP 1, 1 MC), level IV (2 Vocational Baccalaureate and 1 Baccalaureate TSI), level III (2 BTS and 1 degree of automotive expert), higher level (Vocational licence, 1 master's degree and 1 degree in engineering management) • -vocational certificates (titre professionnel d'état) applied to the fields of mechanics, electricity and automotive electronics, which are intended for adult jobseekers and staff being redeployed: Level V (7 CAP and BEP in the manufacturing, maintenance and deconstruction), level IV (3 Vocational Baccalaureate in manufacture and maintenance), level III (4 BTS including 2 in design and 2 in manufacturing) • the certificates of professional qualification (CQP) involving employees of wholesale trade sector (qualifications in the areas of logistics, sales, warehousing, administration and management) and metallurgy (CQP developed by the UIMM) and the qualifications issued by the chambers (after-sales service). 	<p>The committee has proposed that key concepts on controlling the impact of crafts, commerce and industrial activities on the environment and the concept of sustainable development are integrated in all training courses and during training sessions updating the knowledge of employees through continuing education.</p> <p>A common set of basic green competences would ensure a minimum environmental knowledge.</p> <p>Whether in initial or continuing education, occupations in electricity for automobile, mechatronics, deconstruction and repackaging must be given special attention.</p> <p>The recommendations for initial training are:</p> <ul style="list-style-type: none"> • in design, transition from classical industrial design to eco-design: overhaul of training of industrial design based on eco-design, development of training on applied electronics to automotive equipment and computer in real embedded time. • in maintenance, adaptation of training to the changes in vehicle maintenance (electric vehicles, electrical cycles ...) and machines (sites, agricultural, etc.). • in deconstruction, integrate in each training a module of initiation to the practices of the SD (eco-citizenship module), and provide when necessary specific courses in the recycling of batteries or reconditioning of automotive equipment.
Built sector	<p>The training system for building industry is substantial, both for initial and continuing education. However, the construction sector is experiencing a shortage of staff and training provision is lacking behind. The current supply of training is both teeming with a large number of proposed actions with different targets, and diversified since it provides training that result in the award of qualifications, as well as long and short training programmes.</p> <p>Initial training</p> <p>Implementing a large-scale plan 'Energy Building Jobs' (Metiers Batiment Energie), while acting on the number and training of teachers, on the implementation of pedagogical support material such as technological platforms connected to professionals and local building and energy industries.</p> <p>Training materials for teachers to be updated on the basis of professional models ('Energy BAT') and on youth information. This plan should aim</p>	<p>The employees of the building should be trained from the very beginning (initial training) to prevent disparities to arise between urban and rural areas.</p> <p>Some qualifications need to be overhauled, while new diplomas could be created in consultation with professionals.</p>

	<p>to train 70,000 young people per year in order to cover the training needs of many young people who already enter the sector every year without any specific background and to cover the 20,000 additional job offers every year for the annual implementation of the Grenelle Building Plan. The replacement policy in place for education staff (only half of the retiring teachers replaced) should be applied differently for the sector given the difficulties in finding qualified contractual employees.</p> <p>Continuing Education Sustaining and expanding the funding for the FEE BAT scheme that enables professionals throughout the territory, particularly craftsmen, to get trained on the new techniques for achieving energy efficiency as imposed by the Grenelle. This original scheme has proven suitable as it is better adapted to SMEs and multiple occupations in the built sector. It should be extended to architects, construction engineering and should multiply its leverage effect through additional training.</p> <p>Training around innovation Develop e-learning tools for communication and information exchange about innovation (energy performance contracts); develop an on-line resource centre and run the network of competitiveness clusters; adapt the OSEO device to the case of building professionals.</p> <p>Architects' training France suffers from a lack of skills in architecture. A 2008-2012 Plan was developed which stresses the need to better train architects in order to enable them to meet the challenges of sustainable development. The continuing education of architects is another important issue.</p>	
Water, sanitation, waste and air	<p>This sector does not seem to suffer from lack of training supply. Overall, no less than 128 environmental vocational licences, 25 environmental degrees of the MEN and 20 of the MAAP were identified in 2005. These degrees are in constant evolution: from 1997 to 2005, 21 departments were created and 25 terminated.</p> <p>Several training – in particular of the type of CAP – should be adapted and enriched, many licenses should be harmonised. General training on the environment should be considered as additional training for students who already have a specialisation.</p> <p>38,000 students were already registered in 2006/2007 in the environmental field from levels V to II. In addition, three quarters of the students were men.</p>	<p>The quality of the repair activity involves the revalorisation of initial training, support for continuing education of networks of manufacturers and repairers and the creation of formal qualification of 'repair'.</p> <p>Adaptations for specific areas are needed:</p> <ul style="list-style-type: none"> • water and sanitation: needs related to the proliferation of IT tools. Specialisation during the training which must lead to 3 CAP (cleaning, waste / recycling, sanitation) and 2 vocational baccalaureate (conventional cleaning / sanitation, environment) • waste: to address the problem of legibility of qualifications (notably professional licences), there is a need for: <p>Occupations related to services: An overhaul of the CAP 'waste management and urban cleanliness',</p>

	<p>The number of people enrolling in environmental trainings increased more rapidly than the total number of students (2% against 0.5%). However, with the exception of licence holders, the students of environmental training find conditions on the labour market – access to employment, employment rate, wages – less favourable than in other sectors.</p>	<p>creation of a certificate ‘characterisation, sorting and internal collection of waste’, creation of a vocational baccalaureate ‘qualified agent in waste management’ with a major on service. Occupations related to treatment An overhaul of the CAP ‘qualified officer in sorting and dismantling of end of life products’, creation of a vocational title ‘waste treatment agent’ for valorisation and elimination, overhaul of vocational title ‘driver of maintenance material and conditioning of industries in waste treatment’, creation of a vocational baccalaureate ‘qualified officer in waste management’, evolution of the trainings of ‘agent of dismantling’ and ‘reception agent’. - Recycling: few qualifications existing for operational occupations, no qualification between CAP and level Bac + 3, inadequate vocational baccalaureate ‘hygiene / environment’ with regard to the required skills, need to train and support companies.</p>
<p>Electromechanics, electric construction and networks</p>	<p>The sector believes that training existing at national level is very heterogeneous, with traditional curricula integrating ENR modules, new ‘green’ vocational licences, the creation of master’s degrees in ‘energy efficiency’, and in engineering schools, courses in electrical engineering – focusing on green growth. Initial training is not sufficient. There is no initial training provided in the field of Technical Management of Building sector (GTB) nor in the lighting sector, except for some professional licenses. At regional level access to all types of training is very uneven in the field of ‘electrical engineering’ which integrate ENR and networks. It was considered that it was essential to give the trainers in continuing training the necessary tools to help reaching the Grenelle objectives. Actions may be conducted jointly, but so far, no actor has an overview of the whole territory. It is therefore essential to identify and empower an authority to be responsible for maintaining a dashboard of measures, both in terms of quality and quantity. This authority could be the Region. Teachers could undertake in-company traineeships and attend training courses to update their knowledge.</p>	<p>Recommendations:</p> <ul style="list-style-type: none"> • strengthen qualifications of the Ministry of education in the field of electrical installation (GTB, i.e. Technical Management of Building sector), lighting (LBC, LED ...) and electricity networks (so-called smart grids); • increase the number of initial and continuing training programmes in electrochemistry regardless of the level of qualifications, to reflect the developments of renewable energies and electric / hybrid vehicles (development of electrochemical storage systems); • introduce compulsory modules of complementary training in ICT, in green economy, in raising awareness of sustainable development into initial and continuing education curricula (incl. apprenticeships and alternance); • strengthen continuing training in areas identified as priority; • in the short-term, improving the balance between initial and continuing training in the ‘Eco-Power Systems’ sector; • encourage distance learning; • develop a reflection on new diploma titles. This could be done in consultation between the Ministry of education, the Higher Education sector, the training bodies and the industries concerned.
<p>Renewable energies</p>	<p>There are few courses specifically dedicated to renewable energy and energy efficiency. The French training system appears to be lacking</p>	<p>When installing the first large wind turbines, France was forced to bring in expertise from abroad. The German model of training could provide</p>

	<p>behind in the field of renewable energies.</p> <p>More specifically, in the field ‘energy-building’, the number of secondary school teachers is notoriously insufficient, while the number of students is progressing. The training of teacher must be improved.</p>	<p>ideas.</p> <p>In the wind industry, the package ‘energy-climate’ set the goal of 25 GW of production for 2020. The country will therefore probably need to train about 1,500 maintenance technicians over 10 years.</p> <p>In jobs related to the building industry, a comprehensive approach, which would take into account all the different occupations and new complementarities which are inherent to renewable energies and to energy efficiency is necessary. Three issues arise: the generalisation of solar activity, quality of systems and the legal responsibility of the different actors.</p>
Fuel and green chemistry	<p>In two regions, the IAR cluster identified 106 training courses related to its themes. An extrapolation for the whole country would lead to a figure ranging from 1,500 to 2,000.</p> <p>The sector ‘refining, biofuels and green chemistry’ is proposing to incorporate aspects of ‘sustainable chemistry’ in the training of secondary teachers and to organise a regional training for teachers to intensify their contacts with those involved in green chemistry.</p> <p>The clusters and other recent structures must be heavily involved in order to facilitate the relationship between local issues and national ambitions.</p>	<p>A significant share of growth related to green chemistry will take place through innovation and entrepreneurship. It is therefore important to develop joint technical training and managerial trainings to prepare the next generation of developers and to meet all structures which encourage entrepreneurship and innovation.</p> <p>At the same time, it is important to maintain technical training focused on key core occupations, rather than developing training programmes too focused on the environment.</p> <p>There is a need to include in the curricula modules specific to the green chemistry (principles, life cycle analysis, eco-design, toxicology, responsibility, clean processes, natural raw material, and ethics) and adapted to every level. These modules should not exceed 10% of the curriculum. They must incorporate transversal, behavioural, and SD aspects into professional practices.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> • focus on CAP and Vocational baccalaureate for orienting basic training towards new challenges; • at the level of vocational licences, create additional training modules to the basic cycles training of chemical or chemical engineering and encourage links with the university departments of bioengineering. • at the Bac + 5 level: strongly include innovation in curriculum, assess the need for connection of chemistry and agronomy programmes for the challenge of reducing phytosanitary products and the inclusion of vegetable raw materials in industry.
Tourism	<p>The training provision at university has grown significantly in recent years. The degrees in tourism and hotel and catering which are delivered at this level, face however an increasing competition in the labour</p>	<p>The Committee believes that the impact of green growth on certain occupation in the tourism sector indicates a very strong need for initial and continuing training. Rather than creating specialised training in</p>

	<p>market due to other degrees which are more generalist – trade, communication and management. There are about fifty professional master’s degrees, some sixty vocational licences, and two main BTS. Continuing education is important in the tourism sector. However, there is no specific network of continuing education, except for some specialised schools, notably specialised in the training in catering and hotel business.</p>	<p>sustainable development, it is best to bring about changes in professional practices. Links between tourism and sustainable growth must be better known on the field, especially by key stakeholders. This requires raising the awareness of actors, including consultants and public authorities.</p>
Transports	<p>The transport sector has an important training system for both initial and continuing education. This is also true of public works where the resources devoted to continuing education go beyond the legal obligations.</p> <p>Thus, training for employment in the railway sector is today mainly done by SNCF, which has launched a process to identify opportunities in the field of green jobs. Similarly RATP provides ample training for the employees it recruits.</p> <p>In urban transports, additional training for green jobs will be provided by companies.</p>	<p>In road transport, there is a request to raise the level of training of drivers. It would be important to generalise the actions in vocational training which have an energy efficiency component.</p> <p>The logistics industry is an important source of job creation. Occupations and training are diverse but for all of them all ICTs (geolocation, management of circuits and flows) will be essential for the evolution of the sector. Public works have already started to integrate in the training for QSE (Quality, Safety, and Environment) managers the following components: waste treatment on construction sites, environmental law, knowledge of the fauna and flora on sites, biodiversity, reduction of noise, pollution of soil and water protection.</p>
Sea trades	<p>The impact will be very important on the training system which will need to evolve. It is considered flexible enough to meet the expectations; however it must continue its transformation.</p> <p>The new practices related to green growth will lead to further training. It is preferable to envisage short and regular training courses as the techniques changed regularly. Furthermore, the tendency is already to add new elements to the training standards in sea trades because new standards accumulate (and in particular those related to international trade).</p>	<p>One of the commitments of the Grenelle on the sea is to better educate future seagoing personnel to issues of environmental protection: developing a common reference for training on means to respect the sea, waste disposal, marine pollution, awareness of environment, in particular ensuring the training of crews to the environment under the IMO Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW).</p> <p>It is anticipated that short training courses will generalise in the sea sector, as they allow developing the mobility of the workforce between sub-sectors.</p> <p>The transfer of some activities from land to off-shore (wind turbines for instance) will require excellent training in sea technologies.</p>
Biodiversity and ecosystem services	<p>Up to Bac + 2 level, the main training programmes which give access to occupations related to biodiversity are usually provided by agriculture education.</p> <p>At higher levels, the Enita and AgroParisTech, in the agricultural sector, provide such trainings.</p> <p>After A-levels, many universities and engineering schools provide education in ecology. In parallel, the ‘concours’ for public civil servants</p>	<p>Recommendation to strengthen training on ecology in all curricula and to increase the knowledge of plant and animal species.</p> <p>Recommendation to continue to review agricultural qualifications from the nature – biodiversity angle.</p> <p>Recommendation to train landscapers and green space managers: the absence of qualified professionals is counterproductive for biodiversity. Extra knowledge and skills on ecology as well as on agronomy need to</p>

	<p>gives access to the level of technical environment agent (category C), higher technician (B) or agriculture and environment technician (A). It is possible to say that there are too many BTS and vocational licences holders as compared to the market needs.</p> <p>The committee recommends structuring a specific vocational sector for environment education. It also recommends structuring a training offer in the field of ecology for local decision-makers.</p>	<p>be acquired: understanding of interactions, effects on long-term rhythms, etc. 13,450 businesses, of which 90% have fewer than 10 employees, employ 70,000 people in the industry. Over 3,000 jobs are created each year (net).</p>
--	--	--

Annex 3: Vacancies for green jobs identified by Pole Emploi, January 2010

Current offers regarding occupations specifically dedicated to the environment	
Caretaking of the natural landscapes	467
Draughtproofing, insulation and watertightness	342
Urban space cleaning	287
Reuse of industrial by-products	209
Management and engineering of environmental health and safety issues in industries	204
Technical interventions regarding environmental health and safety in industries	175
Water distribution and sanitation	170
Interventions on harmful substances in toxic environments	89
Management of eco-industrial park	80
Research into the sciences of universe, matter and living systems	78
Geological studies	68
Petrochemical energy management	66
Inspection of environment, safety and health management in urban areas	40
Natural heritage protection	36
Salubrity and pest control	30
Industrial analysis laboratory	11
Total (1)	2,352

Current job offers regarding occupations impacted by Grenelle round table commitments	
Agriculture: technical advisory and diagnostic services	
Technical assistance and advisory services and in agriculture	147
Agricultural and environmental engineering	113
Technical diagnosis and control in agriculture	70
Construction industry: energy efficiency	
Installation of thermic and sanitary equipments	2066
Building work	1964
Electricity – construction industry	1653
Roof installation and repair	1247
Works supervision – building and public works sector	1060
Installation and maintenance of refrigeration and air conditioning systems	837
Wood panel assembly	788
Setting up structures and timber frames	308
Manufacture and installation of timber framed structures	223
Technical diagnosis and control in the construction industry	145
Planning, design and architecture – building and public works sector	119
Engineering infrastructure	66

Transports: logistics	
Logistics and supply chain management	75
Management of logistics centre	64
Freight transportation management	46
Total (2)	10990

Current job offers regarding occupations not impacted by, but mobilised by Grenelle round table commitments	
Planning of major building work and public work	955
Driving of lifting gears	516
Driving of earth-moving equipments	495
Maintenance of lifting gears, conveyors, pieces of farm machinery	492
Woodcutting and pruning	176
Driving of pieces of farm and forestry machinery	117
Handling and driving of conveyors	39
Silviculture	36
Inland navigation	27
Railway circulation	25
Railway operation	20
Railway driving	16
Total (3)	3014

Total (1) + (2) + (3)	16356
------------------------------	--------------

Source : MEEDDM, Plan de mobilisation des filières et des territoires pour le développement des métiers de la croissance verte, Rapport final du comité de filière énergies renouvelables, Janvier 2010

Annex 4: Initial vocational education and training in France

The education system in France		Age	Main general curricula			Certifications via apprenticeship	
Higher education	Engineering colleges / universities	18+	Doctorate				
			Master				
			License			Engineering diploma	Apprentices' training centre
			DEUG	BTS, DUT		BTS-DUT	
Under-graduate	Senior high school	15-18	High school diploma	High school technological diploma	High school vocational diploma	High school vocational diploma	
			11 th year technical course	11 th year adaptation course	CAP-BEP	Professional certificate	
			General course	Technological course	Vocational course		
	Junior high school	11-15	Lower grade school certificate			CAP-BEP Lower grade vocational certificate	
			9 th year (general course)	9 th year (technological course)	9 th year (preparatory course)		
			8 th year (general course)	8 th year (technological course)	8 th year (preparatory course)		
Pre-primary & primary graduate	Kindergarten and primary schools	3-11	7 th year 6 th year Elementary school				
			Pre-elementary school				

General course
 Technological course
 Vocational course

CAP: Certificat d'aptitude professionnel (Professional skills certificate)

BEP: Brevet d'enseignement professionnel (Professional studies certificate)

BTS: Brevet de technicien supérieur (Higher technician's certificate)

DUT: Diplôme universitaire technique (Technical university degree)

DEUG: Diplôme d'études universitaires général (Diploma of general university studies)

Source : Cedefop 2008

Classification of training levels

Level	Definition
I and II	Personnel occupying positions usually requiring a level of training / education equal of superior to the 'licence' (degree) or engineering schools (ISCED 5 and higher)
III	Personnel occupying positions usually requiring the higher technician diploma training level (BTS) or a diploma from the Higher Technological Institutes (IUTs) and end of the first cycle of higher education (ISCED 4)
IV	Personnel occupying supervisory staff positions or possessing a level of qualification equivalent to a general, technical or vocational baccalauréat (ISCED 3)
V	Personnel occupying positions usually requiring a training level equivalent to the BEP and the CAP (ISCED 2)
Va	Personnel occupying positions requiring a short training of a year maximum, leading in particular to the Certificat d'éducation professionnelle (Certificate of vocational education) or any other qualification of the same nature.
VI	Personnel occupying positions requiring no training beyond the end of compulsory education.

Source: European Journal of Education, 2007

List of key resource people

Organisation	Contact person
<i>National and regional authorities</i>	
ADEME	Roselyne Forestier, Chargée de formation Yannick Papaix, Chargé de mission ‘Mobilisation des professionnels du bâtiment’
Ministère de l’éducation	Brigitte Trocme, Adjointe au chef du bureau du partenariat avec le monde professionnel et des commissions professionnelles consultatives (DGESCO A2-1)
Ministère de l’Alimentation, de l’Agriculture et de la Pêche	Philippe Joly, Direction Générale de l'Enseignement et de la Recherche, Service de l'Enseignement Technique, Sous Direction des Politiques de Formation et d’Education
Région Ile de France	Stéphane Bulliard, Unité Développement, Direction de la Formation Professionnelle, Service Ingénierie de la commande publique
Région Aquitaine	David Raymond, Accompagnement des mutations économiques
Région Poitou-Charentes	Mme Petitjean, Pôle Education-Formation
Région Provence-Alpes-Côte-D’azur	Folco Laverdière, Service Energie, Déchets, Air et Technologies de l'Environnement
<i>Training providers</i>	
AFPI	Bruno Tixier, Directeur R&D
Formarec	Bernard Favory, Président
MPS Aquitaine	Ana Abad
Université Nancy 2 – IUT Epinal	Marie-José Taillard, Directrice de l'IUT Epinal – Hubert Curien
<i>Business associations/federations</i>	
CLER	Laurence Esnault, Chargée de missions Emploi – Formation
CAPEB	Bruno Real, Service Formation
FEDEREC	Sylvie Flecheau, Conseillère technique Pôle Social
FIDI	Bruno Dumont Saint Priest, Délégué Général
UIMM	Serge Blain, Service Gestion des Ressources Humaines/Formation UIMM
<i>Companies</i>	
Eiffage	Patricia Briffe, Directrice Ressources Humaines
HEULIEZ	Christophe Vergnaud, Directeur Ressources Humaines

Acronyms and definitions

ADEME	Agence de l'environnement et de la maîtrise de l'énergie – Agency for the Environment and Energy Management
AFPA	Association Nationale pour la Formation Professionnelle des Adultes – National Association for the Vocational Training of Adults
AFPI	Association de Formation Professionnelle de l'Industrie – Association for Vocational Training in the Industry
ANAH	National Agency for Housing Renovation
ANFA	National Association for Training in the Automobile sector
AOC	Appellation d'Origine Contrôlée – Controlled Designation of Origin
APEDEC	Association des Professionnels de l'Éco-conception – French Network of Ecodesign Experts
AREF	Regional Association for Training in the Built Sector
ARENE	Regional Agency for Environment and New Energies Ile de France
BAC	Vocational Baccalaureate
BCG	Boston Consulting Group
BEP	Brevet d'Enseignement Professionnel – Professional Studies Certificate
BTP	Bâtiment et Travaux Publics – Buildings and Public Works
BTS	Brevet de Technicien Supérieur – Higher Technician's Certificate
CAP	Certificat d'Aptitude Professionnel – Professional Skills Certificate
CAPEB	Confédération de l'Artisanat et des Petites Entreprises du Bâtiment – SMEs in the Construction Sector
CAS	Centre d'Analyses Stratégique
CFA	Centre de Formation d'Apprentis – Apprentice Training Centre
CGEA	Baccalauréat Professionnel Conduite et Gestion de l'Exploitation Agricole – Vocational Baccalaureate in Farm Management

CIDD	Inter-Ministerial Committee on Sustainable Development
CLER	Comité de Liaison Energies Renouvelables
CNCP	Commission Nationale de la Certification Professionnelle
CNFPTLV	Conseil National de la Formation Professionnelle tout au long de la vie – National Vocational Lifelong Learning Board
COE	Conseil d’Orientation pour l’Emploi
CPC	Commissions Professionnelles Consultatives – Professional Consultative Commissions
CQP	Certificats de Qualifications Professionnelle:
CVET	Continuing Vocational Education and Training
DGER	Direction Générale de l’Enseignement et de la Recherche – Directorate General for Education and Research
DI expert	Diagnostiqueur Immobilier amiante-termites-plomb expert
DPE	Energy Performance Expert
DRIRE	Directions Régionales de l'Industrie, de la Recherche et de l'Environnement
DUT	Diplôme Universitaire Technique – Technical University Degree
EDEC	Engagement de Développement de l'Emploi et des Competencies – Agreement for the Development of Employment and Skills
EDF	Electricité de France – French Power Company
Enerplan	Association Professionnelle de l’Énergie Solaire
EPC	Diagnostic de Performance Energétique – Energy Performance Certificate
ESF	European Social Fund
EU	European Union
FEDEREC	Fédération des Entreprises du Recyclage – Federation of Recycling Industry Businesses

FISO	Fonds d'Investissement Social – Social Investment Fund
FIDI	Fédération Interprofessionnelle du Diagnostic Immobilier
FNSEA	Fédération Nationale des Syndicats d'Exploitants Agricoles
FORMAREC	training body of FEDEREC
GDF	Gaz de France
GDP	Gross Domestic Product
GEIQ	Employer Group for Integration and Qualification
GPEC	Forward Employment and Skills Management scheme
HVAC	Heating, Ventilation and Air Conditioning Systems
HVE	High Environmental Value
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer
INES	Institut National de l'Energie Solaire
INSEE	Institut National des Statistiques
IPCC	Intergovernmental Panel on Climate Change
IUMM	Metallurgy Sector Representative
IUT	Institut Universitaire de Technologie
LCA	Lifecycle Analysis Tools
LMD	Licence-Master-Doctorat
MAAP	Ministère de l'alimentation, de l'agriculture et de la pêche – Ministry of Agriculture
MEEDDM	Ministère de l'Ecologie, de l'Energie, du Développement Durable et de la Mer – Ministry of Ecology, Energy, Sustainable Development and the Sea
MEN	Ministère de l'Éducation Nationale – Ministry of National Education
MINEFE	Ministère de l'Économie, l'Industrie et les Finances – Ministry of the Economy, Industry and Finance

MPS	Maison de la promotion Sociale – Centres for Social Promotion
NGO	Non-Governmental Organisation
ONERC	Observatoire National sur les Effets du Réchauffement Climatique en France Métropolitaine et dans les Départements et Territoires d’Outre-Mer – National Observatory dedicated to the effects of climate change
OPCA	Organisme Paritaire Collecteur Agréé
OPCAIM	Organisme Paritaire Collecteur Agréé des Industries de la Métallurgie
OREF	Observatoire Régional de l’Emploi et de la Formation – Regional Training and Employment Observatories
PACA	Provence-Alpes-Cote-d’Azur Region
PCET	Plan Climat Énergie Territorial – Regional Climate and Energy Plan
PRDFP	Plan for Vocational Training Development
QEB	Qualité Environnementale du Batiment – Environmental Building Quality
RE	Renewable Energy
RNCP	Répertoire National des Certifications Professionnelles
RNQSA	Répertoire National des Qualifications des Services de l’automobile – National Catalogue of Qualifications and Services in the Automobile Sector
SD	Sustainable Development
SEATM	Service d’Étude et d’Aménagement Touristique en Montagne
SIG	Système d’Information Géographique
SNCF	Société Nationale des Chemins de Fer Français – French Railways Company
SOeS	Service de l’Observation et des Statistiques
SVE	Société de Véhicules Electriques

TEE Network	Territoire Environnement Emplois
TOE	Tonnes of Oil Equivalent
UCF-FFB	Union des Entreprises de génie Climatique et Energétique de France
UIMM	Union des Industries et Métiers de la Métallurgie
UNCP-FFB	Union Nationale des Chambres Syndicales de Couverture et de Plomberie de France
UNEDIC	National Union for Employment in Industry and Commerce
VAE	Validation of Experience Procedure
VET	Vocational Education and Training

Bibliography

ADEME. Le développement de produits éco-conçus: un intérêt économique et environnemental certain. *ADEME et vous – stratégies et études*, No 23, Janvier 2010.

ADEME. Les transports électriques en France: un développement nécessaire sous contraintes. *ADEME et vous – stratégies et études*, No 21, Juillet 2009.

ADEME. Maîtrise de l'énergie et développement des énergies renouvelables. *ADEME et vous – stratégies et études*, No 13, juillet 2008.

ADEME. *Maîtrise de l'énergie et développement des énergies renouvelables: un marché en croissance continue malgré la crise économique*. Stratégies et Etudes, Décembre 2009.

ADEME. *Marchés, emplois et enjeu énergétiques des activités liées à l'efficacité énergétique et aux énergies renouvelables: situation 2006-07 et perspectives 2012*. Étude réalisée par la société In Numeri, juillet 2008.

ADEME. *Marchés, emplois et enjeu énergétiques des activités liées aux énergies renouvelables et à l'efficacité énergétique: situation 2007-08 et perspectives 2009*. Étude réalisée par la société In Numeri, Novembre 2009.

ADEME. Premier bilan national. *Plan Soleil 2000-06*, Avril 2003.

ANFA. La branche des services de l'automobile. ANFA, 2009.

APEDEC. *Les formations de l'enseignement supérieur intégrant l'éco-conception*. Enquête APEDEC pour ADEME, Mars 2006.

Bouder, A.; Kirsch, J.L. The French vocational education and training system: like an unrecognised prototype? *European Journal of Education*, Vol. 42, No. 4, 2007.

Centre d'Analyse Stratégique. La croissance verte: quels impacts sur l'emploi et les métiers? *Note de veille*, No 164, Janvier 2010.

Cedefop. *Systems for anticipation of skill needs in the EU Member States*. Working paper No 1. Cedefop, 2008.

Cedefop. *Vocational education and training in France. Short description*. Luxembourg: Office for Official Publications of the European Communities, 2008a.

Chambre de commerce, industrie et services; Institut de développement de produits; ESC St Etienne; Cirano; Université de Montréal; HEC Montréal. *L'éco-conception: quels retours économiques pour l'entreprise?* Décembre 2008.

Chardon, O.; Estrade, M.A. *Les métiers en 2015. Rapport du groupe «Prospective des métiers et qualifications»*. CAS and DARES. Paris, 2007.

Commissariat General for Sustainable Development. *Annual report to the French parliament on implementation of the Environment Round Table commitments*. 10 Octobre 2009.

Commissariat General for Sustainable Development. *Les éco-activités et l'emploi environnemental*. No 10, Juillet 2009.

Conseil d'orientation pour l'emploi. *Croissance verte et emploi*. Janvier 2010.

Conseil d'orientation pour l'emploi. *Travaux du COE sur la formation professionnelle*. Avril 2008.

Conseil Economique et Social. *Les politiques de l'habitat et de l'urbanisme face aux changements climatiques*. Report and opinion published in 2006, following a government referral.

DRIRE Nord – Pas-de-Calais. *Energie éolienne*. 2006.

Economic and Social Committee. *Report and opinion published in 2006*, following a government referral, 'Les politiques de l'habitat et de l'urbanisme face aux changements climatiques', 2006.

European Employment Observatory. *Review: Autumn 2008*. European Commission. Luxembourg: Luxembourg: Publications Office of the European Union, 2009.

European Employment Observatory. *Review: Spring 2009*. European Commission. Luxembourg: Luxembourg: Publications Office of the European Union, 2010.

European Parliament and Council. Directive 2002/91/EC of the of 16/12/2002 on the energy performance of buildings. *Official Journal of the European Communities*, L 1/65, 04/01/2003.

FNSEA. *L'emploi en agriculture chiffres repères*. Février 2009.

IFREMER, *Les énergies renouvelables marines. Synthèse d'une étude prospective à l'horizon 2030*. 2008.

INSEE. L'économie française – comptes et dossiers. *L'industrie automobile en France depuis 1950: des mutations à la chaîne*. INSEE, édition 2009.

MEEDDM. *Annual report to Parliament on implementing France's Environment Round Table commitments*. October 2009.

MEEDDM. *Le grenelle en marche – les 13 domaines d'action*. Hors série, avril 2009.

MEEDDM. *Les filières industrielles stratégiques de la croissance verte*. Les premiers résultats de la concertation publique, Février 2010.

MEEDDM. *Plan de mobilisation des territoires et des filières sur le développement des métiers de la croissance verte. Rapport du Comité de filière Bâtiment*. Comité national de pilotage, Janvier 2009.

MEEDDM. *Plan de mobilisation des territoires et des filières sur le développement des métiers de la croissance verte. Rapport du Comité de Filière Énergies Renouvelables*. Comité national de pilotage, 2009.

MEEDDM. *Plan de mobilisation des filières et des territoires pour le développement des métiers de la croissance verte. Synthèse des travaux des comités de filières*. Janvier 2010.

MEEDDM. *Plan de mobilisation des filières et des territoires pour le développement des métiers de la croissance verte. Rapports des comités de filières*. Janvier 2010.

MEEDDM. *Rapport de l'atelier intergroupe déchets. Grenelle de l'environnement*, Septembre 2007.

MEEDDM. *Réflexions sur le portefeuille de mesures Grenelle Environnement*. Étude réalisée par la société Boston Consulting Group, 2009.

MEEDDM. *Summary report on Round Table discussions. Grenelle de l'environnement*, Novembre 2007.

Michael Page International. *Etudes de fonctions et de rémunération, emplois verts*. Michael Page International: Neuilly-sur-Seine, 2010.

Ministère de l'Alimentation, de l'Agriculture et de la Pêche. *Panorama de l'Enseignement Agricole*. Direction Générale de l'Enseignement et de la Recherche. 2009.

Ministère de l'Alimentation, de l'Agriculture et de la Pêche. *Rénovation novation du Bac Pro CGEA: ce qui change, ce qui demeure*. Juin 2008.

Ministère de l'Économie, de l'Industrie et de l'Emploi. *Eco-industries: la croissance d'une filière*. *Industries*, No 137, Février 2009.

Ministère de l'Éducation Nationale. *Développement durable, gestion de l'énergie: évolutions et conséquences sur l'offre de diplômes*. Pour le ministère chargé de l'éducation nationale, To be published in 2010.

Ministère National de l'Enseignement Supérieur et de la Recherche. *Stratégie nationale de recherche et d'innovation*. 2009.

Observatoire statistique de FEDEREC. *Le marché du recyclage et de la valorisation en 2008*. May 2009.

OECD. *Good practices in the national sustainable development strategies of OECD Countries*. Sustainable Development Studies. Paris: OECD, 2006.

OECD. *Le rôle des systèmes nationaux de certification pour promouvoir l'apprentissage tout au long de la vie*. Paris: OECD, Septembre 2003.

ONERC. *Rapport au Premier Ministre et au Parlement: changements climatiques et risques sanitaires en France*. 2007

ONERC. *Stratégie nationale d'adaptation au changement climatique*. ONERC, 2007.

Plan Bâtiment Grenelle (2010). *Rapport du comité de filière métiers du bâtiment*. Janvier 2010.

Pôle Emploi – Unistatis. *Enquête besoins en main-d'oeuvre*. Paris: Pôle Emploi. 2009.

Quirion, P.; Demailly, D. *-30% de CO₂ = + 684 000 emplois*. Étude pour le WWF, CIREN, 2008.

SIREME. *L'éolien en France: une chance pour l'industrie et le marché de l'emploi*. Paris, juin 2009.

SOeS. Les éco-activités et l'emploi environnemental. *Etudes et Document*, No 10, juillet 2009.