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THE BIOENERGY SECTOR REPORT

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EXECUTIVE SUMMARY

The main political objectives of the EU’s energy strategy are: decreased use of fossil energy sources, reduced CO2 emissions and increased energy self-sufficiency. While bioenergy plays an important role in the achievement of these goals, further development of the bioenergy sector is dependent on a great number of factors, such as economic or climate conditions, availability of/access to natural resources. The availability of adequately skilled human resources is also a recursive concern among professionals. The high demand for qualified human resources in the sector is expected to persist, potentially leading to skills gaps and shortage. If not addressed in time, the shortage of necessary skills could constitute a barrier to the further deployment of the sector. The KnowRES project aims at tackling the issues linked to this major challenge.

A survey research composed of an online survey as well as individual interviews with experts was carried out to collect recruitment needs, job market trends and testimonials from main employers in the sector. This report (part of Work Package 1, Task 4 “RE Jobs Barometer and sectoral reports”) summarises the survey findings and provides information on recruitment trends, forecasts and “most wanted profiles” including key competences. The report represents a “snapshot” of the sector job market by identifying the profiles that companies are looking for and providing critical information on required core and soft skills that make a successful matching between a candidate’s profile and a job’s requirements. Finally the report also highlights the expertise and competences that are lacking and/or need to be further developed.

SURVEY KEY FINDINGS

The bioenergy sector is characterized by fluctuations and skill levels disparity due to the seasonal work load variations and occupies a large number of lower skilled people as well as a smaller number of highly skilled engineers.

Some cross cutting roles have become more and more specialized due to the fast pace of technological development. For instance, a recruitment consultant, in addition to the
necessary skills and competencies to perform the job, needs to also possess knowledge of the sector as well as understanding of the technology involved.

The factors that influence the evolution of the labour market are economic, sociological and demographical, regulatory and technological. These are impacting not only on the content of job occupations but are also contributing to the emergence of new job occupations such as for instance Business Development engineer also called Technical sales. Such an occupation requires the incumbent not only to have a strong relevant network but also solid technical knowledge.

It is interesting to note the increasing specialisation of some cross cutting roles.

**AREAS WHERE DEVELOPMENT OF EXPERTISE AND SKILLS ARE FURTHER NEEDED**

Jobs occupations in general tend to become more technical with an accrued management and coordination, interface (marketing, advisory) component which have great impact in terms of non technical competencies (“soft skills”). At the same time more and more job occupations in the sector require the incumbent to respond to the double constraints of the effects of strong standardization of practices and the need for greater autonomy, versatility and availability.

The strong gap between the academic learning environment and the reality of the job market make it very difficult for a new graduate to apprehend the job market in general and the bioenergy in particular. In a young and yet fairly unorganized renewable energy market, with fast pace of technological changes, one needs to be well informed and prepared to successfully find a job.

The survey research is a very useful tool to provide a snapshot of the sector job market by identifying the bioenergy sector top three most wanted profiles:

- Engineers profiles (mechanical engineer, process and construction, production and control)
- Business developer and/or technical sales
- Research engineer
INTRODUCTION

The leaders of the Group of Seven industrial powers (G7) – US, Germany, France, UK, Japan, Canada and Italy - met last June 2015 in Bavaria and agreed on supporting the cutting of greenhouse gases by 40 to 70 per cent by 2050 from 2010 levels. This recent G7 historic decision to phase out fossil fuel emissions this century indicates the end of the age of fossil fuels and gives the momentum for a vision of a hundred percent renewable energy future.

This agreement represents a strong backing of the main political objectives of the EU’s renewable strategy - decreased use of fossil energy sources, reduced CO2 emissions and increased energy self-sufficiency-. In his key priorities for the European Union, Jean-Claude Juncker clearly asserted this EU political commitment when he declared:

“I want to keep our European energy market open to our neighbours. However, if the price for energy from the East becomes too expensive, either in commercial or in political terms, Europe should be able to switch very swiftly to other supply channels. We need to be able to reverse energy flows when necessary. And we need to strengthen the share of renewable energies on our continent. This is not only a matter of a responsible climate change policy. It is, at the same time, an industrial policy imperative if we still want to have affordable energy at our disposal in the medium term. I therefore want Europe’s Energy Union to become the world number one in renewable energies.” (1)

Bioenergy plays and will play an important role in the achievement of this goal. In fact, today bioenergy already accounts for more than 50% of the EU’s renewable energy consumption according to Eurostat (2). Heat and electricity from biomass amounted to around 85.5 Mtoe in 2012 and would amount to 110 Mtoe in 2020 according to Members States’ projections (3). This share is expected to be maintained in 2020, contributing to half of the EU targets regarding both emissions reduction and renewable energy share of gross final energy consumption.

However, besides this political will, some difficulties faced by the sector these last years have highlighted the fact that the development of the bioenergy sector is dependent on a great number of factors, such as economic or weather conditions, availability of/access to natural
resources. The availability of adequately skilled human resources is also a recursive concern among professionals. The high demand for qualified human resources in the sector is expected to persist, potentially leading to skills gaps and shortage. If not addressed in time, the shortage of necessary skills could constitute a barrier to the further deployment of the sector. The KnowRES project tries to tackle the issues linked to this major challenge.

1- THE KNOWRES PROJECT

KnowRES, The Knowledge Centre for Renewable Energy Jobs, provides job intelligence to industry, candidates and academic and training institutions, while performing an analysis of the skills needed by the industry to ensure that the provided education and training courses are tailor-made to the sectors’ needs. The overall aim of the project is to help closing the skill gaps in the renewable energy sector.

The project, co-funded by the European Union, is coordinated by EUREC, the association of European renewable energy research centres. The project partners include five industry associations namely Aebiom for the biomass sector, Ocean Energy Europe for the ocean sector, ESTELA for the solar thermal electricity sector, Asso Rinnovabili for the small hydropower sector and EGEC for the geothermal sector; one research centre in Spain CIRCE; one university in the Netherlands Hanze University of Applied Sciences; one company from the private sector, Greenfish, specialized in green jobs recruitment. The project covers, in its analysis, the following sectors: Biomass, Photovoltaics, Ocean Energy, Solar Thermal, Small Hydropower and Geothermal.

1.1-ABOUT THE SECTORAL REPORT

The sectoral report summarizes the survey findings and provides information on recruitment trends, forecasts and “most wanted profiles” including key competences. The report represents a “snapshot” of the sector job market by identifying the profiles that companies are looking for and providing critical information on required core and soft skills that make a successful matching between a candidate’s profile and a job’s requirements. Finally the report
also highlights the expertise and competences that are lacking and/or need to be further developed. A separate report will be issued for each sector while an overall Renewable Energy Jobs Barometer will be drafted to cover for all concerned sectors under the KnowRES project.

PURPOSE

The report intends to address the following questions:

- What is the recruitment trend for companies and what (recruitment) challenges are they currently faced with?
- What are the most wanted profiles among the existing job functions along the wood/bioenergy value chain and what are they about?
- Are there any new functions/roles in the sector and what are they?
- What skills and competencies are particularly in demand?
- What issues need to be addressed in order to close the skill gaps in the sector?

While many studies now assess the global employment trend per sector, this report focuses on assessing concrete recruitment needs of companies. The unique collaboration between leading companies, international organizations and academic institutions, under the framework of the KnowRES project, enabled the gathering of pertinent information.

TARGET AUDIENCE

This report’s up to date job intelligence and key findings are directed towards the industry, job candidates, education and training actors. This report is also of relevance to a broader audience such as policy makers seeking specific employment data or recruitment firms interested in job content information and trends.
METHODOLOGY

Given the scope of the subject to be researched, the timeframe and the resources available, a qualitative survey research was proposed for mapping the job market in the wood/bioenergy sector. The rationale behind the survey research is to assess current recruitment challenges and employment opportunities in the European bioenergy industry by providing an instant picture of the sector’s job market with concrete information that could be exploitable immediately by concerned stakeholders, thus taking into account the time (short-term) imperative under which companies are operating.

In addition to the survey results, desk research and face to face interviews with relevant experts were carried out in order to allow for deeper analysis and to provide more complete information on job contents and trends.

LABOUR MARKET TOOLS – JOBS BAROMETER

The testing of the developed labour market tools (i.e survey research complemented by individual interviews, match-making events) enabled the adaptation of the job barometer to the specificity of each renewable energy sector.

The developed and tested tools are intended to be replicated to allow for the mapping of job markets in other sectors. This can be

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WHAT IS A SKILL?

A skill is a learned capacity to carry out predetermined results. It is a proficiency, facility or dexterity that is acquired or developed through training and experience. A skill is learned in order to be able to carry out one or more job functions.

WHAT IS A COMPETENCY?

Competency is a set of abilities, commitments, knowledge and skills that enable a person to act effectively in a job situation. It includes measurable skills, abilities and personality traits that identify successful employees against defined roles within an organization. In other words competency = skills + abilities and behaviors + commitments + relevant knowledge an individual needs to possess to perform work roles or occupational functions successfully.

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Figure 1: Schema of competency

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done on an ad hoc basis whenever there is a need for an instant picture of a specific sector or sub-sector but the tools are especially interesting when used in a systematic and consistent manner and in a longer term period as the comparison of year to year survey research findings will constitute a concrete and accurate up to date jobs barometer.

EXPERT ROUNDTABLES – PANEL DISCUSSIONS

Other tools such as expert roundtables or panel discussions are very valuable to complement the above-mentioned tools in filling the gaps. Experts are invited to provide guidance and feedbacks on the project deliverables by exchanging views on possible innovative approaches and how the effectiveness of established approaches/tools might be enhanced. In addition, the experts will share information on existing initiatives on employment and training in the renewable energy sector in order to define further cooperation opportunities and support the long-term sustainability of KnowRES. To this extent, the KnowRES Advisory Board has been created. It is composed of representatives from different disciplines:

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<tr>
<th>Ioannis-Thomas Theologitis</th>
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<td>François de Hemptinne</td>
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<td>Mark Radka</td>
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<td>Brigitte Hasewend</td>
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<td>Lidia-Borrell Damian</td>
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<td>Robin E.J Chater</td>
<td>FEDEE (The Federation of International Employers )</td>
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<td>Gilbert Debroux</td>
<td>FOREM</td>
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Table 1: Members of KnowRES Advisory board

The role of the KnowRES Advisory Board is twofold:

- On one side, its expertise is requested to support the consortium in filling the gaps on the KnowRES project
• On the other side, its vision is sought in defining possibilities for mutual cooperation with ongoing activities with a view to supporting the long-term sustainability of KnowRES. The Advisory Board will first meet on October 6th in Brussels. A second meeting is forecasted at the end of the project together with the final conference.

2-THE BIOMASS/BIOENERGY SECTOR

2.1-WHAT IS BIOENERGY AND HOW DOES IT WORK?

Bioenergy is energy derived from the conversion of biomass where biomass may be used directly as fuel, or processed into liquids and gases.

Biomass use for energy is multi-faceted: many different raw materials and/or processed types of biomass can be transformed via numerous conversion technologies for use in energy sectors (residential, commercial, industrial heating, electricity or transport). See figure below for bioenergy conversion pathways.

WHAT IS BIOMASS?

Biomass is any organic, i.e. decomposable, matter derived from plants or animals available on a renewable basis. Biomass includes wood (directly from forest or by-products of the wood based industry, agricultural crops, agricultural co-products (e.g.: straw) and residues (e.g.: manure) herbaceous and woody energy crops, agro-industrial residues, municipal organic wastes that can be used to produce energy.

WHAT ARE BIOMASS PRODUCTS?

Biomass products refer to the different products that can be created from biomass. Fuels from biomass generally come in solid, liquid or gaseous forms.

Solid Biofuels
- Wood Pellets
- Wood Chips
- Briquettes
- Firewood

Liquid Biofuels
- Biodiesel
- Bioethanol
- Advanced Biofuels

Gaseous Biofuels
- Biogas
- Biomethane
- Syngas

See figure below for bioenergy conversion pathways.
Figure 2: Biomass sources

Figure 3: Bioenergy conversion pathways
In his list of five main priorities for the EU, the Jean-Claude Juncker, President of the European Commission, has identified as one of the main priorities for the EU to become the *world’s number one in renewable energies*. Biomass is currently making a major contribution to renewable energy use in the EU. It accounts for more than half of European renewables consumption and is showing steady growth patterns across the different market segments. Increasing the use of bioenergy will greatly contribute to reaching the European 2020 and 2030 climate and energy objectives.

The consumption of biomass for heating and electricity in the EU has significantly grown during the current century and it currently exceeds the production capacity of the European soil.

In addition, this growth has been uneven among countries. While the demand has sharply increased in France and the UK and to a lesser degree in Spain and in Italy, those of some traditionally big wood-energy consumers such as Sweden and Poland have slipped.
In 2013, the total EU27 biomass supply for electricity, heating and cooling amounted to 91.5 Mtoe, chiefly domestically produced (95.7 Mtoe).

According to estimates from the National Renewable Energy Action Plans (NREAPs), it is expected to further increase up to 110.5 Mtoe in 2020 and on the basis of current trend, solid biomass is expected to be used mainly for heating (90.4 Mtoe), followed by electricity (20 Mtoe).

![Figure 5: EU biomass consumption in electricity, heating and transport (Mtoe) (Source: State of play on the sustainability of solid and gaseous biomass used for electricity, heating and cooling in the EU. Commission Staff Working Document)](image)

Current markets, mostly involve domestic heat supply (e.g. pellet boilers), large-scale industrial and community CHP generation (particularly where low cost feedstocks from forest residues, bagasse, MSW etc. are available), and co-firing in large coal-based power plants. The deployment of dedicated electricity plants has been mainly confined to low cost feedstocks in relatively small-scale applications, such as the use of biogas and landfill gas from waste treatment.
The differential between demand and production is made up by net imports, mainly as a result of rising wood pellet imports from the United States and Canada. According to data published by AEBIOM in its 2014 report, the EU imported exactly one third of its consumption in 2013. The extent of wood pellet use is country-dependent. In the British, Dutch and Belgian market wood pellets are mainly used as a fuel in high capacity power plants. In Sweden and Denmark, wood pellets are used both in heating appliances, boilers and stoves, and also in large cogeneration plants. In Germany, Italy, Austria and France, the main growth vector is pellet consumption in residential heating systems and they are also used in industrial boiler for heat production.

The developing of the transport biofuels sector has recently slowed down and they currently represent 4.9% of total road transport fuel consumption (Eurobserv’er) and 12.6% of total bioenergy.

![Figure 6: EU-28 biofuel consumption trends for transport (in ktoe) (Source: Biofuels Barometer – Eurobserv’er – July 2015)](image)

They are, however, expected to play an increasing role in meeting the demand for road transport fuel, with 2nd generation biofuels increasing in importance over the next two decades. Even under business-as-usual scenarios, biofuel production is expected to increase
by a factor of 10 to 20 relative to current levels by 2030 (corresponding to a 6 - 8% average annual growth rate).

Developments in the bioenergy sector can influence markets for agricultural products (e.g. food and feed products, straw) and forest products (e.g. paper, board).

Trade will be also an important component of the sustained growth of the bioenergy sector.

World trade in processed bioenergy carriers (e.g. ethanol, biodiesel, wood pellets) is growing rapidly. Present estimates indicate that bioenergy trade is modest – around 1 EJ (about 2% of current bioenergy use). In the longer term, much larger quantities of these products might be traded internationally, with Latin America and Sub-Saharan Africa as potential net exporters and North America, Europe and Asia foreseen as net importers.

![Figure 7: Biofuels demand and production in selected regions (Source: World Energy Outlook, 2013)](image)

However, markets will need access to monetary and physical resources, and will need to function efficiently and transparently in order to counteract the pressure of increasing demand. There is therefore an important role for policy in providing support to an increasingly efficient industry, for example in terms of yields, use of residues and wastes, and
land use, while providing regulation to avoid negative impacts associated with the exploitation of physical resources. This requires active coordination between energy, agriculture and forestry, trade and environmental policies.

2.3- JOBS IN THE BIOENERGY SECTOR

Bioenergy is widely believed to have among the largest employment potential of the Renewable Energy sector. It is much more labour intensive than the other technologies because agricultural operations (cultivation and harvesting biomass feedstock) play an important role and require a large number of usually low skilled people. Processing the feedstock into fuels generates fewer jobs but requires higher skilled people. There is therefore an important disparity of skills level in the sector.

There is currently an estimated 3 million people working in the bioenergy sector worldwide (4) After Solar energy, Bioenergy is the sector with the highest number of jobs within the renewables.

WHAT IS A JOB?

As per the International Labour Organization (ILO), a job is defined as “a set of tasks or duties performed, or meant to be performed, by one person”. Occupation refers to the kind of work performed in a job. The concept of occupation is defined as “a set of jobs whose main tasks and duties are characterized by a high degree of similarity”.

WHAT IS DIRECT EMPLOYMENT, INDIRECT EMPLOYMENT AND INDUCED EMPLOYMENT FOR THE BIOENERGY SECTOR?

Direct employment refers to employment directly related to the production of, for example, forest products or services. As a result of this direct employment, employment is also generated in the businesses that supply goods and services to the forest sector. This is referred to as indirect employment.

Finally, when these directly and indirectly generated income are spent and spent again on a variety of items in the broader economy (e.g. food, clothing, entertainment), it gives rise to induced employment effects.
In Europe, around 500,000 people are estimated to be currently employed in the bioenergy sector (5) and the number is expected to increase in the coming years (steeper growth in innovative fields such as advanced biofuels, for instance, and a more stable growth in traditional sector like in the solid biomass sector).
The bioenergy sector has a great employment potential as long as the sector development trend is sustained. A snapshot of current employment trends is further detailed through the analysis of the survey research results.

Graph 1: EU-27 jobs distribution in the solid biomass sector in 2012

Figure 9: Job distribution in the bioenergy sector in 2012
3- THE MOST WANTED PROFILES SURVEY RESEARCH

3.1-THE SURVEY RESEARCH

In order to assess companies and organizations’ challenges, their recruitment needs and projections, a tailor made survey was designed by the Green jobs specialist and reviewed together with the concerned industry association designated staff to ensure that the information to be collected would be useful and exploitable to all concerned parties (i.e. industry association, companies, training institutions/universities and job candidates). In this regard and for consistency purposes, it was important that all partners involved agreed on working with the same value chain and generic job occupations which were incorporated in the questionnaire.

Under the project partners’ agreement, the industry associations are responsible for broadcasting the survey questionnaire to their respective member companies/organizations as well as companies in their network. A success indicator of 50% responses to the total number of companies/organizations targeted was required.

It is worthwhile to note that private companies are more inclined to respond positively to a request if they see immediate benefit for their effort. It is especially the case for marketing, commercial and sales people who have to fulfill short term financial targets. Given that the majority of people available during the conferences are pertaining to this category, creative corrective measures had to be carried out to incite companies to reply to the survey and boost the response rate. These measures included: using other medium than emails, such as putting an advertisement on EURACTIV or LinkedIn to inform, attract and explain the objective of the survey; intervening in relevant conferences to publicize the project and get direct feedbacks from the panel of experts/companies representatives; interviewing companies during exhibitions and events such as the 23rd EUBCE Conference on Biomass held in Vienna, from 2 to 4 June 2015.

The online survey responses were supplemented by individual – face to face- interviews with people who are performing the job, rather than the Human Resource staff, in order to obtain as specific answers as possible.
This report considers employment throughout the whole bioenergy value chain. This chain includes the harvesting of natural resources; the manufacturing of equipment needed to process feedstock or otherwise harness renewable energy sources; project development for biomass plants (i.e., engineering and construction work); sales, distribution and installation of equipment; and operations and maintenance.

Due to the huge diversity of the bioenergy sector, trying to cover the whole sector through surveys was not realistic within the scope of the project. In fact, depending on the feedstock selected, the value chains could be very different and no clear results regarding the most wanted profile would have emerged. In this context, it was first decided to focus on the wood/bioenergy sector in which AEBIOM has more contacts and expertise. A detailed value chain specific to the wood/bioenergy sector with related job occupations is described as follows:

- Wood production (and/or related activities)
- Wood fuel transformation (and/or related activities)
- Bioenergy production (and/or related activities)
- Transportation
- Other cross-cutting/enabling activities

Later, in the course of the process, due to the limited response rate, the survey questionnaire was widened to the whole solid bioenergy sector (see value chain below) in order to include a larger number of actors.
Besides the different job occupations pertaining to each stage of the value chain, there is a set of cross-cutting occupations such as the human resources, administrative, financial, legal and health and safety roles that are necessary for the functioning of activities within the whole value chain.

The schema below provides a comprehensive overview of some of the economic activities and related job occupations for two bioenergy sources (forest biomass and agricultural biomass).
3.1.2-SURVEY FINDINGS

The most wanted profiles survey is composed of two sections; first section is dedicated to collect information on the sector’s technological and economical evolution and the second section aims at collecting information related to recruitment trends and challenges. An example of the survey can be found in Annex A.

Detailed survey research results are presented below:

**Question 1: name, address, contact details of company/organization**

Thirty five companies/organisations participated in the survey. These companies/organisations are based in the following thirteen countries:
The highest participation rate per country is Austria followed by the UK and The Netherlands.
According to AEBIOM, the KnowRES survey participation rate is representative of companies’ activity per country in the EU for the bioenergy sector.

The graph below gives an overview of the recent state of wood pellet production in the European Union.

![Graph showing wood pellet production in EU countries]

**Figure 13: Bioenergy plants above 1MW using woodchips as fuel (6)**

**Question 2: location on the value chain**

The majority of companies/organizations positioned their activities in the bioenergy production and/or related activities, followed by cross-cutting occupations such as quality control or safety. Then in ex-aequo, wood production and wood fuel transformation.
The size of the staff for companies/organizations active in the wood/bioenergy sector varies tremendously. One of the smallest is staffed with 2 persons, the largest based in the Netherlands has a 17000 people-strong staff with around 2000 employees working directly in the energy field. The number disparity in the staffing reflects the heterogeneity of the sector for which an average value would therefore not be representative.

The size of the companies depends on a number of factors such as supportive legislation, location, the maturity of the market they are covering, the age of the company (i.e. whether it is a new entrant or a long established one), its structure and financial background (i.e. whether it is a unit part of a big group or an independent company).

**Question 4: key competencies critical to the success of companies/organizations in the coming 2 to 3 years.**
Now, albeit the difference in size and market shares, surveyed companies/organizations unanimously agree that the key competencies critical to their continued success in the next 2 to 3 years are within the fields of:

1° Research/engineering

2° Project manager/developers at the same level as Marketing/communication

Bioenergy technology –from agricultural and forest biomass sources- is at the TRL 9, ready for full scale deployment. While the technology is functional and commercially viable, companies are always interested in researching to increase its efficiency and lower its costs throughout the value chain, hence the above responses.
Further analysis will look into details of the job occupations where these competencies are located (see survey findings)

**Question 5: top three staffing related priorities /concerns**

The text analysis shows that the companies are optimistic about their business prospects in the future. One main challenge which has been frequently cited is the **retention of skilled employees** and some companies are willing to increase the pay level to avoid the defection of trained and operational employees to competition within the biomass sector. In addition, companies are concerned about the **lack of technical knowledge and the lack of sales capabilities** of candidates.

**Question 6: Difficulties faced by companies/organizations in finding suitable candidates**

The analysis of the replies shows:

- **a skill gap** with 32 per cent of responses saying “the candidate had insufficient professional experience” and nearly 29 per cent saying “the candidate did not have appropriate education”
- **a skill shortage** with nearly 11 per cent of replies stating they did not receive enough applications for their job vacancies.

The labour shortage is caused by the sector’s skill gap, the lack of sector’s attractiveness (working conditions, salary package) and leakage of workforce to other sectors. The consequences are delays in projects (longer recruitment processes), higher costs (raising salary trends) and a skill mismatch.
Question 7: Do you anticipate any new job opening in the coming 1 or 2 years?

The hypothesis is that in time of economic crisis, cash strapped companies facing uncertainty about future potential business are more reluctant to take on new graduates who need to be trained to be operational. Companies would tend to become more demanding and increase their jobs requirements – raising the number of years of required experience for example - when essential staff needs to be hired.

It is therefore critical to take into account the international socio-economic context in which the companies are operating. Indeed, products and services, consumption patterns, production and working methods are rapidly changing and companies have to be flexible in order to adapt, be competitive and survive. Therefore, when confronted with market uncertainties, companies would rather adopt a “wait-and-see” attitude before hiring new recruits. It is especially the case for Small and Medium Enterprises which do not have the same financial capacities or backings as bigger players.

However, the majority of surveyed companies/organizations -almost 71 per cent- said they will be recruiting in the coming 1 to 2 years. This is a testimonial of companies’ confidence and optimism about the future of their businesses and consequently of the sector.

Question 8: Recruitment channels

When they recruit, companies are mainly hiring via recruitment agencies or/and via internal recruitment channel. They also hire via the posting of vacancies in company/partners websites and more and more via social media.

While recruitment agencies are perceived to be too expensive, it is yet the number one recruitment channel for the majority. This shows the scarcity
of certain profiles and sometimes the unclear contour of some job occupations. Therefore for many small companies which do not usually have a Human Resources department, services provided by a recruitment agency are essential in the hiring process. A 2013 survey, carried out during the European Wind Energy Association’s offshore event in Frankfurt, showed that the types of services companies are expecting from a recruitment firm are -by order of importance-:

1. Advisory services
2. Candidate validation (reference checks)
3. Job vacancy advertisements
4. Assistance with job specifications
5. Communication strategies
6. Drafting of job descriptions

**Question 9/10: Most wanted profiles (see PART 3, II. Most wanted profiles)**

**Question 11: Trainings**

While skill gap and skill shortage is persistent in the sector, companies are working with universities to close the gaps. Besides the inappropriate education and the insufficient professional experience cited, illustrating the skills topography of the sector, the low level of applications for some job vacancies could be explained by the lack of “perceived” attractiveness of the job occupations.

To tackle the issues of inadequate education and insufficient professional experience, 94 per cent of the surveyed companies/organizations have put in place **internal and/or external training schemes**. The duration of the training may vary from a few weeks to a few years. The different schemes are listed below:

- On the job, “hands on” training with colleagues
- Internal training combined with accredited commercial courses
- Training on the knowledge of energy sector technology and sales
Companies sponsoring studies previous to employment (2 to 3 years education on subject such as electronics, physics and chemistry)

A combination of internal and external trainings (3 to 4 years apprenticeships with 1 day/week at college) + accredited courses (biomass, heat pumps, solar thermal)

These training schemes can be costly and only companies with strong financial assets are able to invest in them. Small and Medium Enterprises (SMEs) with less financial capacity are therefore disadvantaged. Developed trainings are usually confidential and specific to each company/organization, leaving therefore no room for synergies between companies.

Targeted communication campaigns to create awareness and raise the attractiveness of specific profiles needed by the industry, as well as recruitment support for SMEs, could help reduce the skill gap and shortage.

**Question 12: interest in collaboration with academic world on shaping education/training programmes**

Close to 58 per cent of survey participants are at the moment not interested in any collaboration. However over 46 per cent is interested in receiving more information.

Technical trainings are sensitive issues as they aim at improving the productivity and therefore competitiveness of companies competing for higher market shares.

**Question 13: Companies/organizations’ participation in match-making event**

A majority of companies/organisations did not wish to participate in the match-making event. Only 38 per cent responded positively. The follow-up with the companies wishing to take part in the match-making was a time consuming process mainly for the following reasons:

- The person who filled out the survey questionnaire is not the person in charge of recruitment
- The HR person and/or decision making person is unavailable
• The complementary match-making/recruitment is a new concept and companies are suspicious this may be a disguised scheme from recruitment agencies
• The notion of match-making is too much tied to B2B match-making and although it was explained, many companies that said yes to the event, withdrew their participation last minute
• The timing was not fitting with the companies priorities.

As the organisation of the match-making events proved to be difficult and time consuming, it was decided to replace them with experts meetings taking place at the different relevant conferences. During these meetings, experts are asked to share their views and expertise of the sector and a panel discussion will allow the gathering of intelligence and trends of the sector job market. Candidates can also meet recruiters bilaterally and benefit from career advice.

3.1.3-CONCLUSIONS OF THE SURVEY FINDINGS

Seasonal fluctuations and skill levels disparity

Stable employment is a clear indication of the sustainable economic well-being of individuals and communities. Employment from the forest sector for instance is an important contributor toward community stability, particularly rural communities that tend to be mostly resource-dependant. However, employment in the bioenergy sector is characterized by seasonal fluctuations and skill levels disparity.

The sector requires, on one hand, a large number of low to medium skilled human resources for the biomass production and harvesting, many jobs in the value chain being occupied for instance by agricultural workers or truck drivers. On the other hand, it also needs high skilled engineers in the development of energy installations or in the development of high technological harvesting tools. Growing and harvesting crops can only take place at certain
period of the year, hence employment in this stage of the value chain – on top of the economic and political trend - also follows the seasonal fluctuations.

Emerging new job occupations and job occupations in transformation

The factors that influence the evolution of the labour market are economic, sociological and demographical, regulatory and technological. The increasing scarcity of natural resources, the shale gas revolution, the steep fall of oil price from 100US$/barril a year ago to the current 50US$, the public expectation of a greener sustainable future, governments’ consensus on acting together against climate change, are some of the main factors influencing the consumption and production patterns toward a greener life style. These are impacting not only on the content of job occupations but are also contributing to the emergence of new job occupations such as for instance biostatistician. A biostatistician is a combination between a bioengineer and a statistician. A biostatistician is someone who uses or applies mathematics and statistics to varying categories in biology. They design biological experiments primarily in the field of agriculture and medicine; collect; dissect; and summarize the data, and release information based on the findings of that data. In the biomass sector, the biostatistician can, for example, experiment on lowering humidity rates to increase process efficiency. Knowledge of computer programming, software development are among the required skills but to define the exact contour of the function in the bioenergy sector will require further research.

Concerning the category of job occupations in transformation, one example is the Business Development engineer also called Technical sales. This single occupation now combines what used to be two different occupations: an engineer (e.g. project engineer) and a marketing/sales person. It requires the incumbent not only to have a strong relevant network but also solid technical knowledge. As such the role is a hybrid one between a technical engineer role and a commercial role.

It is interesting to note the increasing specialisation of some cross cutting roles. For instance, a recruitment consultant, in addition to the necessary skills and competencies to perform the job, needs to also possess knowledge of the sector as well as understanding the technology involved. A particular attention needs therefore to be paid to the training content of the
recruiters. A successful and efficient recruiter should be following the technology trend and be able to identify the transferability of certain skills.

**Areas where development of expertise and skills are further needed**

Jobs occupations in general tend to become more technical with an accrued management and coordination, interface (marketing, advisory) component which have great impact in terms of non technical competencies ("soft skills"). At the same time more and more job occupations in the sector require the incumbent to respond to the double constraints of the effects of strong standardization of practices (perfect technical knowledge, strict compliance with rules) and the need for greater autonomy, versatility and availability.

### 3.2-MOST WANTED PROFILES

Bioenergy developments create employment all along the supply chain: forest management; logistics; commercialisation; production of boilers and stoves; installations; maintenance, etc.

The most wanted profiles companies/organizations are currently looking for are:

- Engineers profiles (mechanical engineer, process and construction, production and control)
- Business developer and/or technical sales
- Research engineer

In order to better understand tasks and responsibilities of each job profiles, some selected professional biographies with the job description linked to their current mission assignment are presented in Annex B.

In addition, some testimonials from people occupying these job functions under the “profile of the month” framework (every month, an interview of a professional working in the Renewable Energy sector is published on KnowRES website), will provide further insight on the various trajectory that lead them to their current role/occupation.
A biomass design engineer is a person with an engineer degree (mechanical, construction, building services engineering degree). The person should have prior professional experience in designing biomass installations and have an extensive knowledge of the functioning of biomass heating systems.

### Example of a job description of a Biomass Design Engineer

Our client is a leading renewable energy business operating in the UK and Ireland. There is currently an exciting opportunity for a Biomass Design Engineer to join the team. The biomass division offers the following services and solutions:

- Biomass heating and power solutions to commercial, industrial and public sector clients
- District Heating system design, build and operation
- Energy Service Companies (ESCOs)
- Wood chip, wood pellet and other biomass fuel sales

### RESPONSIBILITIES AND DUTIES

Within the biomass division, the biomass design engineer will be responsible for the following tasks and responsibilities:

- Design of biomass installations
- Biomass Boiler sizing
- Pipe sizing, Pump sizing
- Civil and Mechanical design related to the biomass installation
- Calculation of flue emissions against requirements
- Calculation of CO2 emissions and savings
- Preparation of budget quotes
- Preparation of tender documents for civil and mechanical sub-contractors
- Evaluation of tender returns
- Preparation of final quotations for submission to potential clients
- Margin management on projects

- Preparation of tenders and Pre-Qualification Questionnaires
- Completion and revision of CAD drawings
- Preparation of CAD drawings for new jobs
- Amendments to existing CAD drawings to reflect design iterations

### EXPERIENCE & SKILLS REQUIRED

- Experience in working in a similar role, preferably involving biomass
- Mechanical or building services engineering degree
- Excellent IT skills including AutoCAD
- Willing to travel/Full driving licence
3.2.2- BUSINESS DEVELOPER AND/OR TECHNICAL SALES

The business development/technical sales role is to identify sales leads, pitch goods or services to new clients and maintain a good working relationship with new contacts. The role revolves around good communication.

Example of job description of business Developer/technical sales

RESPONSIBILITIES AND DUTIES
The position of business developer/technical sales is best suited for an energetic, highly-motivated and results-driven individual. Reporting to the Business Development Manager, the duties and responsibilities of the Business Developer/Technical Sales include the following:

- Following up new business opportunities and setting up meetings
- Planning and preparing presentations
- Communicating new product developments to prospective clients
- Overseeing the development of marketing literature
- Providing management with feedback

EXPERIENCE AND SKILLS REQUIRED

- A minimum of 5 years of technical sales experience is required
- Strong knowledge of the biomass technology and good knowledge of the energy sector technologies
- Excellent communication skills with an ability to communicate confidently with both technically trained and non-technically trained customers
- Demonstrated achievement in sales, business development or product management
- High level of organizational and time management skills
- Interpersonal skills developed to a level sufficient to negotiate and guide potential customers toward a provided solution.
3.2.3- RESEARCH ENGINEER

Research Engineers apply their expertise and knowledge to technical projects in order to find innovative, cost-effective means to improve research, techniques, procedures, and/or products and technologies. Responsibilities include developing, conducting, and evaluating new approaches to meet project objectives faster and more efficiently.

Example of job description of a Research Engineer

RESPONSIBILITIES AND DUTIES

Reporting to the Program Manager, the main responsibilities and duties of the Research Engineer are:

- Develop and commercialize products and technologies.
- Initiate approaches and low-cost innovations to maintain technical leadership.
- Prepare cost estimates and continually analyse design variables.
- Build prototypes, products, and systems for testing.
- Ensure final product meets needs as defined by project.
- Design testing procedures and coordinate testing to identify problems and solutions.
- Conduct tests, document test results, and develop client presentation.
- Provide user training and technical support.
- Coordinate and communicate work effort within organization.

- Identify and keep abreast of novel technical concepts and markets.
- Assist in publication of papers and applications for patents.

EXPERIENCE & SKILLS REQUIRED

- Master’s degree in sciences or engineering (mechanical, environmental or electrical engineering, preferably with a master specialisation in biomass related subjects).
- Analytical thinking and problem solving skills
- Data gathering, validation, analysis and interpretation skills
- Critical thinking and reasoning to identify the strengths and weaknesses of alternative solutions to problems
- IT skills including the ability to work with computer models
- Writing and presentation skills to communicate effectively
CONCLUSIONS AND RECOMMENDATIONS

Due to data limitation and fragmented information, it is difficult to provide a clear overview of the whole sector. “Snapshots” survey research, which can show an instant picture of the job market, does not, however, give the pace and trajectory of employment trends. To fill this gap and to be able to draw a dynamic picture of the sector’s job market, a systematic research framework should be put in place with the same parameters (value chain, technological development trends, companies to be surveyed, key players to be interviewed).

The commitment and input of the industry (companies) are essential to the successful development of a reliable job barometer. Assigning HR persons as focal point would allow for easier implementation of activities. Sending surveys proves to be insufficient to get enough replies. The only way of getting the targeted number of responses is the participation to relevant conferences and exhibitions with the organisation of experts meetings.

To try to solve the skill gap and skill shortage problematic, an increasing number of companies (bigger companies) are closely collaborating with Universities but these initiatives remain at the company level and information is often kept confidential. SMEs that usually do not have the same budget capacity are left out of the possibility of partnering with the training actors. This gap needs to be filled to support the creation of jobs. One possible solution would be to create a network to facilitate the establishment of training for SMEs in different areas. Indeed, a 2012 European research (7) showed that over 80 per cent of new jobs created in the EU was in fact created by SMEs. The majority of companies active in bioenergy sector are SMEs.

Companies will be hiring if they are making profit. In order to do so each company/organisation needs to invest in research to have the most efficient technology, to lower costs throughout the value chain, to be more competitive, leaving very little room for
cooperation with other companies that represent competitors. However, it would be beneficial to the whole sector if some synergies could be identified. Common training schemes could be elaborated and shared, for instance in areas that are relevant to all bioenergy companies such as recruitment, operation and maintenance or in health and safety.

Given its important contribution to reaching the EU 2020 and 2030 climate change targets, the bioenergy sector represents a great potential for employment and new jobs creation. But the timeline of the KnowRES project highlights the difficulty and the limit of a survey tool to cover for different technologies in the sector. Intelligence gathered via the survey research alone are insufficient and should be complemented by feedbacks from Expert roundtables to provide a more accurate picture of the sector’s trends and challenges.
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ANNEX A: MOST WANTED PROFILES SURVEY
QUESTIONNAIRE

1. Name, address, contacts details of the company/organization

2. Where do you locate your firm/organization in the wood/bio-energy fuel consumption value chain?
   - Wood production (and/or related activities)
   - Wood fuel transformation (and/or related activities)
   - Bioenergy production (and/or related activities)
   - Transportation
   - Other cross-cutting/enabling activities

3. How many staff does your company have for production activities (excluding administrative staff)?

4. How many over dry tonnes (odt) of woodchips are you producing/transporting/consuming every year? (This question is for Aebiom internal use only)

5. What would you consider as the key competencies critical to the success of your company for the coming 2 to 3 years?
   - Finance/trade/distribution
   - Marketing/Communication
   - Legal
   - Logistics/operating/maintenance
   - Research/engineering
   - Management/Administration
   - Project manager/developers

COMPANIES’ RECRUITMENT CHALLENGES

6. What are the top 3 priorities and/or concerns related to the staffing of your company/organization?
7. In the past years, did your companies come across any difficulties in finding suitable candidates?
   - Yes, the candidates did not have the appropriate education
   - Yes, the candidates had insufficient professional experience
   - Yes, too many applications were received and not enough time to review them adequately
   - Yes, not enough applications were received
   - No, specific difficulties
   - No recruitment
   - Other (please specify)

8. Do you anticipate any new job opening in the coming 1 or 2 years?
   - If yes, which skills and competencies are you particularly looking for and at what timescale (6 months, 1 year, etc…)?
   - No, no recruitment foreseen in the coming 1 to 2 years.

9. Through which channel do you advertise new job positions?
   - Job boards
   - Social media
   - Company/partner websites
   - Internal recruitment channel
   - Recruitment agency
   - Specialized Press
   - Other (please specify)

10. What occupations/jobs are the most difficult to fill with qualified workers (up to 5 answers)?
    **WOOD PRODUCTION RELATED ACTIVITIES**
    - Certification bodies personnel
    - Foresters/Rangers
    - Sustainability/resource management consultant
    - Industrial wood harvesting material suppliers
WOOD CHIPS PRODUCTION DIRECTLY EXTRACTED FROM FORESTS
- Forest Owners
- Operating manager
- Wood supply manager
- Wood cutter
- Forestry technical engineer
- Wood cutter, forest maintenance (contractors)
- Other/comments

1st QUALITY WOOD PRODUCTION
- Forest Owners
- Operating manager
- Wood supply manager
- Wood cutter
- Forestry technical engineer
- Wood cutter, forest maintenance (contractors)
- Other/comments

WASTE INDUSTRY WOOD CHIPS PRODUCTION
- Waste collectors
- Treatment operators
- Managers
- Commercial operator
- Other/comments

WOOD FUEL TRANSFORMATION RELATED ACTIVITIES
- Wood chippers material supplier
- R&D
- Manufacturing
- Operation and maintenance
• Other

**WOOD CHIPS PRODUCTION FROM INDUSTRIES USING WOOD**

• Operation manager
• Operational technician
• Commercial operators
• Administrative personnel
• Other

**WOOD CHIPS IMPORTATION**

• Buyers/wholesalers
• Manager, admin, operators for storage platforms
• Other

**BIO-ENERGY PRODUCTION RELATED ACTIVITIES**

• production of industrial boilers
• Installation of industrial boilers
• R&D
• Manufacturing
• Marketing
• Sales
• Administrative personnel
• Other

**LARGE SCALE APPLIANCE ENERGY PRODUCTION**

• Plant manager
• Operation and maintenance technician
• Buy and sell services personnel
• Other

**ENERGY DISTRIBUTION**

• Operators of heat/Power networks
• Operation and maintenance technician
• Manager
• Administrative personnel
• Other

**TRANSPORT**

• Truck driver
• Truck filling station worker
• Ship crew
• Other

11. Does your company have a training scheme for new staff?
   • Yes, internal training (please indicate the title and duration of the training)
   • Yes, outsourced training (please indicate the title, duration and training institutions)
   • No

12. Would you be interested in collaborating with the academic world on shaping education/training programmes?
   Yes, please send me more information by email at
   No

13. As a complimentary service to its members, AEBIOM will be co-organizing match-making sessions during which companies that are looking for talents will be able to meet with potential matching profiles candidates. Would you like to participate and advertise your company for free?
   Yes
   No

Thank you very much for your valuable input
ANNEX B: PROFILE OF THE MONTH QUESTIONNAIRE

Job title: Research engineer

1- What is your background (trainings, experience) and what led you to your current job?

I studied mechanical engineering at Université catholique de Louvain, my option was energy so I had classes on renewable energies including a class on biomass use for energy production and utilization. I started working at the university as a research assistant, leading a project aimed at installing an experimental gasification plant in university’s lab. This project was a partnership with a gasifier manufacturer and thus included research, project management and collaboration with the industry. After this 3 years project, I started as a teaching assistant to continue working on gasification and get a Ph. D. on this subject, still in collaboration with our industrial partner.

2- What are your responsibilities and tasks in your current job? Please explain your working environment, challenges, a typical day at work.

My job is divided in two main activities, teaching and research. I teach mainly thermodynamics and supervise master thesis on biomass gasification. The research part includes my Ph. D. research (aimed at improving the knowledge of two-stage gasification phenomena) and research campaigns for the industrial partner as our experimental setup is also used for tests that are not part of my thesis (e.g. testing the potential of new biomass, new gasifying agent).

3- How do you see the evolution of your job (technological, market trend, trainings needs, policies, legislation, etc...)?

As a Ph. D. student, I know that my position at the university is only temporary. I hope I can convert my experience, the knowledge and skills I acquired in the academic world in the industrial world. The advantage of working at a university is that you have time to keep an eye on state of the art research made on biomass. You can also meet a lot of people working on subjects linked to biomass and keep a global view on biomass research. In my case, I also have close contacts with the industrial world through the partnership build around our pilot plant. The main disadvantage of the university...
is that you don’t have a clear and global view of what is happening on the biomass market from an economical point of view.

4- What are the quality and competencies should a person possess to perform your job (hard and soft skills, etc…)? Please also include your job requirements, job description if possible.

My position requires to be flexible as you have to be able to teach classes, do research, do project management (involving two partners that have really different approaches on research) and communicate on your research topic though conferences and publications.

5- What advices would you give to someone who wishes to work in the sector?

The best advice I think I could give is “keep learning”. The sector is moving fast and is really vast. There is really a lot of interesting stuff going on. In my opinion, biomass is the renewable energy with the biggest potential and thus presents plenty of challenges. There is still a lot to learn and discover on biomass and that is what makes it so interesting.

Job title: Research engineer

1-What is your background (trainings, experience) and what led you to your current job?

I have always been fascinated by forests and nature. I studied forestry in University of Joensuu, Finland and I interested about bioenergy issues then. I am worried about the climate change, and I think that one method to do something is to substitute fossil fuels with bioenergy. I did my Master thesis about forest bioenergy potential. After graduation, I did get job from Finnish Forest Research Institute from Bioenergy related project. In my PhD I continued same theme “Effects of forest management on sustainability of integrated timber and energy wood production”. After Dissertation I have continue in different bioenergy related projects in Finnish Forest Research Institute, now merged with agricultural research to Finnish Natural Resources Institute.
2-What are your responsibilities and tasks in your current job? Please explain your working environment, challenges, a typical day at work.

I work at Research Institute at Project work. At the moment we lead one big FP7 project where the main aim is to increase bioenergy use in EU area. Project coordination is my job. But also research, I have been studied energy wood drying and have been developed drying models for energy wood. In addition I have been involved to the productivity studies of machines (e.g.chippers) and to sustainability issues of forest energy. In addition preparing new bioenergy projects is always on my list!

3- How do you see the evolution of your job (technological, market trend, trainings needs, policies, legislation, etc…)?

There are many things changing and needs to change. New technologies are coming to the market, and with them the cost and energy efficiency of energy wood supply chains could be improved. Energy policies are in continuous turn, and this is real problem, because investors don’t know what will be the policy in five years, and they don’t do new investments.

4- What are the quality and competencies should a person possess to perform your job (hard and soft skills, etc…)?

You need to have good knowledge in forestry sciences, and good communication skills. Some management and systematic skills will help you a lot.

For this job requirements were: PhD, experience of forest bioenergy supply chains, quality management, environmental effects of forest energy use, and international research. To perform this job you need to have experience of EU projects, preparation and coordination. Fluent Finnish and English is required, and capability to independent research work, good
communication skills and proof for successful research co-operation and proof for wide publishing activities.

5- What advices would you give to someone who wishes to work in the sector?
This is very interesting and very international work, it is never boring and you have nice challenges. Of course you have to work hard, but in all sectors, if you want to success you have to work hard!