CEDEFOP | European Centre for the Development of Vocational Training

Skills for green jobs: an update

France

2018

[unedited proof copy]

This report has been prepared by Cedefop to contribute primarily as background research for the International Labour Organization's World Employment Social Outlook 2018: Greening with jobs. The reproduction or further use of the information included in this report requires prior permission from Cedefop.

Copyright © European Centre for the Development of Vocational Training (Cedefop), 2019
All rights reserved.

Please cite this report as:
Cedefop (2018). *Skills for green jobs in France: an update* [unedited proof copy]. Available only at: http://www.cedefop.europa.eu/files/france_green_jobs_2018.pdf

Preface

Technological change, globalisation, ageing populations and climate change dramatically increase the pace of change in labour market and skill needs, for new and current jobs alike. The growing importance of sustainable development and the shift to a low-carbon economy imply structural changes across sectors and occupations. This shift leads to new 'green' jobs and 'greening' of existing ones that translate to new skill sets, update of curricula or even new qualifications; for example, the adoption and dissemination of clean technologies requires skills in technology application, adaptation and maintenance.

Skills gaps are already recognised as a major bottleneck in sectors closely linked to 'green economy', such as renewable energy, energy and resource efficiency, renovation of buildings, construction, environmental services, manufacturing. At the same time, the 'greening' of the economy creates skill needs across other sectors, as businesses, workers and entrepreneurs have to rapidly adapt to changes as a consequence of environmental policies.

Given the challenges, Cedefop and ILO joined forces in 2010 and produced the report *Skills for green jobs: a global view* (ILO, 2011). The research was based on 21 country studies with a primary focus on good practice examples of how national policies for greening economies are complemented by identification of skills needs and efficient skills response strategies. Cedefop covered country studies (Cedefop, 2010a) in six EU Member States: Denmark, Estonia, France(Cedefop, 2010b), Germany, Spain and the UK. All studies were conducted based on the same research methodology and criteria for selection of case studies, and following identical structures.

In 2017, these studies were updated for the ILO flagship report *World employment and social outlook (WESO) 2018: greening with jobs,* published in May 2018 ([1]). The country studies were used as background material for chapter 5 of the report on *Skills for the green transition* with the objective to analyse the trends towards decent work and environmental sustainability since 2010; and assess the impact of a transition towards a low-carbon, resource-efficient economy on the world of work.

This country report was produced by Cedefop, Department for skills and labour market, under the supervision of Alena Zukersteinova. Stelina Chatzichristou, Cedefop expert, was responsible for the research conducted from April 2017 to October 2017.

Cedefop would like to acknowledge the research team of the consortium led by Fondazione Giacomo Brodolini who conducted preliminary analysis and drafted their findings under project team leader Andrew McCoshan.

The full country reports are unedited and available only electronically. They are used as background information for Cedefop's synthesis report *Skills for green jobs: 2018 update* ([2]).

([1]) Available from: https://www.ilo.org/weso-greening/documents/WESO_Greening_EN_web2.pdf

([2]) Available from: http://www.cedefop.europa.eu/en/publications-and-resources/publications/3078

Table of content

List of boxes 5

List of tables 5

Executive summary 6

1. Introduction 7

2. Major changes in the economy and employment shifts in the green transition after 2009-10 8

3. Key policies and regulations 14

4. Skills development measures for the green economy 17

4.1. Skills needs identification and anticipation 17

4.1.1. Few new green occupations, but many green jobs requiring adaptation of skills 17

4.1.2. Building networks of actors to lead skills anticipation 18

4.1.3. The role of regional observatories 19

4.2. TVET provision for new green occupations and for greening established jobs/occupations 20

4.2.1. National structures for designing and implementing TVET in general 20

4.2.2. The impact of the green transition on TVET provision: green gestures and awareness 21

4.2.3. The adaptation of sectoral diplomas: the greening of training courses 22

4.2.4. The role of universities and their relationship with industry 24

4.3. ALMPs and retraining measures 25

4.4. The role of the private sector in skills training 27

4.5. The role of the institutional set up 29

5. Conclusions and recommendations 30

List of abbreviations 32

References 34

Websites 36

List of boxes

Box 1: Onemev 9
Box 2: COP21 – France's commitments.....15
Box 3: An example of regional cooperation on green skills.....19
Box 4: Action by large companies to develop in-service training.....28
Box 5: Branch vocational diplomas: an example from recycling.....28

List of tables

Table 1: Jobs (full-time equivalents) and evolution in eco-activities 11
Table 2: Jobs in the nine green occupations (average 2010-14).....12
Table 3: Distribution of green and greening jobs according to activities in 2013 .13

Executive summary

In 2015 there were 440 000 full-time jobs classified as eco-activities, whilst green occupations represented 144 000 jobs and greening occupations represented nearly four million jobs. In the field of skills anticipation, France is characterised by strong stakeholder and social partner engagement. The national observation of the green economy is based on innovative methodologies to estimate green or 'greening' jobs which have been strongly developed in recent years. In 2010, following the 'Environment Round Table', a fully-fledged skills development strategy was set up, a Mobilisation Plan for green jobs was launched and the National Observatory for Jobs and Occupations of the Green Economy was created.

Most key actors involved in skills anticipation have integrated a perspective on the evolution of jobs and skills related to the green economy into their activities. There are many skills- related programmes and measures undertaken by actors at different levels. Skills curricula are frequently renewed or adapted to take into consideration the evolution of the green economy. Many diplomas now include awareness-raising or sensitisation to green issues; some have been the object of more advanced and specific adaptations to the techniques, knowledge and skills required by the ecological transition (or transition to the green economy).

1. Introduction

From the first national sustainable development strategy Act of 2003 ([3]), to the hosting of the United Nations (UN) Climate Change Conference (COP21) ([4]) and the Energy transition for green growth act [Loi sur la transition énergétique pour la croissance verte] in 2015 ([5]), and finally with the more recent Climate Plan of July 2017 ([6]) presenting the national strategy for the next five years, France has been particularly active over the last 15 years on the front of climate change and ecological transition (or transition to the green economy).

These different strategies have relied on strong commitment and cooperation by the different actors in the sphere of employment and training. The key challenge is to anticipate the changes linked to the energy and 'ecological transition' on jobs and skills. The previous work realised by the ILO (2011) and Cedefop (2010a and 2013) highlighted the work done by France in the identification of skills needs and the integration of its findings into coherent education and training policies.

This report provides an update of the results of the previous national report on France, (Cedefop, 2010b). It mostly concentrates on the period 2009-10 to the present. Analysis draws from different statistical information and sources, as France can rely on a considerable number of studies and data on current developments and their impact on skills. A series of interviews with national, regional and company level stakeholders also offered valuable input.

([3]) 2003 Strategy Act: http://www.ladocumentationfrancaise.fr/dossiers/d000075-le-developpement-durable-en-france-de-la-strategie-nationale-au-grenelle-de/la-strategie-nationale-de-developpement-durable-2003-2008

([4]) Information about COP21 is available from: http://www.cop21paris.org/

([5]) Green growth act: https://www.legifrance.gouv.fr/affichLoiPubliee.do?idDocument=JORFDOLE000029310724&type=general&legislature=14

([6]) Information on the Climate plan of July 2017: http://www.gouvernement.fr/en/climate-plan

2. Major changes in the economy and employment shifts in the green transition after 2009-10

In France, the green economy corresponds to several hundred thousand jobs, and is in growth. There are many drivers to this increase in green and so-called 'greening' jobs, as defined in a report from the Ministry of Ecology (2014). In general, there has been a growing awareness among consumers and manufacturers, although there is still room for improvement.

France imports fossil fuels in large quantities. The development of renewable energies, encouraged by public authorities, is helping to reduce this dependence by diversifying energy sources. There has been progress in energy use in housing, which can be explained by the combined implementation of various policies, regulatory measures and incentives, as well as by technical innovations on the part of companies. However, although interest in adhering to the principles of a greener and more sober consumption is increasing, putting this into practice remains difficult - often for economic reasons. A central factor is the renovation of housing and the improvement of their energy performance. Ambitious plans have been launched at national level but their effectiveness remains limited. Several financial aids have been granted to households for housing renovation, but their level has varied from year to year, which may have dis-incentivised some consumers. At the household level, waste production is decreasing. In 2009, France set itself the target of reducing its household waste production by 7% over the period 2009-13 and this had an impact thanks in particular to the development of local services and the waste sector. Purchases of organic products have grown, first among households with high incomes and in recent years in more modest households, supported by supply development. There is also an increase in the number of farms converted to organic farming. At the same time, dependence on cars remains high and the reduction of their environmental impact remains limited.

In general, public authorities and companies have been mobilised to integrate the ecological transition into their thinking and activities. The state supports the transition to a green economy through a number of regulations and incentives. It supports, as discussed below, the structuring of green sectors and encourages research and development (R&D) and innovation. Several sectors are relatively strongly supported, such as water, sanitation, recycling and recovery of waste, or marine energies. At the same time, companies are subject to increasingly stringent regulations. For example, since 2001, listed companies have to include environmental and societal information in their annual management reports.

Over the last few years, the national statistical system has adopted precise concepts and definitions in order to grasp the 'green economy' and its impacts on jobs and skills. The term 'green economy' is the one used most often in the work of the National Statistics Institute (INSEE) [Institut national de la statistique et des études économiques], the Department of Studies of the Ministry of Employment (DARES) [Direction de l'animation de la recherche, des études et des statistiques], the General Commissariat for Sustainable

Development of the Ministry of Ecology, the national employment agency (Pôle Emploi), and so on. These various bodies are gathered together with other partners in the National Observatory for Jobs and Occupations of the Green Economy (Onemev) [Observatoire national des emplois et métiers de l'économie verte] (Box 1). One of the missions of this observatory has been to arrive at definitions commonly accepted by all actors and it seems to have established a general consensus in this respect.

Box 1: Onemev

Onemev was created in 2010 by the Ministry of Environment with the aim of analysing employment shifts in the green economy. Onemev is a neutral entity for dialogue and work that produces statistics and methodologies to enhance knowledge on jobs and occupations within the green economy. It brings together the following institutions: The Evaluation and Statistics Department of the General Commissariat for Sustainable Development (CGDD) [Commissariat général au développement durable]; the Ministry of Ecology; The INSEE; the DARES; the Centre for Studies and Research on Employment and Skills (Céreq) [Centre d'études et de recherches sur les qualifications]; France Stratégie, a think tank supervised by the Prime Minister's Office; the Treasury Directorate (DGT) [Direction générale du trésor]; the Agency for Environment and Energy Management (ADEME) [Agence de l'environnement et de la maîtrise de l'énergie]; the Alliance Villes Emploi (AVE); Pôle Emploi; the French Association for Vocational Training (Afpa) [Agence nationale pour la formation professionnelle des adultes]; the National Centre for the Territorial Civil Service (CNFPT) [Centre national de la fonction publique territoriale]; and Regional Employment and Training Observatories (OREF) [Observatoire regional emploi formation].

Since 2015, Onemev has been organised into two groups, 'Observation, methods and quantifications' for quantitative data and statistics and 'analysis capitalisation and sharing' in connection with green employment, skills and training issues.

Source: Service de l'observation et des statistiques, 2016.

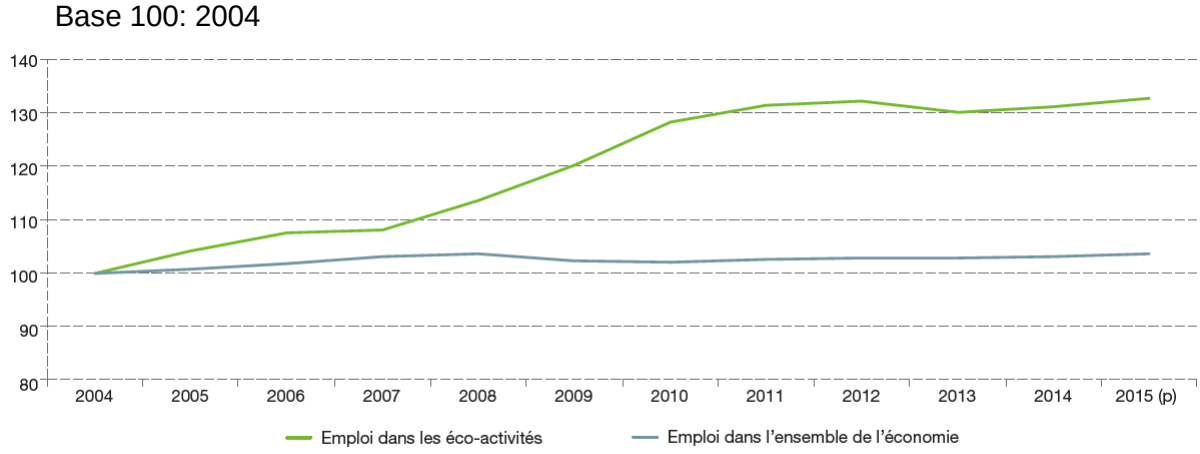
Onemev has developed two approaches to monitoring employment: (a) an activity-based approach, which in particular highlights changes in 'eco-activities'; (b) another approach based on jobs and occupations, making it possible to estimate the number of jobs in the so-called 'green' and 'greening' professions.

Activity-based approach

This approach is based on the activities of the green economy. It includes, first, what are called 'eco-activities', devoted to the production of goods or services for the purpose of protecting the environment or the sustainable management of resources, i.e. the heart of the green economy, in its most restricted definition. Onemev uses the definition established by Eurostat and the OECD. However it also adds some activities: R&D, environmental engineering, and certain public services. Secondly, the approach includes what are called 'peripheral activities', contributing to a better environmental quality but less directly in the core of the green economy.

In 2015, eco-activities accounted for 440 950 full-time equivalent jobs ([7]) (Auzanneau, 2017). From 2004-15, the number of jobs in eco-activities increased significantly (Figure 1) with two phases being identifiable: a first phase, 2004-11, in which the green economy was 'set in motion', and a second one, 2011-15, that was marked by some stabilisation of the growth rate of these activities. Employment increased strongly and peaked in 2012; over the following three years decreased by -1.4%. The average annual change over the period 2004-15 was + 2.6%. Employment growth in eco-activities was much faster than in the rest of the economy (average by +0.3% during the same period). Eco-activities represented about 1.7% of total employment in France in 2015.

Figure 1: Evolution of employment in eco-activities, 2004-15



(p) : données provisoires.
Sources : *SOeS ; Insee, EAP, Esane, Comptes nationaux base 2010 ; Ademe*

There are three main sectors ([8]) within eco-activities: resource management, including renewable energies, environmental protection and some cross-cutting activities. The resource management sector had about 105 000 jobs in 2015, compared with 140 000 in 2011. This decrease was principally attributed to the renewable energy sector. This sector experienced an average annual increase of 5.8% from 2004 to 2015, with an increase of 14.9% over the period 2004-11 – but a significant decline after 2011: there were more than 75 000 jobs in renewable energy in 2011 but by 2015 the sector accounted for fewer than 55 000 jobs, a decrease of 27%. These developments were triggered by changes in the legal environment: in the late 2000s, the state had strongly subsidised the sector of photovoltaics, which had led to the increase of eco-activities' projects and subsequently of jobs. But these tax advantages were diminished in 2011 ([9]) and many companies had to close down or cut

([7]) All the jobs recorded in a sector are taken into account, even those that are not directly related to the environment (for example, an accountant in a waste disposal company).

([8]) The term 'sector' used here refers to official nomenclatures (French activity nomenclature (NAF) [nomenclature d'activités française], corresponding to the European classification – NACE).

([9]) In particular, the tax exemption of 50% for households (created in 2008) was halved, while public support to solar infrastructure projects was stopped.

jobs. The wind sector, another field of the renewable energy is in general challenged by an irregular evolution in its development mostly due to administratively cumbersome projects ([10]), thus affecting job creation.

Table 1: Jobs (full-time equivalents) and evolution in eco-activities

	Jobs in 2015	% change 2004-15
Protection of the environment	**258 850**	**2.3**
Air pollution	7 400	-1.3
Wastewater	71 950	-0.7
Waste	88 250	-1.7
Radioactive waste	2 850	0.7
Soil and wastewater rehabilitation	68 500	10.4
Noise	6 150	0.8
Nature, landscape, biodiversity	13 800	2.3
Resource management	**105 800**	**3.5**
Management of water resources	7 850	0.7
Recovery	21 050	1.7
Control of energy	22 100	1.8
Renewable energies	54 800	5.8
Cross-cutting activities	**76 350**	**2.5**
General public services	34 100	0.9
R&D	26 950	5.2
Engineering	15 250	2.4
Total	**440 950**	**2.6**

Source : Service de l'observation et des statistiques; Insee; EAP; Esane; Comptes nationaux base 2010; Ademe.

In the area of environmental protection (which includes waste, air pollution, noise, nature, landscape and biodiversity, wastewater and soil rehabilitation), employment steadily increased by an annual average of 2.3% over the period 2004-15. This sector accounted for 258 850 jobs in 2015 compared to 239 500 in 2011 and fewer than 200 000 in 2004. The activities that drive this sector are the rehabilitation of soils and wastewater which saw an average annual employment increase of 10.4% over this period, from fewer than 10 000 jobs in 2004 to 68 500 jobs in 2015. Total spending in the sector has more than doubled over the last decade, from EUR 715 million in 2000 to more than EUR 1.5 billion in 2014, principally driven by the need to control urban sprawl.

Cross-functional activities, including public services, R&D and engineering accounted for 76 000 jobs in 2015. Employment in these activities grew by 2.5% on average per year over the period 2004-15.

Approach based on jobs and occupations

The second approach of Onemev is based on jobs and occupations. It measures the number of people in 'green' or 'greening' occupations. According to the definitions adopted by

([10]) All the jobs recorded in a sector are taken into account, even those that are not directly related to the environment (e.g. an accountant in a waste disposal company).

Onemev, green occupations are those relevant to measuring, preventing, controlling and mitigating adverse impact and damage to the environment; subsequently, green trades require skills to serve these goals. By contrast, greening occupations do not have a direct environmental purpose but integrate competences relating to the environmental dimension into their work. After a process of discussion among its members and with representatives of the branches ([11]), Onemev identified nine green occupations and about 70 greening occupations (DARES, 2017a).

Between 2010 and 2014 there were, on average, 144 000 'green' jobs (Table 2) representing 0.6% of total employment in the country. In 2013, nearly half of green jobs were located in eco-activities (32% in the protection of the environment, 15% in the management of the resources), while around 40% were located in sectors not specifically related to the environment (

([11]) In France, the term 'branches' (or professional branches) refers to companies grouped generally in the same sector of activity and covered by a collective agreement (convention collective). Social dialogue is structured at several levels, including the branch level. A branch (and a collective agreement) may cover several sectors (according to the NACE definition or NAF in France).

Table 3) ([12]) (DARES, 2017b).

Table 2: Jobs in the nine green occupations (average 2010-14)

Waste management and treatment	**51 000**
Skilled workers in wastewater treatment and treatment	7 000
Garbage collection vehicle drivers	12 000
Unskilled workers in wastewater treatment and treatment	32 000
Production and distribution of energy and water	**65 000**
Engineers and managers of the production and distribution of energy, water	11 000
Supervisors and technicians in the production and distribution of energy, water, heating	45 000
Skilled workers in other industries (water, gas, energy, heating)	9 000
Protection of nature and the environment	**28 000**
Environmental engineers and managers	10 000
Environmental and Pollution Treatment Technicians	14 000
Forestry technicians, forest guards	4 000
Total	**144 000**

Source : Insee, Dares

([12]) Sectors not specifically related to the environment (or other activities) are sectors such as trade, transport, construction, etc., which are not as such considered as 'eco-activities' or peripheral activities with a link to the protection of environment or resource management. This is based on a definition adopted by the Onevem.

Table 3: Distribution of green and greening jobs according to activities in 2013

	Green jobs	Greening jobs	Total employment
Activities in the 'green economy'	**89 000**	**1 286 000**	**4 938 000**
Eco-activities*	72 000	809 000	3 689 000
- Protection of the environment	46 000	333 000	2 560 000
- Resource management	23 000	327 000	754 000
- Cross-cutting activities	3 000	149 000	374 000
Peripheral activities**	17 000	477 000	1 249 000
Other activities***	**58 000**	**2 482 000**	**21 305 000**
Total	**147 000**	**3 768 000**	**26 242 000**

Source: INSEE; 2013 census ([13]); Service de l'observation et des statistiques (2016, p. 20).

** Eco-activities are defined as the sectors directly aiming at the protection of the environment or the sustainable management of resources. Eco-activities also include cross-cutting activities such as 'research and development' activities in the environmental field, environmental engineering and general public environmental services.*

*** The so-called 'peripheral' activities contribute to a better environmental quality but they are less directly in the core of the green economy. They are linked to the areas of water production and distribution, green space management, transport and energy efficiency.*

**** 'Other activities' concern all other sectors such as trade, transport, construction, etc., which are not as such considered as 'eco-activities' or peripheral activities with a link to the protection of environment or resource management, but in which one may find green jobs or greening jobs.*

This is based on a definition adopted by Onemev.

The number of 'greening' jobs is significantly higher and is estimated to 3.7 million. The definition of 'greening' jobs is very broad and encompasses jobs not directly in the environmental sector. Indeed, two-thirds of individuals with a 'greening' profession work in sectors not directly linked to environment such as construction and transport. 21% of greening jobs are in eco-activities, generally in public administration (in socio-cultural animation, public works, etc.) or in the installation of equipment (thermal, electrical, etc.). Furthermore, these calculations count for all workers in some 'greening' professions (e.g. masons or road drivers) as they are currently being transformed by the ecological transition – even though it can be assumed that not all the workers or companies thereby included really have an environmental concern. For this reason relevant figures of greening jobs should be considered broad estimates. A comparison of green and greening jobs is provided in

([13]) Information on the 2013 census is available at: https://www.insee.fr/fr/information/2409289

Table 3.

Regarding gender issues, green and greening jobs are largely male dominated. In 2012, women represented only 17% of green and 16% of greening jobs. These shares were, however, larger than those in 2008 (respectively 13% and 15%). The share of women rises as the occupations become more skilled. Some green occupations have experienced a relatively notable increase in the share of jobs accounted for by women, for instance in production and distribution of energy and water (from 15% in 2008 to 21% in 2012).

3. Key policies and regulations

Since 2003, environmental policies have been defined in the context of two National Sustainable Development Strategies (NSDSs), and two conferences that have set longer-term objectives, namely the 'Grenelle de l' Environnement' ([14]) and the COP21 (Climate Change Conference, Paris, 2015).

The first NSDS was launched in 2003. A few years later, in 2007, an innovative process called the 'Grenelle de l' Environnement' or 'Environment Round Table' was launched. This process, drawing upon principle of multi-governance, was described in the previous country report (Cedefop, 2010b).

The second national strategy for sustainable development was launched for the period 2009-12. It was largely based on the conclusions of the Round Table. This strategy encompasses the UN Millennium Development Goals (MDGs). As a follow-up to the Grenelle Forum, a plan to mobilise territories and sectors [plan de mobilisation des territoires et des filières] ([15]) was established with the aim of enriching green growth by supporting the development of new activities and adapting skills (Section 4). This resulted in the establishment of 11 sectoral committees in the economic sectors with the greatest potential for creating 'green' jobs, namely: agriculture and forest industries; automobile industry; biodiversity and ecosystem services; construction; electro-mechanics, electric construction and networks; fuel and 'green' chemistry; renewable energies; sea trades; transportations; tourism; water, sanitation, waste and air.

These sectoral committees constituted an important part of the coherent national strategy elaborated since the 2007 Grenelle Round Table ([16]) to meet the skill needs of the greening economy. Each committee brought together a large number of actors, focused on the short and long-term anticipation of changes in jobs, skills and training needs. Various reports detailing the impacts on these sectors were produced. A conclusion common across these reports was that the ecological transition does not radically transform the content of jobs and occupations, but rather requires a series of adaptations meaning that not only do education and training systems need to adapt themselves but companies have to integrate changes into their human resource activities.

As of 2012, the new government anchored its strategy in the preparation of the COP21, which took place in Paris in 2015, and was based on a European-wide approach (European

([14]) Information on the Grenelle is available at: https://en.wikipedia.org/wiki/Grenelle_Environnement

([15]) As a follow-up to this plan, two reports were commissioned by the Ministry of Ecology which highlight that all the training courses that have been revised or created since the Grenelle Round Table in 2007 have sought to address the skill needs arising from the ecological transition (Section 4.2).

([16]) Information on the Grenelle round table is available at: http://data.bnf.fr/16027718/grenelle_environnement/

Parliament, 2015). This new strategy introduced the principle of a national climate conference to be held annually, to reignite the multi-governance process introduced by the Grenelle and to revive the enthusiasm of the Round Table, which had begun to run out of steam (Rossignol and Nègre, 2013). These conferences bring together the five partners who met within the framework of the Grenelle (a process called 'governance of the five'). The content of the last environmental conference held in April 2016 was directly based on the commitments made at COP21 the year before (Ministère de l'Environnement, de l'Énergie et de la mer, 2016). At the COP21, EU countries agreed on commitments to be taken in the fight against climate change. Countries have also made commitments at the national level (Box 2).

Box 2: COP21 – France's commitments

On energy:
- 40% reduction in GHG emissions by 2030 and 75% by 2050,
- 32% renewable energy consumption in 2030,
- 50% reduction in energy consumption by 2050.

In building: 54% reduction in emissions.
In transport: 29% reduction, focusing on improved energy efficiency and clean vehicle development.
In agriculture: 12% reduction thanks to the development of agro-ecology.
In manufacturing: 24% reduction through the previous targets and the development of the circular economy.
In waste management: 33% reduction through reduction of waste, ecodesign, recovery of waste.

Since 2012 and in the perspective of COP21, France has taken a series of measures to achieve its objectives. A National Low Carbon Strategy (SNBC) [Stratégie nationale bas-carbone] was deployed, which contains sector-based and national recommendations. According to the Strategy, a low- carbon economy should increase the number of jobs by an average of 100 000 to 350 000 between 2015 and 2035. This strategy requires territorial initiatives in order to anticipate jobs and skills.

Two important laws have recently been promulgated. First, the Energy transition for green growth act [Loi sur la transition énergétique pour la croissance verte] ([17]) was adopted in 2015. Its main objective is to achieve the energy reduction targets cited above. The implementation of the law proved to be rather effective, since almost a year after its adoption, almost all the implementing legislation was published. The flagship measures are in the field of building renovation, with the aim of improving their energy performance. Another set of measures concerns the development of clean transport, particularly electric cars, the development of renewable energies and the fight against fuel poverty. The employment

([17]) Green growth act: https://www.legifrance.gouv.fr/affichLoiPubliee.do?idDocument=JORFDOLE000029310724&type=general&legislature=14

effect of this legislation alone has been estimated at 100 000 short-term jobs and 200 000 by 2030, mostly in the energy efficiency sector and a smaller part in renewable energies.

The second major law adopted to meet the commitments is the Reconquest of the biodiversity of nature and landscapes act of 2016 [Loi pour la reconquête de la biodiversité de la nature et des paysages] ([18]). It aims to support new sectors in particular in the development of green jobs, those in the circular economy (sometimes called 'blue jobs'). As a result, a French Agency for Biodiversity has been created. This law also includes a 50 billion Euro Future Investment Program (PIA) [Programme d'investissements d'avenir] over the decade 2010-20, which is broken down into several categories: support to SMEs developing innovative projects that preserve biodiversity; support plan for education, research, innovation in industry, transport, energy; investment in vocational training, etc.

In July 2017, the new government presented a long-term vision through a 'climate plan. The objective is to achieve 'carbon neutrality' by 2050, i.e. to ensure that the level of greenhouse gas emissions is not higher than the emissions captured. This new objective constitutes an enhancement of the ambition that has so far been to divide French emissions by four between 1990 and 2050, with a 40% reduction target in 2030. However, this new plan does not contain precise terms, in particular concerning employment and training.

These different policies are not 'linked' through a common regulation or standard regarding the identification and development of green skills. No evaluation of the effectiveness of these recent laws has been made. Additionally, there is no specific approach through which new green policies, programmes and regulations may include gender issues in developing new green skills.

([18]) Act of 2016: https://www.legifrance.gouv.fr/eli/loi/2016/8/8/2016-1087/jo/texte

4. Skills development measures for the green economy

4.1. Skills needs identification and anticipation

4.1.1. Few new green occupations, but many green jobs requiring adaptation of skills

The previous report (Cedefop, 2010b) concluded that for the majority of existing jobs, skills at the core of the profession will not change significantly. Sustainable development will nonetheless become a backdrop for most occupations. This requires an overall adjustment of skills in the labour market, as professionals will have to integrate ecological transition into their activities. The period since 2010 confirms this approach. Three categories of occupations can be distinguished (Observatoire régional des métiers PACA, 2014):

(a) occupations that require awareness-raising with respect to environmental constraints. This will be achieved through awareness or sensitisation modules in initial or continuing training. For example, the training of road drivers now includes eco-driving;

(b) occupations that require greater adaptation of skills. This can be achieved by adding new modules (perhaps newly designed) to, or by redesigning the training path. This concerns, for example, operatives involved in the maintenance of green spaces who will be trained in rational water and waste management or in new techniques of depollution by plants;

(c) new occupations appear, but quite rarely. These are essentially job niches. For example, the Association for the Employment of Managers (APEC) [Association pour l'emploi des cadres] found that between 2005 and 2014 the creation of new occupations as a result of the energy transition was minimal and found only in niches, mainly in mediation and support, for example in the jobs of energy manager or project manager. In a previous report in 2010, APEC had found that new occupations were mainly concentrated in the areas of auditing, consultancy, energy, biodiversity protection and eco-mobility. In construction, there are new functions in project management. In the energy sector, a new specialisation of thermal engineer has emerged. These new jobs can be located either in ‘green’ jobs (engineers and technical managers of the environment), or in greening jobs (engineers and managers in the building sector). Such new specialisations require the creation of new training.

Overall, with regard to the key competences required to accompany the green transition, what appear as top priorities in professional or vocational training are mainly ‘generic’ skills (such as employee autonomy, communication, English provided as part of general provision) or ‘generic’ green skills (such as waste sorting, energy saving). ‘Specific’ green skills are more relevant to new professions particularly in emerging sectors (Commissariat général au développement durable, 2015).

4.1.2. Building networks of actors to lead skills anticipation

Skills anticipation in France is characterised by strong stakeholder and social partner engagement ([19]). There are a lot of parallel initiatives (covering assessment, forecasting and foresight) undertaken by actors at different levels: ministries, public authorities at national or regional levels, chambers of commerce, social partners, and sector organisations. As a result, these initiatives are quite fragmented. This is probably one of the main barriers to the improvement of the institutional set up.

Recently, however, skills anticipation activities in relation to green jobs have strongly developed. This has become a key issue alongside the digital transition. Most key actors involved in the field of anticipation have developed their views and/or a position on the evolution of jobs and skills related to the green economy.

More specifically, three sets of organisations need to be highlighted.

Sectoral committees

Following the Grenelle de l'Environnement, a Mobilisation Plan for green jobs was launched in 2010, [Plan de mobilisation des territoires et des filières sur le développement des métiers de la croissance verte] (Cedefop, 2010b). The Mobilisation Plan activated various stakeholders and led to the creation of 11 sectoral committees (Section 3). These committees, which are no longer functional, were based on the active participation of employers, social partners and decision makers at government level. Part of their mission was to research on green occupations and skills needs in the French economy. Today, the anticipation of new skills in relation to this transition has largely been integrated into the prospective work of many sectors.

National observatory of jobs and professions of the green economy

At national level, important work has been conducted under the aegis of Onemev (Box 1). One of its departments that works on, namely, the 'analysis, capitalisation and sharing', launched a working group in 2015 on the combined impact of the ecological and digital transitions on jobs and skills and the training needs arising. Three sectoral reports have been prepared: on building, agriculture and logistics ([20]). This work enables learners and policy makers to identify new needs in certain occupations.

The 'Jobs and Skills' network

France Stratégie, a member of Onemev, runs the 'Jobs and Skills' network (REC) [Réseau emplois compétences] created by the state and the social partners in 2013. The REC network brings together:

([19]) Skills Panorama. Analytical highlights. Skills anticipation in France: http://skillspanorama.cedefop.europa.eu/en/analytical_highlights/skills-anticipation-france

([20]) Le métiers de certains secteurs économiques: https://www.ecologique-solidaire.gouv.fr/metiers-certains-secteurs-economiques

(a) producers of observations on and forecasts of jobs and skills: state services, the OREF, prospective observatories for trades, qualifications and skills (OPMQC) [observatoire prospectif des métiers, des qualifications et des compétences] set up by the branches;
(b) public and economic decision-makers in charge of defining strategies and actions in the areas of economic development, employment, guidance and vocational training (state, regional councils, branches and social partners, business representatives, etc.).

4.1.3. The role of regional observatories

An important role in anticipation is also played by the regions. Not only are they the competent authorities for the implementation of vocational training policy for young people and adults seeking employment or vocational guidance but they operate their own observatories, namely the OREFs. OREFs regularly publish studies on green jobs and skill needs in the regions which contribute to building regional strategies ([21]). The regions are also able to work with the professional branches, the social partners and local authorities to build a training offer adapted to economic needs. Box 3 gives an example of such an activity.

Box 3: An example of regional cooperation on green skills

The ECECLI project (Direccte Île-de-France (2014) recently identified potential activities that would lead to employment and skills development in the context of the ecological and energy transition in the Great Paris area ([22]). This project involved several actors: regional representatives of the ministries of employment and ecology, the regional authorities, as well as the Seine Normandie Water Agency (AESN). The projects identified the evolution of the skills in 35 professions, in particular emerging professions (e.g. ecologists specialised in the restoration of natural environments; eco-mediators for sorting waste and energy efficiency, etc.) or professions subject to transformations (e.g. bus drivers who will have to master eco-driving as much as the computer embedded in their vehicle, site managers in construction who will have to organise the sorting of materials).

([21]) A few examples: see the work done by the regional observatory in the former Regions Alsace: http://www.oref-alsace.org/secteurs/economie-verte-et-environnement or PACA: https://www.orm-paca.org/Economie-verte-en-PACA-quels-286

([22]) Regional forecast studies ECECLI: study on the evolution of key competences in 35 green jobs or occupations: http://www.driee.ile-de-france.developpement-durable.gouv.fr/publication-de-l-etude-prospective-ececli-35-a2166.html

4.2. TVET provision for new green occupations and for greening established jobs/occupations

4.2.1. National structures for designing and implementing TVET in general

4.2.1.1. *The role of Ministries in the evolution of skills standards and training curricula*

The national education system plays an important role in defining and adapting training, taking into consideration the training needs of companies and sectors. Although decentralisation has devolved more responsibility of vocational training to the regions ([23]), central government retains a key role in the definition of standards of skills and qualifications, as well as in the regulation of diplomas. The state controls the certification of diplomas. Several ministries can design and award qualifications. Most qualifications are issued by the Ministry of Education as well as by the Ministry of Agriculture, which manages agricultural education. Other ministries can also certify diplomas, such as the Ministry of Employment or the Ministry of Youth.

Professional advisory committees (CPC) [Commissions professionnelles consultatives], which are managed by the Ministry of Education, play a decisive role in adapting or revising existing courses, and designing new courses according to industry needs. The national education system frequently overhauls training programmes after the work of these commissions, in general every five years. CPCs can make proposals on the creation, modification or suppression of education and training programmes. There are 14 CPCs covering different branches/sectors. Each CPC is composed of 40 members, appointed by public authorities, employers' or employees' federations/unions. The result of the activity of these committees with regard to green skills is described below.

4.2.1.2. *The role of the branches*

Certificates of Professional Qualifications (CQP) [certificats de qualification professionnelle] can be created by the branches and therefore are often very specific. Increasingly, inter-branch CQPs (CQPIs) [certificats de qualification professionnelle inter-branches] are also created, which validate less specific and more transferable skills. Some CQPs or CQPIs are registered in the National Directory of Professional Qualifications (RNCP) [répertoire national des certifications professionnelles], which then allows the national recognition of the corresponding title outside its professional branch of origin. The creation of CQP may therefore sometimes give more flexibility to certain branches to create qualifications quickly in line with new needs, which is very relevant in the context of adapting or creating new training curricula to new, emerging, green skills (Section 4.4).

([23]) Responsible for continuous VET (vocational education and training) and with growing responsibilities for IVET (initial vocational education and training) alongside the State (Ministry of education).

4.2.2. The impact of the green transition on TVET provision: green gestures and awareness

In France, new green skill needs are well integrated into training, according to stakeholders and evaluation reports, thanks to the various mechanisms of identification, adaptation and consultation mentioned above. Research highlights that all the training courses that have been revised or created since the Grenelle Round Table in 2007 ([24]) have sought to address the skill needs arising from the ecological transition. Two reports were produced at the request of the Ministry of Ecology by Céreq, This work is a follow-up to the Mobilisation Plan (Beaupère et al, 2016; Beaupère and Labruyère, 2016). Comparative analysis of the period 2007 to 2015 highlights two approaches in place.

4.2.2.1. *Awareness of environmental issues*

First, the adaptation of training courses can be of a general nature, essentially concerned with awareness-raising. In a number of curriculum standards, particularly those concerning training programmes that do not target jobs directly impacted by the ecological transition, references to sustainable development are mainly reflected in 'green actions' or 'eco-citizenship' initiatives, referring to transversal and general skills and to sensitisation measures. These actions are sometimes defined as 'eco-friendly gestures' or 'green gestures' [gestes verts], i.e. a set of good practices and uses contributing to the preservation of the environment (example: sorting of waste, no waste of water, etc.). In general, the core of such curricula are unchanged with professional activities not specifically adapted, such as in the fields of 'Administrative and financial services' and 'Hairdressing, aesthetics and related services'.

The Ministry of Education has made an important effort to raise awareness on environmental issues. Since 2009, all lower secondary vocational diplomas have incorporated an awareness-raising module called 'environment and health prevention' (PES) [Prévention santé environnement]. As stated in official texts, this teaching aims at the acquisition of *knowledge in the context of prevention, health and the environment; a responsible behaviour with regard to health and environment; social and civic skills enabling one to succeed in his life in society respecting one and the others; a scientific and technological culture aimed at developing a critical spirit*. This frame of reference, formulated in very generic terms, is intended to be implemented in all lower secondary and upper secondary VET diplomas (Ministère de l'éducation nationale, 2009).

4.2.2.2. *More advanced and specific adaptations*

Curriculum adaptations are more specific where job tasks are changing in relation to the green transition, for instance in renewable energies, construction, agriculture. In these cases, training goes far beyond awareness raising to change professional practice. Such

([24]) Information on the Grenelle round table is available at: http://data.bnf.fr/16027718/grenelle_environnement/

specialised training can be complex to set up, sometimes due to lack of skills on the side of training organisations.

Given that the green transition mainly requires adaptation of existing occupations rather than the creation of new ones, training course design is first and foremost a question of changing the existing training rather than creating new training courses, often through the addition of modules to existing qualifications. However, the approach is not fast: it takes at least a year and a half to validate the content of a modified training course in order to allow consultation processes to take place.

Alongside these developments of state-certified diplomas, universities can also create their own higher education pathways (under the authority of the state). The branches also adapt, via the creation or evolution of their own qualifications, the CQPs. This is described below.

The sections below give an overview of the main evolution of training courses from 2007 to 2015, drawing on the two Céreq reports (Beaupère et al, 2016; Beaupère and Labruyère, 2016).

4.2.3. The adaptation of sectoral diplomas: the greening of training courses

As of 2007, some CPCs are directly dealing with occupations in the core of eco-activities or concerning 'green' occupations: e.g. in chemistry, bio-industry and environment, wood industry and agriculture. Other committees are in charge of sectors that are strongly greening, such as metalworking industry, construction, transportation, etc.

Specific examples of recent training adaptations are as follows:

(a) In 2013, 40 diplomas fell under the remit of the Committee 'Chemistry, bio-industry and environment' of which 11 had been revised or created since 2007 (Beaupère et al, 2016; Beaupère and Labruyère, 2016):
   - level V vocational diplomas: plastics and composites (2009), industrial process control and transformations (2009), hygiene, cleanliness and environment (2009, repealed in 2013), chemical, water and paperboard processes (2012), hygiene, cleanliness, pollution management and protection of the environment (2013);
   - level IV vocational diplomas: plastics and composites (2009), bio-processing industries (2009), chemistry, water and paperboard processes (2012), hygiene, cleanliness, sterilisation, pollution management and environment (2012);
   - level III vocational diplomas: nuclear environment (2011), environmental services (2013).

All these diplomas deal with the protection of the environment, at different levels of intensity. Ecology holds a predominant place in the standards (i.e. the skills repository that is the national common definition). Sustainable development policies are taken into account transversally in the tasks described for professions. For example, in the curriculum standards of the 'chemistry, water and paperboard' diplomas the candidate is asked to 'take sustainable development into account in his/her daily practice'. In the certification framework, mention is also made of 'sustainable development (eco-friendly techniques, impact of products, etc.)'.

(b) Another case that can be mentioned is that of the adaptation of diplomas in metalwork industries. The CPC metallurgy is very much marked by the consideration of sustainable development. For example, the diplomas on foundry professions state that future graduates will be required to carry out their activities in sectors related to the environment or to sustainable development lato sensu. The automotive and agricultural equipment industries are also experiencing changes and innovations directly related to the concerns of ecological transition. Across the 113 diplomas existing in these industries, 30 were revised or created between 2009 and 2013. These diplomas all include the 'health-safety-environment' imperative. For instance the level V diploma 'Production Conductor' states that *it is a matter of preserving the health of all people and ensuring their safety while preserving property and the environment*. Recycling materials or energy management have become a common concern and is a full component of the curriculum. For example, the level-III diploma in 'aerospace' has now a component dedicated to the *environmental impacts of the manufacture, operation and recycling of aircraft*. The waste and recycling sector is also very active in adapting its standards and creating new degrees adapted to the needs of the industry.

(c) Many of the jobs and professions covered by the Commission for diplomas in 'building, public works and construction materials' have evolved and require new skills. This commission has 77 diplomas and 47 'greening' specialities can be counted. But there are few training programmes specifically dedicated to renewable energies and energy efficiency. However, provision of initial vocational education and training relevant to the renewable energy sector is increasing. Modules on renewable energies are integrated into more traditional training programmes at all levels, including level-3 professional diplomas and engineering degrees. A qualification for 'renewable energy technicians' (a post-graduate diploma) was created in 2010, following the demands of the professional branches. In the standards of this CPC, sustainable development is therefore very important. The construction and public works sectors are particularly concerned with environmental issues, not only because of regulations, but also because of tax incentives for building and improving the energy efficiency of buildings. Since 2008 a strategy to take these issues into account has been adopted by the CPC. Some new content in regard to waterproofing (in water and air), or in terms of respect for the environment and ecosystems, has been introduced.

(d) In agriculture, diplomas issued by the Ministry of Agriculture also fully integrate the issues of green transition. The training courses of the Ministry of Agriculture all propose, from levels V to III, a week dedicated to health, safety and sustainable development education during which health issues, and occupational risks related to the use of materials or chemicals are addressed. The organisation and content of this week are the responsibility of the training institutions. Some diplomas, such as the level-III diploma 'Management and control of water' are directly preparing participants for green jobs.

More generally, all diplomas related to agricultural production ([25]) are changing, due to the regulatory framework. Since the law of modernisation of agriculture, agroecology is the new approach underlying French agriculture. Thus standards are evolving and expressly include the teaching of alternative techniques, particularly organic farming, and phyto-protection.

Other CPCs refer to sustainable development without actually integrating it as far as the ones mentioned so far. This is the case for five CPCs, including that relating to 'Logistics Transport'. Some of the recently revised diplomas mention the environmental dimension of sustainable development, but the adaptation is less intensive. Depending on the specificities, some diplomas include knowledge ranging from effluent treatment for river transport to eco-driving. In terms of drivers, it is first of all regulatory constraints that are the pre-eminent factor causing training programmes to take into account eco-friendly techniques, in particular those related to the sorting and recycling of waste and packaging. For other programmes, a reference to eco-driving (that is the practice of driving in such a way as to minimise fuel consumption and the emission of carbon dioxide) has become recurrent. This can probably be attributed to both economic and ecological concerns.

There is also less intensive integration of training in relation to the green transition by the committees in food, fashion, applied arts and tourism. In the food sector, there have been some interesting developments. For instance the level-IV vocational diploma in bakery, which was updated in 2012, is particularly advanced in this area. Its standards insist on the 'increased level of responsibility' for sustainability/environmental issues at the laboratory and sales levels. It emphasises the need for the apprentice to 'know the general principles of sustainable development'; the supply of input must be 'eco-responsible' which implies in particular the purchase of local products or the type of oil and margarine used. The level-V diploma in 'fishmonger' includes teaching on the reasonable use of energy and takes into account fishing standards and the preservation of this resource.

Finally, some other CPCs make an even more minor reference to ecological transition, mainly through the awareness raising and 'eco-friendly gesture' approach described above. However, these sectors are somewhat less directly related to greening occupations: e.g. graphic and audio-visual communication, marketing and distribution, administrative and financial services, hairdressing, aesthetics and related services, and the medico-social, health and social sector.

4.2.4. The role of universities and their relationship with industry

Universities have some autonomy to launch new diplomas, although they have to be authorised by the Ministry of Higher Education. Vocational licences (level II, 'Licences Pro') illustrate how qualifications evolve on the basis of the identification of skill needs by professionals on the ground. These qualifications are revised every four years with the

([25]) Pigs or poultry, ruminants, arboriculture, field crops, horticulture, viticulture, aquaculture.

renewal of ministerial authorisations. Some new licences are being created in new, emerging fields, such as 'Ecodesign' vocational licence (2010 national report). However, one must be careful of passing trends, since it is comparatively easy to add attractive terms such as 'sustainable development' to diploma labels, whilst not really addressing the topic.

Between 2008 and 2011, some 100 new training courses were labelled 'environmental' (Ministry of Ecology, 2014). More than half were in the field of energy, about 20 in the field of prevention and reduction of pollution and 15 in the field of management of environmental issues (relating to engineering and sustainable development, corporate social responsibility, environment and sustainable development, etc.). Professional licenses and masters were the diplomas most affected by the increase in the supply of 'environmental' training during this period. A hundred vocational licenses were created between 2008 and 2011, including one third in the field of energy (mainly in sustainable construction and renewable energies) and one quarter in the prevention of pollution. More than 120 new masters were recorded in four years, particularly in nature protection and prevention and reduction of pollution.

Regarding the creation of mechanisms to adapt training to the needs of professional branches, some good practices can be identified (Assemblée Nationale, 2014). 78 'campuses of professions and qualifications' are currently in place including educational institutions (secondary and higher education, initial or continuing education) and enterprises. Ten campuses directly concern eco-industries ([26]). For instance, the campus of energy and maintenance in the industrial Lorraine region is associated with a 'competitiveness cluster' of companies and education institutions specialising in the development of new fibres and materials based notably on biosource polymers; it offers training in production, industrial maintenance, boiler making, and electro-technics ([27]). Another campus in Normandy specialises in energy and energy efficiency in several sectors: wind, nuclear, photovoltaics, bioenergy, and energy efficiency in buildings, industry and transport ([28]).

4.3. ALMPs and retraining measures

The Pôle Emploi monitors and reports on developments regarding green occupations and skills. At the territorial level, Pôle Emploi's agencies play a role in identifying promising sectors and matching the needs of companies with the profiles of jobseekers. Some groups of jobseekers are particularly targeted, in particular older workers, workers made redundant after large company restructuring (more specifically in the manufacturing sector), or people

([26]) Information on eco-industries campuses is available at: http://www.education.gouv.fr/cid113431/transition-energetique-eco-industrie-les-campus-des-metiers-et-des-qualifications.html

([27]) Information on Lorraine campus is available at: http://cache.media.education.gouv.fr/file/07_-_juillet/93/8/CMQ2014_lorraine_energie_maintenance_447938.pdf

([28]) Information on Normandy campus is available at: http://cache.media.education.gouv.fr/file/07_-_juillet/92/6/CMQ2014_basse_normandie_industrie_energie_447926.pdf

with no or low qualifications. Jobseekers are activated according to their distance to employment and benefit from individualised guidance ([29]).

Pôle Emploi's analysis focuses on recruitment opportunities in emerging sectors. Pôle Emploi informs jobseekers about opportunities in, for instance, sectors like recycling or sustainable building jobs. The organisation has developed workshops for people who do not necessarily come from these sectors, in collaboration with companies, to provide them with the most up-to-date information possible. Depending on jobseekers' skills and professional pathways, this may lead to a match with companies' needs, or in other cases to individual training or also small internships in companies. Data about the participation rates of jobseekers in retraining measures focusing on green occupations are unfortunately not available.

Pôle Emploi does not provide training itself but instead purchases provision from training centres, working alongside the regions (Section 4.1) that also purchase training programmes from training centres. For example, in the Hauts-de-France region, in the wind power sector, it has been identified that 400 new jobs will be needed to reach the production target of 2 800 MW in 2020. The region and the Pôle Emploi direct job seekers towards specialised training in the maintenance of wind turbines. This requires a rigorous selection process, as there are several prerequisites expected from the candidates: minimal qualification or professional experience, good physical health, having a driving license, etc. ([30]).

One challenge is to keep the training offer up to date with changing skill needs. In the field of wind power, the training of 'technician of maintenance of wind farms and offshore' is currently delivered by only a few establishments in France. However, the Greta du Mans in the Pays de la Loire region ([31]) provides a good example of how training can be adapted: since 2010 it has offered training to adapt skills acquired in declining industries like automobile production and wind power.

Other local players associated with the public employment service are the employment houses [maisons de l'emploi] that provide a coordinating function in respect of vocational guidance and training for unemployed people ([32]). The employment houses are grouped within the 'Alliance Ville Emploi' network, which participates in the work of Onemev and which also participated in 2012-13 in the EU-funded 'Build Up Skills' project. Build Up Skills was designed to tackle issues raised by the need for new green skills for construction workers, mainly hired by small businesses or craftsmen. The project involved public employment services (employment houses, training centres), public authorities, training

([29]) Information is available at: http://travail-emploi.gouv.fr/archives/archives-courantes/plan-500-000-formations-supplementaires/plan-500-000

([30]) Information is available at: http://www.hautsdefrance.fr/mot/formation/

([31]) Information is available at: https://www.greta-paysdelaloire.fr/nos-centres-de-formation/greta-du-maine/

([32]) Information is available at: http://www.cee-recherche.fr/publications/connaissance-de-lemploi/les-maisons-de-lemploi-ou-lintrouvable-politique-territoriale-de-lemploi

providers and employers' federations in building a roadmap that might identify these emerging needs and remove obstacles to meeting them ([33]).

4.4. The role of the private sector in skills training

The role of enterprises and the private sector in training is important at several levels. First, companies contribute to the financing of continuing vocational training by directly financing training actions for their employees and by paying a 'training' contribution corresponding to 1% of the payroll for companies with more than 11 employees (and 0.55% for the others). State-approved organisations (OPCAs) [organisme paritaire collecteur agréé], jointly managed by social partners, are responsible for collecting fees and managing the training contributions paid by enterprises. These organisations have a central role in the system of continuous training for employees in France, in particular, in the distribution of funds and the targeting of training, where necessary, on sub-groups of employees.

The largest companies (more than 300 employees) also have an obligation by law to anticipate internal jobs and skills (GPEC) [gestion prévisionnelle des emplois et des compétences]. GPEC is designed to enable companies to anticipate their future skills needs and should lead to the development of relevant training programmes. GPEC is intended to place the largest companies in a process of anticipating change.

Large companies in the sectors most impacted by the green transition (energy, buildings and public works, waste management, transport, etc.) are generally well aware of these ongoing changes and have often developed internal in-service training programmes. For example, transport companies are developing training modules for eco-driving ([34]). An example in the electricity field is shown in Box 4.

([33]) Information on the BUILD UP project is available at: http://france.buildupskills.eu/fr

([34]) Although this may also be pursued for purposes of cost reduction or the development of new products and services rather than green reasons per se.

Box 4: Action by large companies to develop in-service training

The example of Enedis: Enedis, the main electricity grid operator (a subsidiary of EDF [éléctricité de France]), has in recent years developed an 'intelligent' electrical network, notably by installing intelligent, connected electricity meters, whose management requires more complex actions. This requires an increase in the skills of its employees. In the company, the title of technician has become 'multi-skilled [polyvalent] field technician'. More generally, more than half of the 39 000 employees of Enedis have been identified as having a need for training in energy transition, notably to develop renewable energies, which are growing in their share of distribution and power consumption at the national level. Up to August 2017, 15 000 employees had been trained. The company's training and HR departments have had to build complex training for a large number of people. Such training has been adapted to people from different professional backgrounds and with different levels of knowledge or awareness with regard to green issues. Innovative methods, such as e-learning or 'serious games', have been used.

The second main way in which the private sector plays a major role in skills training is via the professional branches. The branches participate in the joint CPCs which allow the content of diplomas to evolve, using a bottom-up approach. The social partners also participate in regional training policies, under different consultative bodies. In addition, the branches have, as mentioned above, the possibility of creating their own qualifications, valid for the sector (CQPs) or transferable across several sectors (CQPIs). The creation of branch vocational diplomas in the form of CQP has occurred in many industries because it enables a close match with qualification needs.

One example is that of the Professional federation of recycling companies (FEDEREC) [Fédération professionnelle des entreprises du recyclage], as shown in Box 5.

Box 5: Branch vocational diplomas: an example from recycling

The recycling field is in constant evolution, with increasing needs in new skills. The development of the circular economy (recycling products, giving a new life to old products, etc.) entails the need for sorting which must be more qualitative, requiring a better knowledge of waste issues, etc. Low-skilled occupations in the field of sorting are therefore evolving rapidly in this context.

The FEDEREC includes 1 300 companies in the sector. The branch benefited from public co-financing to make a prospective inventory of its needs and skills which led to the creation and implementation of five new certifications, i.e. two CQPs and three CQPIs ([35]):

- CQP manual sorting operator;
- CQP mechanised sorting operator;
- CQPI industrial team leader;
- CQPI industrial equipment operator;
- CQPI industrial maintenance operator.

The example in Box 5 illustrates the process of creating new diplomas directly by the branches, on the basis of a prospective analysis. It is however not possible to have a complete overview of recently created or revised CQPs related to ecological transition,

([35]) Information available at: https://www.metiers-recyclage.info/formation/cqp-cqpi/

because of the large number of these certificates, and in the absence of a centralised and comparative tool.

More generally, the presence of branches and employers' representatives in the various consultation processes already mentioned makes it possible to identify needs and leads to the creation of new training courses. This is the case, for example, for the emerging profession of ‘referent energy in industry’. This need was identified through a sectoral contract drawn up by the National Industry Council's (CNI) [conseil national de l’industrie] Eco-Industry Strategic Committee. Manufacturers have identified skills needs and therefore training needs. Different working groups have been set up depending on the professional branch of the industry to define this trade according to specific needs. Training has been developed in conjunction with ADEME, a public institution whose purpose is to coordinate and facilitate initiatives for the protection of the environment.

Other bottom-up approaches may identify new needs, but do not immediately lead to changes in training. In 2014, within the framework of Onevem’s work, a workshop led by Céreq and the Afpa was dedicated to the analysis of the employment-training relationship in green occupations (Onemev, 2015). The case of a company in the sector ‘quarries and materials’ was examined, focusing on the multiple impacts of the new activity of taking care and recycling quarry wastes on traditional jobs in the waste sector (operators, sales representatives, laboratory technicians, logisticians, etc.). Given the small number of staff involved, this initiative has so far not led to a change at national level (through for instance a revision of the diploma content).

4.5. The role of the institutional set up

France relies on numerous committees and consultative bodies with a specific focus on green skills. At the national level, the impetus of the Grenelle Environment Forum in 2007 and several recent revivals of its dynamics have led to effective institutional arrangements. Sectoral committees produced detailed work on the topic of jobs/skills changes at the sector level in the late 2000s. Onemev plays a co-ordinating role in various fields of work, and in the face of a growing lack of resources. It relies on the missions of other organisations which themselves have their own networks of actors and their own anticipation and foresight strategies. At the sectoral level, the branches generally benefit from observatories allowing them to anticipate changes in employment and skills. They can benefit from public funding for initiatives to develop skills through training as a result of these prospective studies. Public-private partnerships are fully implemented at these different levels.

5. Conclusions and recommendations

Through different institutions, processes and initiatives, France seeks to analyse and meet future skills needs related to changes in the labour market driven by the green transition (Commissariat Général au dévelopement durable, 2015). The French approach relies on:

(a) good social dialogue on these issues, institutionalised at all levels, and which includes collaboration between the government and the social partners (employees and employers) in identifying skills needs and designing training programmes;
(b) an invitation to continually upgrade certifications and systems accreditation, passing through the professional committees managed by the Ministry of Education;
(c) a training offer designed to meet anticipated or identified skills needs;
(d) a close monitoring and evaluation of education and vocational training programmes.

Since 2009-10, France has continued to involve key stakeholders in order to anticipate changes in jobs and skills in green or greening occupations. Tools for co-ordinating studies have been set up, such as the national Observatory for green jobs. It has produced innovative methodologies to estimate jobs in the green or greening occupations. These methodological approaches are ever-changing because they are based on experience in the field and a bottom-up process. Greening jobs cover by nature a dynamic group of occupations and data built on such a broad definition might overstate the actual numbers of jobs, since they include every job belonging to one socio-occupational category. The example of road drivers or masons is a good example: not all practices are undergoing greening, yet they are nevertheless considered as a whole as 'greening' occupations.

Several issues are raised today. A first question concerns the ability to develop quality training thus implying competent trainers with sufficient knowledge on new skills and new training methods. The development of new pedagogies of training, especially through digital tools, is a potential opportunity.

A second question concerns the ability of skills standards to adapt to changing needs, as the main channels of training towards new green or greening jobs are in constant adaptation. At the same time, the delays caused by the processes of analysis and revision of diplomas may sometimes be out of step with the needs of the economy. Equally, it is important that training content is not in a permanent process of modification, otherwise the training offer may start to lack coherence.

Thirdly, branches can develop their own qualifications and this gives them flexibility. But there is also a trend towards the development of inter-sectoral qualifications, which reflects the need for labour market mobility and employability and the fact that skills that are too sector-specific and non-transferable can be a barrier to both such needs. It is therefore of great importance that training be in support of the ability of individuals to adapt to a changing world.

Fourthly, awareness-raising and sensitisation appear to be increasing across a large majority of sectors, more or less close to the core of green activities. This trend is laudable,

but care needs to be taken to ensure that this can be effectively translated into professional practice. Training people in certain ‘eco-friendly gestures’ adds value if the professional environment in which they are recruited values these actions. Raising awareness at managerial levels is also important, but managers rarely benefit from continuing training and very rarely on these issues, apart from the case of large companies in the green economy. Good business practices should be valued in this direction.

In some cases, concerns are expressed regarding the content of new ‘green’ education/training programmes: titles of programmes may have been adjusted to become more attractive to students (e.g. putting the emphasis on sustainable development), but with little or no transformation of the actual content.

In the end, the ecological transition can be a means of renewing an occupation or a sector by integrating concretely the issue of sustainable development. This was underlined in a 2015 report by the French Economic, Social and Environmental Council (EESC) (Levaux and Genty, 2015). According to this report, the adjustment of skills and therefore of training to the ecological transition will also be made thanks to changes in the attractiveness of some sectors in particular the industrial ones. The attractive side of a job or sector is an important part of the success of the ecological transition. Some occupations face decline or radical change such as those in crafts or traditional manufacturing industries, or may present a negative image like waste management. Employers may have a chance to develop these jobs and their attractiveness, and finally change the very content of these jobs, through the ecological transition.

List of abbreviations

ADEME	Agency for Environment and Energy Management [Agence de l'environnement et de la maîtrise de l'énergie]
Afpa	French Association for Vocational Training [Agence nationale pour la formation professionnelle des adultes]
ALMP	Active Labour Market Policy
APEC	Association for the Employment of Managers [Association pour l'emploi des cadres]
AVE	Alliance Villes Emploi
Cedefop	European Centre for the Development of Vocational Training
Céreq	Centre for Studies and Research on Employment and Skills [Centre d'études et de recherches sur les qualifications]
CGDD	Evaluation and Statistics Department of the General Commissariat for Sustainable Development [commissariat général au développement durable]
CNFPT	National centre for the territorial civil Service [Centre national de la fonction publique territoriale]
CQP	Certificates of Professional Qualifications [Certificats de qualification professionnelle]
CQPI	Inter-branch CQP [certificats de qualification professionnelle inter-branches]
CPC	Professional advisory committees [Commissions professionnelles consultatives]
DARES	Department of Studies of the Ministry of Employment [Direction de l'animation de la recherche, des études et des statistiques]
DGT	Treasury Directorate [Direction générale du trésor]
EU	European Union
FEDEREC	Professional federation of recycling companies [Fédération professionnelle des entreprises du recyclage]
GPEC	Anticipate internal jobs and skills [Gestion prévisionnelle des emplois et des compétences]
ILO	International Labour Organization
INSEE	National Statistics Institute [Institut national de la statistique et des études économiques]
IVET	Initial vocational education and training
MDG	Millennium development Goal
NAF	French activity nomenclature [nomenclature d'activités française] (corresponds to the European classification NACE)

NSDS	National Sustainable Development Strategies
Onemev	National Observatory for Jobs and Occupations of the Green Economy [Observatoire national des emplois et métiers de l'économie verte]
OPCA	State-approved organisation [Organisme paritaire collecteur agréé]
OPMQC	Prospective observatories for trades, qualifications and skills [Observatoire prospectif des métiers, des qualifications et des compétences]
OREF	Regional Employment and Training Observatories [Observatoire regional emploi formation]
PES	Environment and health prevention [Prévention santé environnement]
PIA	Future Investment Program [Programme d'investissements d'avenir
Pôle Emploi	French public employment agency
R&D	Research and development
REC	Jobs and Skills' network [Réseau emplois compétences]
RNCP	National Directory of Professional Qualifications [Répertoire national des certifications professionnelles]
SNBC	National Low Carbon Strategy [Stratégie nationale bas-carbone]
TVET	Technical and Vocational Education and Training
UN	United Nations
VET	Vocational Education and Training

References

Assemblée Nationale (2014). *Rapport d'information sur l'évaluation de l'adéquation entre l'offre et les besoins de formation professionnelle*. Rapport No 1728.

Auzanneau, M. (2017). *Les éco-activités et l'emploi environnemental en 2015: premier résultats*. Datalab Essentiel No 107, Mai 2017. Paris: Ministère de l'environnement, de l'énergie et de la mer. http://www.statistiques.developpement-durable.gouv.fr/fileadmin/documents/Produits_editoriaux/Publications/Datalab_essentiel/2017/datalab-essentiel-107-eco-activites-2015-mai2017.pdf

Beaupère, N.; Labruyère, C.; Wendling, J. (2016). *Prise en compte des mutations induites par la transition vers l'économie verte dans les formations professionnelles initiales*. Volume 1. Céreq Etudes No 4. http://www.cereq.fr/publications/Cereq-Etudes/Prise-en-compte-des-mutations-induites-par-la-transition-vers-l-economie-verte-dans-les-formations-professionnelles-initiales

Beaupère, N.; Labruyère, C. (2016). *Prise en compte des mutations induites par la transition vers l'économie verte dans les formations professionnelles initiales*. Volume 2. Céreq Etudes No 6. http://www.cereq.fr/publications/Cereq-Etudes/Prise-en-compte-des-mutations-induites-par-la-transition-vers-l-economie-verte-dans-les-formations-professionnelles-initiales-Volume-2

Cedefop (2010a). *Skills for green job. European synthesis report*. Luxembourg: Publications Office of the European Union.

Cedefop (2010b). *Skills for green jobs. Country report: France*. Thessaloniki: Cedefop. Available at: http://www.cedefop.europa.eu/en/uploads/dfu/country-reportfrance

Cedefop (2013). *Skills for a low carbon Europe: role of VET in a sustainable energy scenario*. Luxembourg: Publications Office of the European Union. Research Paper No 34.

Cedefop (2019). *Skills for green jobs: 2018 update. European synthesis report*. Luxembourg: Publications Office. Cedefop reference series; No 109. http://data.europa.eu/doi/10.2801/750438

Commissariat général au développement durable (2015). *La France mobilisée sur les compétences professionnelles de la transition écologique*. Le Point Sur, No 216, décembre 2015. http://www2.developpement-durable.gouv.fr/IMG/pdf/LPS216.pdf

DARES (2017a). *Les professions de l'économie verte*. DARES Analyses. Paris: Ministère du travail, de l'emploi, de la formation professionnelle et du dialogue social. Janvier 2017, No 007. http://dares.travail-emploi.gouv.fr/IMG/pdf/2017-007.pdf

DARES (2017b). *Professions de l'économie verte: quelle dynamique de l'emploi*? DARES Analyses. Paris: Ministère du travail, de l'emploi, de la formation professionnelle et du dialogue social. Janvier 2017, No 006. http://dares.travail-emploi.gouv.fr/IMG/pdf/2017-006.pdf

Direccte Île-de-France (2014). *Evolution compétences emplois climat Île-de-France*. Projet Direccte ECECLI Île-de-France. Synthèse Septembre 2014. Aubervilliers: Direction Régionale des Entreprises de la Concurrence, de la Consommation, du Travail et de l'Emploi. http://idf.direccte.gouv.fr/sites/idf.direccte.gouv.fr/IMG/pdf/synthese_ECECLI_2014_ok_bd_.pdf

European Parliament (2015). *COP21: Quelles ambitions pour l'Union Européenne?* [COP21: what ambitions for the EU?] Synthesis of the European Parliament's initiative report presentation. http://www.europarl.europa.eu/france/resource/static/files/PDF/cop-21---quelles-ambitions-pour-l-ue_compte-rendu.pdf

ILO (2011). *Skills for green jobs: a global view*. Synthesis report based on 21 country studies. Olga Strietska-Ilina, Christine Hofmann, Mercedes Durán Haro, Shinyoung Jeon. Geneva: International Labour Office, Skills and Employability Department, Job Creation and Enterprise Development Department. http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_159585.pdf

ILO (2018). *World employment and social outlook (WESO) 2018: greening with jobs*. Geneva: International Labour Organization. https://www.ilo.org/weso-greening/documents/WESO_Greening_EN_web2.pdf

Levaux, M.-B.; Genty, B. (2015). *L'emploi dans la transition écologique*. Les avis du CESE. Paris: Conseil économique, sociale et environnemental. http://www.lecese.fr/sites/default/files/pdf/Avis/2015/2015_15_emploi_transition_ecologique.pdf

Ministère de l'éducation nationale (2009). Bulletin officiel spécial No 2 du 19 février 2009. http://www.education.gouv.fr/pid20873/special-n-2-du-19-fevrier-2009.html

Ministère de l'environnement, de l'énergie et de la mer (2016). Feuille de route gouvernementale pour la transition écologique 2016. Conférence environnementale 2016, Paris, 25-26 April 2016. https://www.ecologique-solidaire.gouv.fr/sites/default/files/Conf%C3%A9rence_environnementale_FRTE_2016.pdf

Ministry of Ecology (2014) *L'environnement en France*. Paris: Ministère de l'Écologie, du Développement durable et de l'Énergie. http://www.eaufrance.fr/IMG/pdf/Rapport_sur_l_environnement_2014_201410.pdf

Observatoire régional des métiers PACA (2014). *Observer les métiers verts et verdissants*. Présentation aux Matinales Atouts Métiers, 18 mars 2014. https://www.orm-paca.org/IMG/pdf/v4_les_matinales_oref_lr_ev_18_mars_2014_mode_de_compatibilite_.pdf

Onemev (2015). Rapport d'activity 2014. Paris: Ministère de l'Écologie, du Développement durable et de l'Énergie. https://www.ecologique-solidaire.gouv.fr/sites/default/files/Onemev_RA2014.pdf

Rossignol, L.; Nègre, L. (2013). *Report on the application of the Grenelle I and II laws*. Senate. https://www.senat.fr/rap/r12-290/r12-2901.pdf

Service de l'observation et des statistiques (2016). Observatoire national des emplois et métiers de l'économie verte. Rapport d'activité 2016. Document de travail No 33. Paris : Ministère de l'Environnement, de l'Énergie et de la Mer. http://www.statistiques.developpement-durable.gouv.fr/fileadmin/documents/Produits_editoriaux/Publications/Documents_de_travail/2017/document-de-travail-33-rapport-onemev-mai2017.pdf

Websites

Basse-Normandie. Campus des métiers et des qualifications de l'industrie des énergies Basse-Normandie. http://cache.media.education.gouv.fr/file/07_-_juillet/92/6/CMQ2014_basse_normandie_industrie_energie_447926.pdf

Build up skills France. http://france.buildupskills.eu/fr

Centre d'études de l'emploi. http://www.cee-recherche.fr/publications/connaissance-de-lemploi/les-maisons-de-lemploi-ou-lintrouvable-politique-territoriale-de-lemploiClimate Plan of July 2017. http://www.gouvernement.fr/en/climate-plan

COP21, Paris, 2015. http://www.cop21paris.org/

Économie verte en PACA: quels effets sur l'emploi? Questions métiers No 2 Juillet 2013. Observatoire régional des métiers, Région PACA. https://www.orm-paca.org/Economie-verte-en-PACA-quels-286

Energy transition for green growth act [Loi sur la transition énergétique pour la croissance verte]. https://www.legifrance.gouv.fr/affichLoiPubliee.do?idDocument=JORFDOLE000029310724&type=general&legislature=14

First national sustainable development strategy Act of 2003 [première Stratégie nationale de développement durable] http://www.ladocumentationfrancaise.fr/dossiers/d000075-le-developpement-durable-en-france-de-la-strategie-nationale-au-grenelle-de/la-strategie-nationale-de-developpement-durable-2003-2008

Grenelle de l' Environnement. https://en.wikipedia.org/wiki/Grenelle_Environnement

Grenelle Round Table 2007. http://data.bnf.fr/16027718/grenelle_environnement/

Greta du Maine. https://www.greta-paysdelaloire.fr/nos-centres-de-formation/greta-du-maine/

INSEE, 2013 census. https://www.insee.fr/fr/information/2409289

Le métiers de certains secteurs économiques. https://www.ecologique-solidaire.gouv.fr/metiers-certains-secteurs-economiques

Lorraine. Campus des métiers et des qualifications énergie et maintenance Lorraine. http://cache.media.education.gouv.fr/file/07_-_juillet/93/8/CMQ2014_lorraine_energie_maintenance_447938.pdf

Métiers recyclage. https://www.metiers-recyclage.info/formation/cqp-cqpi/

Plan 500 000 formations supplémentaires pour les personnes en recherche d'emploi. http://travail-emploi.gouv.fr/archives/archives-courantes/plan-500-000-formations-supplementaires/plan-500-000

Reconquest of the biodiversity of nature and landscapes Act of 2016 [Loi pour la reconquête de la biodiversité de la nature et des paysages]. https://www.legifrance.gouv.fr/eli/loi/2016/8/8/2016-1087/jo/texte

Région Hauts-de-France. http://www.hautsdefrance.fr/mot/formation/

Regional forecast studies ECECLI: study on the evolution of key competences in 35 green jobs or occupations: http://www.driee.ile-de-france.developpement-durable.gouv.fr/publication-de-l-etude- prospective-ececli-35-a2166.html

Regional observatory in the former Regions Alsace http://www.oref-alsace.org/secteurs/economie-verte-et-environnement

Skills Panorama. Analytical highlights. Skills anticipation in France. http://skillspanorama.cedefop.europa.eu/en/analytical_highlights/skills-anticipation-france

Transition énergétique / éco-industrie : les Campus des métiers et des qualifications. http://www.education.gouv.fr/cid113431/transition-energetique-eco-industrie-les-campus-des-metiers-et-des-qualifications.html

United Nations Climate Change Conference (COP21), Paris, 2015. https://www.un.org/sustainabledevelopment/cop21/