

The Progress of the EU Labor Market Based on the Green Economy

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Abstract: The article focuses on the analysis of the challenges and opportunities of the labour market in the conditions of the transition to the climate-neutral economy. The research methodology is based on the research of specialized literature in the field about green transition and the comparative analysis of the data on green jobs from International Renewable Energy Agency, International Labour Organisation and Eurostat. The key objective of the research is to identify the main qualifications necessary to increase employment in green economy and means to accelerate the implementation process of transition to a climate-neutral economy in the European Union. In conclusion, in the context of the cohesion policy, the specific challenges of the European Union are to strengthen the economic, social, and territorial cohesion based on the Union's political priorities according to the green and digital transition.

Keywords: labour market, green jobs, renewable energy, skills, challenges, opportunities

JEL Classification : J2, J24, J48, Q2, Q52

1. Introduction

The article is based on the author's results of the research carried out as a part of the Research Program PSG2 of the Institute for World Economy, Study PSG 2.7 "The perspectives of the post-COVID-19 development of labor markets in the European Union through the just transition" and aims to present the impact of green transition on labour market worldwide and in the EU.

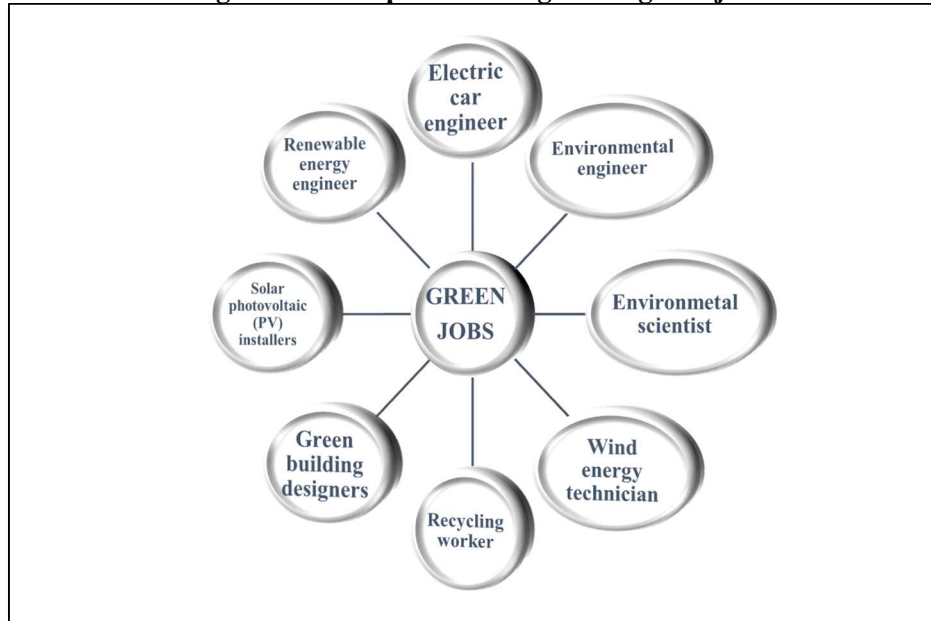
The global economy faces labour challenges. A well-designed transition to a climate-neutral economy can be the answer to these complex issues, because it makes labour markets more resilient to: (1) the potential negative effects generated by the amplification of the process of globalization, (2) the consequences produced by the adoption of new technologies, (3) the deficits of the workforce, and (4) the demographic changes (Czako, 2020). The climate-neutral economy is based on *green jobs* that support the decarbonization of the economy, protect the environment, reduce the energy consumption, and develop the renewable energy production (Figure1).

The green jobs are classified as "jobs in businesses that produce goods or services that benefit the environment or conserve natural resources" or "jobs where workers' tasks involve producing products through green processes or using fewer natural resources" (US Bureau of Labour Statistics, 2013).

In the European Union, the transition to a climate-neutral economy is a component of the EU's cohesion policy, within the European Green Deal. The European Green Deal set the blueprint for reducing emissions by at least 55% by 2030, compared to 1990 levels, and turning the EU into the first climate-neutral continent by 2050. This will create new opportunities for innovation, investments, and jobs. Besides, it is estimated that around 160,000 additional green jobs will be created in the construction sector (European Commission, 2023).

According to the European Commission, the Just Transition Mechanism (JTM) is a specific instrument for European decarbonisation policy, aimed at mobilizing at least EUR 55 billion between 2021 and 2027. It supports a "fair" transition (no one is left behind) to a climate-neutral economy, equivalent to mitigating the socio-economic impact of this multilevel transformation and restructuring process (European Commission, 2021). The JTM provides targeted support based on Territorial Just Transition Plans (TJTP).

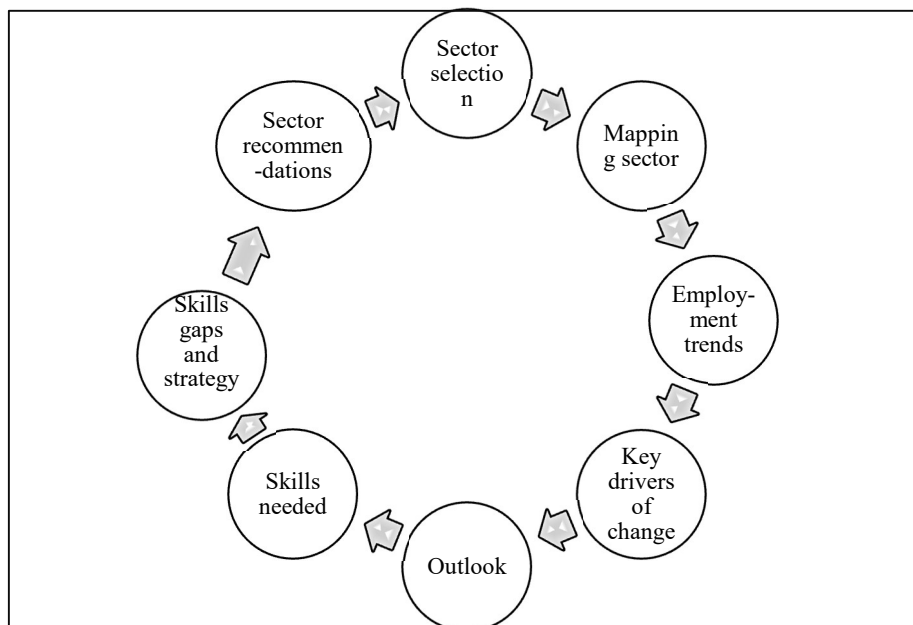
Figure 1: Examples of ecological or green jobs



Source: Author’s representation based on literature review.

Experts of the International Labour Organisation (ILO) underline that “transition to the green economy and sustainable development bring about economic restructuring and shifts in employment. New jobs and new job tasks require different skills. The key to inclusive and just transition is to help enterprises to adjust to change and to equip current and potential workforce with relevant skills in order to ensure that job losses are mitigated and those affected receive retraining. Anticipating skill needs therefore becomes critical, but it is a process that takes time” (ILO, 2015). The ILO’s experts have provided an overview of the sector analyses process how to approach skills expectations for green jobs at the sector level (Figure 2).

Figure 2: Overview of sector analysis process for green jobs skills



Sources: Author’s representation based on ILO (2015).

2. Specialized literature review on the impact of green transition on labour markets

Vandeplass et al. (2022) appreciate that the green transition will have a direct effect on potential labour input, and will affect the structure of labour demand through the obsolescence of some jobs and human capital. This will crucially depend, inter alia, on the ease with which displaced workers can be re-integrated into other sectors

(and/or occupations) of employment, and the ability of employment policies to support people during possible unemployment spells in reskilling and finding new jobs (Vandeplas et al., 2022).

Martinez-Fernandez et al. (2010) present two major channels through which green economy may affect labour markets: (1) impacts from regulations, affecting the supply (enterprises) and the demand (consumers) side, and (2) direct impacts on natural and built environments. The same authors recommend that a third issue to be considered, namely how social conscience influences and drives policies and regulations and labour markets by changing consumer choices of "green" products and services.

Bowen (2012) underlines that skill shortages are reported in industries and occupations likely to benefit from green policies. He shows that the challenges are the high-level skills necessary to manage large-scale green policy interventions and the associated large-scale projects over a long period of time in a way that will build the credibility of green growth aspirations while allowing for learning and policy improvement over time.

Janta et al. (2023) identified that greening of the labour market will lead to some groups being particularly affected (both negatively and positively). Gender, age, and skills levels are the factors of potential social inequalities in securing greener employment opportunities. However, dividing the impact of each of these social dimensions is difficult due to the intersectionality of disadvantages (Janta et al., 2023).

International Monetary Fund (2022) experts looked at the relationship between workers' demographic characteristics and the environmental properties of their jobs. They have found that more green-intensive occupations tend to have higher-skilled and more urban workers, while the opposite is true for more pollution-intensive jobs. Targeted and effective training programs to boost the human capital of lower-skilled workers in pollution-intensive or neutral occupations could help by improving these workers' ability to move into more green-intensive jobs (IMF, 2022).

Vona et al. (2021) appreciate that building and reinforcement of a comparative advantage in sectors where demand will grow very rapidly in the near the future is an additional reason to consider skill development for green and low-carbon technologies as a key strategic investment of the European Green Deal. The European regions may differ in the endowment of competences that are required to build or reinforce such green comparative advantage. Beaudry et al. (2010) show that the local endowment of certain skills is one of the main drivers of the diffusion of the low-carbon technologies, that use intensively these skills.

Moretti (2004) has found that spatial and personal inequalities are associated with differences in skill endowments across regions and workers. The key policy question is thus no longer to simply increase the supply of tertiary-educated students, but to precisely identify which types of qualifications, educational and training programs, including on-the-job training, are better suited to provide the skills required in expanding technologies (Vona and Consoli, 2015).

Pociovălișteanu et al. (2015) opine that the number of jobs created in all stages of greening the economy depends on many factors, such as investment size, the extent of demand for organic products, employment elasticity, and the cost of green products and services for consumers. They recommend that: (1) policies aimed at creating green jobs must consider not only the direct creation of such jobs but also indirect jobs that can be created in adjacent industries, (2) employment policies correlate with educational policies needed to create the right skills for the new demands of the green economy.

Pociovălișteanu et al. (2015) conclude that in the European Union the implementation of measures to positively influence green employment are the following: access to European funding, an integrated policy approach to environmental and employment issues, identification and implementation of training needs of the workforce in line with green employer requirements, focus on sectors with potential for creating green jobs by developing customized training programmes and by developing public-private partnerships.

3. The development of renewable energy industries effects on labour markets

The green transition focuses on energy supply by reducing fossil energy sources and increasing renewable energy. Economic sectors based on conventional energy technologies, oil, natural gas, coal, and nuclear represent the sectors with a high share of the labour market. The development of renewable energy industries is much more recent and started to generate significant effects in terms of employment in recent years. Some of these renewables, such as the photovoltaic, wind, and bioenergy sectors, are already mature industries and important employers in the EU and globally. Others, such as geothermal and marine energies, still have a limited impact on the workforce.

Based on the ILO data, approximately 18 million jobs can be created by 2030 worldwide by limiting global warming to 2 °C (ILO, 2018). Global employment in the energy sector reached nearly 58 million in 2017, and

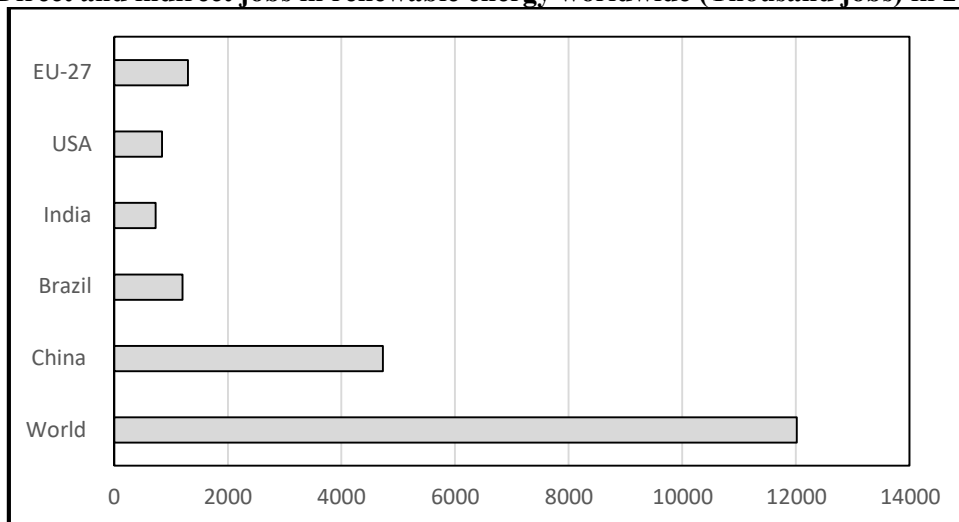
half of these jobs were in fossil fuel industries (IRENA, 2022). According with International Energy Agency, over 65 million people were employed in the energy and related sectors in 2019, accounting for almost 2% of formal employment worldwide. Half of the energy workforce is employed in clean energy technologies (IEA, 2022).

According to the International Renewable Energy Agency's target of limiting global warming to 1.5 °C, approximately 38 million jobs can be created in the renewable energy sector worldwide by 2030 and 43 million jobs by 2050, double forecasts as compared to official policies and commitments. As stated by IRENA (2021), the jobs in the energy sector will increase overall to 122 million in 2050 by limiting global warming to 1.5 °C, as compared to 114 million under current policies and commitments. Solar energy will have the largest share of jobs in renewable energy in 2050, namely 19.9 million jobs, followed by bioenergy 13.7 million jobs, wind energy 5.5 million jobs labour, and hydropower 3.7 million jobs.

In the opinion of the European Commission, in 2016 approximately 87.6 million jobs could be considered green in the EU (including the United Kingdom at that time), representing 40% of employment that year (European Commission, 2019). In the renewable energy sector, more and more jobs can be created than in conventional energy production based on fossil fuels due to the greater size of the labour intensity of green energies (Czako, 2020).

The employment in the renewable energy has registered a steady growth trend over the last decade, both internationally and at the EU level. In the renewable energy sector, employment increased continuously globally, reaching a total of 12 million jobs in 2020, as compared to 11.5 million jobs in 2019 and 7.3 million jobs in 2012, and a third of renewable energy industry jobs worldwide were in the solar photovoltaic sector (IRENA& ILO, 2021) (Chart 1).

Chart 1: Direct and indirect jobs in renewable energy worldwide (Thousand jobs) in 2020



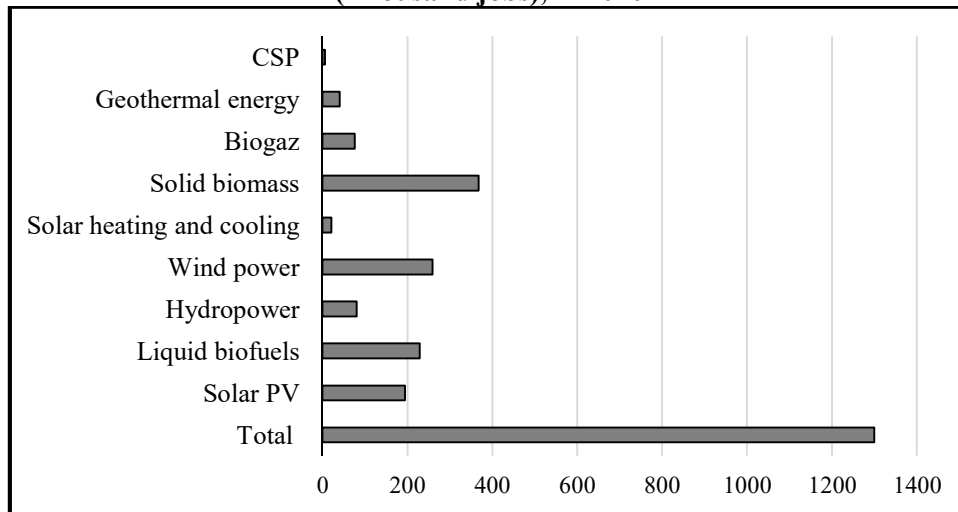
Source: Author's representation, based on data provided by IRENA & ILO (2021).

Data indicate that the EU countries had a total of 1.6 million jobs in renewable energy, of which approximately 1.3 million of these were in the EU-27 member countries (after Brexit) in 2020. The bioenergy sector is the largest employer from renewables sectors in the European area. The solid biomass (for heat and electricity) totals approximately 414,000 jobs (of which 368,000 in the European Union), followed by biofuels with 242,000 jobs (229,000 in the European Union) and biogas with 79,000 jobs (76,000 jobs in the European Union).

IRENA& ILO (2021) estimates the number of jobs in the wind energy at 333,200 in Europe, of which 259,500 jobs were in EU member states in 2020 (Chart 2). The European continent's cumulative wind generation capacity remains at 208 GW, with around 14.3 GW added in 2019, while in 2020 the capacity additions stood at 11.4 GW. Germany, Spain, and the United Kingdom are the leaders in wind installations in Europe, but in all three countries, the pace slowed considerably in 2020 (IRENA & ILO, 2021). The European offshore wind industry continues to expand, and it is estimated that almost 100,000 jobs have been created in this segment alone. In addition to domestic markets, energy exports have been an important source of wind jobs in Germany, Spain, and Denmark. Thus, export of wind equipment has remained constant over the last decade, at approximately EUR 8 billion annually, even though wind capacity has expanded worldwide. Both Europe as a whole and EU member state added record amounts of solar PV in 2019 and 2020, more than double the volume of 2018, contrary to

estimates that COVID-19 could reduce the market (IRENA & ILO, 2021). EU member states accounted for the majority of 90% of the continent's photovoltaic capacity growth, representing a significant increase from a 79% share in 2019 (IRENA & ILO, 2021).

Chart 2: Direct and indirect jobs in renewable energy in the European Union, by sectors, (Thousand jobs), in 2020



Note: CSP=concentrated solar power, PV=photovoltaic.

Source: Author's representation, based on data provided by IRENA & ILO (2021).

4. Challenges of labour markets in the context of green transition

4.1. Global challenges: misalignments between the demand and supply of skills

The transformation of the energy sector based on the just transition is a multilevel process. In addition to the industrial restructuring, the implementation process includes the reform of the university curriculum and professional training systems, active employment strategies, and effective social protection networking. These actions can help local economies innovate and overcome the potential labour market imbalances between job losses (redundancies, restructuring) and new job creation. Labour market policies accompanying the just transition are also essential to help generate better-paid jobs for employees.

According to the analysis of IRENA & ILO (2021), the energy transition to the energy industry of the future will encounter frictions and mismatches between several components, such as temporal, spatial, educational, and economic, as a result of misalignments between the demand and supply of skills (Table 1).

Table 1: Types of misalignments between the demand and supply of skills

TYPES OF MISALIGNMENTS	DESCRIPTION
Temporal misalignments	- It happens when job losses precede large-scale job creation. An example is the closure of mining activities that do not necessarily coincide with the development of new activities in the renewable energy or energy efficiency sectors.
Spatial misalignments	- It occurs when new jobs become available in other communities or regions. It is a challenge to move for people who have lost their jobs and may have the right qualifications and skills, but have financial, family or property connections in the region where they live.
Educational misalignments	- It takes place when the skill levels required for the occupations in the energy transition have not been developed by education and training systems. The solution required is careful planning and anticipation of future skill requirements.

TYPES OF MISALIGNMENTS	DESCRIPTION
Sectorial misalignment	- It is the case of changing the value and supply chains based on the energy transition. If the new industries are located domestically, we see a shift from one industry to another, and from one job to another. If the new value chain is highly dependent on imports, the impact on domestic jobs is negative, creating jobs outside the country.

Source: Author's representation, based on data provided by IRENA & ILO (2021).

4.2 The development of the qualifications necessary to increase employment in green economy

The energy transition produces significant employment opportunities in various fields of activity, but education and continuous training for new skills are needed to support industrial restructuring. Despite positive trends and recent developments, skills gaps and shortages are widespread in several Member States, except those where proactive employment measures are consistently taken. In high-income countries, skills anticipation systems are linked to technical education systems, many of the most significant shifts in skills and occupations in the green economy are taking place at higher skill levels, requiring university education or highly qualified technical training.

However, renewable energy sectors employ people with various qualifications and levels of education. For example, IRENA & ILO (2021) show that in the onshore wind energy sectors over 60% of the workforce requires a minimum of basic training, and people with degrees in fields such as science, technology, engineering, and mathematics are required in smaller numbers (about 30%). Professionals such as lawyers, logistics experts, marketing specialists, or regulatory and standardization experts account for approximately 5%, while administrative staff accounts for 14%. In the marine (offshore) wind energy sectors, the proportion of those with a basic level of training also represents the largest share of jobs, at 47% (IRENA & ILO, 2021).

The rapid innovation processes taking place in the energy sector bring with them the need for a set of new skills. Therefore, the efforts are directed to respond to emerging skills requirements in areas such as electric vehicles, energy storage sectors, bioenergy, solar heating and cooling and digitization of energy networks. Additionally, innovation and entrepreneurship skills can be vital for developing not only new technologies but also viable business models (IRENA & ILO, 2021).

Ensuring the necessary skills can be achieved in a variety of ways. Depending on the context of each state, multiple pathways may be available for the same type of qualification, for example, either through an apprenticeship scheme, continuing vocational training or through direct on-the-job training. The same analysis shows that there are 35 key occupations in the field of wind energy, however only 16 of these jobs require a university degree, the rest of the skills can be developed either through on-the-job training or continuing vocational training and/or apprenticeship.

According to the same source, within the higher education system, experiential learning methods are encouraged whereby students are encouraged to develop knowledge through direct practice in the new energy sectors. Complementarily, the shift to online and digital learning, which has been accelerated by the COVID-19 pandemic, has drawn attention to the potential role of information and communications in improving the training methods used to develop the necessary skills.

4.3 EU's specific challenges related to the impact of green transition on labour market

In the context of the cohesion policy, the specific challenges of the European Union are to strengthen the economic, social, and territorial cohesion, based on the Union's political priorities as the green and digital transition. Increasing employment and value-added in environmental economy¹ are essential for achieving the green transition in European Union.

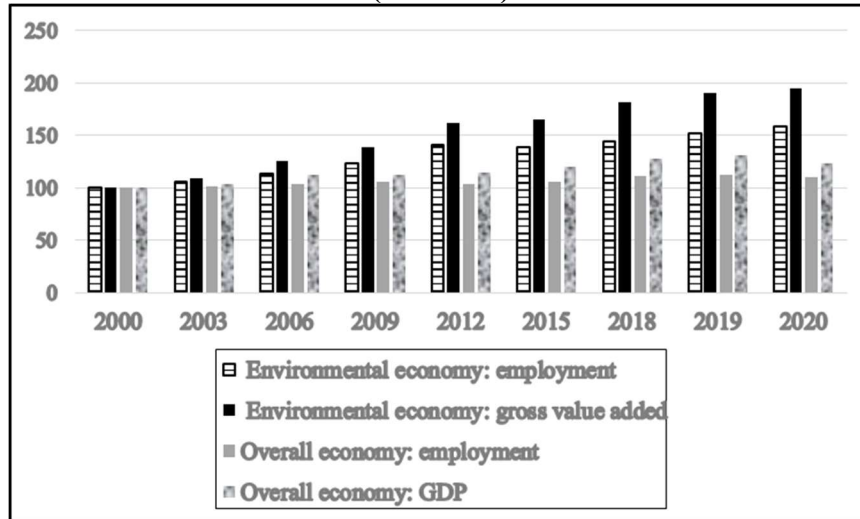
4.3.1 The evolution of the key indicators for the environmental economy

According to Eurostat (2023), the employment in the EU environmental economy increased from 3.2 million full-time equivalents in 2000 to 5.1 million full-time equivalents in 2020. The environmental economy

¹ According with Eurostat, the environmental economy encompasses activities and products that serve either of two purposes: 'environmental protection' — that is, preventing, reducing, and eliminating pollution or any other degradation of the environment, or 'resource management' — that is, preserving natural resources and safeguarding them against depletion.

generated EUR 828 billion output and EUR 341 billion gross value added in 2020. Between 2000 and 2020, employment and gross value added grew faster in the environmental economy than in the overall economy (Chart 3).

Chart 3: The evolution of the key indicators for the environmental economy and overall economy in the European Union, between 2000-2020 (%) (2000=100)

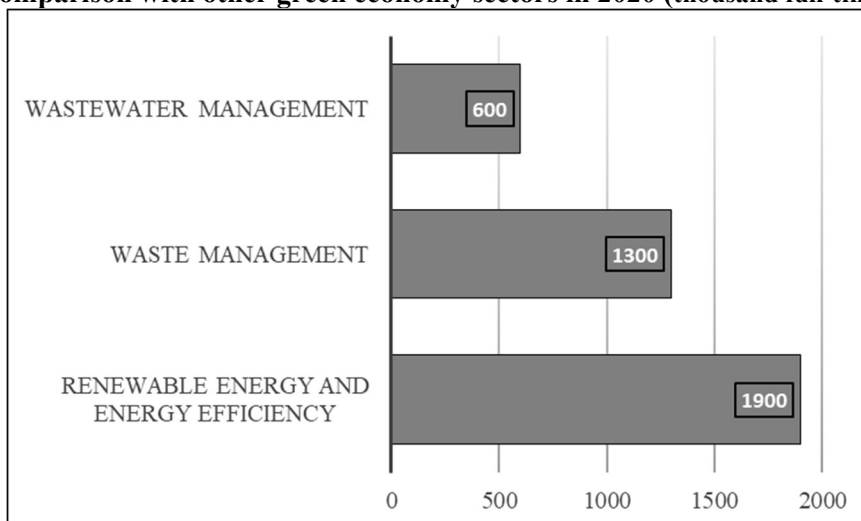


Source: Author’s representation, based on data provided by Eurostat (2023) (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Environmental_economy_%E2%80%93_statistics_on_employment_and_growth#Development_of_key_indicators_for_the_environmental_economy).

4.3.2 The development of the employment in renewable energy sectors by comparison with some of the environmental economy sectors

Eurostat (2023), data show that also as a result of renewable and energy-efficiency measures more than a million full-time equivalent jobs have been created in the EU between 2000 and 2020 (1.9 million full-time jobs equivalents in 2020) (Chart 4). The second largest contribution to environmental employment in 2020 came from waste management, with the number of jobs increasing from 0.9 million full-time equivalents in 2000 to 1.3 million full-time equivalents in 2020 (overall increase of 49 %). By contrast, employment related to wastewater management decreased in the same period by 14% from 0.7 million to 0.6 million full-time equivalents (Chart 4).

Chart 4: The employment in renewable energy sector in comparison with other green economy sectors in 2020 (thousand full-time jobs)



Source: Author’s representation, based on data provided by Eurostat (2023) ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Employment_in_the_environmental_economy,_by_domain,_EU,_2000%E2%80%932020_\(thousand_full-time_equivalents\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Employment_in_the_environmental_economy,_by_domain,_EU,_2000%E2%80%932020_(thousand_full-time_equivalents))).

5. Conclusion

The green economic transition is an ongoing process in the context of political efforts to act against climate change. As part of this process, the energy sector is also undergoing a significant ecological transition, with the renewable energy component sectors expanding as key elements. Fossil fuel sectors have seen job losses in some parts of the world, including the EU. On the other hand, the significant demand to increase the efficiency of buildings means that the construction industry has a high potential to create energy efficient jobs. The opportunities from the perspective of the just transition are closely related to the establishment of matches between the demand and the supply of the necessary skills.

The process of transition to a green economy is complex and includes, in addition to the technological components and measures of education and professional training, measures of active employment on the labour market, as well as social and regional protection. These tools are essential to help local economies innovate, overcome potential labour market imbalances, and manage both job losses (staff reductions, restructuring) and job creation. Labour market policies accompanying the just transition are also essential to help generate decent jobs for employees.

Green economy offers significant opportunities to create jobs, but also leads to some challenges, especially in certain areas and for certain workers. The European Union sees green growth as both a challenge and an opportunity for the labour market and skills that are key factors for enabling green growth. The main challenges for restructuring the global labour market are the misalignments between the demand and supply of skills and the anticipating and establishing adequate skills policies to support workers in coping with structural change. In the European Union, the weaknesses concerning the green transition's implementation and its negative impact on the labour market comes from the gaps between member states concerning the economic and social development and different level of development of the national institutional structures. The EU strength comes from the EU cohesion policy instruments, including the Just Transition Mechanism to reduce the economic and social gaps between member states.

In this context, governmental measures are necessary for macro-economic and fiscal policies to price pollution, incentivise employment in renewable energy sectors, and channel funds from carbon-rich consumers to the energy poor through a Just Transition Fund. The success of this Just Transition process depends on the implementation of measures that include, on the one hand, the responsible restructuring of the traditional core of the local economy and, on the other hand, the construction of new competitive advantages thanks to investment, employment, transport, and waste management and wastewater management.

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