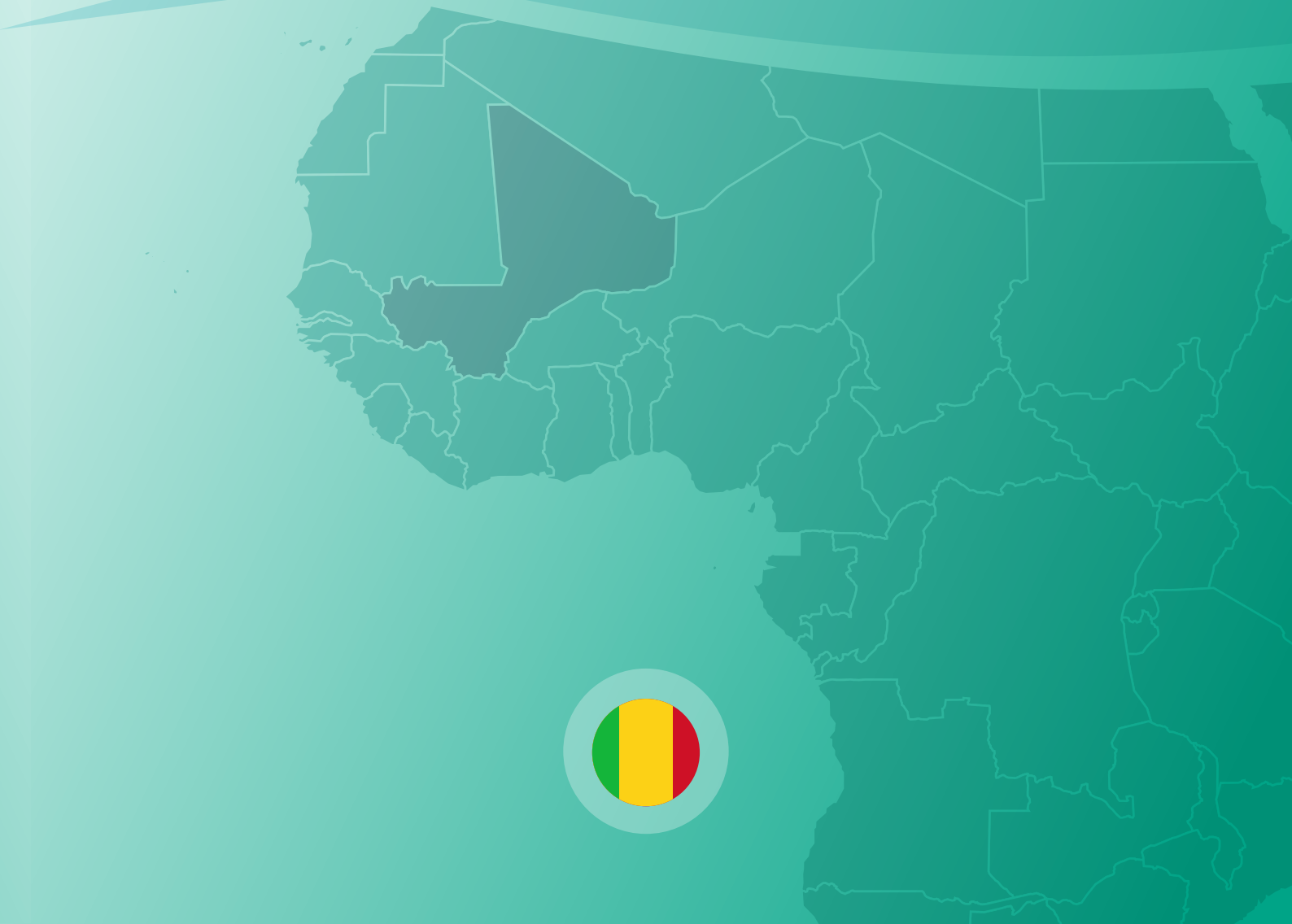
International Labour Organization

Skills for Green Jobs in Mali



Skills for Green Jobs in **Mali**

First published 2018

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ISBN 978-92-2-132917-6 (print)
978-92-2-132918-3 (web pdf)

Design and layout by the International Training Centre of the ILO, Turin – Italy

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Abbreviations and Acronyms

AEDD	Agency for Environment and Sustainable Development
AER-Mali	Mali Renewable Energy Agency
AFD	French Development Agency
AMADER	Malian Agency for Domestic Energy and Rural Electrification
AMO	Compulsory Health Insurance Scheme
ANADEB	National Agency for the Development of Biofuels
ANPE	National Employment Agency
APC	Approche Par Compétence (Competency-Based Approach)
APEJ	Youth Employment Agency
CAA	Agricultural Learning Centres
CIFED	International Centre for Training in Energy and Sustainable Development
CNPM	National Council of the Patronage of Mali
CPDN	Contribution Planned Determined at National Level
CREDD	Strategic Framework for Economic Recovery and Sustainable Development in Mali
CSR	Corporate Social Responsibility
CSRCP	Strategic Framework for Growth and Poverty Reduction
ECOWAS	Economic Community of West African States
EDM-SA	Energie du Mali
EMOP	Modular and Permanent Survey
FAFPA	Support Fund for Vocational Training and Learning
FDP MD	Feed the Future Micro Dose
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIZ	Gesellschaft für Internationale Zusammenarbeit (German Cooperation)
GNP	Gross National Product
HIMO	Haute intensité de main d'œuvre (Employment Intensive Investment Programme)
ILO	International Labour Organization
IPOMER	Professional Insertion Oriented towards Ecologically Responsible Occupation
IPR	Rural Polytechnic Institute
LOA	Agricultural Guidance Law
NAPA	National Adaptation Program of Action
NDC	Nationally Determined Contribution
ODD	Sustainable Development Goalså
ONEF	National Observatory on Employment and Training

PAM	World Food Program
PAMT	Policies Labor Market Activities
PDASB	Program of Development of Access to Basic Energy Service
PIL-ADCC	Program of Local Initiatives for Sustainable Adaptation to the Effects of Climate Change in Vulnerable Rural Communities in Mali
PNCC	National Policy for Climate Change
PNE	National Employment Policy
PPP	Private Public Partnership
PRODEFPE	Ten-Year Program for the Development of Vocational Training for Employment
PTF	Technical and Financial Partner
SHER	Hybrid Systems of Rural Electrification
SIDA	Sweden International Development Agency
TVET	Technical Education and Vocational Training
UEMOA	West African Economic and Monetary Union
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VAE	Validation of acquired experience

Abstract

This study on skills for green jobs highlights the progressive greening of the Malian economy, thanks to governmental determination, marked by the implementation of policies strongly anchored in the Sustainable Development Objectives and Strategic Framework for Economic Recovery and Sustainable Development in Mali. There is as yet no specific strategy on green jobs to underpin Mali's vision of promoting a green and resilient economy, which could contribute to massive creation of decent green jobs for young people and adult women.

Nevertheless, despite difficult internal (post-crisis) geopolitics, economic sectors have generally grown in recent years and continue to evolve, thanks to ecological projects and the expected investments in green financing.

To seize all these opportunities, as well as promote green professions, it is necessary to develop the identified green skills (mainly in the fields of agriculture, industry, sanitation and renewable energies), by integrating a green jobs dimension within companies, economic sectors and training centres.

Involvement of the private sector (including the informal sector which has great potential job opportunities) is desirable, in order to establish a formal and inclusive social dialogue, and to reorient traditional education towards the structuring of green professions.

Acknowledgment

This study was conducted by Mali-Folkecenter Nyetaa, as a part of set of national studies on skills for green jobs conducted in some thirty countries globally. The set of studies is the result of collaboration between the ILO and the European Centre for the Development of Vocational Training (Cedefop). Overall methodological guidance was provided by Olga Strietska-Ilina (ILO Employment Policy Department, Skills and Employability Branch). Coordination of country studies and technical backstopping was provided by a team led by Catherine Saget (ILO Research Department), Tahmina Mahmud (ILO Skills and Employability Branch) and Takaaki Kizu (ILO Research Department). Moustapha Kamal Gueye and Marek Harsdorff (ILO Enterprises Department) contributed to the studies' implementation on behalf of the ILO Green Jobs Programme. Alena Zukersteinova and Stelina Chatzichristou from Cedefop's Department for Skills and Labour Market coordinated studies among the participating EU countries. Valuable inputs were provided by the ILO colleagues: Christine Hoffmann, Laura Brewer, Maria Ilca Lima Webster, Alvaro Ramirez Bogantes, Hassan Ndahi, Fernando Vargas Zuñiga, Patrick Daru, Akiko Sakamoto, Mikhail Pouchkin, Gabriel Bordado, Julien Magnat, Kanae Tada, Tendy Gunawan, Bolotbek Orokov, Gwyneth Anne Palmos, Georginia Pascual, Badiane Cheickh and Kishore Kumar Singh. Massimiliano Leone, Ana Buzdugan (International Training Centre ILO Turin), Mariela Dyrberg and Annette Brandstäter (ILO Employment Policy Department) Solveig Boyer (ILO Green Jobs Programme) and Manuela Flamini (Edizioni Retrò s.r.l.) were responsible for editing and design.

1. Introduction (objectives, methods used)

This study aims to update the first study on 'Skills for Green Jobs "conducted by Mali-Folkecenter in 2009 (see: http://ilo.org/skills/inst/WCMS_144268/lang--en/index.htm). The aim is to identify the major changes in Mali's policies and strategies in the area of green skills development, good practices and projects or programmes for low-carbon technologies.

The results of this study will provide sound, evidence-based and up-to-date advice to government, legal advisors and national and international stakeholders on how to address skills development in order to ensure a smooth transition to a green economy.

The research methodology used in this study focused on a fairly comprehensive literature review and on meetings with key players in the field. The new policies and strategies developed by public actors were identified, as well as new documents produced by civil society actors and development partners from 2009 to the present day.

As part of the preparation for the mission, a scoping meeting was held with the ILO representative in Mali, which provided additional guidance and recommendations for the successful conduct of the mission.

Through the use of questionnaires and interview guides (see Annex 4) integrating all aspects relating to the study problem set out in the Terms of Reference, the mission team conducted a series of meetings with the actors on the ground. The meetings involved stakeholders in the study, from the public sector, private sector, civil society, labour unions and other structures working in the field of renewable energy, the environment, climate change, and promotion of employment and vocational training.

The analysis of the data and information collected will also help define the factors of success and good practice which are illustrated in four practical case studies, namely: 1) innovative financing of renewable energies through the solar roof programme; 2) waste recovery in improving agricultural productivity and production; 3) skills in ecological architecture in urban areas; 4) hybrid solar mini-grid systems in rural areas.

2. Major changes in the economy and employment shifts in the green transition since 2009/10

Mali is at the heart of West Africa with an area of 1.2 million square kilometres, and an estimated population in 2015 of 17.7 million, 75.4 per cent of whom live in rural areas.[1]

Following the security and political crisis that the country experienced in 2012, Mali is making progress in its normalization process. Indeed, in 2012 Mali experienced a recession with a GDP growth rate of -1.2 per cent as against an initial forecast of 5.6 per cent. At the time this led to a slowdown in economic activity in the secondary sector (industry) and tertiary sector (commerce and tourism), which resulted in the closure of some businesses and a rise in unemployment (3,558 job losses in the private sector according to the 2013 report of the ONEF).

Currently Mali is in a phase of economic recovery and consolidation of a lasting peace. Presidential elections were held in 2013, followed by legislative elections in 2014. The peace agreement between the belligerents was signed in June 2015 in Bamako in the presence of the international community, which made it possible to stabilize the country's policies safely.

In the area of climate change Mali has made international commitments, signing the United Nations Framework Convention on Climate Change in 1994 and the Kyoto Protocol in 1999. Mali also contributed in the sub-region to the elaboration of the ECOWAS White Paper on Renewable Energy and Energy Efficiency, and the Great Green Wall project. To this end Mali undertook to take measures to fulfil its commitments by drawing up its National Adaptation Action Programme (NAPA) in 2007.

The National Policy on Climate Change, together with the strategy and an action plan was developed in 2011.

At institutional level the Agency for Environment and Sustainable Development (AEDD) was created in 2010 to address the various issues related to climate change and sustainable development.

Mali developed and forwarded its Intended Nationally Determined Contributions (INDCs) to the 2015 United Nations Climate Change Conference (COP 21). After ratification of the Paris Agreement, the INDCs became Mali's NDCs. Mali intends to contribute as much as possible to the collective ambition to limit greenhouse gas emissions and promote the green economy and resilience to climate change through five programmes (forestry, smart agriculture, renewable energy, water resources and pastoral resources) as part of the adaptation process.

These various aspects have been a precursor for Mali's building a green economy as a solution to climate change. Thanks to the involvement of the authorities, the private sector and civil society, the greening of the economy is leading to the creation of green jobs.

2.1 Changes in the effects of climate change on economic activity sectors and new data on the current situation

Mali's economy is based on the exploitation of natural resources, which are strongly affected by the adverse effects of climate change. According to the report on the NDCs, natural climate risks have increased with the intensification of climate change: repeated droughts, floods, strong winds, bush fires, and destabilization of the rainfall regime leading to uncertainty in agricultural schedules. Agriculture, which is the most affected, accounts for 45 per cent of GNP and occupies about 80 per cent of the working population; it remains very sensitive to climate change.

1 Source EMOP Août 2015, page 9.

Mali, as part of its National Determined Contributions, has four priorities: financing the green fund and the adaptation fund; adaptation to climate change impacts; technology transfer and capacity-building; and reduction and mitigation of greenhouse gases. In its strategy Mali aims to develop the use of renewable energy to further reduce its greenhouse gas emissions (Mali emits only 0.06 per cent of global greenhouse gas emissions).

By limiting its greenhouse gas emissions Mali is committed to modifying its economic development mechanism, which is currently dominated by traditional energy sources (biomass, diesel, petroleum), the use of pesticides and herbicides in agriculture, domestic breeding and deforestation for new fields. Thus moving towards a green economy will require the development of new systems such as composting, biofuel, solar energy, reforestation, biogas, housing and so forth.

Already action has started in this direction through State incentives for the promotion of renewable energies (removal of taxes on import duties on solar energy products, promotion of biofuels), work in the field of agriculture and forestry (e.g. HIMO Employment Intensive Investment Programme, Agricultural Guidance Acts, laws on the protection of forests).

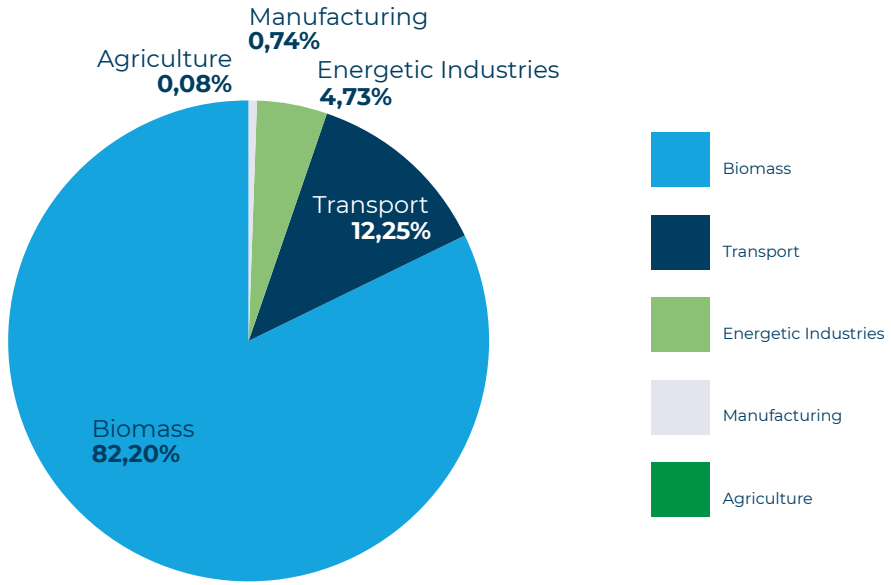
2.2 Potential of the energy sector, with a strong capacity for green employment

The energy sector is one of the three most greenhouse-gas (GHG)-emitting sectors in Mali. According to NDC statistics this is due to the use of biomass (wood energy and charcoal) by households, as shown in the Figure 1.

The redistribution of GHG emissions in relation of the energy subsectors (transport, energy production, agriculture machinery) is as follows:

Transport is the second most polluting sector, with massive consumption of fossil fuel. Small

Figure 1. Sub-sector of energy GHG



Source: From Malian NDCs, 2015

processing units occupy the third sector that emits quantities of greenhouse gas (industry units which use fuel to produce energy). In view of these elements, it is important to focus policies for mitigating GHG emissions on the residential, transport, and energy-intensive industries. According to the NDC report, during the period 1995-2012 CO_2 emissions in the energy sector increased from 945 kT to 2782 kT, an increase of more than 190 per cent over the 17-year period.

This increase relates to biomass, and is attributable to the rural population. Owing to the problems of crop yield and climate change and also to the high demand from cities for wood and charcoal, this environmentally harmful activity provides employment opportunities for the rural population. Thus Mali, as part of its strategy to stabilize its greenhouse gas emissions, needs to popularize low-carbon technologies and develop the skills of the population in the most ecologically beneficial techniques.

In recent years there has been strong enthusiasm for renewable energies. Populations in rural areas in particular are being increasingly equipped with solar technology, and other directly-related jobs are also being created as a result. For example, a person who installs a solar panel in his or her home allows others to benefit from it. As a result, the development of the renewable energy sector remains promising (in terms of solar energy, wind, biofuels, energy efficiency), but remains unmanaged and unsupported. Moreover its impact on the economy is not measured or well understood, especially as Mali is following the current trend of meeting energy needs using large solar power systems, which has created a strong demand for qualified technicians for the management and operation of these units.

The renewable energy sector needs to be better organized to take advantage of the country's rich potential in clean energy resources: average solar energy radiation of 6 kWh/m²/day; biomass including 2 000 ha of Jatropha plantations, 1 400 000 litres of alcohol from sugarcane; average wind speeds that vary from 3 m/s in the south to 7 m/s in the north; and a total potential hydropower resource of 1 150 MW, of which only 22 per cent has been developed.

In addition, the productive use of this energy facilitates the creation of income-generating enterprises, and creation or consolidation of jobs.

In this context some new skills are necessary and need to be popularized in the various production links, installation, maintenance or servicing services, and in marketing and local use. Among the areas concerned are: (i) energy efficiency (improved cooking stoves, low-energy lamps, intelligent management of energy in buildings, and so forth.); (ii) wood substitution for energy generation (biogas, butane gas, fuel briquettes); (iii) biofuels; and others.

Promising green trades in renewable energy (says the Director of CIFED)[2] include the following: renewable energy engineers; technicians and engineers in intelligent networks; hybrid power plant managers; environment and sustainable development managers.

2.3 Real opportunities for green jobs in agriculture

Greenhouse gas emissions in agriculture are more pronounced in the area of fertilizer management, and livestock management is also a sector generating emissions, especially of methane. Moreover, there is the burning of savannahs and agricultural residues, and rice cultivation. The mitigation measures need to address the chemical fertilizer and livestock subsectors. According to the NDC report, based on sectoral distribution the fertilizer sector remains the largest emitter of CO_2 with 35kT, after breeding with 10kT, and finally the rice sector with 1kT.

The labour market is relatively linked and correlated with local economic conditions. It

2 Centre International de Formation en Energie et Développement Durable.

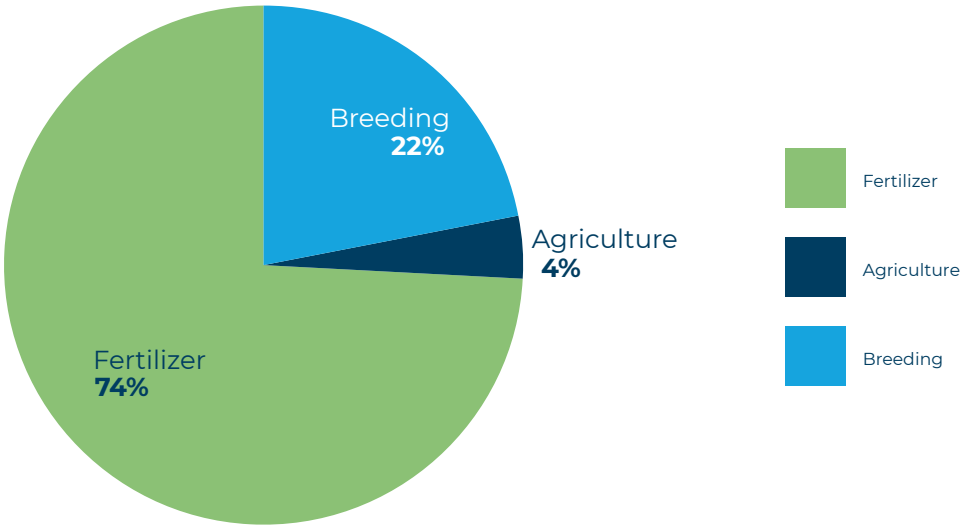
is very clear that a socio-economic situation favourable to growth has direct effects on the development of professional activities and mainly on the integration of youth into the economic fabric. Employment is an outcome of economic development (all things being equal). Thus employment in Mali primarily consists of agricultural employment, since the economy is strongly dominated by the agricultural sector, the main sector of growth. About two-thirds of all those employed work in agriculture (including livestock, fishing, hunting and forestry). Agricultural employment takes many forms: self-employment and seasonal employment, among others. The strong growth in agricultural production in Mali in recent years has resulted in a significant increase in employment in this sector.

In the 2015/2016 crop year cereal production amounted to 8.0m tonnes for all grains combined (rice 30.5 per cent, maize 26 per cent, millet 24.8 per cent, sorghum 18 per cent, fonio 0.3 per cent, wheat and barley 0.4 per cent). Compared to the results for the 2014-2015 season, which were estimated at 7.0m tonnes, there was an increase of 15.25 per cent. In the 2016-2017 season Mali produced 8.8m tonnes of cereals (up nine per cent) to rank second in West Africa after Nigeria (figures from the Ministry of Agriculture). As for the cotton sector, the country produced 645,000 tonnes. Other agricultural activities have recorded similar annual increases.

However these agriculture-related jobs could still be better remunerated, given the low producer prices, lack of streamlined distribution systems, and above all the weak technological base of the sector.

The introduction of environmentally-friendly technologies is changing the nature of agriculture, making the activity more sustainable and therefore more viable. The massive creation of green and decent jobs in the agricultural sector is a good way of promoting strong economic growth, helping reduce unemployment and offering prospects for newcomers on the labour market.
This requires developing the skills of the participants, particularly in green techniques and technologies; examples include use of bio-fertilizers, composting, permaculture, inclusion of the use of plant species replacing pesticides, renewable energy (installation of solar panels for irrigation), market gardening (mainly peri-urban) and other green technologies used as sustainable and efficient solutions to the

Figure 2. Agriculture GHG



Source: From Malian NDCs

need to revive the soil and increase agricultural yields (see Case Study 2 on waste recovery through improved agricultural production and productivity). There should also be good coherence between the policy defined by the Government and farmers' expectations based on yields, which for them is synonymous with more income but does not integrate the environmental aspects.

2.4 Promoting niches in the forestry sector

Forestry makes Mali a carbon sink, according to the NDC report: "The net record of forestry and land-use sector is a GHG sequestration record with an average value of 220,505 Kilotons of CO_2 per year". Indeed, according to the report of the NDCs on forestry and the land-use sector, GHG sequestration, with an average value of 781,473 kilotons of CO_2 per year, is ensured only by the forest zone. On the other hand, emissions of an average value of 560,976 kilotons of CO_2 per year come from mineral soils allocated to agricultural systems and to silvopastoralism and converted land (grassland and cleared areas).

The woodlands that occupied about 32 million hectares in 1985 covered only 17.4 million hectares in 2011 owing to human pressure and climate change (PNCC, 2011). There is significant forestry potential, the forest domain covering about 100 million hectares, of which only 21 million (17 per cent of the national territory) generate real production. The potential for natural regeneration is estimated at seven million tonnes per year.

Owing to deforestation and degradation, this forest resource is under strong pressure. According to the different sources, the loss of forests is estimated at between 100,000 ha/year (PNCC, 2011) and 500,000 ha/year (CSCRP3, 2011).

Action is under way in Mali to use firewood, household waste, agricultural residues and animal waste more sustainably. Cleaner cooking fuels using sustainable biomass offer opportunities for creating jobs in rural communities, increasing incomes and improving health.

Opportunities for creating wealth and employment also exist in current reforestation activities. However, emphasis should be placed on the planting of useful trees (e,g, for food, furniture and health) such as baobab, moringa, tamarind and venn wood. Thus measures for production of timber resources or energy wood in a controlled, and therefore sustainable, manner through private exploitation of large areas will contribute to satisfying the needs. In addition they will help protect natural forest resources, hence facilitating better soil protection for sustainable land management, thereby helping lift people out of the poverty cycle.

The skills that need to be developed revolve around reforestation of forest species, conservation of plant and animal diversity, ecotourism, restoration of degraded ecosystems, improved stoves, and use of biomass briquettes. Techniques for raising awareness and popularizing best practices will also be integrated (to help change some misconceptions to the effect that nature will regenerate forest species on its own).

2.5 Innovative green technologies in the livestock and fishery sectors

The livestock and fishery sectors account for about ten per cent and five per cent of GDP respectively (AEDD, 2010). The Malian herd, made up of millions of heads of cattle, more than 25 million heads of sheep and goats and nearly a million dromedaries, is one of the largest in the sub-region. Poultry is also traditional with 35 million units.[3]

Livestock production, which is extensive, is subject to the high climatic variability of recent decades, with a direct impact on animal mortality, animal health and fodder availability. This has led to an upsurge in regular conflicts between herders and farmers.

3 Source: Politique de Développement Agricole du Mali (PDA), page 10.

Initiatives to integrate agriculture and livestock farming (through housing techniques, for example) will have to be adopted, facilitating the acquisition of skills inherent in the professionalization of this sector.

Vegetable tanning, which is very popular, has great potential as a green craft, and makes it possible to compete against industrial tanning, provided that the leather and hide sector is well organized and that the actors in the vegetable tanning value chain are enabled to acquire the necessary skills for the adoption of innovative techniques. Annual production, estimated at more than 500,000 hides of cattle and 3,500,000 hides of sheep and goats, places Mali as the largest ECOWAS (ANPE) producer.

The fishing sector employs between seven per cent and eight per cent of the Malian working population. Fishery production is around 100,000 tonnes per year. Fish production potential is over 200,000 tonnes per year. This sector is particularly sensitive to the availability of surface water resources which are themselves sensitive to high temperatures. This leads to a reduction in the quantity of fish and the disappearance of some species. Fish farming is a good sustainable alternative to depletion of fish stocks and degradation of aquatic ecosystems. This calls for the promotion of appropriate skills for the adoption of proper techniques for the integration of this sector with poultry and market gardening, and skills for small-scale fish farming above ground as a solution for preserving aquatic fauna.

2.6 The industry sector can be a provider of green jobs

The prospective study Mali 2025 is predicated on an annual growth rate of ten per cent in the industry sector between 2015 and 2025, divided between mining with seven per cent, telecommunications with 14 per cent, manufacturing with nine per cent and electricity with ten per cent.[4] The companies in the sector must increasingly take environmental issues into account at all stages of their production processes. The skills to be developed relate to the management of industrial waste and the use of solar and other green technologies. Other skills can be developed in Risk Management and Climate Opportunity advice for industrial companies.

Moreover, industrial enterprises have an interest in investing in the creation of indirect jobs to make their environment more secure. For example they can support environmental programmes, in particular within the framework of their Corporate Social Responsibility (CSR) since degradation of the environment affects the materials feeding the industries, which gradually become scarcer. This decline in industrial activities can be detrimental to employment levels.

2.7 Niches of opportunities in the health and sanitation sector

Increases in temperature have implications for human health, particularly in the advent of meningitis, malaria and cholera.

In this context the skills to be acquired relate to capacity-building for prevention of the adverse effects of climate change and the fight against climate-sensitive epidemics and diseases.

In the field of iron and waste recovery, an entire informal economy is growing in recycling, but suffers from lack of supervision.

Skills should be developed for better solid and liquid waste management, recycling that is beneficial for agriculture (market gardening), and better organization of this sector.

Particularly in the field of dyeing (using chemical pollutants), progress has been noted in Bamako, with the creation of basins and sewerage systems to treat wastewater.

Finally, in the field of recycling, good knowledge of the production cycles of the existing industrial units will allow implementation of plans for the recovery and reuse of some by-products that can be used as raw materials for starting a new production cycle. This will open up an option at national level to bring the country back into the cycle of a circular economy.

4 PRODEFPE 2015, page 16

3. Key policies and regulations

Overall, there is no specific policy or strategy on green employees.

- New policies have been developed since 2009, some of which take into account aspects of environmental protection, such as climate change policy, and CREDD, a law prohibiting the use of non-biodegradable plastic waste (see section 3.7) . These new policies have taken into account the greening evolution of the economy.
- On the other hand, other strategies or policies have not undergone any change or revision since 2009. This is the case with the national renewable energy strategy and the national energy policy.
- Among the 2009 policies and strategies that have been revised are the Agricultural Guidance Law (LOA) and the National Employment Policy (PNE). However, new public policies and strategies, as well as existing ones that have been revised over the period, make no reference to skills development aspects for green jobs.

The lack of consideration of these green skills is mainly due to a lack of coordination between environmental services and other ministerial departments in policy-making and a lack of popularization of the principles of green skills.

The existing policies are set out in the following paragraphs.

3.1 The National Policy for Climate Change (NPCC)

In July 2011 Mali developed its National Climate Change Policy with the support of the European Union Delegation. The objective of the NPCC is to contribute to poverty reduction and sustainable development by providing appropriate solutions to the challenges of climate change to ensure that they do not become limiting factors in socio-economic development. The policy is guided by principles such as the "polluter pays" principle, the precautionary and anticipation principle, and the public-private partnership. The NPCC also seeks to respond to the sectoral changes in agriculture, livestock, health, sanitation, education, industry, transport, energy, and territorial issues.

One should recognize that the policy addresses the need for better protection of the environment through strategies to adapt and mitigate climate change, and even proposes the creation of green employment in the industry sector, although not yet providing enough elements for economic greening. It is necessary to conduct a policy review using the key concepts of "green economy" to better illustrate the policy internationally.

3.2 The National Energy Policy and the Renewable Energy Strategy

Adopted in 2006, the National Energy Policy aimed to make the provision of energy services accessible to the greatest number of people, while promoting socio-economic activities. The policy was supported by several strategies such as the National Strategy for Renewable Energy and the National Strategy for the Development of Biofuels. The aim of the latter strategy[5] was to increase the use of renewable energy in national electricity production from less than one per cent in 2004 to six per cent in 2010 and ten per cent to 2015. This strategy for renewable energies was to be revised in the course of 2017. The National Strategy for the Development of Biofuels[6] aimed to reduce imports of fuel (gasoil and distillate diesel oil) and of biofuel (jatropha and ethanol) by 15 per cent by 2018 and 20 per cent by 2023.

5 Stratégie Nationale sur les Energies Renouvelables, 2006.

6 6Stratégie Nationale des biocarburants, 2008.

The quantitative objectives of the national energy policy are to increase the country's electricity coverage and raise the level of rural electrification to 55 per cent; to reduce the contribution of wood fuels by 60 per cent; and to increase the use of renewable energy in national electricity production to ten per cent. The achievement of this objective has a considerable impact not only on the level of adaptation, but also on reducing greenhouse gas emissions, thus contributing to the promotion of a greener, sustainable economy with green jobs.

Several agencies have been set up to help realise this policy, namely AMADER for the promotion of domestic energy and rural electrification in rural areas, ANADEB for the development of biofuels, and AER-Mali for the promotion of renewable energy. The government is also maintaining its customs tax exemption for renewable energy imports, and a special reduced rate of five per cent for VAT (Value Added Tax)[7], compared to 18 per cent for other products.

3.3 The law prohibiting the use of plastic and non-biodegradable waste

According to the report of the Ministry of Environment Sanitation and Sustainable Development, plastic waste accounts for three per cent of urban waste. Of the 17,089 tonnes of plastics produced in or imported into Mali, only between 1,355 and 1,720 tonnes are recycled. The Law on "Prohibition of the production, import, possession, marketing and use of non-biodegradable plastic bags and non-biodegradable pellets intended for the manufacture of the said bags in the Republic of Mali" was adopted in January 2012. However this law has not yet been implemented. It enables new initiatives to be taken on careers and techniques that are less harmful to the environment, and provides an opportunity to develop business and investment in the field of green skills.

3.4 The Agricultural Guidance Law (LOA)

In August 2006 Mali adopted the Agricultural Guidance Law (LOA). This law forms the basis of Mali's general agricultural development policy until 2025. It reflects the will of all the partners in the sector to move from subsistence agriculture to intensive, diversified and Climate-Smart Agriculture capable of satisfying the growing needs of the country, and aimed at exploiting the sub-regional and global markets. CSA is an approach to transforming agricultural development under the new realities of climate change. The Food and Agricultural Organisation of the United Nations (FAO) defines this as “agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHGs (mitigation) where possible, and enhances achievement of national food security and development goals”.

The aim of the LOA is to contribute to: 1) economic and social promotion of families in rural and peri-urban areas, 2) ensuring sovereignty and food security, and 3) environmental protection and sustainable management of resources. This LOA aims to encourage the professional organization of the agriculture sector, as well as the extension of agricultural enterprises. Supporting measures are envisaged for agricultural enterprises. This law was reinforced by the Land Act passed by the deputies in April 2017. It aims to protect farm operators against land speculators, to supplement the legal framework for agricultural land management, and finally to regulate the agricultural sector.

Climate change affects the agriculture sector, and this law has been an important element in guiding and securing farmers. It encourages promotion of water control techniques, energy production (use of biofuel, and mechanization of agriculture) and control, agricultural education and vocational training, which are still assets with a strong potential for a green economy and for building up the capacity of the actors.

7 Décret n°2014-0816-P-RM du 27 octobre 2014.

As mentioned in the previous report, the promotion of rural employment and fight against youth unemployment as defined in the LOA remain common basic objectives for all agricultural and food sector policies and strategies. These objectives will be achieved in the agricultural, animal, fish breeding and forestry sub-sectors, which absorb job-seekers, and fruitful points of convergence between them and all categories of job-seeker will be established.

3.5 The National Employment Policy of Mali

The National Employment Policy in Mali aims to contribute to increasing decent job opportunities. This policy specifically aims at collaboration with all national policies in the cross-cutting aspects of employment. Some specific objectives are: (i) strengthening measures for job promotion and creation, promotion of private employment-generating activities, support for modern enterprises and micro and small enterprises, identification of measures to promote employment to take account of the demographic challenge and the specific nature of the integration problems of some groups (women, youth, disabled persons, returning migrants, and others); (ii) improving the employability and provision of vocational and technical training; and (iii) improving the governance of the labour market. To achieve this objective the policy calls for an intervention strategy aimed at quantifying the number of jobs created annually (i.e. 10,000 per year).

In the global climate context the National Employment Policy update in 2014 failed to take account of or establish the link with the climate change issue. Since 2009 this national policy still has not related directly to the green jobs and climate change issues. It is important for the structure of employment that elaboration of the policy includes the green economy sector, the climate change issue and energy.

The Government of Mali in its policy addresses employment in general but takes specifically into account the needs of youth, women, and disabled people, with an emphasis on decent jobs.

3.6 The National Policy for the Protection of the Environment

The aim of the National Environment Policy is to ensure a healthy environment and sustainable development by taking environmental aspects into account when deciding on the design, planning and implementation of policies, programmes and development activities through the accountability and commitment of all stakeholders. Although the objectives are not quantitative, this policy intends to address the basic questions concerning the fight against desertification, food security, prevention and the fight against pollution, in order to ensure sustainable socio-economic development of Mali. Like the National Policy on Climate Change, it also applies the principles of equity and equality to all, including the "polluter-pays" principle. The policy does not clearly mention green jobs. Thus it remains confronted with major challenges relating to the following:

- A better match between the sustainable management of natural resources and population expansion through rational country-wide land management;
- Promotion of a living environment for rural and urban populations, with the establishment of sanitation infrastructures to manage pollution and wastewater issues more effectively;
- Promotion of new and renewable energies within populations, particularly in rural areas;
- Research on desertification and environmental protection issues, with a view to developing appropriate technologies and technologies.

In conclusion, this policy raises expectations in relation to the greening of other sectors of the economy, as reflected in the CREDD 2016/18 (see section 3.7).

3.7 Strategic frameworks, major reforms and new priorities of the Government (emergency policies and programmes)

The Strategy Framework for Growth and Poverty Reduction (CSCRP) is the framework for all development policies and strategies in Mali. In its second generation (2012-2017) this framework has extensively addressed environmental issues and renewable energies. Following the lessons learned from the different strategic frameworks, it took Sustainable Development into account in the drafting of the third generation of the Strategic Framework for the Fight against Poverty in the context of the greening of the CLSP.

Following the security challenge and the return to final peace on the territory, one of the priorities of the Malian government is the revival of the economy through promotion of private investment, creation of sustainable jobs for youth, and environmental protection. For the first time climate change has been taken into account in the Strategic Framework for Growth and Poverty Reduction (CSRCP-2012-2017), which is the framework for all development policies and strategies in Mali. CSRCP noted the protection and better management of natural resources without, however, taking into in-depth account the environmental impacts of the economic options being considered for poverty reduction.

The shortcomings of this sustainable development and climate change strategy have been taken into account in the CREDD (Strategic Framework for Economic Recovery and Sustainable Development-2016-2018), which is the new updated version of the CSRCP. It is the sole reference document on development policies and strategies, according to the Ministry of Economy and Finance.

The overall objective of CREDD is to promote inclusive and sustainable development for the reduction of poverty and inequality in a united and peaceful Mali, building on its potential and resilience capacity to achieve the Sustainable Development Objectives (SDOs) by 2030.The CREDD Strategic Axis 1 has been dedicated to "Inclusive and sustainable economic growth" and takes into account, in the fifth priority area, environment protection.

The specific objective of this priority is the promotion of green economy through sustainable management of natural resources and an effective fight against global warming. Moreover in this context the CREDD anticipates infrastructure development, taking into account the development of renewable energy and increasing access to electricity at lower cost for rural and urban populations. The green notion is reflected in strategy, hence in the creation of green jobs.

In 2011 the Ministry of Environment and Sanitation, with the support of UNDP (United Nations Development Programme), developed a strategy for a green and climate-resilient economy. This strategy is geared to building an economy which can accommodate or adapt to climatic effects. The strategies and measures to be undertaken were proposed in the areas of agriculture, livestock, fisheries, water, health, transport, mines, and land. At the level of the NDCs, the corresponding commitments are to a mitigation scenario that will reduce greenhouse gas emissions by 29 per cent for agriculture, 31 per cent for energy and 21 per cent for forests, based on a baseline scenario for 2030.

The main orientations of the strategy relate to limitation of pressure on forest areas, promotion of renewable energies and energy efficiency, restoration of degraded land, efficient use of fertilizer systems, and finally studies on the link between health and the environment.

This strategy is today an important step towards a greening of the Malian economy. Implementing the measures is the responsibility of the Agency for Environment and Sustainable Development (AEDD).

The Law on Public-Private Partnership (PPP), adopted in December 2016, allows the State to benefit from the financing of private operators for the implementation of infrastructure projects and public services. It clarifies the basic

principles of governance, the administrative and financial procedures of the parties, and the mode of settlement of disputes. Given the various challenges faced by the country and the low level of State income, this law is beneficial and will contribute effectively to the financing of economic growth. Thus strategies developed in the field of energy, climate change and environmental protection may have sources of financing. Indeed, in the context of the PDASB (Programme for Development of Access to Basic Energy Service), financed by the World Bank, and the Public-Private Partnership, this model has made it possible to achieve the objectives of the programme by increasing the rate of access to energy in rural areas - from one per cent in 2003 to 17 per cent in 2015.

3.8 Projects and programmes initiated by the Government and other actors

Mali has been an active actor in advocating environmental issues and climate change at national and international levels, and to this end several projects and programmes have been implemented or are being implemented by stakeholders (the Government, the civil society, and the private sector). These projects and programmes focused on several aspects of adaptation or mitigation in the face of climate change, namely capacity-building, action research, pilot projects, communication, and thematic information for actors and beneficiaries.

The achievements of the projects and programmes have been funded by multiple donors including 1) the UN through the Climate Fund, UNEP and UNDP; 2) bilateral cooperation and international cooperation agencies, the Embassy of Sweden including SIDA, the French Embassy including the French Development Agency, the Embassy of Norway, the Embassy of Denmark, the Embassy of the Netherlands, and the German Cooperation through GIZ; and 3) the World Bank, and private initiatives with the Government of Mali.

The implementation of projects through these financing mechanisms has facilitated technical solutions with less negative impact on the environment and creates many green jobs across the country. Below are described some notable projects carried out by the government, the civil society, and the private sector under the PPP (Public - Private Partnership).

3.8.1 The governmental sector

The Government of Mali has undertaken programmes and projects to encourage measures to achieve the objectives of the National Climate Change Policy and of the Sustainable Development Goals (SDGs), in particular SDGs 4, 6, 7, 8, 11, 12, 13, 14 and 15.

The Mali Climate Fund headed by UNDP in Mali

The government and the UNDP multi-partner office signed a Memorandum of Understanding in 2012 to create a Mali Climate Fund. The objective of the Mali Climate Fund is to enable the government to access international climate funds in partnership with the United Nations system. The aim is to mobilize private and public funding, and bilateral and multilateral sources.

The mobilized fund is 3.68 billion FCFA (US$ 6,1 million), provided by the Swedish Cooperation (3.1 billion FCFA, or US$ 5,1 million) and the Norwegian Government (592.3 million FCFA, or US$ 0.99 million).

After a call for projects in 2014, three projects received financial resources in the field of agricultural intensification, fish farming through the extension of new techniques, the wood and energy sector, and modern water management. Implementation of these projects will contribute to implementation of the strategy for the green economy and creation of green jobs

Hybrid Systems for Rural Electrification project (SHER)

The SHER project aims to reinforce and continue the extension of rural electrification, using decentralized mini-grids in rural areas, with hybrid technology (solar photovoltaic and diesel

generators) and the installation of domestic solar kits at household level. The project aims to install 50 hybrid power plants with a capacity of 4.8 MW, to provide 2 400 households with solar photovoltaic systems and distribute 100 000 (one hundred thousand) "Lighting-Africa" certified solar lanterns under Public-Private Partnerships. The total cost of the project is US$ 44.9 million, or 25.7 billion FCFA.

With this project, about a hundred green jobs will be created, relating to solar panel and inverter installations, system programming, and monitoring and management of solar power plants. Emphasis will also be placed on the productive use of energy, which allows the creation of direct or indirect green jobs through the use of energy during the day for income-generating activities.

3.8.2 Civil society and development partners

Civil society organisations have carried out several projects as part of the process of adaptation to the effects of climate change, and of mainstreaming green (or ecologically responsible) careers in Mali. This will be illustrated by concrete projects carried out by the Reso-Climat-Mali Platform and the IPOMER (Professional Insertion Oriented towards Ecologically Responsible Occupation) programme.

In 2008 civil society actors gathered together to form the Reso-Climat Mali Platform. It has 112 members and consists of six thematic groups (1-Adaptation, 2-Mitigation, 3-Technology Transfer, 4-Advocacy/Lobbying for Gender and Communication, 5-Disaster Risk Reduction, and 6-Sustainable Development and Green Economy). All these themes support the development of a greener economy with techniques that can promote green jobs. In 2009 the Reso-Climat Mali Platform received support from the Swedish cooperation agency SIDA totalling 2.56 billion FCFA (US$ 4.5 million) under the PAIRCC (Programme of Support for the Initiatives of Reso-Climat Mali for 2009-2019) project to finance 28 micro-adaptation projects in favour of vulnerable groups and communities, capacity-building, and the establishment of a technology centre in the context of climate change. In 2014 Reso-Climat Mali was financed by the SIDA for implementation of the Programme of Local Initiatives for Sustainable Adaptation to the Effects of Climate Change in Mali's Vulnerable Rural Communities (PIL-ADCC). The total cost of the project is 3.4 billion FCFA (US$ 4 million), and it will help implementation of 20 micro-projects by 2018

The IPOMER (Professional Insertion Oriented towards Ecologically Responsible Occupation) project, totalling 554 million FCFA (US$ 923,333) is financed by the French Development Agency and Handicap International. It is a multi-partnership project (civil society, municipalities, and State technical services in the field of employment and vocational training) carried out in the region of Sikasso. The aim of the project is to integrate youth and disabled people into decent and environmentally-friendly trades.

The project has targeted areas such as poultry farming, fish farming, beekeeping, fruit and vegetable processing, photovoltaic installation, cashew processing, and shea processing.

The project in its execution demonstrates the methods of integration of disabled people, but also support for the realization of decent ecological and environmentally-friendly professions. One of the integration methods has been to entrust the beneficiaries to peers who have had experience in their trade over a defined period. Following tutorial training this method enabled the beneficiaries to become better acquainted with their future jobs.

Other large-scale projects and programmes have demonstrated the possibility of moving towards a green economy in response to the adverse effects of climate change, namely: (1) German cooperation through GIZ within PACT / ELCOM, (2) Luxembourg cooperation project PIC and its three components (MLI021, MLI022, and MLT023), and (3) USAID as part of its CCA project.

3.8.3 The private sector in the framework of public partnership

The Government of Mali has also encouraged the national and international private sector in implementation of environmental projects in the fields of energy and sanitation. Among these projects are the following:

- The 33 MW grid-connected solar power plant project in Ségou is being carried out under a BOOT contract with the Ségou-Solaire company; the contract is for a total of € 55 million (US$ 68 million). The project is in its construction phase, and expects to create 200 direct jobs.
- The 50 MW solar power plant in Kita, by the company AKUO Kita Solar under a BOOT contract, the signed agreement being for a total of 50.2 billion FCFA (US$ 84 million)
- The project to clean up the city of Bamako, with the Moroccan company OZONE under a contract for 9 billion FCFA (US$ 15 million) per year, for a period of eight years. The contract anticipates the creation of 1,500 jobs and the conversion of solid waste into energy resources.
- The Solar Roof Project, an initiative of the Minister of Energy which aims to finance, through credit from a bank, a domestic solar system for individuals or microenterprises, and the supply and installation of the materials by a company specialized in the area.
- The project of a 25 MWp solar power plant in Koutiala and a 50 MWp solar power plant in Sikasso for EDM-SA.

It should be noted that among the agreements signed, some are in the implementation phase (OZONE, Photovoltaic Power Plant) and others are in the preparation phase (33 MW project in Ségou and 50 MW project in Kita). In short, it is clear that green job skills are an opportunity for young people in Mali, with these ecological projects already recruiting staff, along with future job needs to cope with the professions required by these projects for installations, maintenance, monitoring and training.

Table 1. Potential of green sectors , occupations, techniques and technologies

POTENTIAL SECTOR	OCCUPATIONS/ TRADES	TECHNIQUES & TECHNOLOGIES
Agriculture	› System installer with low water › consumption	› Dropping Technique *Used by PILADCC projects*
	› Moderate user of fertilizers in the fields	› Microdosing *Used by Project USAID*
	› Manufacturer of soil fertilizer fertilizers	› Composting
	› Organic farmer	› Compost fertilization › Organic pesticide from natural products
Forestry	› Nursery man (Reforestation intensive)	› Reforestation (nursery)
	› Producer of coal from residues or other biomass	› Technique of charring and transformation of residue into briquette (shives or coal)
Energy	› Solar photovoltaic systems › installer	› Solar photovoltaic
	› Wind system installer for › lighting and pumping	› Wind power
	› Engineer Designer &designer of › solar production systems for › rural electrification	› Design and dimensioning of renewable energy needs
	› Biodigester builder with cow dung	› Manufacture of biodigester
Others	› Architects › Masons › Plumbers › · Electricians	› Building in local clay › Use of local materials › Dryers › Solar panels › Solar water heaters › Low consumption lamps or lbc › Humidifiers › Rational water management in buildings

4. Skills development measures for the green economy

4.1 The major challenges to the emergence of a green economy

The adverse effects of climate change are threatening the growth of Mali's economy and the livelihoods of the population. In these circumstances, taking them into account is necessary for considering economic progress or sustainable development.

Indeed, the impact of climate change is reflected in the level of poverty. Poverty itself is often at the root of the process of environmental degradation. It will take the effort of all concerned (decision-makers, technical and financial partners, beneficiaries) to stop this vicious cycle, taking into account the specific but strategic needs of the population, especially youth. For, as in most developing countries, the population of Mali is predominantly young. People under the age of 15 account for about 58 per cent of the total population. Taking 25 years-of-age as a threshold, 68 per cent of the Malian population can be considered young.

Youth are severely affected by unemployment. According to the Modular and Permanent Survey (EMOP-August 2015) PAM, unemployment affects 10.6 per cent of the working population of working age (15-64 years). Women are more affected by this phenomenon than men (13.9 per cent versus 7.8 per cent respectively).

The persistence of unemployment and underemployment of youth is the main cause of impoverishment, clandestine migration and increasing social tensions. Indeed, the growing number of unemployed youth creates considerable pressure on the labour market and is a major risk to the social stability of the country.

However, support to enable youth to obtain paid employment and self-employment in various green sectors with high growth potential can contribute to a lasting solution to unemployment. The main green sectors are agriculture, livestock, fisheries, energy, forestry, industry, sanitation and health. As a result, promotion of green skills also promotes the transformation towards a sustainable economy and simultaneously combats unemployment, climate change and ecological decline.

As in the previous 2009/2010 report, the main challenge for skills development for green jobs in rural areas remains the lack of training for young people and women in techniques and knowhow to adapt to the climate change threatening the agriculture sector (livestock, fisheries, agriculture). At present efforts are being made by the authorities and civil society to improve the democratization of access to and use of meteorological information, promotion of cultural techniques and popularization of low-carbon technologies (see project PIL-ADCC, Climate Fund Mali).

4.2 Skills needs identification / anticipation

4.2.1 The greening of different skills in the transition towards a sustainable economy

In a changing environment companies and economic actors always have to question their working methods in order to remain competitive on the market. Faced with new techniques or technologies, companies need trained staff with appropriate skills[8] and the choice of recruiting new employees, retraining or parting with former employees.

8 See annex 1 for definition of skills.

It is noted that currently in Mali few companies are taking adaptation or mitigation measures in anticipation of future changes and the evolution of the economy in transition to the green dimension.

Moreover the need to integrate the green dimension differs according to the sector and the will of the actors. On the whole, companies that are exporting (eg, agri-food) are adopting this green dimension so as to have more markets or a certification process for their products.

This is the case for the many exporting factories or enterprises in Mali which are obliged to have specific competences in their knowledge of the rules of certification and international trade standards. In the agri-food sector these skills also include mastery of technical itineraries in organic farming, composting, and food manufacturing authorization techniques (among others; see below).

Being in a competitive environment, some companies (most often focused on the domestic market) may be reluctant to adopt green technologies for reasons of profitability or competition in their sector. In this case the State will have to intervene through coercive measures (prohibition, established norms) or incentives (exemptions or administrative facilities or subsidies).

However it should be stressed that many measures taken by the government concerning the environment and natural resources management (Plastics Act, Forest Code, Fertilizer Quality Control Act) are not well implemented in the field. The main causes are insufficient sensitization, lack of involvement and appropriation of local populations, low literacy and non-translation of (often complex) texts into local languages.

For example, new laws and government regulations on green skills will need to be improved in their popularisation and in the monitoring of their inclusive application.

Donors and development partners will also have to provide the necessary support, subsidizing technologies or facilitating skills development for employees.

Support for companies and workers must allow the acquisition of skills such as:

- mastery of national laws and regulations (environmental protection, management of forest and natural resources);
- knowledge of international standards and regulations (decisions taken at major climate conferences);
- opportunities arising from new trends in the international market (promotion of organic products and also the socially responsible economy);
- ability to adapt to the environment, adopting an approach to identifying and anticipating green skills.

Such identification requires an assessment of the needs of the company and an inventory of the skills available, prior to developing appropriate strategies for the development of skills. This may involve renewal of skills in existing occupations or new competences to be acquired in new occupations, induced by the prospective greening of the socio-economic sectors.

Identification of the competences to be integrated for the greening of the current professions

With the greening of businesses, some trades will undergo modifications; new green activities will be introduced. For example, the most polluting sectors will undergo restructuring and even profound changes in the introduction of sustainable production practices.

Such changes lead to new needs in terms of enhancing (complementary) skills for workers, who in this case retain the same professions or trades.

For worker development needs, changes or developments will require re-training and upgrading of their knowledge, incorporating the required green skills. The greening of these skills will be required in virtually all trades and occupations, owing to the cross-cutting issues of environmental protection and greening of socio-economic sectors.

Identification of skills needed for new green trades

In some sectors changes in the economy will require that some companies drop some tasks or even trades in favour of others that are more environment-friendly, less polluting or more sustainable (introduction of new technologies, prohibitions). This is the case in Mali with some industries that manufacture plastic bags; and there are employment needs for new sectors such as energy, improving security and environmental conditions in industries (hotel structures, tanning of skins, pharmaceuticals, slaughterhouses and sludge treatment).

In such cases re-training in these new professions will require the re-shaping of existing profiles, in order to meet the needs for the specific skills acquired and adapted to these new professions.

In addition to the workers who start new trades, such adaptation of skills can concern graduates from training centres or job-seekers (through qualifying training).

4.2.2 Role of social dialogue

In Mali there is no formal, inclusive and functional framework for social dialogue; and the country has not yet organized (at least in recent years) professional elections of trade union representativeness, to avoid disputes.

Tripartite exchange frameworks (government, trade union representatives, business representatives) are required with a view to carrying out a review of collective agreements, among other issues debated. These frameworks do not much involve enterprises in the informal sector.

However, in 2001 a National Pact was established, and currently a project for the creation of a National Council for Social Dialogue is in progress. This will be the national body for social dialogue.

Formal social dialogue is essential, particularly in the design and implementation of policies for climate change and transition to a green economy. Indeed, the changes inherent in greening jobs (and occupations) must ensure that decent work standards are respected and that access to adequate social protection is promoted.

In this context such social dialogue would be an effective mechanism for anticipating and resolving, in a concerted manner, all the problems that might arise in the context of the greening of competences. It would contribute to the easing of predictable tensions between workers (trade unions) and the government on the one hand, and between workers and employers on the other, following re-conversions to green trades.

Social dialogue should also be a good lever for building strong professional relationships between social actors, enabling the future transition to the green economy to begin in an atmosphere of serenity and social peace.

Thus future revisions of labour legislation and regulations will have to define the terms and conditions for the development of green skills within companies. In addition, in the framework of the drafting or revision of the collective agreements of enterprises (all socio-professional sectors combined), the competence references that will appear must take account of the size of the green economy.

Through social dialogue, all stakeholders with the support of the State will have to ensure compliance with the provisions regarding competences, particularly their inclusion in collective agreements, as well as vocational training and professional development in the green trades.

Dialogue should, however, involve the informal sector, which occupies a large place in the Malian economy. No fewer than 91 per cent of employed persons work in informal enterprises (100 per cent in primary, 26 per cent in secondary and 72 per cent in tertiary sectors)[9].

Generally, it is in these less formal businesses that strong relationships are built up between employers and employees, dismissing all kinds of claims or grievances. It is noted that working

9 PRODEFPE, page 10.

conditions and remuneration are more modest in this sector than in the formal sector; and in the vast majority of cases these informal jobs are not covered by labour legislation or by a good social protection policy (social security, health insurance), although progress is being made with the proposed extension to the Compulsory Health Insurance Scheme (AMO).

4.3 TVET provision for new green occupation and for greening established jobs / occupations

4.3.1 Presentation of the Technical Education and Vocational Training System

Despite the efforts made in recent years to promote the education and training sector, Mali's educational indicators remain modest. The gross enrolment ratio in the first cycle of basic education in Mali was estimated at 74.1 per cent in 2015, with disparities between urban and rural areas (respectively 104.0 per cent and 62.9 per cent) and between boys and girls (respectively 76.8 per cent and 71.1 per cent). Equity between girls and boys in schooling is therefore far from being achieved.

The lack of access to schooling is partly due to inadequate school infrastructure and teaching staff and to the social status of some parents.

As for vocational training, it has always had, in addition to its role in the trade, an important socialization function, due to its contribution to the integration and social integration of young men and women (see the example of ESIAU on the construction of the citizenship of school leavers in Case Study 3).

According to the National Policy on Vocational Training, technical and vocational education is still characterized by insufficient specialization, despite considerable efforts by the authorities to develop new programmes based on the competence-based approach (APC). However, these new programmes need to take green skills into account.

Public support for vocational training is carried out through the FAFPA (Support Fund for Vocational Training and learning), APEJ (Youth Employment Agency) and the National Agency for Employment (ANPE). These three structures have pursued the same roles and functions in the direction of vocational training, integration and job creation. Although none of them have incorporated the skills aspects for green jobs directly, there have been measures related to environmental citizenship and large-scale work with high labour-intensity in the field of agriculture.

The UFAE (Unit for Training and Support for Enterprises) was restructured in 2012, combining the different training units UFAEMB (Training and Support Unit for Maintenance and Building Companies), UFAEBCI (training unit supporting civil engineering, mining and industrial enterprises), and UFAEGO (training and support unit for business management organizations) to form the National Institute of Engineering of Vocational Training (INIFORP). The initial mission of INIFORP is to contribute to the recycling of interfaces between training centres and the labour market and to provide consulting services to companies to facilitate diagnosis of the problem of qualified human resources. Depending on the evolution of the green jobs market and the need for human resource recycling in companies, INFORP can contribute to the transition to the green economy.

As for **private sector vocational training**, there are 500 establishments. Despite the plethora, supply in this sector remains largely concentrated in the specialities of the tertiary sector (82 per cent of private establishments; source PRODEFPE, 2015, page 18).

In the case of **initial training**, more than two-thirds of the Malian population has not been educated at all (source: EMOP 2015, page 9). Despite the Government's efforts, girls are less educated, and more than 70 per cent of women have no initial vocational education or training (especially in rural areas, source: EMOP 2015).

As for **continuous training**, almost three-quarters of employees have received training in the context of the exercise of their activity, according to data from PRODEFPE, 2015. Most of these training courses benefit the public sector. Through these courses employees develop their skills to better perform tasks in the professional environment.

4.3.2 Integrating green skills into TVET for better match between vocational training and sustainable employment

Green trades are not yet well integrated into the education and vocational training system in Mali, while the need for green skills is high in the national economy and will continue to evolve over the coming years.

In this context it is probable that training centres will need to shape curricula so that the training pathways integrate sufficiently into promising economic sectors and anticipate green economy pathways.

It is quite clear that the potentialities of each country or locality must be the basis for shaping the local workforce. Thus any vocational training or formal or non-formal education devoted to youth or to women must aim at contributing to the competitiveness and performance of the local economy. By orienting it in this way this training should be able to provide an adequate response to current and future labour market needs, by providing the economy with skilled human resources. Training centres should therefore be encouraged to develop themes in line with the economic potential of the localities.

Today the vocational training sector does not anticipate the channels of green employment. The integration of green skills in vocational education and training makes it possible to present youth with a pool of employment opportunities in the growing niche of green trades. To do so, these training centres will have the choice between: (i) integrating green skills into current pathways and qualifications; or (ii) developing new frameworks for green skills. Specifically:

- **integrating green skills into current pathways and qualifications:** specific training modules can be designed and referenced for the green trades; this will make it possible to specialize young people in promising niches and centres to diversify their training offers;
- **developing new frameworks on green skills:** at the same time, some green skills that are quite transverse (such as competences related to renewable energy or environmental management) can be integrated into conventional channels, in order to complete and shape the profiles of persons being educated or trained.

As to the issue of gender in vocational training, the framework of the “Ten-Year Programme for the Development of Vocational Training for Employment” (PRODEFPE) takes into account the gender issue. Measures have been taken so that the objective of equal access to training can be regularly observed through the monitoring of reception in the various training courses set up within the framework of PRODEFPE. Efforts must be made in the field to encourage and adopt incentives to promote gender equity at the technical and vocational levels, for example in the electricity trades, construction and public works.

However it should be recognized that women have overall lower levels of education generally; according to the ONEF calculation from the EMOP data (2014), when considering the percentage distribution of the population aged 6 and over by level of education and diploma, 73.8 per cent of women have no education at all, compared to 65.7 per cent of men.

These gender inequalities, which are clearly reflected in this distribution of men and women between levels of education, are largely due to the low level of schooling of girls and the inadequate literacy of women. The integration of green skills in technical education and vocational training should promote equality between girls and boys, while encouraging the former to embrace the scientific and technological sectors.

4.3.3 Some specialized training initiatives

With the economic growth and climate challenges, the vocational and classic training fails to cover all the needs for new job opportunities. The Malian authorities quickly realized that specialized centres should be promoted by the primary sector and other emerging sectors such as energy, agro-industry and services. These centres may be public or private; they are targeted on specific audiences. Teaching systems and methods are modular and supported by intense practical work with the use of appropriate teaching materials.

Efforts are under way in the establishment of some training centres, particularly in sustainable development, climate change and the green economy (renewable energy, environment and agriculture). The CIFED[10] initiative partially addresses the need for continuous training in renewable energy and sustainable development. The centre develops skills for technicians and engineers in various areas including photovoltaic technology; the design, sizing and installation of a hybrid power plant; an energy audit of a building; and implementation of a sustainable development strategy. The centre offers two types of training, initial and continuous. It contributes useful green job skills development in the energy and building sectors.

In the agriculture and environment sectors there are also training centres. Examples include CAA (Centres d'Apprentissage Agricole- Agricultural Learning Centres), the Forestry Training Centre, IPR (Institut Polytechnique Rural) and the centre of Ouelessebougou. There are now four CCAs operational in Mali. Each year the CCAs recruit students by competition between young people (aged at least 18 years and at most 25 years), at DEF[11] level. For the IPR initial training for engineers and technicians to be accessible, students must have bachelor level qualifications. These centres do not sufficiently directly integrate green skills in their curricula.

This lack of integration of ecological skills in programmes is partly due to the fact that these curricula are largely oriented towards food self-sufficiency and agricultural intensification rather than environmental standards and renewable energies. It is also indicative of the need to develop referenced modules on green trades as well as training of trainers in the area of green skills, while adopting innovative approaches such as the APC.

In the region of Kayes (a region of high migration), training is provided by the Ministry of Employment, Vocational Training, Youth and Civic Construction, in collaboration with the villagers who usually use solar technology. This centre was built in April 1999 and renovated in March 2017.

People from those villages who now live in Europe provided the financial support for young people (with donations of 40 000 FCFA or 61 Euros per month per young person) and the search for partnerships, especially in France (e.g. the partner Electricité De France / EDF). The training modules provided cover metal construction, solar panels, electricity for buildings, rural electrification, micro-networks and electrical safety, market gardening, and bovine or ovine fattening. The target groups include the following: young people who have not been able to get places in secondary schools; migrants from Development Education Centres (at village level); apprentices from craft associations; young migrants returning to the country; potential young Franco-Malian migrants (thanks to agreements signed with the French general council); and young women who wish to develop new income-generating activities. At the end of the courses, which are modular, a certificate is issued.

Private centres such as 2IE (a sub-regional training centre based in Burkina Faso, with a branch in Mali) have training modules on renewable energies and the environment.

USAID's FDP MD (Feed the Future Micro Dose) project provides training to farmers as part of the widespread dissemination of two innovative agricultural technologies: Deep Placement of Fertilizers on Rice and Vegetables; and Micro Dose on millet and sorghum.

10 Centre International de Formation en Energie et le Développement Durable.

11 Diplôme d'Etude Fondamentale (9 years of primaryschool).

The Eléphant Vert Group develops and produces organic amendments, bio-fertilizers, bio-stimulants and 100 per cent natural bio-pesticides. It works for a greener agriculture, healthy and sustainable, throughout the country.

The Renewable Energy Agency (AER), in partnership with FAFPA, is developing a range of qualifying training courses for graduates of vocational training centres (mainly electricity) with the aim of equipping them with renewable energy skills. In addition the AER offers opportunities to students to have three-month internships with experimental renewable energy enterprises. The next step should be scaling-up of this type of process with other national agencies such as AEDD, and the Direction National of Agriculture, on specific green jobs.

Finally, the SOLEKTRA-Solar Academy is a structure dedicated to solar technologies. It offers training at three levels: 1) training of skilled workers targeting unskilled youth; 2) training of senior technicians with the baccalaureate degree and higher technician degrees; and 3) training at engineering level. The modules cover general electricity, dimensioning, installations, design of large projects, and management of photovoltaic power plant systems. It has existed since January 2016, and aims to train 200 students per year. This centre builds the skills capacity of students (generally from the energy sector) in green issues and climate change adaptation.

4.4 ALMPs and retraining measures

In its labour market policy Mali promotes the employability of youth and vulnerable groups: girls, disabled people and veterans. Disabled people constitute a very disadvantaged social stratum on the labour market in Mali. Public service remains virtually the only hiring niche for these citizens.

The government has imposed a two per cent youth employment tax on the gross wage to support job creation. The general statute of the civil service in Article 18 provides special measures for the integration of disabled people. Veterans' integration programmes have also been set up and supported by the Government. But improving the employability of youth also requires matching educational supply with the jobs available in the green economy. Graduates from training centres have two opportunities for integration:

- Direct employment (through paid jobs) in companies (large companies, SMEs, private and public companies); or
- Indirect employment through creation of their own collective or individual enterprises (through self-employment jobs).

Studies show that informal businesses are the main source of direct employment in Mali. Job announcements mainly concern labour. In 2014 this social category accounted for 60.0 per cent of announcements registered by the ANPE and the various private employment agencies in Mali.

Conversion of profiles of graduates from training centres to a green profile will provide more opportunities for inclusion in the formal sector and will help meet the demand from companies for green skills.

Therefore, and as mentioned in section 4.3.2, training centres should prepare themselves for the evolution of the economy towards the green dimension, by integrating green skills in their curricula in the following areas: environmental protection, renewable energies, management of forest resources, management of natural resources (land, water), sustainable and climate-smart agriculture, waste management, architecture and ecological planning, control of pollution and other nuisances, and so forth.

A comprehensive approach is needed to integrate jobseekers, including guidance and private employment agencies (APEJ and ANPE in particular) and vocational training centres.

Since 2006 APEJ has established a programme to strengthen the employability of youth through professional internships. These professional internships aim to address the lack of experience that is one of the reasons for the low employability of youth. The duration of these

internships is one year. Internship expenses are shared with the government for the first 6 months, and the hosting organisation for the second 6 months. Recruitment for this course does not yet exhibit gender parity.

In this regard, by 2014 65 per cent of young people aged 15-40 had been employed, compared to 6.7 per cent unemployed. Of the active youth, 72 per cent have no educational attainment compared to only one per cent with higher education. Young women are the most numerous among the inactive (71 per cent). For this reason the training centres should be helped in the support of leavers and in the establishment of recruitment units which promote gender equality.

In addition, training centres should give priority to practical situations in the green professional environment (practical training in green enterprises) at the end of the training cycles. Regular research and studies should also be carried out on environment-friendly niche markets with the aim of updating the training provision to better match the needs of the labour market.

As for self-employment, the green funds that are being implemented and developed will have to integrate the financing of the start-up investment for youth, the main bottleneck. The Mali Climate Fund should make it possible to achieve securely and efficiently the investments needed to build a green and climate-resilient economy. This fund will have to establish an appropriate financing mechanism and incentives for the extensive creation of green jobs.

Still on the subject of green financing, one can note the partnership between AER-Mali, the Access company and banks to facilitate access to photovoltaic solar equipment through the "Renewable energy loans" operation. A case study is devoted to this innovative green financing mechanism later in this report.

Finally, there is as yet no information system in place for collecting data on the evolution of green jobs. Current studies and research carried out by ONEF do not take sufficient account of green skills. However, reliable and regularly-updated information is needed to make good decisions on green employment policies, training and development of green skills, and to monitor progress in greening the economy.

4.5 The role of the private sector in skills training

The private sector plays an essential role in that it must be involved (and even lead) in the vocational training process, and in defining the needs and content of the curricula. It is the private sector that receives and uses the products of training centres, and that knows the environment and its specificities. The private sector thus remains a field of competence within the framework of vocational training and especially of traditional apprenticeship.

In Mali, as in many developing countries, education and technical and vocational training are available only to a small minority of youth. Only 29.5 per cent of the population have any level of education and only 0.8 per cent of the population have reached higher education level (source: EMOP 2015, page 9). Thus apprenticeship in the informal economy provides many out-of-school youths with the opportunity to learn a trade and enter the labour market. According to PNE (National Employment Policy, 2014), about 75 per cent of youth aged 15-34 who do not attend school are illiterate. These youths are trained in various trades in workshops, artisanal or semi-industrial units, farms or stables.

However, there is no process for recording the qualifications of these young apprentices for these trades, in particular through certification with the VAE (Validation of Acquired Experience) method. There is also no certification system adapted to green skills, with referenced modules on which young people (in or out of school) will be trained in a practical manner within the professional environment (workshop, units, and so forth). In this context the private sector plays a key role and must be present at sectoral meetings responsible for validation of the various stages of this process. The private sector must also participate in the writing

and validation of the guidelines on green trades and the development of green skills as part of the implementation of alternative education. It participates in the evaluation of these competences. It may even happen that it presides over the certification boards. In many African countries the partnership commissions on programmes and certification are chaired by the private sector.

Moreover, it should be stressed that the supply of training (private and even public) in the primary sector (agriculture) is very limited, whereas this sector is the main provider of employment in Mali, just as the involvement of the private vocational training sector in initial training on renewable energy and sustainable development is not yet effective.

4.6 The Role of Institutional Implementation

At institutional level there is no formal framework and there are no competence councils; the only established bodies are for one-off consultations for employment and training projects. For example, during the installation of development projects and programmes professional associations and management are involved, often in steering activities.

However, the initiative by Swiss Contact has led to the establishment of regional multi-stakeholder consultative frameworks (local authorities, private sector).

At regional level concentration frameworks are financed by Swiss cooperation (for operational costs). However for sustainability the actors have to develop a strategy for continuity in the event of withdrawal by the financial partner (local authorities, for example).

In short, a framework for national dialogue should be established under a public-private partnership approach, involving decision-takers, civil society actors, the private sector and development partners. This framework for national consultation on green employment and vocational training can be coordinated by the Ministry of Employment and Vocational Training. It will play the roles of watchdog, coordination and guidance on all issues related to green employment, by drawing on decision-making tools such as the national employment observatory and professional training. It should be noted that this framework goes beyond the Ten-Year Programme of vocational training for employment, comprising thirteen ministries coordinated by the Ministry of Employment and Vocational Training but not integrating the other actors.

5. Analysis of case studies

From 2009 to the present time the Malian economy has made considerable progress in taking into account mitigation measures and mechanisms for adaptation to the negative effects of climate change, as well as the use of low-carbon technologies.

Although there are as yet no specific strategies or policies dedicated to skills for green jobs, opportunities for developing potential green skills exist.

The present case studies will illustrate practices in Mali on the development of green skills in promising fields such as energy, agriculture and ecological construction.

First, renewable energies, which are important elements in the transition to a green and low-carbon economy, will be illustrated by two cases:

a) an integrated and innovative green financing system based on financial, technical, technological and commercial skills to promote inclusion of solar energy access for households; and

b) new skills for the installation of hybrid systems for the improvement of rural electrification.

Second, Malian agriculture, which is strongly influenced by climate change, is also confronted with the intensive use of chemical fertilizers and pesticides in rural areas. On the other hand the urban environment is confronted with problems of waste treatment of all kinds. The case study on this topic will show the skills needed to process or recycle compost waste in order to promote the productivity and sustainability of the agricultural system.

Finally, the last case study focuses on new skills in green building in urban areas through the experience of Higher School of Engineering, Architecture and Town Planning (ESIAU).

Case study 1: New opportunities and job skill for the solar roof program

Figure 3. Solar roof installation in a Bamako household

Introduction

In Mali 60 per cent of loans granted by banks and financial institutions are provided for the trade sector, petrochemicals, transport, telecommunications and real estate. The sector that received the bulk of the funding is still commerce and trade, which accounts for between 41 per cent and 45 per cent of all mobilized loans. Renewable Energy accounts for a very small share of the bank portfolio. However, renewable energy technology is mature. It remains the key solution to enabling a larger proportion of the population to have access to energy and reduce electricity costs. But it must

be recognized that the cost of purchasing solar equipment is not accessible to the purchasing power of a large part of the Malian population. Thus it is necessary to have an innovative financial mechanism by encouraging banks to take an interest in this sector.

As part of the implementation of the national energy policy recommendations for the introduction of alternative resources that can be easily mobilized in the energy mix, the Minister for Energy and Water has put in place the "Renewable Energy Loan'' to facilitate acquisition of individual photovoltaic kits with the predefined or custom-designed capability of meeting all or part of the domestic or residential needs of electricity consumers.

The overall objective of the project is to set up an innovative financing mechanism through loans by Malian banks under the Public-Private Partnership for the Renewable Energy sub-sector, to promote the development of renewable energies and contribute to the reduction of the energy gap in Mali and the protection of the environment.

The project aims to achieve installation of 600 Solar Kits in its pilot phase at a cost of 1.6 billion FCFA.

The Memorandum between the parties:

- a Memorandum of Financing Agreement with banks to overcome the obstacle of the initial investment's being too expensive, allowing consumers to negotiate with the bank individual loans for acquisition and kit installation;
- a partnership contract with a recognized company for supply of the kit needed to carry out the project.

"SOLAR ENERGY LOAN PROJECT" products

- Kit 1: 500W (2 panels of 250W) costs 1,185,557 FCFA (1,807 Euros);
- Kit 2: 1000W (4 panels of 250W) costs1,909,363 CFA (2,911 Euros);
- Kit 3: 2000W (8 panels of 250W) costs 3,229,256 FCFA (4,923 Euros);
- Kit 4: 3000W (12 panels of 250W) costs 4,373,706 FCFA (6,668 Euros).

+ Installation costs according to the quote with a 1-year warranty

The system layout:

Figure 4. Technical design of the system of solar roof program

The system works during the day with the solar panels, and at night with batteries; in the event of battery exhaustion the system is promptly switched into the national electricity grid.

Green jobs opportunity

In the past many households used generators as a back-up for power cuts. The use of these devices caused noise and greenhouse gas emissions which are harmful to the environment. This initiative of the Minister of Energy and Water has been beneficial in reducing noise pollution and emission of GHGs. In addition it introduces a new paradigm for green jobs creation, through the skills of design engineers in systems sizing, installation and maintenance of the solar system, and of sales specialists in solar energy.

Other indirect skills development are:

- assembly of the frames following the completion of work by the design engineer, by metal joinery firms specializing in framing;
- concreting the panel supports to maintain the equilibrium of the equipment, undertaken by masons;
- sales techniques for solar equipment and equipment sizing, and support or advice on equipment choices and financing methods from the commercial agents of banks.

Financing by banks

Approximately ten banks have signed the agreement with the Minister of Energy. They have undertaken to support the project with attractive loan rates and flexible granting. The sales managers of the banks were trained in solar technologies and its contribution to climate change mitigation and environment protection, and also in facilitating their risk assessment. The AER-Mali are working with the FAFPA to develop modular training support for electrical technicians and bank sales managers.

Banks have developed fact sheets and communication materials for clients, to make it possible to set up new specific renewable energy banking systems.

Figure 5. Sample poster BNDA (National Bank for Agricultural Development)

Institutional Framework and its role

AER-Mali: Mali's Renewable Energy Agency ensures the quality of equipment and installation work in accordance with current standards. It also issues the reception report to authorize the disbursement by the bank.

The banks fund the project through loan grants to customers at reasonable and attractive rates. Once the work has been carried out by the company and received by AER-MALI, the banks will pay for it after receiving the reception report.

The clients are the recipients of the loan and solar installations. Depending on the amount of the estimate, the banks grant loans repayable in accordance with the conditions attached to the individual projects.

The company suppliers are responsible for providing quality equipment and the proper execution of work within the load specifications. The suppliers are paid by the customers' banks once the works have been favourably accepted by AER-Mali.

Scaling-up

This is the first-time banks have been involved in financing renewable energy through firm commitments. The next step is having financial products specifically dedicated to renewable energy.

On the institutional side, legislation is being prepared to allow consumers to sell their surplus energy to EDM-SA (Energie du Mali), Mali's national electricity company, in accordance with the feed-in tariff model. This will specifically help EDM-SA by reducing the energy consumption of the beneficiaries' households. It will also allow the households to maintain their own independent electricity supply using the batteries in solar system when there is a power cut on the national grid in their area. This should also reduce pressure on the EDM-SA generating capacity and reduce the need for power cuts and load shedding.

Following this phase the Ministry, in collaboration with the banks and private companies, plans to extend the project beyond Bamako to other cities in Mali.

Case study 2- on waste recovery in improving agricultural productivity and production

Inadequacy of the combined actions of public and private authorities in waste management

Figure 6. Photo of a garbage dump at Lafiabou Commune IV Bamako

The average annual waste production of a Malian inhabitant is between 180 and 240 kg (THONART, 2005)[12]. That of an urban dweller (including industrial, household and hospital waste) is estimated at 584 kg per inhabitant or 1.6 litres/day (MEA, 2008)[13]. The treatment of this liquid and solid waste remains crucial in Mali, owing to the major environmental and public health problems it poses.

In Bamako and other major cities, there is a shortage of waste disposal facilities and landfill sites that meet the required standards; and owing to urbanization and population growth, those that are available are unable to keep pace with the increasing production of waste of all kinds. Thus the public measures supplemented by those of the private groups in dredging and waste collection have only attenuated the anarchic dumping of rubbish at various sites.

12 Philppe THONART: Guide pratique sur la gestion des déchets ménagers et des sites d'enfouissement technique dans les pays du Sud.

13 Ministère de l'Environnement et de l'Assainissement.

The recommended recycling procedure is still informal and affects only a fraction of the volume of waste. So as to ensure considerable reduction of waste as well as its treatment, it will be necessary to intensify the recycling systems through green techniques such as composting.

Composting, an alternative and innovative technique for the circular economy

The use of chemical fertilizers has an ephemeral effect on agricultural yields alongside the destructive effects on the environment, which are of sufficient concern to the Government of Mali for an Act to be passed (Act No. 08 of 28 February 2008 on quality control of fertilizers).

Figure 7. Photo of making of compost

Indeed the use of these chemical fertilizers leads to ecological problems, in particular the eutrophication of surface water, accumulation of nitrates in groundwater, acidification of soils and emission of nitrous oxide. To this must be added the adverse effects on the livestock, the wildlife, the flora and the health of the populations.

Unlike chemicals, fertilizers and green pesticides made from composting enhance soil vitality (productivity) and increase crop production.

In addition to the jobs generated by the increase in agricultural production, many trades can expand, for example those of collectors, composters, trainers, distributors of organic products, and so forth.

Popularisation of composting skills: the need for scaling

The agricultural sector is proving to be a promising niche for the composting of waste, owing to the potential for Mali presented by its agriculture and livestock. Although demand for fertilizer in agriculture is high (of 43.7 million hectares of usable land, only 4.5 per cent is cultivated)[14], the potential for composting is considerable.

Indeed, the total amount of green waste (agricultural waste) and household waste (more than one-half of it, according to an estimate), as well as the sludge from sewage treatment plants, is compostable. This means that the supply of compost is elastic in comparison with the demand.

The opportunity lies in strengthening the know-how of farmers, by disseminating methods

Example of the company Elephant Vert Mali

Elephant Vert offers a variety of bio-fertilizers that can be applied directly to plants. The company has established a plant in Ségou, with a production capacity of 50,000 tonnes per year, which can be expanded to 100,000 tonnes. The bio-fertilizers and bio-pesticides produced will contribute to the restoration of cultivated soils so as to boost agricultural productivity.

The company itself has created about 100 direct jobs and several hundred indirect jobs such as collectors of cow dung and agricultural residues, mango nut collectors and commercial dealers, as well as dealers from the national union of agricultural input retailers in Mali (partner of the company).

14 Politique de Développement Agricole du Mali, page 10.

Figure 8. Photos of composting and agropastoral integration, Biron (Koulikoro)

and techniques that can help them prepare quality composts. Indeed, the use of agricultural residues, livestock excreta and other available biodegradable waste proves more economical and valuable for farmers (especially in reducing the rather heavy production costs, e.g. purchases of seeds and inputs, maintenance of equipment, and payment of labour, among others).

The required competences can include the ability to select compostable waste; mastery of composting techniques; spreading methods; soil management techniques; and environmental protection.

The scale of these competences concern programmes already implemented by organizations such as:

- USAID with the FDP MD project (Feed the Future Micro Dose);
- the NGO Mali-Folkecenter with the CIRTA (Centre for Rural Innovation in Adapted Technologies) in Biron;
- the NGO CAEB in partnership with SOS Faim Belgium in the Programme to Combat Food Insecurity and Malnutrition.

Scaling up the skills of Malian farmers must be promoted in the large-scale production of compost and in taking advantage of the availability of these virtually free inputs to increase the area of arable land, as a result of which a much-needed green agricultural revolution could be realized.

Case study 3: Skill in ecological architecture in urban areas

Figure 9. An Ecological Building in Biron, Mali

Ecological architecture can contribute to improving the living environment

Mali is a weakly urbanized country, with less than a quarter of the population living in cities. However, urban growth is stronger than rural growth because of a massive exodus movement from village to town, along with population growth. This will require cities to house 50-75 per cent of the population by 2050[15], with a large proportion in Bamako.

The challenge for all of these cities is to be able to change their development and infrastructure to a more sustained rate than under the current urbanisation progression. This will enable them

15 National Report for Sustainable Development in Mali, page 50.

to respond better to people's needs in terms of jobs, basic social services and housing.

However urban management is permanently confronted with the deterioration of living and environmental conditions, which could be changed or improved if more attention is given to the economic advantage and opportunities given by the green dimension, including standardization of building systems and valorisation of available local materials. These ecological and energy-efficient solutions, when used in the building sector, can contribute to economy growth and job creation once the necessary skills are developed in the trades of architects, urban planners, contractors, masons, plumbers, electricians and so forth. These are the challenges for the Higher School of Engineering, Architecture and Town Planning (ESIAU).

ESIAU is a higher school for excellence

The Higher School of Engineering, Architecture and Town planning (ESIAU) in Bamako is among the only private higher education institutions in Africa which focus on the four components of the city's trades: 1) architecture, 2) town planning, 3) civil engineering, and 4) land use planning.

The ESIAU started its activities in 2006, its emerging course subjects including the following: environment, governance, town planning, urban manufacturing, local building materials, earth architecture for protection of degrading assets, and others.

The promoter of the school, Mr Abdoulaye Deyoko, is a professor and researcher who has contributed to the modernization of some African cities. With a strong civic commitment, he is a Knight of the National Order of Mali and is a true pan-Africanist.

The ESIAU is an international school which brings together African students from ten different nationalities. It is based on principles such as:

- urbanization and extension of cities such as Bamako;
- earthen architecture (building in local clay, use of local materials; and
- use of alternative green technologies (dryers, solar panels, solar water heaters, low consumption lamps or LBC, humidifiers, rational water management in buildings, etc.).

The school has developed strong partnerships with public authorities and international actors (examples are the Ecole Nationale Superieure d'Architecture de Toulouse, Institut National des Sciences Appliquées de Toulouse, Université de Paris 13, Ecole Supérieure Technique d'Architecture de Barcelone). In cooperation with the Malian Ministry of National Education, it has established a project which connects artisans with schools of engineering and architecture in Bamako (including ESIAU). This project is currently being implemented with a view to professionalizing this sector of crafts.

Figure 10. Practical course at ESIAU

This is a good initiative and remains crucial in the context of integrating learning into the formal vocational training system.

Another typical example of collaboration is the rehabilitation of public equipment (the livestock and animal health department of the University of Ségou) using local materials financed by the World Bank. ESIAU conducted the architectural studies, including those on the resumption and work of the museums of Djenne, demonstrating its recognized capacities. The school's volunteers participated in the annual plastering of the Djenne mosque, a UNESCO World Heritage Site.

Finally, ESIAU has obtained distinctions and prizes, among which are: (i) winner of the

International Urbanists Without Borders competition: ESIAU was awarded the 2nd "USF Sustainable Development Award" in 2014 with its Development Plan for the TSF sector in Commune II of the District of Bamako; (ii) participation in 2017 in the International Robotics Competition in the United States (first global robotic competition) and the Pan-African Robotic Competition in Dakar, Senegal. This technology can be applied in the field of building: for example, these robots can be led to manage the consumption of energy in a house in the absence of the user.

ESIAU focuses on adapting the skills of school alumni to market needs in order to facilitate their integration

ESIAU has trained several hundred graduates since 2007, in accordance with the higher education system of BMD (Bachelor, Master, Doctorate). Some alumni hold high-level positions in Mali and internationally (e.g. heritage architect at UNESCO in Bamako and many others in the public and private sectors).

Employment of the students of the ESIAU accounts for around 70 per cent of the workforce, and many are recruited before the end of their final study year, according to statistics provided by the school. This reflects the nature of teaching, which is very practical and oriented to the needs of the workplace (companies and institutions) with whom students are in regular contact.

In addition the school integrates personal development, which the Director-General summarizes by saying that training is first and foremost in the mind. This "savoir-être" instilled in students prepares them to face professional challenges, but also to be model citizens and to strive for excellence in their work.

Moreover, without widespread support from Mali's citizens no investment in the protection of the environment can be sustained.

Case study 4: Skill to install the hybrid solar mini grid system in rural areas

Context of Mini-grid system in Mali

Figure 11. Technician installed mini grid solar plant in Bankoumana

Electrification in remote villages has historically typically been accomplished with diesel generators. A current concern with diesel as a source of energy in remote areas is the rising cost of fuel delivered to the site, related pollutant emissions and energy waste in the fuel supply chain from producer countries. Because of the risks to the long-term supply of conventional fuel, hybrid solar technologies are financially attractive and tailored solutions for new energy applications are being distributed in distant locations. The falling costs of solar energy also make it increasingly attractive. The objective of the Malian government in collaboration with the World Bank, KFW (German Cooperation) is to green the mini-grid sector by increasing the solar component, the capacity-building of technicians, and productive use of clean energy.

Opportunities for renewables energies

The renewable energy technology is a solar hybrid system. Solar energy is now a well-proven and attractive technology for Africa, and Mali has some of the best solar energy resources (56kWh/m^2/day). The solar hybrid systems comprise a Solar PV field, a generator for back up, battery storage, and a low-voltage grid. These have greatly increased the security of electricity supply

along with new opportunities for local economic development and poverty reduction.

Technology description and design

The technical design of the system is based on solar diesel hybrid technology for energy production, and battery banks for energy storage.

Project outcome

So far there are more than 32 hybrid systems in Mali, these projects having a significant impact on economic, social, and environmental development. The project offers electricity to households, small businesses, schools, health centres, and street lighting. The next step will be the densification of the grid, extension of solar capacity and battery storage, and improvements in clients' management systems by introducing the smart meter. The project provides job creation and new activities in the village.

Public - Private Partnership for the project implementation

AMADER, the Malian Agency for Rural Electrification and Domestic Energy, has the task of increasing energy access in rural areas, promoting project implementation and monitoring the Public-Private Partnership.

In this project, the total investment costs were split between the private operator which provided 20 per cent, and the Malian government through AMADER which provided 80 per cent as an investment grant to encourage private investment in rural areas. For that purpose the price of electricity is determined by the regulatory agency with responsibility for a rural area provided by AMADER. It should ensure that the price is compatible with both the needs of the operator of the system but also with the purchasing power of rural clients. To this end AMADER has the means to set the right price.

Scaling up and replicability

The business model is based on the Public-Private Partnership, of which AMADER has extensive experience in the World Bank, KFW and among Malian private operators. The main objective is to increase the proportion of renewable energy in rural electrification production, by encouraging the productive use of energy through solar photovoltaic technology. This initial experience has enabled Malian private operators to mobilize significant funds for the financing of rural electrification projects. Now

The green job issues:

Hybrid mini-grid systems provide green job opportunities for the project developer and designer (system design); for project implementation and field monitoring engineers (control and implementation); for project installation technicians; and for project managers and technicians. Hybrid mini-grids provide around 25-30 temporary jobs during implementation, and 5-10 permanent jobs according to the size of the plant (30 – 250 KWc).

There are also indirect jobs created through rural electrification. Because of availability of electricity during the day, thanks to solar photovoltaic technology this gives people an opportunity to develop businesses through productive use of energy.

The most relevant competences in this area relate to:

- installation of panels and inverters in a professional manner (with respect to the polarities of the electrical circuit and the positioning angles);
- starting up the system with the programming systems to ensure optimization of the solar equipment and efficiency of production;
- design of the system in accordance with the solar energy needs of the population.

the Government of Mali, in collaboration with donors, will develop this model for 142 villages by 2020, creating around 1,136 permanent jobs, which demonstrates that replication of the innovative solar hybrid model is already under way, viz.:

- World Bank: SHER project: electrification with hybrid system in 50 localities, total cost US$44,9 million;
- BADEA and Abu Dhabi Development Fund: project PERSHY, electrification in 32 localities, cost US$19 million;
- Agence Française de Developpement: project for electrification with the hybrid system of 60 localities, total cost €38 million.

The existence of this energy solution contributes to development and diversification of green economic and entrepreneurial opportunities. This is how the creation of new types of jobs and services in the various localities is demonstrated, thus contributing to the so-called green growth and furthering the planned National Determinate Contribution of Mali (CPDN).

Case of Bancoumana, electrified by ACCESS

The rural population of Bancoumana (20,000 inhabitants) had no modern energy services available until 2013, and the monthly average expenditure for non-conventional energy through concessions on kerosene, candles and batteries was estimated at €25.50.

The local population has expressed its need for electricity in the village, which the municipal authorities have referred to ACCESS, an innovative Malian solar and hybrid energy systems company with 10 years of experience and 42 employees, and currently electrifying 23 villages in Mali using hybrid technologies (solar, diesel, etc.).

Thanks to the collaboration between ACCESS, the Malian government and KFW, the villages obtained modern energy mini-grid infrastructure systems with hybrid solar diesel technology at the end of 2014. During project implementation 25 temporary and 5 permanent jobs (manager, technicians, and security guards) were created.

The project provides clean energy to the rural population of Bancoumana, reaching more than 400 clients for lighting, education, advertisements and productive use. ACCESS is responsible for the coordination, monitoring and evaluation of the project, as well as for operating the installed hardware in a technically, environmentally and financially sustainable way. There is an energy committee (composed of beneficiaries) which manage the social aspect of the project. For sustainability each client pays a monthly bill (€0.28/KWh) which covers operating costs.

The total project investment cost was €404,068, of which 20 per cent was from ACCESS and 80 per cent from KFW/AMADER (Malian Rural Electrification Agency).

6. Conclusions and recommendations

6.1 Conclusions

Mali is emerging from a political, social, economic, security and institutional crisis that has led to a recession in the economy. Through a national campaign the Malian authorities have made significant efforts to develop policies and strategies to address the challenges, including environmental and climate challenges. These institutional advances remain the foundation for the country's transition to a green economy.

Several projects and programmes have been funded by development partners and the national budget in the fields of renewable energy, environmental protection and climate change.

Despite these achievements, the country needs substantial funding to address climate challenges. According to the NDC, the overall cost of the conditional mitigation scenario is US$34.7 billion, and the cost of adaptation needs has been estimated at US$1.062 billion. Mali relies heavily on green climate funds and promises made in the context of climate negotiations.

All of these opportunities have created a strong need for skills development in current and future green professions, which must be addressed through: (i) a greater match between the supply of training centres and demand from the labour market, (ii) emergence of vocational and academic training centres in the fields of renewable energy and sustainable development, (iii) establishment of inclusive dialogue and dialogue instruments, and (iv) improvements in financing tools for green employment (including self-employment).

6.2 Recommendations

At the end of this study, we make the following recommendations aimed at the Government of Mali and other actors:

For the Malian Government

a) **Establish incentives for the promotion of green jobs:** in terms of opportunities that present environmentally-friendly activities for economic growth, the government should provide incentives such as the following: (i) developing green skills for public sector staff; (ii) encouraging the creation of entrepreneurial initiatives in green sectors through investment grants; (iii) granting and facilitation of fiscal benefits with a green dimension for businesses and workers; iv) supporting the establishment of flexible mechanisms for re-financing of green projects by financial institutions (guarantee funds, concessional funds).

b) **Promote implementation of policies and laws on the protection of the environment:** Mali has many laws and policies for the protection of the environment, which are not well applied because of a communications deficit with citizens and a lack of effective monitoring in the field. The non-application of these provisions may hamper the transition to the green economy within the desired timeframe.

c) **Harmonise policies and sectoral intervention strategies to include green jobs and climate change:** employment and climate change are cross-cutting issues in all development sectors and require a strong consultation mechanism with a view to their proper consideration in all documents, policies and sectoral strategies.

d) **Establish a data collection system for "green jobs":** it is necessary to set up a national structure as a focal point that can collect all data on issues relating to green jobs and also inform the authorities, as well as Mali's multilateral and bilateral partners. This function could be carried out by ONEF.

For other stakeholders (public and private)

a) **Promote green jobs through awareness-raising, information and training:** the notion of "green jobs" remains inadequately known and is new to many stakeholders. On the strength of this observation, it is desirable to organize training and awareness-raising activities for the benefit of the general public and actors from all sectors of development. The sharing of information may also entail publication of communications media and documents, and may help guide training centres towards promising niches. The popularisation of green employment and green professions will facilitate its incorporation into policies at local (decentralised) and national levels.

b) **Promote high-quality sustainable agriculture:** owing to the significant share of the use of pesticides and chemical fertilisers in GHG emissions, it is necessary to promote the use of compost through the creation of production and distribution units, but also to examine the possibility of increasing taxes on chemical fertilisers.

c) **Facilitate the integration of apprenticeship on green trades in the formal vocational training system:** certification with the VAE (Validation of Experience Acquired) modality, adapted to green trades, should be adopted by involving the private sector, with reference modules for young people enrolled in schools and also for young candidates for migration.

d) **Establish sectoral consultation frameworks for the development of green skills:** that is, set up a structure such that the CNPM can play this supporting role with the involvement of civil society. These sectoral consultation frameworks will:

- help identify green skills at company level;
- provide the necessary support for implementing the training plans of these companies in the field of green jobs;
- facilitate awareness-raising activities to take account of green issues; and
- facilitate access to certifications, including ISO certification on the environment.

e) **Support the basic structuring of companies and professional organisations, to facilitate creation of inter-professional organisations:** the creation of umbrella organisations in the form of inter-trade bodies needs to be promoted in the agricultural sector, but also in all other economic sectors. These must also be reinforced for the consideration of green jobs, providing them with the skills needed to explain their views in negotiations and the various consultation frameworks. They can even become “proposition forces" able to carry out lobbying activities towards the government and other partners, and to defend the advocacy of green professions and protection of the environment.

7. Annexes

Annex 1: Definition of skills

For the definitions, we refer to the definition adopted in 2000 by 175 ILO members on training and human resource development.

This Resolution defined employability skills as follows: « the skills, knowledge and competencies that enhance a worker's ability to secure and retain a job, progress at work and cope with change, secure another job if he/she so wishes or has been laid off and enter more easily into the labour market at different periods of the life cycle. Individuals are most employable when they have broad-based education and training, basic and portable high-level skills, including teamwork, problem solving, information and communications technology (ICT) and communication and language skills. This combination of skills enables them to adapt to changes in the world of work».

The following table shows the skills for the world of work :

Table 2. Skills for the world of work

Basic/foundation	At their most elemental, foundation skills include the literacy and numeracy skills necessary for obtaining work that can pay enough to meet daily needs. These skills are also a prerequisite for continuing in education and training, and for acquiring transferable and technical and vocational skills that enhance the prospect of obtaining good jobs.
Vocational or technical	Specialized skills, knowledge or know-how needed to perform specific duties or tasks.
Professional/personal	Individual attributes that impact on work habits such as honesty, integrity, work ethic.
Core work skills	The ability to learn and adapt; read, write and compute competently; listen and communicate effectively; think creatively; solve problems independently; manage oneself at work; interact with co-workers; work in teams or groups; handle basic technology, lead effectively as well as follow supervision.

Source: Enhancing youth employability: What? Why? and How? Guide to core work skills/Laura Brewer

Annex 2: References and documents:

- Growth and Poverty Reduction Strategy Framework 3 generation (CSCRP 2012-2017);
- National Climate Change Policy;
- Conference of African Ministers of the Environment;
- United Nations Framework Convention on Climate Change;
- National Climate Change Committee;
- National Environmental Action Plan;
- National Climate Change Strategy;
- Strategic Investment Strategy for Sustainable Land Management (ITUC-GDT) 2014;
- The ECOWAS White Paper;
- Rapport final : Révision du Profil environnemental du Mali, Octobre 2014, finance par UE;
- PNE (National Employment Policy);
- NDC: Nationally Determinated Contributions;
- Country Environmental Profile (Profil Environnemental du Pays);
- EMOP (Modular and Permanent Survey);
- National Policy of Energy, 2003;
- National Strategy of biofuel, 2008;
- National Strategy of Renewable energy, 2006;
- Environmental and Social Management Framework (Cadre de Gestion;
- Environnementale et Sociale-CGES);
- Consolidated annual reports of the activities of the Mali Special;
- Climate Fund 2014, 2015 and 2016 (FondsClimat Mali).

Web sites

- http://www.2ie-edu.org/pays/mali/
- http://esiau-mali.com/
- http://onef-mali.org/
- http://www.apej.ml/

Annex 3: List key contacts (interviewees, etc.)

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Mr Gualy Sisssoko		Internal control department	
Mr Modibo Malet		Head of Legal Department	
Mr Moussa Diourté		advisor	

Annex 4: Questionnaire for interviews

INTERVIEW GUIDE

Date of interview: .....

Q1. Name of Institution: .....

FIRST NAME AND NAME OF PARTICIPANTS IN THE INTERVIEW	POSITION IN THE INSTITUTION	CONTACT

Q2. National Policy and Strategy

- Do you know any policies and strategies of the Malian State that evoke these aspects?
- What do you think of the way in which the green employment and green economy strategies are taken into account in Mali?
- Do you think that there has been an evolution in skills development for green jobs?

Q3. Disposition in Teaching and Technical and Vocational Training

- What are the difficulties encountered by vocational training centres or schools in taking into account the skills development for green jobs? What solutions do you recommend for upgrading skills standards?
- What measures have been taken to benefit vocational training schools in this field? What vocational integration measures are taken in green employment for the graduates of these vocational training schools?

Q4. New skills

- What are the existing and future current opportunities for green employment? What are the barriers to accessing these opportunities?
- What solutions do you recommend for adapting the profiles of graduates to the needs of the green professions (skills needed for these jobs or economic activities)?

Q5. Other issues (green funding, social dialogue, synergy, recommendations)

- Are there any adapted financial arrangements (global financial system) for green funding (project initiators or development of activities)?
- How can one promote green funding?
- What is the assessment of climate impacts (rainfall, temperature, new technologies) in the relationship between the unions and the government? What measures can employers take to identify and anticipate the conversion to green jobs?
- What are the social measures to be taken to address climate change and the transition from ecology to the green economy (in response to loss of jobs or a decline in agricultural production, for example)?

- How do you appreciate the level of complementarity, dialogue and coordination between the public institutions and the organisational structures in charge of employment issues, especially green employment? How can one improve this level of synergy?
- What are your general recommendations for skills development for green jobs?

Q6. Other supplementary questions for training centres

- What are the difficulties encountered by vocational training centres or schools in taking into account the skills for renewable energies and the environment?
- What solutions do you recommend for upgrading skills standards?
- What are the vocational integration measures carried out by your training centre?
- What are the current and future opportunities for green employment?
- What difficulties do young people face in accessing these opportunities?
- What solutions do you recommend for adapting the profiles of graduates to the needs of the green jobs market?
- What are the training streams of your centre in relation to skills development for green jobs?
- What are the economic activities or trades that can in the future have a high hiring capacity in the field of renewable energies and the environment? Give examples?
- How important are these jobs to the green economy?
- What will be your needs in trainers' training?
- What do you recommend to facilitate the integration of young graduates into training courses in renewable energy and the environment?
- What do you recommend for the promotion of skills development for green jobs?
- What do you recommend to facilitate the integration of young graduates from the training centres in renewable energies and the environment?

Interview conducted by the MFC team: .....

ISBN 978-92-2-132917-6