Renewable Energy Jobs Barometer
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The Knowledge Centre for Renewable Energy Jobs project is coordinated by the Association of European Renewable Energy Research Centres (EUREC)

EUREC, the Association of European Research Centres in Renewable Energy.

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EXECUTIVE SUMMARY

Renewable energy is a key sector for achieving targets under the EU 2020 framework. In the transition to 100% renewable energy future, new areas of activities will be developed while some others will disappear or transformed to adapt to the fast evolving energy environment. Identifying areas where skills need to be updated or acquired is crucial to helping reduce the skill gaps and shortage in the renewable energy sectors. Furthermore, identifying skills that are transferable from traditional sectors to the new renewable energy sectors is an important step towards creating employment opportunities for decent work and social inclusion in a green economy.

The Renewable Energy Jobs barometer provides an overview of jobs trends per sector and highlights the critical skills and competencies the renewable energy sectors need for a successful deployment. The highly volatile environment makes it more difficult to forecast human resources needs in the renewable energy sector than in other traditional sectors. Regular reassessment of these forecasts are recommended for a more accurate jobs barometer.

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Three most wanted profiles</th>
<th>Short term recruitment forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>› Engineer (various disciplines)</td>
<td>71% companies will be recruiting</td>
</tr>
<tr>
<td></td>
<td>› Business developer/technical sales</td>
<td></td>
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<td></td>
<td>› Research engineer</td>
<td></td>
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<tr>
<td>Geothermal</td>
<td>› Drilling engineer</td>
<td>91% of companies will be recruiting</td>
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<td></td>
<td>› Project manager</td>
<td></td>
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<td></td>
<td>› O&amp;M plant manager</td>
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<tr>
<td>Ocean</td>
<td>› Project manager</td>
<td>74% of companies will be recruiting</td>
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<td></td>
<td>› Structural research engineer</td>
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<td></td>
<td>› R&amp;D engineer</td>
<td></td>
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<tr>
<td>PV</td>
<td>› Technical researcher</td>
<td>63% of companies will be recruiting</td>
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<tr>
<td></td>
<td>› O&amp;M field technician</td>
<td></td>
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<tr>
<td></td>
<td>› Engineer (project planning)</td>
<td></td>
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<tr>
<td>Small hydropower</td>
<td>› Technical sales</td>
<td>60% of companies will be recruiting</td>
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<td></td>
<td>› Field service technician (O&amp;M)</td>
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<td></td>
<td>› Mechanical design engineer</td>
<td></td>
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<tr>
<td>Solar Thermal</td>
<td>› Technology researcher</td>
<td>80% of companies. Due to difficulties, forecast need to be reassessed</td>
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<tr>
<td></td>
<td>› Chief, sales and marketing officer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>› O&amp;M technician</td>
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<td>Needed skills and competencies</td>
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<td>-------------------------------</td>
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<tr>
<td>German language skills, Sales skills, Multitasking skills</td>
<td>Lithuania, Austria, Germany, UK</td>
<td></td>
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<tr>
<td>Hydro-geologist, Reservoir engineer, Chemist</td>
<td>Turkey, France, Germany, Italy, Hungary</td>
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<tr>
<td>Health and Safety, Technical skills, soft skills (multitasking and problem solving)</td>
<td>Scotland, UK, France</td>
<td></td>
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<tr>
<td>Soft skills, Language skills, Legal expertise, Marketing, lobby skills</td>
<td>Algeria, Morocco, China</td>
<td></td>
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<tr>
<td>Project managers, business developer, Technical sales, legal, environmental managers</td>
<td>Market shift to Africa, North America and Asia</td>
<td></td>
</tr>
<tr>
<td>Soft skills, O &amp; M technicians</td>
<td>South Africa, USA, India</td>
<td></td>
</tr>
</tbody>
</table>

KnowRES industry survey main findings: jobs trends and forecasts per sector
The Paris historical climate change accord reached by over 190 countries represents a strong mandate for a transition to a 100% renewable energy future. The debate is no longer on whether this is going to happen but when and how this transition will happen.

Energy is a fundamental input for economic systems. Current economic activity still depends overwhelmingly on fossil fuels (oil, coal and natural gas). Renewable energy sources such as biomass, small hydropower, solar photovoltaics, solar thermal, geothermal, ocean and wind energy still account for less than 20% of global energy consumption.

Replacing the current fossil-fuel dominated energy system is not an easy task as there are a number of challenges to be overcome. These challenges are at the technological, political and economic level. The speed of the transition to renewable energy will therefore be highly influenced by policy choices. For instance reforming fossil fuel subsidies, increasing energy research and development expenditures and renewable energy targets are supportive policies that can speed up the transition. Improving the efficiency of energy grid and storage are key areas of technological development that could significantly reduce renewable energy costs.

In this transition, there will be winners and losers. New sector of activities will be developed while some others will disappear or transformed to adapt to the fast evolving energy environment. Indeed with higher energy costs, buildings, transportation networks and manufacturing will be redesigned to be less energy intensive.

In the process, there is a need to assess and plan human resources which represent a major enabler of this transition. Without adequately trained human resources, this transition will not be possible.

The current skills gaps and shortage in the renewable energy sector need therefore to be clearly identified and urgently addressed so that renewable energy technologies can be further deployed. While the lack of engineers is well documented in Europe, the lack of information on the jobs market is making it difficult for stakeholders –candidates, companies and training institutions- to have a clear picture and plan for the future.

The objective of the first edition of the Renewable Energy Jobs Barometer is to provide a snapshot of the current outlook of the jobs market for the concerned renewable energy sectors while at the same time providing very accurate and detailed information on the recruitment needs in the renewable energy sectors.
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 skills gaps in the Renewable Energy sectors.

The project co-funded by the European Union is coordinated by EUREC, the association of European research centres in Renewable Energy. The KnowRES consortium is composed of nine partners coming from four European countries, with complementary expertise. Five industry associations (Aebiom, ESTELA, AssoRinnovabili, EGEC, Ocean Energy Europe) active in the area of renewable energy, a research centre, CIRCE, located in Spain, recognised expert in providing socio-economic analysis in the area of renewable energy; an University of applied sciences, Hanze UAS, located in the Netherlands; a recruitment company, Greenfish located in Brussels, specialised in providing experts for the clean tech sectors. The Renewable Energy (RE) sectors are one of the fastest growing sectors in terms of jobs creation. An estimated 7.7 million people are currently working in the RE field worldwide (1) and the number will continue to rise. It is a fast evolving sector, highly dependent on technological development; it is therefore important to understand what the existing competences in the area are.

The KnowRES online platform ([www.knowres-jobs.eu](http://www.knowres-jobs.eu)) gathers information on RE companies and candidates: formerly and currently employed as well as students.

### a. About the Renewable Energy Jobs Barometer

The Renewable Energy Jobs Barometer provides an overview of the current renewable energy jobs trend per sector with a particular focus on soft skills and transferability of skills between different sectors. On the basis of the information collected in the industry survey research, sectoral reports were drafted, providing information on the trends and forecasts per sector and on the "most wanted profiles" including key competences needed in the sector. The top three profiles per sector are further analysed and additional interviews of people performing these functions are carried out to gather more accurate job related content and challenges. The sectoral reports on biomass, ocean energy, photovoltaics, small hydropower, geothermal and solar thermal electricity are available on the KnowRES website.

The barometer intends to address the following questions:

- What are the recruitment forecast/trends for companies and what (recruitment) challenges are they currently faced with?
- What are the current most wanted profiles?
- What skills and competencies are particularly in demand?
- What issues need to be addressed in order to help close the skill gaps in the Renewable Energy sector?

While many studies now assess the global employment trend per sector, this Barometer focuses on assessing concrete recruitment needs of companies, highlighting the critical skills and competencies the renewable energy sectors need for a successful deployment. The unique collaboration between leading companies, international organisations and academic institutions, under the framework of the KnowRES project, enabled the gathering of pertinent information.
2

The Renewable Energy sector
Renewable energy can be produced from a wide variety of sources including wind, solar, hydro, ocean, geothermal, and biomass. By using more renewables to meet its energy needs, the EU lowers its dependence on imported fossil fuels and makes its energy production more sustainable. The renewable energy industry also drives technological innovation and employment across Europe. (2) It is estimated that the renewable energy industry supports the employment of 1.2 million workers in the EU-28 – with the majority in wind, solar and bioenergy industries (3), a figure that could rise to 2 million by 2020. Renewable energy in Europe is projected to account for almost one third of total generation by 2030. (4)

a. Different Renewable Energy technologies

Most of renewable energies depend in one way or another on sunlight, with the exception of tidal and deep geothermal. Wind and hydroelectric power are the direct result of differential heating of the Earth’s surface which leads to air moving about (wind) and precipitation forming as the air is lifted. Solar energy is the direct conversion of sunlight using panels or collectors. Biomass energy is stored sunlight contained in plants. Other renewable energies are geothermal energy, which is the energy stored in form of heat below the earth’s surface and tidal energy, which is a conversion of gravitational energy.

**Bioenergy** is referring to a wide range of technologies able to produce renewable energy out of biological sources. Biomass used could be any material of organic origin such as wood (directly from forest or by-products of the forest-based industry), agricultural crops, agricultural by-products (eg: straw) and residues (eg: manure), agro-industrial by-products, or municipal biowaste. Bioenergy technologies are mostly designed to produce heat, electricity or transport fuels. Most of the biomass consumed today for energy purpose is used to produce heat for both domestic and industrial applications.

**Hydroelectric energy.** This form uses the gravitational potential of elevated water that was lifted from the oceans by sunlight.

**Geothermal power** is the energy stored in form of heat below the earth’s surface. In certain areas the geothermal gradient (increase in temperature with depth) is high enough to exploit to generate electricity. From the earth, a renewable energy resource delivering heat and power 24 hours a day throughout the year, an energy resource nearly infinite and available all over Europe.

**Ocean energy.** Energy from tides and the oceans are other forms that can be used to generate electricity. Tidal energy utilises the gravitational energy of the attraction of the Sun, Earth and Moon. Wave power converts the energy released in crashing waves, which originated in the wind, which is driven by sunlight. Ocean thermal energy exploits the greatest collector of solar energy on Earth the sea.

**Solar.** This form of energy relies on the nuclear fusion power from the core of the Sun. This energy can be collected and converted in a few different ways. The range is from solar water heating with solar collectors or attic cooling with solar attic fans for domestic use to the complex technologies of direct conversion of sunlight to electrical energy using mirrors and boilers or photovoltaic cells.

**Wind Power.** The movement of the atmosphere is driven by differences of temperature at the Earth’s surface due to varying temperatures of the Earth’s surface when lit by sunlight. Wind energy can be used to pump water or generate electricity. (5)
b. Figures and trends of the Renewable Energy sector

2020 renewable energy targets

The EU’s Renewable energy directive sets a binding target of 20% final energy consumption from renewable sources by 2020. To achieve this, EU countries have committed to reaching their own national renewables targets ranging from 10% in Malta to 49% in Sweden.

All EU countries have adopted national renewable energy action plans showing what actions they intend to take to meet their renewables targets. These plans include sectorial targets for electricity, heating and cooling, and transport; planned policy measures; the different mix of renewable technologies they expect to employ; and the planned use of cooperation mechanisms.

The figure below shows the overall share of Renewable Energy in percentage of the gross final energy consumption in the 28 member states of the European Union, as well as the target to reach in 2020:

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**Figure 1:**

Overall RES share EU-28

*Source: Eurostat 2015*

- Overall RES Share 2013
- Indicative Trajectory 2013/2014
- 2020 RES Target
A new target for 2030

Renewables will continue to play a key role in helping the EU meet its energy needs beyond 2020. EU countries have already agreed on a new renewable energy target of at least 27% of final energy consumption in the EU as a whole by 2030. This target is part of the EU’s energy and climate goals for 2030.

Figures

Every two years, the EU publishes a renewable energy progress report. The latest report from 2015 states that 25 EU countries are expected to meet their 2013/2014 interim renewable energy targets. In 2014, the projected share of renewable energy in the gross final energy consumption is 15.3%. According to data from Eurostat, the total share of renewable energy in the EU in 2012 was 14.1%, up from 8.7% in 2005 (6).

Figure 2:
RES shares in the gross final energy
Source Eurostat 2015

The renewable energy industry is composed of many different types of companies, from the smallest startup to big companies involved in electricity generation and distribution. This diversity offers stability and flexibility for the whole renewable energy industry in Europe.

Renewable power generation includes technologies as wind, biomass, photovoltaics, ocean energy, hydropower, solar thermal and geothermal.
Figure 3:
Electricity generated from renewable energy sources, EU-28, 2003-13
Source Eurostat June 2015

The Renewable Energy sector

Geothermal (TWh)
Biomass & renewable waste (TWh)
Solar (TWh)
Wind turbines (TWh)
Hydropower (TWh)
Electricity from renewables (% of consumption)
As a result of learning rates and equipment cost reductions, it is expected that the levelised cost of electricity from Renewable energy sources decreases. This will raise its competitiveness, renewable power becoming the most cost-effective option in many electricity markets all around the world where abundant resources are available.

**Figure 4:**
The levelised cost of electricity from utility-scale renewable technologies, 2010 and 2014

*Source: Renewable Power Generation Costs in 2014, IRENA*
c. Jobs in the Renewable Energy sector

Renewable energy employment continues to be shaped by an array of industrial and trade policies, industry realignments, and technology developments, as well as an ongoing regional shift from Europe and North America to China and other Asian nations. According to IRENA, in 2014 an estimated 7.7 million people worked directly or indirectly in the sector. Solar PV is the largest employer, with 2.5 million jobs, most of which are concentrated in China due to its undisputed lead in manufacturing as well as a rapidly expanding domestic market. Japan, the United States, and Bangladesh have also boosted their solar PV employment. Jobs in the European PV industry have decreased by 35%, falling to 165,000 in 2013.

Global wind power employment crossed the 1 million jobs threshold in 2014. Growth has been especially strong in China and the United States, with Brazil and the European Union experiencing moderate increases (7).

The estimated 7.7 million people working in the renewable energy worldwide is expected to increase in the coming years given the strong political mandate provided by the climate change accord reached in Paris last December. In addition to the favourable political framework, the inherent characteristics of most renewable energies systems - system modularity, distributed deployment, and local availability and diversity of fuel sources- make them suitable for reinforcing the resilience of the wider energy infrastructure and for ensuring the provision of energy services.

Figure 5:
Jobs in Renewable Energy
Source: REN21 Renewables 2015 Global Status Report
KEY DEFINITIONS: EMPLOYMENT (IRENA 2014)

**Long-term employment** encompasses jobs which can be maintained for several years due to either domestic RET deployment or export markets. Examples are jobs in fuel supply (cultivating and harvesting feedstock for bioenergy) or in O&M.

**Short-term employment** are jobs which are required only for a short period of time, for example in the planning of a renewable energy facility, or in construction and installation.

**Direct employment** refers to employment which is generated directly by core activities without taking into account the intermediate inputs necessary to manufacture renewable energy equipment or construct and operate facilities.

**Indirect employment** includes the employment in upstream industries which supply and support the core activities of renewable energy deployment. Usually, these workers do not consider themselves as working for renewables; they produce steel, plastics or other materials, or they provide financial and other services. These industries are not directly involved in renewable energy activities but produce intermediate inputs along the value chain of each RET.

**Induced employment** encompasses jobs beyond the renewable energy industry and its upstream industries, such as jobs in the consumer goods industry. Changes in consumer electricity tariffs due to higher/lower costs of RETs give rise to induced employment impacts as the disposable income of the consumer changes.
3 Skills for the Renewable Energy sector
a. Summary of the main findings of the sectoral reports

To assess the concrete recruitment needs and skill gaps/shortage in the renewable sectors, a tailor made survey was designed in consultation with the project partners 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, all partners involved agreed on working with the same value chain and generic job occupations which were incorporated in the questionnaire. The rationale behind the survey research is to assess current recruitment challenges and employment opportunities in the European renewable energy industry by providing an instant picture of the sector’s job market with concrete information that could be exploitable immediately by concerned stakeholders.

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Preferred recruitment channels</th>
<th>Skills and expertise needing further development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biomass</strong></td>
<td>› Recruitment agencies and internal recruitment channels + more and more via social media</td>
<td>› Language skills (German)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>› Sales skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>› Hands-on, multitasking skills</td>
</tr>
<tr>
<td><strong>Geothermal</strong></td>
<td>› Company/partners’ websites</td>
<td>› Hydrogeologist</td>
</tr>
<tr>
<td></td>
<td>› Job boards</td>
<td>› (hydrologist + geologist)</td>
</tr>
<tr>
<td></td>
<td>› Social media</td>
<td>› Reservoir engineer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>› Chemist</td>
</tr>
<tr>
<td><strong>Ocean</strong></td>
<td>› All</td>
<td>› Health and Safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>› In addition to technical skills, soft skills such as multitasking and problem solving</td>
</tr>
<tr>
<td><strong>PV</strong></td>
<td>› Word to mouth, private networking channels</td>
<td>› Adaptability and problem solving skills</td>
</tr>
<tr>
<td></td>
<td>› Recruitment agencies</td>
<td>› Language skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>› Legal expertise</td>
</tr>
</tbody>
</table>
| **Small hydropower** | › Company/partner’s websites (60%)  
› Recruitment agency (53%)  
› To a lesser extent, all recruitment channels are used | › Skill upgrade required for a series of occupational functions to respond to the needs of the new geographic markets. Project managers, business developer/technical sales, legal or environmental managers |
| **Solar Thermal** | › Company/partners’ websites, internal recruitment channel and recruitment agency              | › Soft skills                                                                          |
|                  |                                                                                               | › Operations and maintenance technicians                                                 |
The information gathered via the KnowRES industry survey research was subsequently analysed and interviews with experts were held to provide a deeper understanding of the challenges their respective sector is facing as well as detailed information on the most wanted profiles jobs and their particular career trajectories. Examples of these interviews are showcased in the profile of the month section of the KnowRES website.

Over 260 companies/organisations participated and additional interviews with experts were held in the past 18 months.

Below is a summary table of the survey research’s main findings.

<table>
<thead>
<tr>
<th>Recruitment trend and most wanted profiles</th>
<th>Level of skill transferability to other sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; Engineers profiles (mechanical engineer, process and construction, production and control) &gt; Business developer and/or technical sales &gt; Research engineer</td>
<td>&gt; High transferability from traditional sectors such as agriculture, carpentry, logistical (truck-drivers) depending on the biomass sub-sector involved.</td>
</tr>
<tr>
<td>&gt; Drilling engineer (feasibility drilling) &gt; Project manager (drilling &amp; construction) &gt; Plant manager (O&amp;M)</td>
<td>&gt; High level skill transferability from oil &amp; gas, mining and in general hydrocarbon industry</td>
</tr>
<tr>
<td>&gt; Project Manager &gt; Structural Engineer &gt; R&amp;D Engineer</td>
<td>&gt; Medium to high level of transferability from offshore industries such as wind, oil &amp; gas. &gt; Naval and marine industries from which part of the skills and competences could be transferable to the ocean energy sector</td>
</tr>
<tr>
<td>&gt; Technology researchers (manufacturing) &gt; Field technicians (O &amp; M) &gt; Engineers (electrical, process, structural for project planning)</td>
<td>&gt; High level of skills transferability from traditional sectors such as automotive, real estate, architecture, construction or recycling sectors</td>
</tr>
<tr>
<td>&gt; Technical sales &gt; Field service technician &gt; Mechanical design engineer</td>
<td>&gt; Oil &amp; gas &gt; Metallurgy &gt; Construction &gt; Automotive &gt; Other RE sectors</td>
</tr>
<tr>
<td>&gt; Technology researcher &gt; Chief Sales &amp; Marketing officer &gt; Solar Thermal O&amp;M Technician</td>
<td>&gt; High level of skill transferability from oil and gas (plant hybridisation) &gt; Medium to high level of skill transferability from the chemical, thermal power and automotive industries</td>
</tr>
</tbody>
</table>

Table 1: KnowRES industry survey research main findings

1- Wind is not included in the table since the KnowRES survey research focused on the following sectors: biomass, geothermal, ocean, PV, small hydropower and solar thermal electricity.
Recruitment channels

In general, all recruitment channels (i.e., job boards, social media, companies/partner’s websites, internal recruitment channels, recruitment agencies) are widely used for the recruitment of staff. However, some sectors, such as PV, rely more on traditional channels such as “word to mouth” private networks channels.

Although there is a common complaint about the high cost of recruitment agencies, most of the sectors hire the services of recruitment agencies for some very specific competences or head-hunt a particular profile, highlighting the high level of skills required and the urgent demand to fill some occupations in the renewable energy sectors.

Skills and expertise needing further development

Skills are generally divided in two categories, hard skills and soft skills. Hard skills are for instance the technical skills necessary to perform in a job while soft skills are the ones that address how to best interact and work with others. A combination of the two categories is required for a successful performance in any type of functions.

Among the hard skills, in addition to the engineering/technical skills of the various occupations representing the core and indicated in the summary table above, the following were the most cited by companies:

- Language skills
- Technical sales skills
- Health and Safety related skills

Among the many soft skills cited such as multi-tasking or problem solving skills, we can summarise them into three main skills that an ideal candidate should possess. They are Flexibility, Adaptability and Resilience (F.A.R).

F.A.R.

**Flexibility** is the thinking skill that focuses on one’s ability to adapt to new situations, improvise, and shift strategies to meet different types of challenges. Flexibility in the workplace is about adapting successfully to changing situations and environments.

**Adaptability** means effectively managing changing environments in the organisation, global, economic, and political matters; maintaining effectiveness when dealing with multiple and conflicting priorities across different cultural settings, or during emergency and crisis situations.

**Resilience:** to be resilient means to be able to bounce back. It is the ability to become strong, healthy, or successful again after some bad or negative experience.
Recruitment trends and most wanted profiles

The **Biomass sector** is characterised 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. The current most wanted profiles are:

- **Engineers** in various disciplines (mechanical, process, construction, production, control...)
- **Business developer/technical sales.** This is a key function which requires a personal network and strong proven track records in the sector given that the incumbent has to be capable of engaging clients that have the financial capacity to invest in installations starting at 2.7 million € (co-generation installation).
- **Research engineer.** This is a profile always in demand given that companies are continuously seeking to develop new products.

The **Geothermal sector** is experiencing a slow but steady growth. Project development risks and the lack of awareness of the potential and value of geothermal energy are two main challenges the sector is currently facing. The most wanted profiles in the geothermal sector are:

- **Drilling engineer** (feasibility drilling). This function is located at the geothermal power development phase of the value chain. This is a key position given that feasibility drilling aims at examining the financial and technical feasibility of a project.
- **Project manager** (drilling & construction) This is a highly qualified position requiring a minimum of 10 years work experience with high level of responsibilities including the planning, execution and monitoring of all aspects of a project (technical, financial, risk assessment, reporting...)
- **Plant manager (O&M).** The maintenance manager provides direct supervision to the maintenance personnel, ensures the efficient, reliable operation of the facility, and ensures compliance with safety and environmental standards.

The geothermal sector is faced with two main challenges: project development risks as well as the lack of awareness of the potential and value of geothermal energy. Main market located in East Africa, South East Asia and Turkey. In EU countries growth is expected in France, Germany, Italy, and Hungary.
The Ocean energy sector is experiencing a tempered progress but full of promises. The sector enjoys strong political support with new pilot demonstration projects in the UK. Tidal energy is expected to be commercially viable in 2016/2017. The current most wanted profiles for the ocean energy sector are:

▷ **Project manager.** This function requires highly skilled competences, since the project manager’s role is to manage complex projects of various scales from A to Z and in a fast changing environment.

▷ **Structural research engineer.** This position could be located at the project appraisal and development phase as well as the project execution phase of the value chain. This specialised position requires a high level of flexibility to adapt behaviour and work methods in response to new information, changing conditions or unexpected obstacles.

▷ **Research and Development engineers in various disciplines.** (mechanical, hydrodynamics, electrical...)

The PV sector is experiencing a slow-down in the European market with a market shift towards new countries such as China and Japan. The PV sector current most wanted profiles are:

▷ **Technology researcher** for manufacturing. Companies are always seeking to increase the efficiency and longevity of their products to reduce the cost.

▷ **Field technician** (Operation & maintenance). This profile is highly in demand for the maintenance of older existing operations as well as for newly installed solar farms.

▷ **Engineers** of various disciplines (electrical, structural) for project planning. These are mainly foreseen for new markets outside of Europe.

The small hydropower sector is experiencing a market shift to Africa, North America and Asia. In Europe, activities are mainly focused on the refurbishment of existing installations in order to increase their efficiency and power output as well as to meet new environmental regulation requirements. The most wanted profiles in the sector are:

▷ **Technical sales with engineering background.** The successful candidate for this position would possess an extensive network of contacts and a proven track record in business development and sales, on top of the required technical knowledge.

▷ **Field service technician.** This is a physically intensive position involving high amount of field travels and requiring good physical conditions and at least a minimum of 5 years of experience.

▷ **Mechanical design engineer.** This is a relatively junior position requiring a minimum of 3 years of experience and requiring strong teamwork skills given that the mechanical design engineer is working closely with fellow engineers on the fabrication side as well as from the project execution team.
The solar thermal electricity sector is experiencing some turbulence after one of the leaders of the sector announced the disruption of its activities beginning of the year. Nonetheless, confidence on the future development of the sector remains positive. The most wanted profiles in the sector are:

- **Technology researcher.** Research focus remains on the improvement of thermal energy storage and solar forecasting. Researchers with multidiscipline background and strong communication and interpersonal skills are highly in demand given the increasing trend of plant hybridisation.

- **Chief sales & Marketing officer**

- **Solar Thermal Operation & Maintenance technician.** The technician is required to travel to multiple site locations and work in hot, dry and dusty environments. Good physical condition and prior work experience in the solar thermal sector are prerequisite.

While some profiles are sector specific, many of the profiles (skills and competences) are transferable from one sector to the other within and/or beyond the renewable energy sectors.

In the transition to a 100% renewable energy future, some skills and competences will become obsolete while other new skills and competences will be created. Identifying areas where skills need to be updated or acquired is crucial to helping reduce the skills gaps and shortage in the renewable energy sectors. Furthermore, identifying skills that are transferable from traditional sectors to the new renewable energy sectors is an important step toward creating employment opportunities for decent work and social inclusion in a green economy.
b. Focus on soft skills

For a skill to be considered a soft skill, it needs to have the following three characteristics:

1. **Rules for mastering this skill are not black and white** – Unlike hard skills, like math, where the rule for doing it perfectly is always the same, how effective you are at a soft skill changes depending on your emotional state, external circumstance, and the type of people you interact with.

2. **This skill is portable and valuable to any job/career** – Because soft skills are about your inner strength and interpersonal effectiveness, as long as you work with people, these skills are valuable to your career.

3. **Mastering this skill is an ongoing journey** – You can reach a level of competency in it but you can always encounter new situations or people that will test your soft skills and push you to learn more.

Some examples of main soft skills are listed below (9):

- **Communication skills** – being able to actively listen to others and articulate your ideas in writing and verbally to any audience in a way where you are heard and you achieve the goals you intended with that communication.

- **Presentation skills** – Effectively presenting your work results and ideas formally to an audience that captivates their attention, engaging their input, and motivating them to act in accordance to your desired outcome.

- **Interpersonal relationship skills** – Effective at building trust, finding common ground, having empathy, and ultimately building good relationships with people at work and in your network. This skill is closely related to Communication Skills.
Teamwork skills – Being able to work effectively with anyone with different skill sets, personalities, work styles, or motivation level to achieve a better team result.

Meeting management skills – Leading a meeting to efficiently and effectively reach productive results. At least 50% of meetings today are a waste of time.

Facilitating skills – Being able to coordinate and solicit well represented opinions and feedback from a group with diverse perspectives to reach a common, best solution.

Selling skills - Building buy-in to an idea, a decision, an action, a product, or a service. This is not just for people in sales.

Management skills – Creating and motivating a high performing team with people of varied skills, personalities, motivations, and work styles.

Leadership skills – Defining and communicating vision and ideas that inspires others to follow with commitment and dedication.

Mentoring / coaching skills - Providing constructive wisdom, guidance, and/or feedback that can help others further their career development.

The lack of soft skills is one of the main recruitment concerns among hiring companies.

Given the relatively high level of skills required, and urgent demand to fill occupations, the renewable energy sectors are often faced with a shortage of adequate skills (soft and hard skills) to successfully complete projects. Currently, most companies are recruiting experienced individuals with comparable skill sets and then providing job specific training. While this strategy is costly and risky for a sector which faces dramatic increases in human resources requirements, it is a sensible one in helping close the skills gaps in the renewable energy sector.

We would rather hire someone with the right set of soft skills than someone with perfect technical skills but poor people skills because technical skills can always be learnt.

Skills for the RE sector

c. Focus on skills transferability

In a volatile energy market in transition toward a 100% renewable energy future, jobs in some traditional sectors will be lost. However part of this surplus of workforce, with adequate re-training, can be absorbed by the new green employment opportunities created in this transition. Many managerial and technical skills and competencies are transferable and highly valued in the new renewable energy sectors.

Besides the soft skills that are transferable and highly valued in the renewable energies sectors, below are some more concrete examples:

Skills transferability from Oil & gas to offshore wind and ocean energy sectors

There is a high potential for oil and gas experience transfer to offshore wind and ocean energy sectors. New entrants to the offshore wind or ocean energy sectors from oil and gas would provide essential additional supply chain capacity. The skill transfer is high in the following areas:

Planning and development phase. Larger surveying companies often from the oil and gas sector are capable of offering a full service covering environmental, geophysical, geotechnical surveying and even offshore installation.
Support structures. This is an excellent area for skills transfer with offshore expertise in designing and manufacturing support structures, especially in more challenging deep water sites.

O&M skilled technicians. This is an excellent area for skills transfer with a highly skilled workforce and a comprehensive training infrastructure. The skills required to carry out underwater inspection, maintenance and repair can be easily transferred.

Health & Safety. There are many professionals from other industrial sectors who could be trained to utilise their qualifications or transfer their skills.

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Skill transferability from</th>
<th>Level of skill transferability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>Traditional sectors such as agriculture, carpentry, logistical (truck drivers) depending on the biomass sub-sector involved</td>
<td>High</td>
</tr>
<tr>
<td>Geothermal</td>
<td>Oil &amp; gas, mining and in general hydrocarbon industry</td>
<td>High</td>
</tr>
<tr>
<td>Ocean</td>
<td>From offshore industries such as wind, oil &amp; gas.</td>
<td>Medium to High</td>
</tr>
<tr>
<td></td>
<td>Naval and marine industries</td>
<td></td>
</tr>
<tr>
<td>PV</td>
<td>Traditional sectors such as automotive, real estate, architecture, construction or recycling sectors</td>
<td>High</td>
</tr>
<tr>
<td>Small hydropower</td>
<td>Oil &amp; gas, Metallurgy, Construction, Automotive, Other RE sectors</td>
<td>Medium, High</td>
</tr>
<tr>
<td>Solar Thermal</td>
<td>High level of skill transferability from oil and gas (plant hybridisation)</td>
<td>Medium, High</td>
</tr>
<tr>
<td></td>
<td>Medium to high level of skill transferability from the chemical, thermal power and automotive industries</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Level of skill transferability per sector

Skill transferability from the construction sector to the PV and Solar Thermal Electricity sectors

Many profiles from the construction sector have skills and competences that are highly transferable to the PV and solar thermal electricity sectors. People who have previous experience in construction sector, with some additional training, could work in the following occupational functions in the PV and STE sectors:

Solar system installer (installs and repairs solar energy systems for residential, commercial or industrial use).

Instrumental control electrical Systems Technician (monitors and repairs the instrumentation, controls and electrical systems in a utility scale power-generating facility)
Solar Thermal system Installer (involves work in the field installing residential and commercial solar thermal systems, and installing and repairing solar energy systems designed to collect, store, and circulate solar-heated water or other medium for residential, commercial, or industrial use)

PV system installer (typically works with a team to install rooftop photovoltaic arrays, including electric wiring and trenching for underground conduit)

Lead PV Installer (leads installation teams, commissioning and troubleshooting on residential and commercial installed systems)

Solar field service technician (provides on-site maintenance for solar electric systems)

Solar Commercial Installation Engineer (installs solar panel systems on commercial structures; work with blueprints; and assist with technical concerns during installations).

Many skills and competences can be transferable to the renewable energy sectors. Still, sector specific training is of paramount importance and would enable the transition of technical skills to the needs of the concerned renewable energy industry.

In many cases, solar thermal O&M technicians originate from general helpers or laborers who move to more responsible position as they become familiar with the plant.
CONCLUSIONS AND RECOMMENDATIONS

Renewable energy is a key sector for achieving targets under the 2020 framework and has an important role in fostering the creation of socially inclusive and decent jobs. As a rapidly growing sector, renewable energy is creating new green jobs opportunities not only for new entrants on the job market but also for experienced professionals with transferable skills from other sectors including traditional sectors such as the oil & gas.

Investing in skills development, anticipating labour market changes and promoting social dialogue are considered crucial conditions in a just transition towards a green and sustainable economy. SMEs often do not have the capacity to train their staff. Larger enterprises that may have the capacity to do so could use the budget for other activities such as technology development.

The rapid evolution of the renewable energy sectors, at policy, technology or/and financial level makes it very challenging for companies, candidates and the academic world to apprehend and follow up on the different renewable energy sectors’ trends. The sector’s bumpy and often unpredictable development paths with strong development periods followed by slow-downs and reversed trends have direct impact at the human resources level. Following the sector’s evolution, recruitment forecasts may change drastically in a few weeks’ time. Therefore, better labour market intelligence (i.e; identification of skills gaps, availability of relevant trainings and most wanted profiles) can help the stakeholders (companies, candidates and training institutions) in making better informed decisions.

While recruiting and retaining qualified staff remain one of the major challenges companies in the renewable sectors are faced with, the competition for skilled workers has shifted from the oil & gas sector to the renewable energies sectors. With diving oil price edging toward 30$ per barrel, the oil & gas sector has shut down many projects making part of the workforce redundant. Some of these transferable profiles are benefitting to the renewable energy sectors such as the geothermal and offshore wind sectors. Nonetheless, for some highly demanded profiles, the competition for the most sought after profiles remain fierce and head-hunting missions are more and more taking place within the renewable sectors. Efficient communication on the current value and future potential of the sector will play an increasing role in attracting the best talents.

A regular and reliable RE Jobs Barometer will be a useful tool for skills anticipation and planning, especially in light of the growing need to train and up-skill the existing competences to respond to changing working conditions related to climate change. To ensure the continued relevance of the KnowRES Jobs Barometer, this unique collaboration between leading companies, international organisations and academic institutions should be further strengthened and given the means to carry out its mission and help close the skills gaps in the renewable energy sectors.

Timely and accurate job intelligence is of high value in enabling the workforce adaptation and transition to a sustainable energy system.
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