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Article

European Green Deal and Recovery Plan: green jobs, skills and wellbeing economics

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Abstract: This is a paper of Political Economy and Economic Policies into the European Green Deal framework to improve the Recovery Plan post-COVID-19. This paper is focused on the green jobs opportunity for Europe, especially for Spain. It is offered a systematization of concepts and calculations in the issue (attending the international institutions and forums proposals) to harmonize the recovery plans, to apply them beyond the energy sector and to align public and private sector, as well other key stakeholders in achieving this goal. The obtained outcome gives the creation of around 350.000 new green jobs and the necessity of a new workforce reskilled. This result makes necessary to coordinate sectoral plans by the policymakers in which all the involved entities might express their needs and views on the best education approach to renewables sector and green jobs.

Keywords: European Green Deal; Recovery Plan; Green Jobs; Skills; Wellbeing Economics.

1. Introduction

In the last decades, there are many international institutions and forums committed to realise a climate neutral economy of wellbeing (beyond the welfare state economy model): a model of satisfaction based in a balance relation of people-planet-profit [1]. For example: the UN SGD agenda for Horizon 2030 [2,3], the Economy of well-being of OECD [4], the Wellbeing Economy Alliance of WEF and the net of trans-national corporations [5], the EU Green Deal [6], etc. The EU Green Deal was passed officially in 2019 [7], for the Multiannual Financial Framework 2021-27 [8], with the aim to promote the clean energy production [9], smart cities and wellbeing business and professionals in Europe [10]. With the black swan [11] of COVID-19 crisis and its management [12, 13], there is an opportunity to implement real recovery plans aligned with the Green Deal. Currently, in the EU there is a high employment rates, for this reason, the European Commission has to double its commitment to green and sustainable growth with the Recovery Plan for Europe [14], funded with 1.8 trillion euros, and designed to put the recovery on track by the path of the European Green Deal. In the last months, there are in progress several fronts: the proposal and launch in some countries of the Climate Law [15-17], the development of a sustainable blue economy in the EU for the industries and sectors related to oceans, seas, and coasts [18, 19], the strategy towards Zero pollution for air, water and soil [20], or the Organic action plan [21], to produce high quality food with low environmental impact and organic farming trough farm to fork strategy.

The EU Green Deal and the Recovery Plan for Europe is a big opportunity for the European Union, but in order to turn it into a success, it must be strongly based on the fundamental pillars of EU system, in particular, the concepts of solidarity, with sustainable and wellbeing development, environmental protection and labour relations generation. In the European Union, the Recovery Plan for Europe as well as the National Plans for each country can therefore enable member states to reap the benefits of the green

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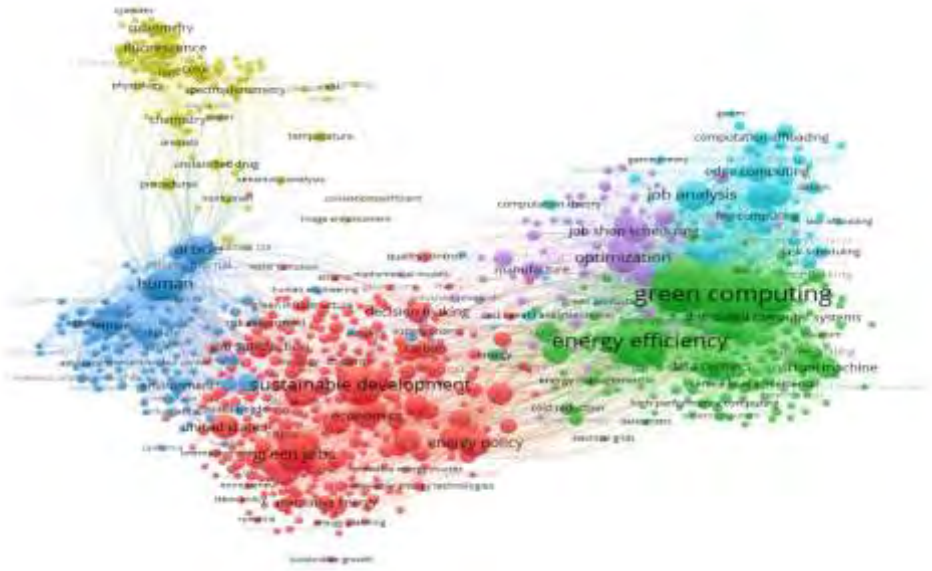
transition, such as significant job creation, resilient economic growth, and cleaner air, while avoiding the risks of failing to align national economic development with the EU Green Deal. In this context, this paper analyzes the green jobs generation in Spain and its Recovery Plan or "*Plan de Recuperación, Transformación y Resiliencia*" [15].

2. Theoretical framework and methodology

This is an analitical study of Political Economy (with theoretical and ethical approach) and an empirical study of Economic Policies (with historical and comparative approach). This paper assumes the changes in the reality and its paradigm with the globalization [1], and its reformulation from international institutions and comparative and global solutions [22].

The International Labour Organization (ILO), it is part of the universal system of the United Nations, and it has the responsibility to establish the general standards in labour relations in the World [22]. ILO promotes the green jobs, as part of decent work (ILO project on the future of the work). In this way, green jobs are connected with sustainable development, people wellbeing and healthy organizations, etc. ILO adopted some recommendations in green jobs during the 102nd ILC in 2013. Later, it passed the *Guidelines for a just transition towards environmentally sustainable economies and societies for all*, adopted in November of 2015, by the ILO Governing Body [23]. ILO defines green jobs are decent jobs that contribute to preserve or restore the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency [16]. In general, green jobs, contribute and help to improve energy and raw materials efficiency, limit greenhouse gas emissions, minimize waste and pollution, protect and restore ecosystems and support adaptation to the effects of climate change. Also, ILO goes beyond and it connects the green jobs with other fields, supporting the research of many scientist and scholars (see the following figure).

Figure 1: Green jobs, wellbeing and other fields connected.



Source: own elaboration based academic databases (VOSviewer).

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There are other dimensions to extend the concept of green job, since the definition is not uniform [24]. Various papers provide different aspects to set up the boundaries of green jobs more specifically, using the type of industry, the production methods, and the specific jobs with the associated skills and abilities [24-27]. Also, statistical offices recognize the challance to define the green jobs [28], and they harmonize the definition into the Environmental Goods and Services Sector (EGSS) describing it in terms of number of jobs and generated value added, identifying the green jobs associated to the EGSS [29]. There is also a classification provided by the US Department of Labour [30-31]. This entity establishes the occupations that have been identified as "Green," being the green occupational categories assigned to the occupations in the way that they classify in Green New&Emerging, Green Enhanced Skills, Green Increased Demand, depending on the level and type of impact of green economy activities and technologies in the worker requirements and employment demand. An example of the most relevant green jobs in the USA, as well as its foreseen evolution are shown in below's table

Table 1: Green jobs in USA, 2021.

Green Jobs USA as of May 2021	Employment (2019)	Projected job openings (2019-2029)	Projected growth (2019-2029)
Sustainability Specialists	1.316.800	128.000	much faster than average (8% or higher)
Landscaping and Groundskeeping Workers	1.188.000	158.900	much faster than average (8% or higher)
First-Line Supervisors of Production and Operating Workers	648.900	56.900	little or no change
Inspectors, Testers, Sorters, Samplers, and Weighers	590.100	48.500	decline (-1% or lower)
Plumbers, Pipefitters, and Steamfitters	490.200	49.800	average (3-4%)
Financial and Investment Analysts	487.800	38.600	faster than average
Training and Development Specialists	327.900	53.700	much faster than average (8% or higher)
Sales Rep., Wholesale and Manufacturing, Tech and Scientific Products	521.000	50.700	average (3-4%)
Mechanical Engineers	316.800	19.200	average (3-4%)
Chief Sustainability Officers	287.900	13.900	decline (-1% or lower)
Production Workers, All Other	238.600	24.700	slower than average (1-2%)
Energy Engineers, Except Wind and Solar	170.100	10.500	slower than average (1-2%)
Architects, Except Landscape and Naval	129.900	8.700	slower than average (1-2%)
Mixing and Blending Machine Setters, Operators, and Tenders	128.000	13.300	slower than average (1-2%)
Career/Technical Education Teachers, Postsecondary	124.100	9.400	slower than average (1-2%)
Industrial Ecologists	90.900	9.900	much faster than average (8% or higher)
Machine Feeders and Offbearers	62.900	7.000	little or no change
Separating, Filtering, Clarifying, Precipitating, Operators, and Tenders	58.100	5.400	average (3-4%)
Materials Engineers	27.500	1.500	slower than average (1-2%)
Foundry Mold and Coremakers	17.600	1.400	decline (-1% or lower)
Total	7.017.600	668.600	New jobs
		9.53%	Increase

Source: own elaboration based on O*NET [38]

One general approach to simplify the definition of green jobs is related to the sectors and skilled workforce that produce goods or services that help to protect the environment, the natural resources, and develop new technologies and processes that could stop or revert the effects of climate change. Regarding the skills necessary to execute a green job, some works [20-21] highlight the importance of having a set of different skills adapted to perform the green tasks.

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Figure 2: Structure and methodology (research plan).

Source: own elaboration

In particular, highlights the fact that "employed persons in jobs with high green potential are, on average, younger, more often men, have a higher level of educational attainment and a higher probability of having immigrated than employed persons in other occupations. There is a need and shortage of skilled labour force in the group of jobs with high green potential, which is especially notable for the groups of managers and professionals" [20]. With the arrival of the Green Recovery Plans, it is expected a rise in the job demand for green jobs [21]. Hence, specific efforts in labour skills related to this field (mainly education at all levels, and skills upgrading) should be implemented in all countries, to reach the levels of demand of skilled specialists for the necessary and rapid adaptation to the new sustainable economy caused by the pandemic and the subsequent work crisis.

The methodology used to obtain the final data and conclusions, has followed a three stages approach. Firstly, the search for the most updated documentation about Recovery Plans, and the in-depth analsys of the Spanish Plan, including the renewable and other specific programms. Using the data provided by International Energy Agency (IEA) and International Monetary Fund in the World Energy Outlook [34], in which they use "employment multipliers" and "input-output model" approach that makes an estimation of how many jobs are generated per million euros invested. Secondly, an identification of the main skills according to the OECD [36], and the existing gap between Spain and other European countries. As a result, it is laid the foundations for subsequent analysis to identify the specific green skills needs in the country. Lastly, in the conclusion section, the most relevant points are highlighted, as well as the limitations of the study and some future research lines.

3. Green Jobs generation.

3.1. Macroeconomics view

3.1.1. An overwiew

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The Spanish Recovery Plan envisages the mobilisation of more than 140 billion euros in public investment until 2026 [15], with a significant concentration of investments and reforms in the first phase of the [6,8], covering the 2021-2023 period, to boost recovery and achieve the greatest possible countercyclical impact. Given the high level of uncertainty about key variables, the Plan provides greater details for the initial phase entailing the mobilisation of nearly 69,52 billion euros in transfers from the European Recovery and Resilience Facility [32].

The Plan earmarks 40.29% of investments for promoting the green transition, and 29.58% for the digital transformation, in clear alignment with the UN SDG 2030 Agenda [3] and with the specific recommendations of the EU institutions [32].

3.1.2. Cross-cutting lines of action for a green Spain

Although the Spanish Recovery Plan has four cross-cutting lines of action that serve as the backbone for all the levers and components, here we focus our analysis on the green initiatives, the so-called the ten lever policies.

Lever policy I: Urban and rural agenda, agricultural development and the fight against depopulation

Cities play a key role in economic and social transformation. But in addition to those living in metropolitan areas, other populations, such as the rural population, must also be considered. It is necessary to design specific measures for the depopulated areas of Spain, to promote social and territorial innovation and facilitate the development of new professional projects, to maintain the rural population, attract talent, provide services, and foster a sustainable use of the resources.

The components set forth include:

1. Plan for safe, sustainable and connected mobility in urban and metropolitan areas
2. Housing rehabilitation and urban renewal plan
3. Green and digital transformation of the agri-food and fisheries industries

Lever policy II: Resilient infrastructures and ecosystems

Infrastructure has the capacity to mobilise large volumes of investment in the short term, as well as generate a structural impact on the economy and society. To develop nature-based solutions and strengthen climate adaptation and resilience in infrastructure, the Plan includes the following components:

4. Ecosystems and biodiversity conservation and restoration
5. Coastal area and water resources preservation
6. Sustainable, safe and connected mobility

Lever policy III: A fair and inclusive energy transition

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Developing a decarbonised, competitive and efficient energy sector will enable the mobilisation of very high volume of private investment, giving the necessary elements of certainty and a predictable regulatory framework, and harnessing the country's enormous renewable potential and of existing value chains to reinforce competitiveness in domestic and export markets. It will also allow for strategic positioning in rapidly growing global sectors in which the country can be a leader.

The Plan includes the following components:

7. Renewable energies implementation and integration
8. Electrical infrastructures, promotion of smart networks and deployment of flexibility and storage
9. Renewable hydrogen roadmap and sectoral integration
10. Fair transition strategy

A summary of the complete Spanish Recovery Plan can be seen in the following table, with the previous Lever Policies embedded along with the allocated budget per program and its percentage over the total amount, 69,52 billion euros for the period 2021-2023.

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Table 2: Recovery plan sections

Lever policies and components	€Bn 2021-23	%
I. Urban and rural agenda, agricultural development and the fight against depopulation	**14,4**	**20,7%**
1. Action Plan for sustainable, safe and connected mobility in urban and metropolitan areas	6,53	9,4%
2. Housing rehabilitation and urban renewal plan	6,82	9,8%
3. Green and digital transformation of agri-food and fisheries industries	1,05	1,5%
II. Resilient infrastructures and ecosystems	**10,40**	**15,0%**
4. Ecosystems and biodiversity conservation and restoration	1,64	2,4%
5. Coastal area and water resources preservation	2,09	3,0%
6. Sustainable, safe and connected mobility	6,66	9,6%
III. A fair and inclusive energy transition	**6,38**	**9,2%**
7. Renewable energies implementation and integration	3,16	4,5%
8. Electrical infrastructures, promotion of smart networks and deployment of flexibility and storage	1,36	2,0%
9. Renewable hydrogen roadmap and sectoral integration	1,55	2,2%
10. Fair transition strategy	0,30	0,4%
IV. A public administration for the 21st century	**4,31**	**6,2%**
11. Modernisation of public administration	4,31	6,2%
V. Modernisation and digitalisation of industry and SMEs, entrepreneurship and business environment, recovery and transformation of tourism and other strategic sectors	**16,07**	**23,1%**
12. Industrial Policy Spain 2030	3,78	5,4%
13. Fostering SME growth	4,89	7,0%
14. Modernisation and competitiveness of the tourism sector	3,4	4,9%
15. Digital connectivity, cybersecurity, 5G deployment	3,99	5,7%
VI. Promotion of science and innovation and strengthening of the capabilities of the National Health System	**4,94**	**7,1%**
16. National Strategy for Artificial Intelligence	0,50	0,7%
17. Institutional reform and capacity building in the national science, technology and innovation system	3,38	4,9%
18. Renewal and expansion of the capabilities of the National Health System	1,06	1,5%
VII. Education and knowledge, lifelong learning and capacity building	**7,31**	**10,5%**
19. National Plan for Digital skills	3,59	5,2%
20. Strategic plan for Vocational Training	2,07	3,0%
21. Modernisation and digitalisation of the education system, including early years education from age 0 to 3	1,64	2,4%
VIII. The new care economy and employment policies	**4,85**	**7,0%**
22. Emergency plan for the care economy and reinforcement of inclusion policies	2,49	3,6%
23. New public policies for a dynamic, resilient and inclusive labour market	2,36	3,4%
IX. Promotion of the culture and sports industries	**0,82**	**1,2%**
24. Valorisation of the cultural industry	0,32	0,5%
25. Spain audio-visual hub	0,2	0,3%
26. Sports industry promotion plan	0,3	0,4%
X. Modernisation of the tax system for inclusive and sustainable growth	**0**	**0,0%**
27. Measures and actions to prevent and combat tax fraud	0	0,0%
28. Tax reform for the 21st century	0	0,0%
29. Improving the effectiveness of public spending	0	0,0%
30. Long-term sustainability of the public pension system within the framework of the Toledo Pact	0	0,0%
Total	**69,52**	
Total Green Initiatives	36,98	53%

Source: own elaboration based on Spanish Recovery Plan [15].

The components with an effect on the green transition are analysed (marked in green), as well as other subchapters not explicitly contemplated in above's table.

Sustainable and connected mobility strategy (€13,2bn). The action plan is positive due to its support for zero-emission vehicles. As some of the funding available through this measure will likely also support "low-emission" vehicles, i.e., not best-in-class solutions with regards to the green transition, this component is not assessed as very positive. Furthermore, it should be noted that the plan's funding for the mobility sector is strongly focused on the automotive sector, with little to no support for other mobility solutions.

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Plan for housing renovation and urban regeneration (€6.8bn). The action plan is very positive, although its final assessment is conditional on the presentation of specific standards and targets to be achieved through the renovation measures.

Further mobility investments (€6.7bn), which we assess as positive due to its support for TEN-T rail corridors and sustainable transport, but not as very positive due to ambiguities on what specifically will be supported through some measures included in the component.

Investments into renewable energy deployment and integration (€3.2bn) which we assess as very positive.

A renewable hydrogen roadmap (€1.6bn) with the objective of developing and deploying renewable hydrogen. We assess this measure as very positive due to its focus on renewable hydrogen. However, this assessment is conditional on only renewable hydrogen receiving support, and we note that there are some concerns that also non-renewable forms of hydrogen may receive support through this measure, which would necessitate a less positive assessment.

A Just Transition Strategy (€0.3bn) which will support the implementation of just transition agreements in energy transition zones and investments in just transition measures. We assess this measure as positive as it makes an indirect, important contribution to the green transition.

Investments into the industry sector and a 2030 Industry Strategy (€3.8bn) which can be categorized as having a likely climate effect that is not assessable, as the decarbonization of the industrial sector is a crucial next challenge in the green transition, but the component itself does not include specific green targets.

Investments into science, technology and innovation (€3.4bn) is assessed as positive as the component includes some research projects on environmental topics.

Below, it is shown the top 20 programmes in terms of mobilizing investments, as well as the top 20 reforms of the Spanish Recovery Plan. At this respect, it should be highlighted that the main reforms -marked in green as very positive-, are aligned with green projects and new initiatives.

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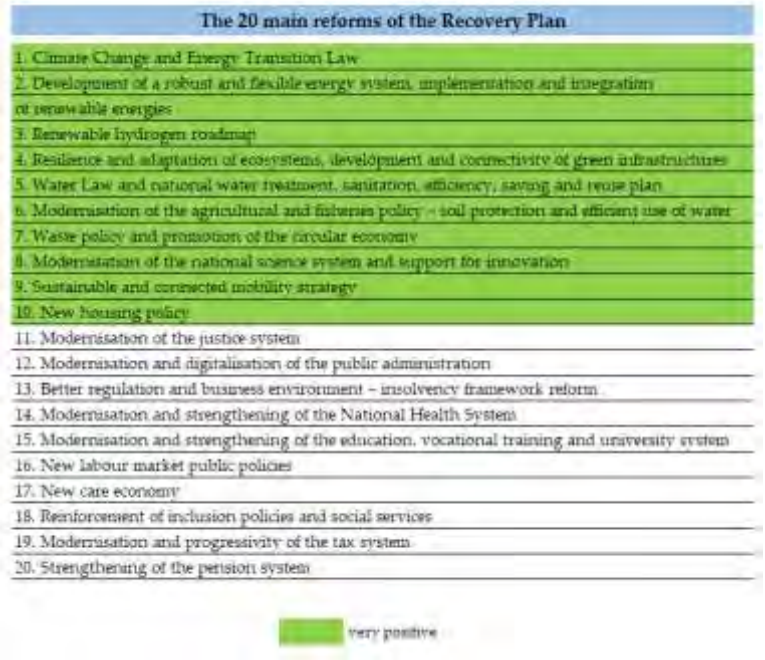
Table 3a: Recopery plan investments

The 20 programmes driving investment	€Bn 2021-23
1. Safe, sustainable and connected mobility strategy	13,2
2. Housing rehabilitation and urban renewal programme	6,82
3. Modernisation of the public administration	4,31
4. SMEs Digitalisation Plan	4,06
5. 5G roadmap	3,99
6. New Spain 2030 industrial policy and circular economy strategy	3,78
7. National Plan for Digital Skills	3,59
8. Modernisation and competitiveness of the tourism industry	3,4
9. Development of the national science and innovation system	3,38
10. Implementation and integration of renewable energies	3,16
11. New care economy	2,49
12. New public policies for a dynamic, resilient and inclusive labour market	2,36
13. Preservation of coastal areas and water resources	2,09
14. Strategic plan for vocational training	2,07
15. Modernisation and digitalisation of the education system	1,64
16. Conservation and restoration of ecosystems and biodiversity	1,64
17. Renewable hydrogen roadmap	1,55
18. Electrical infrastructure, smart networks and storage	1,36
19. Renovation and modernisation of the health system	1,06
20. National Strategy for Artificial Intelligence	0,5
Total	**69,52**
Total Green Initiatives	36,98



Source: own elaboration based on Spanish Recovery Plan [15].

3.1.3. Green recovery plans - cross country view

With the aim of comparing good practices in the recovery and resilience plans of various European countries (in the framework of the EU Green Deal [39-41]), the strengths as well as the different plans and investment levels have been briefly analysed and described: France, Germany, Portugal and Spain (see below's table).

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France: Professional trainings to support the ecological transition. France is reinforcing training for the "strategic professions of tomorrow", in line with strategic sectors (digitalisation, ecological transition, industrial sectors concerned by the issue of economic sovereignty and the relocation of productions) and in line with the priorities of the recovery plan. The training activities in the three sectors considered strategic are funded by €25 M.

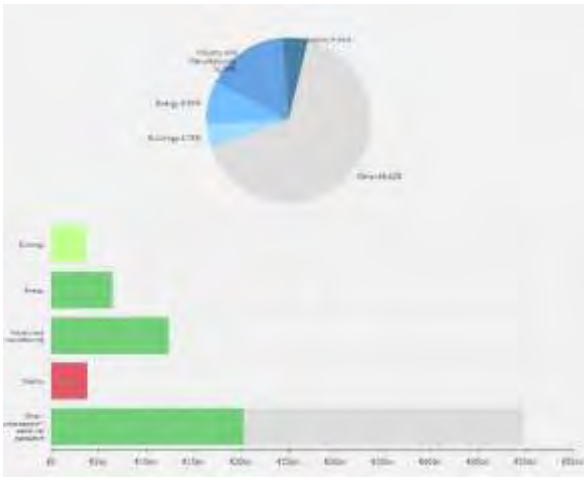
Germany: Its recovery plan does not include support measures for the fossil fuel industry, although the large German manufacturers strongly forced the opposite. There are some exceptions for gas engines and new aircraft purchases.

Portugal: Investments in nature-based solutions. Portugal's Resilience and Recovery Plan includes €665m of investments into forest management and cultivation. This measure, which will be implemented by the Environment and Climate Ministry, is presented as an important resilience measure for rural territories, combining climate change mitigation and long-term resilience. Furthermore, the 2030 Investment Plan contains a further €300m for maritime biodiversity protection.

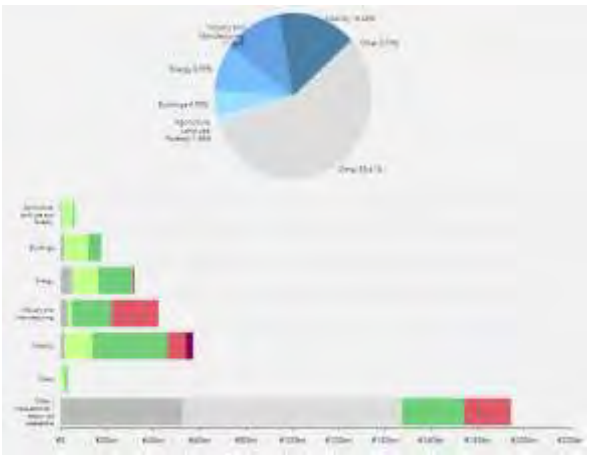
Spain: Linking economic recovery and regional development. The Spanish government is putting an explicit emphasis on supporting less developed regions in the country through its recovery measures in alignment with territorial policies, aiming to create more jobs and develop new economic activities in these regions.

Figure 3: Green jobs comparative view.

Spain



France



Germany

Portugal

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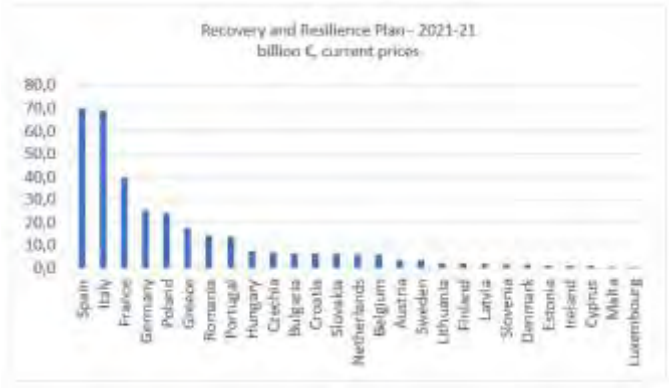
Source: own elaboration from Green Recovery Tracker, E3G and Wuppertal Institute [33].



Source: own elaboration based on Spanish Recovery Plan [15].

3.1.4. Green jobs to generate in Spain

Using the data provided by International Energy Agency (IEA) and International Monetary Fund in this World Energy Outlook [34], we have made an estimation of the new green jobs that could be created because of the Spanish Recovery Plan. We have focused the analysis on the green initiatives of the programs previously stated.

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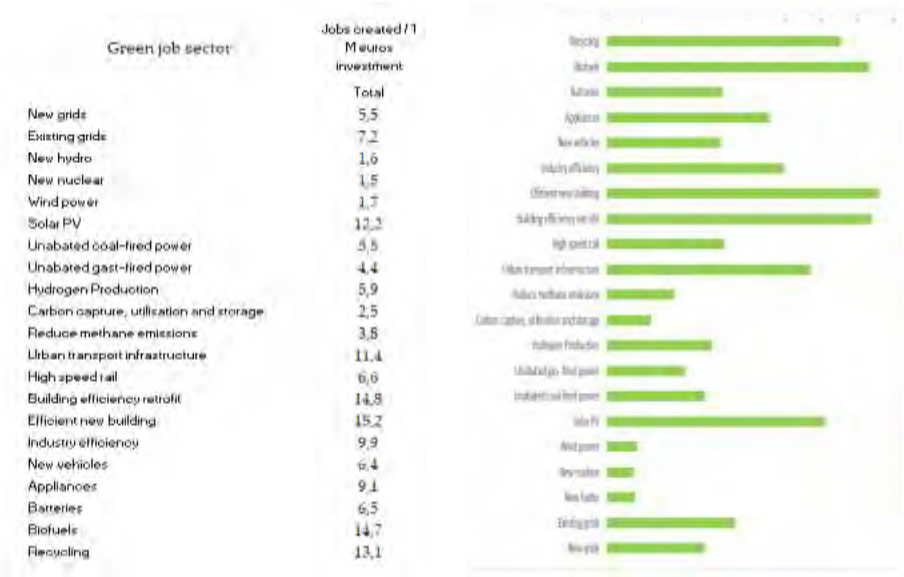
Figure 4: Green jobs generated



Souce: own elaboration with IEA [34] and Spanish Recovery Plan [15].

Table 3b: Recopery plan investments

The 20 programmes driving investment	Bn euros 2021-23	New green jobs / 1M investment	New green jobs created
1. Safe, sustainable and connected mobility strategy	13,2	9	118800
2. Housing rehabilitation and urban renewal programme	6,82	15,2	103664
6. New Spain 2030 industrial policy and circular economy strategy	3,78	9,9	37422
9. Development of the national science and innovation system	3,38	8	27040
10. Implementation and integration of renewable energies	3,16	6,95	21962
13. Preservation of coastal areas and water resources	2,09	8	16720
16. Conservation and restoration of ecosystems and biodiversity	1,64	8	13120
17. Renewable hydrogen roadmap	1,55	5,9	9145
18. Electrical infrastructure, smart networks and storage	1,36	6,35	8636
Total Green Initiatives	36,98		356.509

Souce: own elaboration with IEA [34] and Spanish Recovery Plan [15].

A first approach with the mentioned methodology, and assuming the investment level per programme along with the corresponding multiplier, the final estimation is approximately 356.000 new green jobs for the period 2021-23. This first approach should be put in context since the following steps are the approval of the green projects that will give them the chance to be implemented to reach the foreseen outcome.

3.2. Microeconomics view

3.2.1 Green jobs and skills

The main sources of data and analytics about skills are in the databases and reports of OECD Stats, O*NET, Skills Ovate [31,35]. The methodology used has been to clasiffy

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job skills coming France, Germany, Italy and Spain, as it shown in below's Table. After the individual classification of the most relevant skills by country, we have developed a simple comparison analsysis to detect the skills in which Spain clearly is more defficient compared to the average.

Table 4: Green jobs comparative view.

	Basic Skills (Content)	Basic Skills (Content)					
		Reading Comprehension	Active Listening	Writing	Speaking	Mathematics Skills	Science
Country							
France	0,167	0,173	0,167	0,182	0,22	0,109	0,153
Germany	0,259	0,32	0,279	0,3	0,263	0,235	0,156
Italy	0,375	0,487	0,377	0,452	0,37	0,29	0,274
Spain	0,342	0,475	0,335	0,433	0,364	0,269	0,175

	Basic Skills (Process)	Basic Skills (Process)			
		Critical Thinking	Active Learning	Learning Strategies	Monitoring
Country					
France	0,211	0,166	0,189	0,308	0,181
Germany	0,228	0,255	0,268	0,223	0,165
Italy	0,311	0,373	0,349	0,275	0,248
Spain	0,307	0,332	0,328	0,335	0,234

	Complex Problem Solving Skills	Complex Problem Solving Skills	Social Skills	Social Skills					
		Complex Problem Solving		Social Perceptiveness	Coordination	Persuasion	Negotiation	Instructing	Service Orientation
Country									
France	0,094	0,094	0,158	0,152	0,19	0,1	0,129	0,259	0,116
Germany	0,244	0,244	0,228	0,225	0,117	0,341	0,293	0,219	0,175
Italy	0,341	0,341	0,19	0,209	0,138	0,222	0,208	0,28	0,082
Spain	0,256	0,256	0,187	0,197	0,166	0,177	0,169	0,28	0,133

	Technical Skills	Technical Skills										
		Operations Analysis	Technology Design	Equipment Selection	Installation	Programming	Operation Monitoring	Operation and Control	Equipment Maintenance	Troubleshooting	Repairing	Quality Control Analysis
Country												
France	-0,016	0,058	0,014	-0,027	-0,007	-0,049	0,006	-0,052	-0,062	-0,01	-0,042	-0,003
Germany	-0,034	0,242	0,103	-0,052	0,024	0,095	-0,167	-0,236	-0,123	-0,101	-0,079	-0,077
Italy	0,094	0,295	0,122	0,045	0,018	0,155	0,089	-0,001	0,046	0,067	0,069	0,125
Spain	0,027	0,169	0,074	0,007	0,07	0,1	-0,034	-0,081	-0,018	-0,006	0,014	0,002

	Systems Skills	Systems Skills			Resource Management Skills	Resource Management Skills			
		Judgment and Decision Making	Systems Analysis	Systems Evaluation		Time Management	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources
Country									
France	0,133	0,143	0,118	0,139	0,169	0,17	0,124	0,144	0,238
Germany	0,263	0,247	0,25	0,291	0,1	0,089	0,104	0,062	0,145
Italy	0,348	0,335	0,353	0,355	0,159	0,222	0,113	0,082	0,219
Spain	0,302	0,299	0,306	0,302	0,093	0,191	0,028	0,031	0,124

Source: own elaboration based on OECD data [36]

The aim of the OECD's new Skills for Jobs Indicators is to facilitate better adaptation to changing skill needs by making available a database of skill imbalances indicators that is comparable across countries and regularly updated. The Skill Needs Indicators provide an overview of the shortages and surpluses of skills across countries.

3.2.2. Harmonization and unit of measure used

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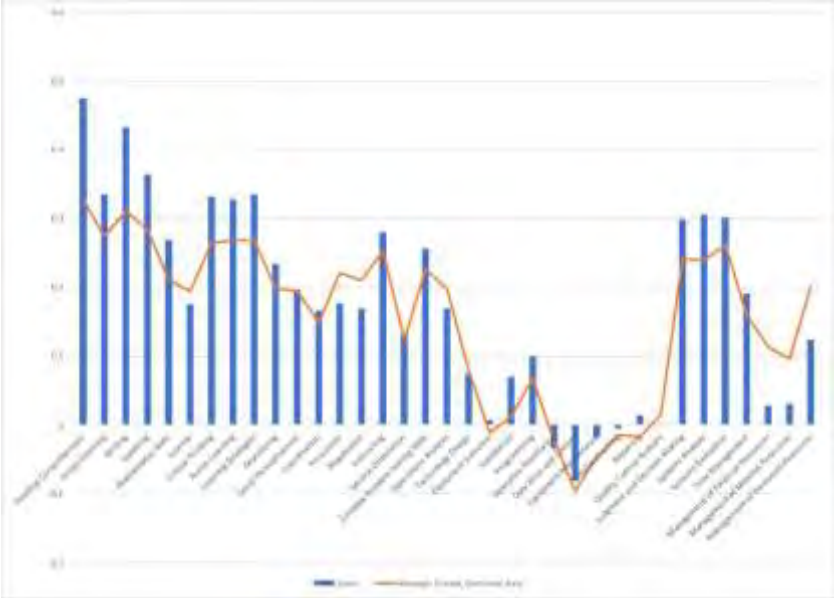
Positive values indicate skill shortage while negative values point to skill surplus. The larger the absolute value, the larger the imbalance. Results are presented on a scale that ranges between -1 and +1. The maximum value reflects the strongest shortage observed across OECD [36] countries and skills dimensions.



Source: own elaboration with OECD data [36]

Skills that must be improved in Spain to adapt generally and for green jobs, according to the analysis made by OECD Skills Stats, are the following: Reading Comprehension, Active Listening, Writing, Speaking, Mathematics Skills, Critical Thinking, Active Learning, Learning Strategies, Monitoring, Social Perceptiveness, Coordination, Instructing, Service Orientation, Complex Problem-Solving Skills, Technology Design, Equipment Selection, Installation, Programming, Operation and Control, Equipment Maintenance, Troubleshooting, Repairing, Judgment and Decision Making, Systems Analysis, Systems Evaluation, Time Management

Another view of the needed skills is the provided by Cedefop Europe [37], that classified the skills on a more detailed and visual way.

From the combination of both approaches, we may outline a profile of the most required skills, firstly in the case of Spain, and secondly at a European level.

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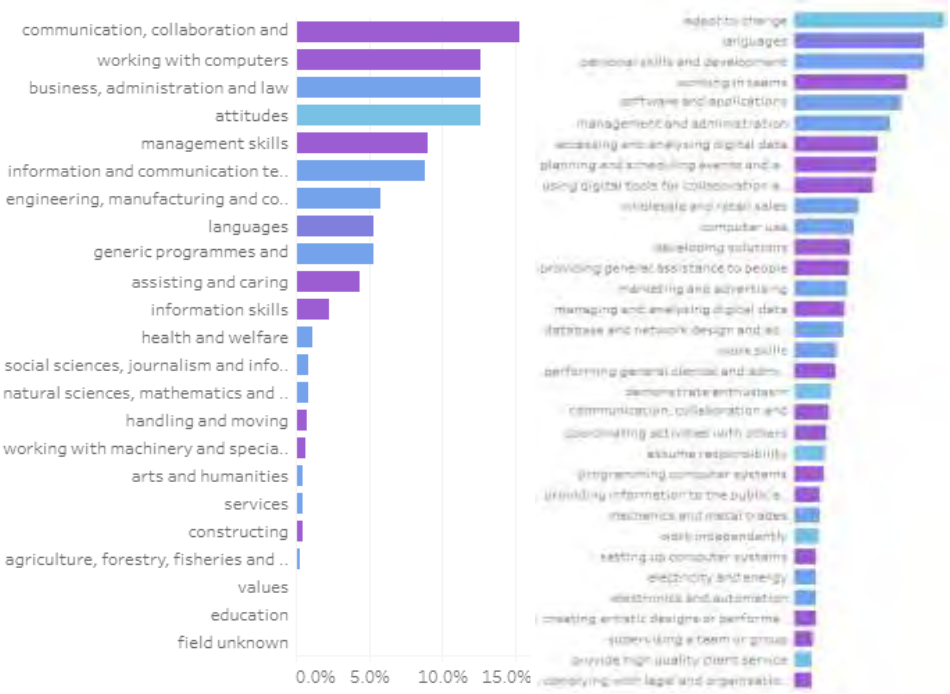

Source: Cedefop [37].

4. Discussion and conclusions

According to the analysis and methodology used in this paper, the number of green jobs that can be created in Spain in a relatively short period of time (2021-23), exceeds of 350.000 jobs. This amount relies on the European recovery package, but also must considered other factors. Firstly, the approach we have followed should be refined at a sectoral level. One limitation of our study is the consideration of macro numbers that should have landed into the specifics and dynamics of the occupations, with more abundant micro data and methodologies more precise. There is abundant scientific and professional literature (some mentioned here), to ensure that, and a clear conscience in ensuring that economic recovery should be based on sustainable growth opportunities, that build resilience through the protection of climate, environment, and biodiversity. We all should take advantage of all the positive aspects around this challenge.

Secondly, the creation of green jobs is associated to the presentation, approval and implementation of projects with real green impact. Anticipating the big rise in demand for green jobs, the education and skills of a big number of workers, should be increased. Green jobs require associated skills, some can be adapted from other sectors, and others do not, are fully new or require specific knowledge that the workforce do not fulfil completely.

Lastly, national and sectoral plans are necessary to identify skills and investment. Policymakers must create task force in which representatives from the government, industries, associations, unions and academia, might express their views on the best education and reskilling approach to green jobs.

All these points, correctly coordinated, will generate huge amount of data that should be tracked over time, for continuously identify and recommend measures for improving the effectiveness of the green jobs' education plan.

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