

Employment of women in the Just Energy Transition in Spain

Summary of the analysis
and opinions of expert voices

With the collaboration of



Naturgy 
Foundation

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Summary of the analysis

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The opinions expressed herein reflect the point of view of the authors of the articles.

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Presentation

Rafael Villaseca
Chairperson of the Naturgy Foundation

The Energy Transition is undoubtedly one of the most important challenges facing society and the economy. A challenge that is an enormous opportunity at the same time, given that what is at stake is the transformation to energy that is more sustainable and, at the same time, more just and inclusive. And it is important to be aware that such a change will not be guaranteed by technology alone; it will also be more or less successful depending on how social, economic and cultural factors are addressed. Faced with a challenge of this magnitude, collaboration between the public and private sectors is essential and is the best guarantee of success in highly complex issues such as this one.

A good example of this public-private partnership is precisely the report we are presenting here, which is the result of the protocol signed between the Instituto para la Transición Justa (hereinafter, Institute for the Fair Transition) – an agency under the Ministerio para la Transición Ecológica y el Reto Demográfico (Ministry for the Ecological Transition and the Demographic Challenge) – and the Naturgy Foundation, whereby we are seeking to develop actions that promote employment and gender equality in the energy sector.

We have therefore asked Abay Analistas, an expert consultant in the development of methodologies and economic and social analyses, to conduct a study that allows an accurate and realistic diagnosis of the situation of women in employment in activities related to the energy transition, both in Spain and in Europe, and the evolution thereof over the last decade.

This diagnosis provides highly useful information, both for administrations, as a guide when defining their public policies, and for companies, in the design and implementation of internal strategies to help reduce gender gaps in the sector.

The report also rightly points out the importance of focusing on training, both at the university level and in Vocational Training. The employment gap is largely based on a previous gap in the participation of women in technical studies that are directly related to the energy transition.

In this regard, we are facing an issue in which the Naturgy Foundation is especially involved, not only through its Vocational Training programme, which has benefited nearly 50,000 people since 2018, a task that also represents an example of best practices in the public-private partnership with numerous administrations; but also through the promotion of actions to enhance STEM vocations, aimed at girls between 10 and 16 years of age, with our "Efigy Girls" programme, through which we have already mentored and coached nearly 300 young women in their passage through the First Lego League. We continue to bring girls and young women into this educational program, thus fostering female talent, promoting equal opportunities, and awakening their interest in the highly demanded STEM professions.

Therefore, this study is another example of the Naturgy Foundation's commitment to a just energy transition and represents a valuable contribution to this goal. Special thanks to Cristina Monge, political scientist and researcher on governance for the ecological transition, who has coordinated this study, and also to the experts who, with their knowledge and experience, have prepared various articles in which they share their vision and provide recommendations on the subject.

This report shows us where we are, and underscores what we are doing well, as well as where we can and should improve. It thus appeals to all actors involved in the energy transition. Using the language of the training itself – which, as we have seen, is a core element in this matter – we could say that it marks our work and gives us homework. And as for achieving a just transition, it is essential that measures that will lead to ensuring conditions of equal employment for women in the energy sector be addressed quickly.

Foreword

Maria Eugenia Coronado
Director of the Naturgy Foundation

Sara Agesen Muñoz
Secretary of State for Energy and President of the Institute for the Just Transition

There is no doubt that the energy transition process towards a decarbonised and non-polluting model is positive in labour terms, and this trend is expected to increase in the coming years thanks to the investments that are being made. According to data from the International Renewable Energy Agency (IRENA), the renewable energy sector will create more than 38 million jobs worldwide by 2030. Estimates for Spain are also positive. The National Integrated Energy and Climate Plan (PNIEC 2021-2030) estimates this net creation at between 253,000 and 348,000 jobs per year, resulting from the investments planned within the framework of the Plan, which is currently being updated and will undoubtedly reinforce these targets.

In this positive scenario for employment, at the Naturgy Foundation and the Institute for the Just Transition, we have committed ourselves to the task of learning about the employment situation of women. We share the idea that the just energy transition process on which we are embarked must also be positive for the employability of women. We therefore wanted to know, in detail, the quantitative and qualitative aspects of female employment in activities related to the clean energy transition, derived from implementation of the PNIEC, and subsequently offer specific recommendations to reduce the gender gaps existing in the sector.

This publication is the result of the partnership agreement signed between the Naturgy Foundation and the Institute for the Just Transition in 2022, and it seeks to promote women's equality in accessing the new jobs that arise based on the deployment of renewable energies, conservation of the environmental, and sustainability during the energy transition. This work is framed within objective 2 of Spain's Just Transition Strategy.

It is the first study of these characteristics published in Spain. To prepare the study, data coming from the *EU Labour Force Survey* (Eurostat), from Spain's Labour Force Survey (EPA), the Social Security Affiliation Statistics database and the Continuous Sample of Working Lives (MCVL) were analysed. This analysis has allowed us to understand the employment situation of women within the major economic and productive transformations linked to the clean energy transition, and led by five subsectors: electrical energy, networks and self-consumption, energy renovation and the installation of heating and cooling equipment, energy efficiency in transport, energy consulting, as well as activities related to suppliers of goods and services of the previous subsectors.

Fortunately, we have some good news to report. Women have occupied almost four out of every ten of the net new jobs created in the sector in recent years; progress has been made in the participation gap in the sectors of electricity production, networks, and self-consumption and energy efficiency in transport; and the gender wage gap in the sectors under study is smaller than what is observed in the economy as a whole.

However, there is still a long way to go to reduce the gaps faced by the women in these sectors. And not only in Spain, but also at the European level. The main gender gap is that of participation. In 2020, in the European Union, 19.7% of the people employed in these activities were women, and in none of the member countries did this percentage reach 30%, considered the critical mass level. In Spain, this participation was 18.2% in 2022. Another important gender gap is that of occupational segregation. Women occupy mainly administrative jobs, and their presence in high- and medium-skilled technical positions (technicians, scientists and executives) is low, especially in executive positions, at less than 15%. Moreover, it is important to note that women present high levels of over-qualification in the analysed subsectors.

The study also provides a qualitative diagnosis, through focus groups and interviews carried out with the participation of more than 50 women who are currently working in activities related to the energy transition, who were able to share their experiences and their view of the sector. The quantitative and qualitative perspectives complement each other, further underscoring the soundness of the work and its conclusions.

To address the detected gaps, the study includes up to 50 recommendations grouped around six areas. These recommendations include: making women visible as an active part of the energy transition, activating training as a lever for change, researching and evaluating the women's progress in order to improve, promoting research and knowledge generation, pointing to the central role of companies in the change, innovating in the application of European instruments or paying special attention to women with specific difficulties, to mention a few examples. Implementing these recommendations requires the work of all relevant players in the sector, including the administration itself and the companies, but also social agents, researchers and the educational community as a whole.

We would like to thank the team of researchers from Abay Analistas who prepared the study, as well as the group of experts who participated. Thanks also to Cristina Monge, who coordinated all the work, as well as to the teams of the Naturgy Foundation and the Institute for the Just Transition, for their commitment and dedication to this process.

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Summary of the analysis.

The energy transition must be "just", meaning that it must guarantee, among other parameters, an equitable distribution of job opportunities between men and women.

Chapter 1.

Introduction

1.1

Why is such a study necessary?

The energy transition can be defined as the set of changes in energy production, distribution and consumption models for transforming the current energy system, with its high presence of fossil fuels, into an energy system based on renewable energies and zero carbon emissions. In other words, we are not talking strictly about one specific sector of activity, but rather about a process of enormous scope that affects all economic agents.

In the case of Spain, the National Integrated Energy and Climate Plan (PNIEC) is the strategic planning tool that integrates energy and climate policy to achieve the decarbonisation targets established in the EU. This plan will involve investments of 241,412 million euros between 2021 and 2030. It is expected to result in the creation of between 250,000 and 350,000 new jobs per year during this period, most of them high- or medium-skilled. This is therefore an extraordinary opportunity that must be taken full advantage of.

However, **the energy transition must also be "just"**, meaning that it must guarantee an equitable distribution of job opportunities between men and women, among other parameters. In this regard, we must start from a fundamental idea: low-emission energy systems are not necessarily more gender-inclusive than traditional systems. It is not technology that determines the outcome of the energy transition, rather the way in which technology interacts with the existing sociocultural, socioeconomic and institutional context. This means that, if corrective measures and policies are not implemented, existing structures of inequality may be perpetuated. And, in this regard, energy transition activities are among the least gender-diverse.

At the same time, it is not only a question of social justice or fairness (although this component should be sufficient), it is also economic. The lack of gender diversity is already recognised as a competitive constraint by some energy-related industries. Some studies indicate that energy companies with greater gender diversity experience a better business performance, while at the same time generating a greater empowerment of women. **If more women are not brought on board, the energy transition will not only be unfair, it could be strangled** by a lack of qualified personnel.

It should be clarified that this is not a strictly Spanish problem, but rather a Europe-wide problem, as we shall see. Nor is it strictly a new problem, but rather it is one rooted decades in the past, when, unlike what happened in most economic sectors, women continued to find it difficult to be hired in the activities now linked to the energy transition. Finally, it is essential to note that companies are not solely responsible for this problem: the existence of a previous gap in access by women to technical degrees (both the so-called STEM university degrees and vocational training), which must provide personnel for transition activities, is another key factor.

We are therefore faced with a highly complex problem that requires a clear diagnosis first and foremost. And this diagnosis must be based on accurate statistical information.

1.2 What does this study contribute?

The study, promoted by the Naturgy Foundation, first involved a review of the academic literature on the subject and of the initiatives for gender equality in the energy sector promoted by international organisations. This review has served to show how the lack of statistical information has been a major obstacle to understanding the reality of women in the energy transition to date. And, in order to obtain this statistical information, it is first necessary to conceptualize and delimit the energy transition in economic classifications, at an operational level.

This is what this study therefore does, within its **quantitative diagnosis** (part II of this document). An *ad hoc* delimitation of the activities related to the energy transition has been created within the National Classification of Economic Activities 2009 (CNAE09), thus distinguishing four core or characteristic subsectors (services whose main objective is the reduction of emissions) and a subsector that groups together the so-called activities related to the transition. Within these five subsectors, 37 four-digit code branches have been selected, which are directly involved in the energy transition (see Table 1).

This delimitation based on the CNAE09 codes is the key that subsequently enables us to delimit the data corresponding to the energy transition in statistical sources such as the *EU Labour Force Survey* (Eurostat), Spain's Labour Force Survey, the Social Security affiliation data or the Continuous Sample of Working Lives, thereby providing access to multiple sources of precise and extremely valuable information. In addition, it is possible to study this information not only at the general level of the energy transition, but also in relation to the five subsectors or even the 37 branches considered. Another advantage is that the delimitation based on CNAE09 is also valid for the rest of the European Union.

In fact, this very important methodological contribution of the study is useful for analysing other elements of the energy transition beyond gender, such as the difference in the level of development of transition activities by autonomous communities (Navarre, the Basque Country and Aragón would lead this classification).

In addition, the study has also given a voice to more than 50 women who are currently working in transition-related activities. This **qualitative diagnosis** (part III of this document) was produced through six individual interviews and four discussion groups (with executives; highly-skilled technicians; and female workers involved in the Just Transition agreements of Los Barrios (Cádiz) and Valle del Nalón (Asturias)). Their contributions have been analysed both from a thematic and discourse perspective, showing a high degree of coincidence in terms of experiences, obstacles and demands by women who, in principle, are in very different situations, thus underscoring the soundness of this diagnosis.

In any case, the qualitative and quantitative diagnoses complement each other and show a high degree of coincidence in terms of the analysed reality, which reaffirms the validity of each one individually and of both of them together. From this perspective, we consider that **this study represents a complete and definitive diagnosis that should allow all the agents involved to move on to the next phase:** that of action, meaning, in other words, the implementation of corrective measures to achieve a just energy transition from the point of view of women's employment.

Table 1.

Delimitation of the energy transition in Spain's National Classification of Economic Activities 2009 (CNAE09).

		Electrical energy, power grids and self-consumption
351		Production, transmission and distribution of electricity
	3512	Transmission of electricity
	3513	Distribution of electricity
	3514	Trade of electricity
	3515	Hydroelectric power generation
	3516	Electricity generation from conventional thermal power
	3517	Electricity generation from nuclear power
	3518	Electricity generation from wind power
	3519	Electricity generation from other sources
		Power grid construction
	4222	Construction of electrical and telecommunications networks

Continued →

		Green hydrogen
	2011	Manufacturing of industrial gases
		Energy renovation and the installation of heating and cooling equipment
432		Electrical, plumbing and other construction site installations
	4321	Electrical installations
	4322	Plumbing, heating and air-conditioning installation
	4329	Other installations on construction sites (thermal insulation)
433		Building completion and finishing work
	4331	Plastering (coating)
	4332	Installation of carpentry (double glazing)
	4333	Floor and wall coverings
	4339	Other building completion and finishing work
		Energy efficiency in transport
291		Manufacture of motor vehicles
292		Manufacture of motor vehicle bodies
293		Manufacture of electrical and electronic equipment for motor vehicles
491		Intercity passenger transport by rail
492		Freight transport by rail
493		Other passenger land transport
	4931	Urban and suburban land passenger transport
		Energy consulting
711		Technical services related to architecture and engineering and other activities related to technical advice
	7111	Technical services related to architecture
	7112	Technical services related to engineering and other activities related to technical advice
		Related activities
	1629	Manufacture of other wood products; articles of cork, basketware and wickerwork
251	2512	Manufacture of doors and windows of metal
261	2611	Manufacture of electronic components
271		Manufacture of electric motors, generators and transformers, electrical distribution and control devices
	2711	Manufacture of electric engines, generators and transformers
	2712	Manufacture of electrical distribution and control devices
272		Manufacture of batteries and accumulators
	2720	Manufacture of batteries and accumulators
279		Manufacture of other electrical material and equipment
	2790	Manufacture of other electrical material and equipment
281	2811	Manufacture of engines and turbines (except vehicle engines)
282	2821	Manufacturing of ovens, furnaces and furnace burners (solar panels)
331		Repair of metal products, machinery and equipment
	3311	Repair of metal products
	3312	Repair of machinery

Source: Prepared by Abay Analystas.

Chapter 2.

Quantitative approach

2.1

Has the energy transition created jobs in recent years?

Have women taken advantage of these opportunities?

As we have already explained, the National Integrated Energy and Climate Plan (PNIEC) will involve an injection of 241,412 million euros of investment in the sectors involved in the energy transition throughout the current decade. The forecasts are for a net creation of between 250,000 and 350,000 jobs a year in Spain during this period.

However, the energy transition is a dynamic process that has already been under way for some time now. In fact, **over the last seven years, the energy transition has created more than two million net jobs in the EU-27 and more than 152,000 in Spain.** The growth rate of employment related to the energy transition was 10.6% throughout this period in Spain, while at the European level it was 11.5%.

Particularly important is the finding that a large part of this new employment has been in positions requiring a high and medium-high level of skills (64%, or 106,000 jobs). In fact, the hiring of employees with higher education has been even greater, up to a total of 125,000 people.

In both Spain and the EU-27, female employment has grown at a much faster rate than male employment in the subsectors of the transition. It should be recalled that these results are linked to a previously low presence of women in these subsectors.

In any event, women have occupied 34% of the new jobs created by the transition subsectors in the 2015-2021 period. In Spain, the percentage was even higher, at 38.1%, which represents a total of 58,136 new jobs held by women (see Graph 1).

Graph 1:

Participation of women in the creation of jobs in the energy transition subsectors between 2015 and 2021. Spain and the EU-27.

Men / **Women**

61.9% (94,382)



38.1% (58,136)



Spain

(%)

66.0% (1,360,620)



34.0% (702,342)



EU-27 2020

(%)

Source: European Union *Labour Force Survey* (Eurostat).

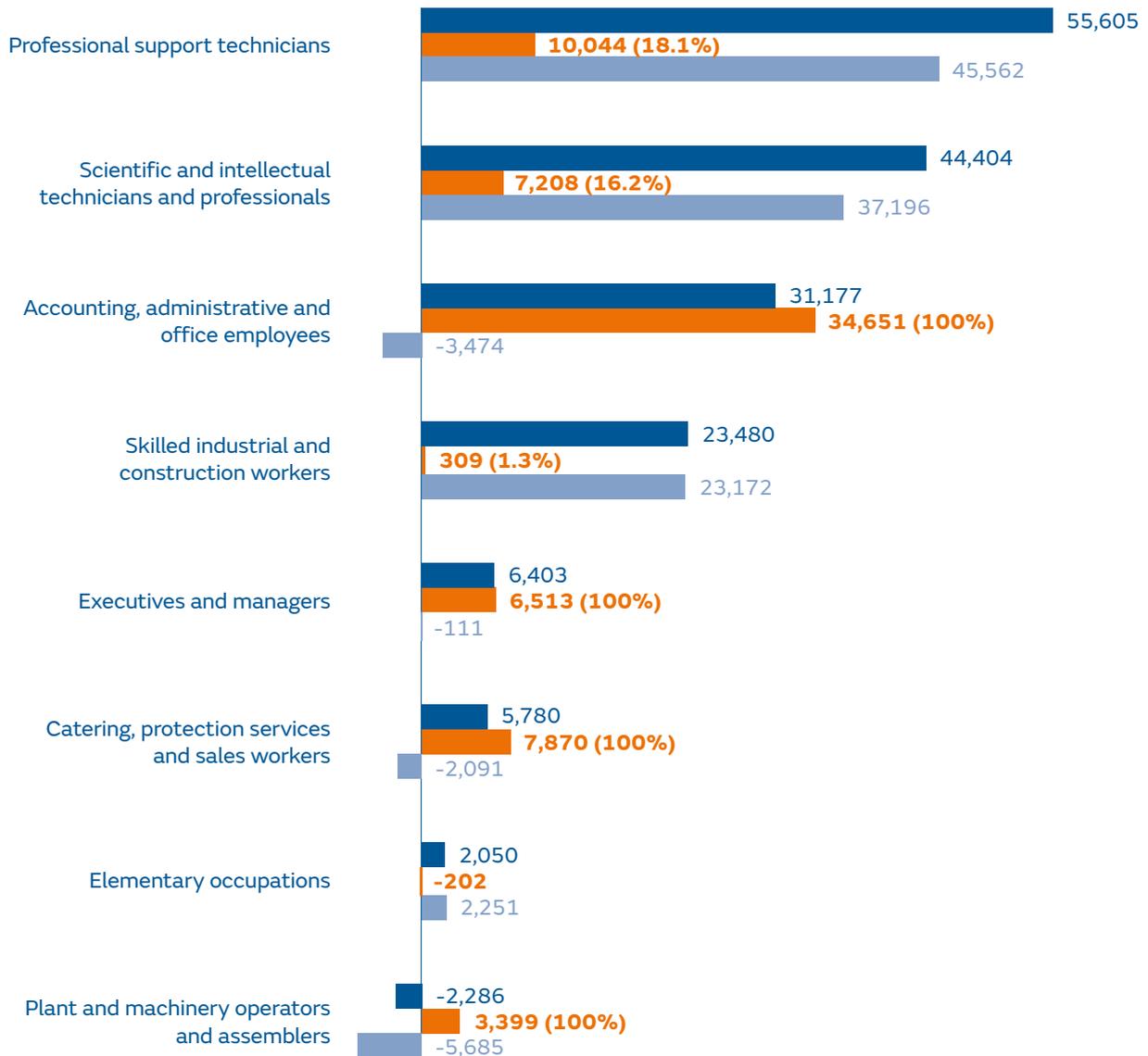
However, a more in-depth analysis reveals less favourable data. First, if we look at the behaviour of the five subsectors that we have linked to the energy transition, we can see that such behaviour is very diverse. For example, the Related Activities subsector accounts for only 4% of new female employment, while it has absorbed 52% of new male employment and is, in fact, the subsector that has generated the most total new employment.

To analyse how these new jobs are distributed in Spain based on the occupational group, we incorporate data from the national Labour Force Survey, which also provides us with results for 2022. This once again allows us to see how job creation has been concentrated in highly skilled positions. However, **many of these high-skilled jobs include very few women** (see Graph 2).

Graph 2:

Job creation in energy transition activities in the 2015-2022 period. Breakdown by occupational group and gender.

Total / **Women** / Men



Source: Prepared by Abay Analistas based on Spain's Labour Force Survey (EPA) 2015 and 2022 (Q2).

Thus, only 16.1% of the new jobs for scientific and intellectual technicians and professionals, and 18.1% of those for professional support technicians have been occupied by women. These two occupational groups account for 85.5% of male employment created in the period, while accounting for only 24.7% of female employment. Conversely, the group of accounting, clerical, administrative and other office jobs accounted for half (49.6%) of new female jobs.

It should be noted that this **strong bias towards female employment in administrative occupations** seems to be a characteristic of energy transition activities, given that 43.5% of female employment created between 2015 and 2022 in the economy as a whole corresponded precisely to the group of scientific and intellectual technicians and professionals.

2.2

What is the extent of women's participation in the labour force for energy transition activities today?

The labour force participation gap is the first and most important gap affecting women who work in energy transition activities. Consequently, it has been a subject of interest in academic literature, but generally focused on the electricity sector, while this study broadens the focus to all subsectors of the energy transition.

At the same time, academic literature has already established the thresholds that must be taken into account for assessing the participation level of women and the consequences it will have for them:

- **Labour force participation of women below 15% of the total:** these are cases of severe under-representation, and the environment is particularly difficult for women. Because there are so few, their visibility increases, which at the same time increases the pressure (for example, when it comes to proving their professional validity). Forming a part of such a minority group can also lead to increased isolation from the dominant group, to acceptance of the dominant group's ideology, or to the adoption of certain stereotypes (such as the woman-mother, woman-object, woman-mascot or the iron maiden). Finally, it can also increase rivalry or discrimination among women themselves. Logically, all these effects can also provoke physical and psychological stress.

- **Labour force participation of women between 15% and 30%:** the negative effects described in the preceding case also apply to this situation, albeit mitigated by the fact that the increase of women in the environment may enable the formation of alliances among them, and it reduces the stereotyping and the pressure linked to the representation of the entire female collective.
- **Labour market participation of women between 30% and 45%:** there continues to be under-representation, but 30% is considered the critical mass level, a sociological concept from which the minority group acquires its own dynamics and can influence the whole. Once the critical mass is reached, the incorporation of members of the minority group (in this case, women) is expected to accelerate.

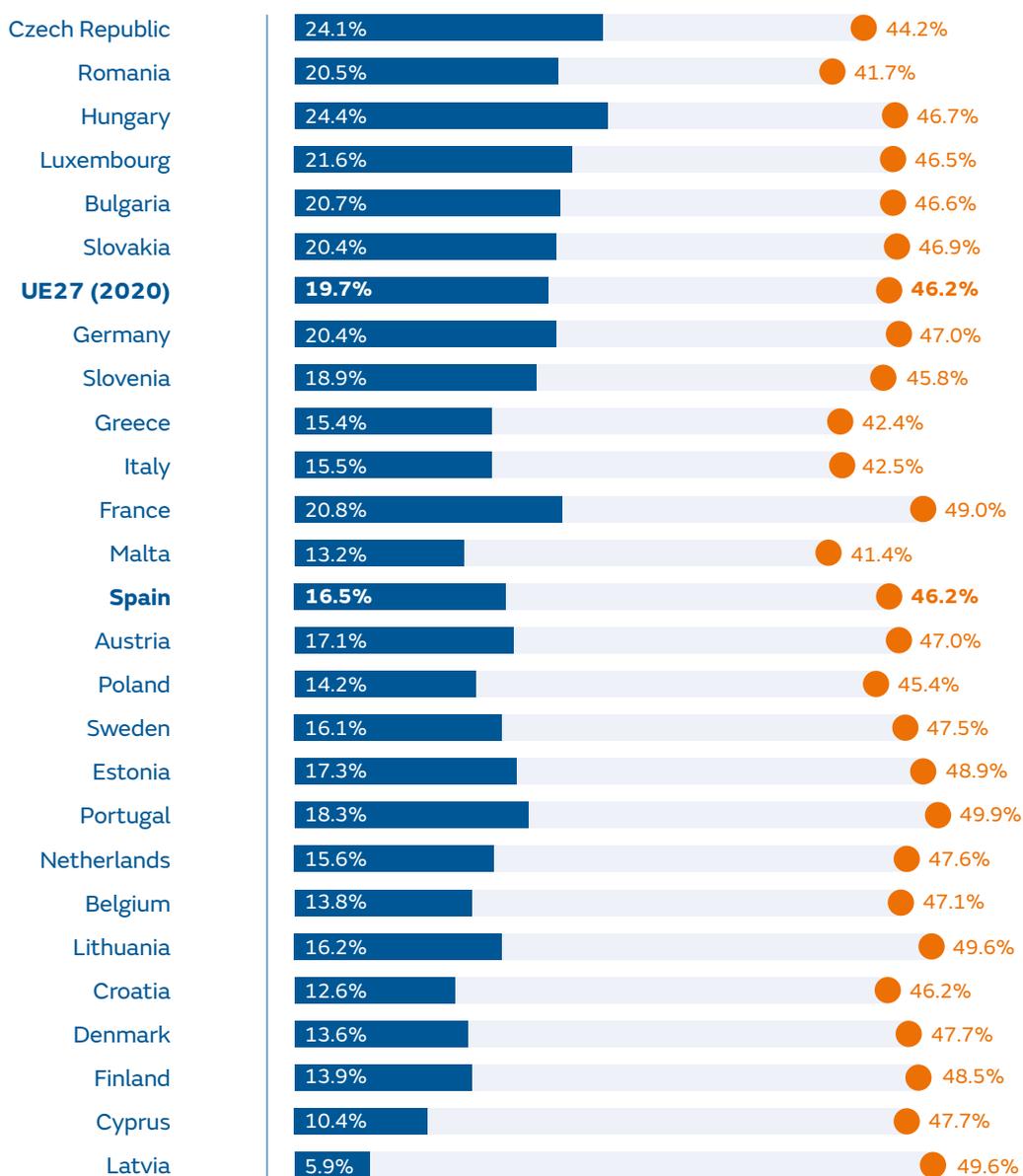
The **labour market participation of women in the energy transition subsectors in the EU-27 was 19.7% in 2020**, which would mean a situation of clear under-representation, far from the critical mass. That same year, women accounted for 46.1% of employment in the economy as a whole. Therefore, the sector has a participation gap of 26.4 percentage points.

Graph 3 shows how there are significant differences between the various countries. The smallest gaps are found in Eastern European countries, while the largest gaps are found in Nordic countries. However, it is particularly significant that **no country in the European Union reaches the critical mass level of female labour market participation** in energy transition activities. Another element of interest is the fact that there is no relationship between the participation of women in the sector and in the economy as a whole: for example, the country with the highest under-representation of women in the transition sector, Latvia, is at the same time one of the countries that is closest to 50% of participation for women in the economy as a whole. This seems to imply that there are specific barriers to women's participation in transition activities.

Women accounted for 46.1% of the labour force in the economy as a whole, compared to 19.7% in the energy transition subsectors in the EU-27 in 2020

Graph 3:

Presence of women in employment in the energy transition subsectors and in total employment. EU and EU-27 countries. 2021. Percentage of women in entire labour force.



Energy transition / Participation gap / Total economy

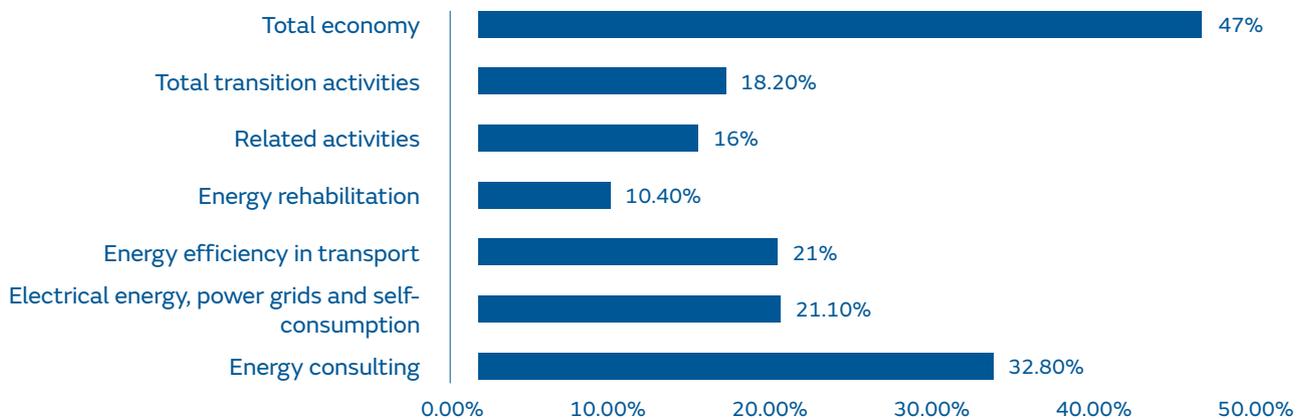
Source: European Union Labour Force Survey (Eurostat).

Finally, the data also indicate that between 2015 and 2020, participation by women in the transition subsectors increased from 18.1% to 19.7%. This is a **positive but at the same time very slow advance**, and it should be kept in mind that in some countries progress has been practically nil or has even regressed.

Focusing on Spain, the data on Social Security affiliation allow us to obtain even more precise information. Thus, in March 2022, **women accounted for 18.2% of jobs related to the energy transition, compared to 47% in the economy as a whole**. This therefore represents a gap of almost 30 points. As was the case with the data for Europe as a whole, this situation of under-representation is far from the critical mass level. If we analyse the data by subsector (see Graph 4), only one, energy consulting, exceeds the critical mass level.

The significant gaps in participation by women indicate that there are no active advancement processes in these sub-sectors and that, in the absence of specific actions to close these gaps, women will have very limited access to the jobs that are created.

Graph 4:
Participation by women in energy transition labour force. Breakdown by subsector. 2022. Percentage of women out of total labour force.



Source: Social Security affiliation statistics (data as of March 31).

It is possible to further refine the analysis by extending it to the total of 37 branches of activity involved in the energy transition (see Table 2). The results are clear:

- Only in one branch, trading of electricity, **do women achieve a balanced representation in employment** (45.7%). And only four others are above the critical mass level.
- Therefore, in **32 of the 37 branches, the critical mass value is not reached** (30%), and in 16 of them the under-representation can be considered severe, given that it does not reach 15%. Most of these branches are located in the Energy renovation subsector.

Table 2.

Map of participation by women in labour force in the branches of activity involved in the energy transition. 2022. Percentage of women in total labour force in each branch.

Balanced representation (46% to 54%)	1	● Trade of electricity	45.7%
Under-representation with critical mass (31% to 45%)	1	● Technical services related to architecture	41.0%
	2	● Manufacture of electrical and electronic equipment for motor vehicles	39.1%
	3	● Manufacture of electronic components	37.1%
	4	● Technical services related to engineering and other activities related to technical advice	30.6%
Under-representation without reaching critical mass (16% to 30%)	1	● Manufacture of electrical distribution and control devices	27.5%
	2	● Electricity generation from wind power	27.4%
	3	● Electricity generation from other sources (solar and others)	26.7%
	4	● Manufacturing of industrial gases	26.5%
	5	● Manufacture of other electrical material and equipment	26.1%
	6	● Manufacturing of other components, parts and accessories for motor vehicles	26.0%
	7	● Intercity passenger transport by rail	23.8%
	8	● Distribution of electricity	22.9%
	9	● Manufacture of electric engines, generators and transformers	22.3%
	10	● Manufacturing of engines and turbines (other than aircraft and motor vehicles)	22.3%
	11	● Manufacture of other wood products; articles of cork, basketware and wickerwork	20.1%
	12	● Hydroelectric power generation	19.3%
	13	● Manufacture of motor vehicles	18.7%
	14	● Transmission of electricity	17.1%
	15	● Manufacturing of ovens, furnaces and furnace burners	16.5%
	16	● Urban and suburban land passenger transport	16.1%
Severe under-representation (less than 15%)	1	● Freight transport by rail	14.7%
	2	● Electricity generation from conventional thermal power	13.2%
	3	● Manufacture of batteries and accumulators	13.1%
	4	● Manufacture of doors and windows of metal	12.6%

Continued →

Severe under-representation (less than 15%)	5	● Plumbing, heating and air-conditioning installation	11.8%
	6	● Repair of machinery	11.3%
	7	● Manufacture of motor vehicle bodies; manufacture of trailers and semi-trailers	11.3%
	8	● Electrical installations	11.1%
	9	● Other installations on construction sites	10.6%
	10	● Construction of electrical and telecommunications networks	10.2%
	11	● Repair of metal products	9.9%
	12	● Installation of carpentry	9.4%
	13	● Electricity generation from nuclear power	9.3%
	14	● Other building completion and finishing work	8.1%
	15	● Floor and wall coverings	6.8%
	16	● Plastering	4.8%

Energy audits and consulting / Energy rehabilitation and installation of heating and cooling equipment / Energy efficiency in transport / Related activities / Electrical energy, networks and self-consumption

Source: Social Security affiliation statistics (31 March 2022)

Finally, the comparison between data from 2012 and 2022 allows us to see the evolution over the last decade. Overall, **the progress has been very small, from 17% in 2012 to 18.2% in 2022**. However, there are differences by subsector: Electricity, networks and self-consumption and Energy efficiency in transport show a positive evolution, with increases of 6 and almost 4 percentage points, respectively; but, in all other subsectors, the progress has been nil, and regressions have even been recorded in the most masculinised subsectors (Related activities and Energy rehabilitation).

These differences are also observed in the evolution of the 37 branches. Significant progress has been made in some of these areas, but it is worrying to note that **many of the branches where women did not even reach 15% in 2012 have seen a further reduction in female presence in 2022**. Therefore, it seems that the low levels of female participation are propitiating a backward dynamic in female participation.

A final issue to keep in mind when talking about the gap in participation by women in the energy transition is that it **also extends to their participation in entrepreneurship**. According to data from 2022, in the Spanish economy as a whole women account for 35% of self-employment (entrepreneurs, self-employed and cooperatives), while in transition activities it is only 10.1%. And what's more, there has been a slight decrease compared to 2015, when they accounted for 10.4%.

2.3

What other gender gaps are observed in employment in energy transition activities?

Although the participation gap is the most important gap, there are indeed other gender gaps that affect women working in the sectors involved in the energy transition. In this case, the research is based on data from the 2021 edition of the Continuous Sample of Working Lives, which is based on a sample of almost 900,000 workers, of which more than 71,000 are linked to energy transition activities. Thus, for example, we can determine that the average age of women employed in these activities is 42.4 years and that the percentage of women under 30 years of age is 13.1%, slightly below the results for the economy as a whole.

Occupational segregation is the phenomenon that describes the concentration of women in certain activities and occupations and men in others. This is a situation that occurs in transition activities. Thus, the occupational structure of the sector speaks for itself in terms of gender differences (see Table 3). Thus, **44% of women hold administrative jobs (versus only 13.8% of men)**. Conversely, medium-skilled technical positions represent 62.3% of jobs among men, versus only 24.2% for women.



44%

of women hold administrative jobs compared to only 13.8% of men.

Table 3.
Occupational structure of
male and female employment
in energy transition activities. 2021.
Percentage of total employees.

	Men	Women	W/M (M = 100)
Highly skilled	12.5%	23.6%	189
Engineers, university graduates and senior management	7.2%	14.8%	207
Technical engineers, experts and assistants	5.3%	8.8%	165
Administrative positions	13.8%	44.2%	321
Administrative and workshop managers	3.4%	4.3%	127
Assistants w/o university degrees	4.0%	3.4%	83
Administrative officers	4.0%	16.2%	410
Administrative assistants	2.4%	20.3%	852
Technical positions	62.3%	24.2%	39
1 st and 2 nd level skilled workers	42.8%	11.2%	26
3 rd level skilled workers and specialists	19.5%	13.0%	67
Low-skilled positions	11.5%	7.9%	69
Unskilled workers	10.7%	6.8%	64
Subordinates	0.8%	1.1%	144
Total	100.0%	100.0%	100.0

Source: Continuous Sample of Working Lives 2021.

Occupational segregation can also be observed in the percentage of women in the labour force for each social security contribution group, the so-called participation rate. Thus, 64.1% of the people working as administrative assistants in transition activities are women, while, for example, only 5.2% of the first and second level skilled workers are women.

Finally, the Duncan index of dissimilarity is a unique measure that enables us to compare occupational segregation in different sectors or territories. Consequently, the Duncan index for energy transition activities is twice that of the Spanish economy as a whole (46 versus 23, respectively).

Another gender gap has to do with **over-qualification**, i.e. the fact that women often enter the labour market with qualifications much higher than are required and than those of their male counterparts. In the case of transition activities, **the percentage of women with higher education is double and in some cases**

triple that of men in all medium and low skilled categories. For example, 53.9% of women working as administrative and shop floor managers have completed higher education, compared to only 23.7% of men (see Table 4).

Table 4.
People employed with superior technical degrees or university studies in energy transition activities. 2021. Percentage of total employees in each social security contribution group.

	Men	Women	W/M (M = 100)
Highly skilled	78.3%	85.5%	109
Engineers, university graduates and senior management	81.1%	87.4%	108
Technical engineers, experts and assistants	74.6%	82.4%	110
Administrative positions	24.2%	33.2%	137
Administrative and workshop managers	23.7%	53.9%	227
Assistants w/o university degrees	14.2%	40.7%	287
Administrative officers	24.4%	36.9%	151
Administrative assistants	24.6%	25.9%	105
Technical positions	3.5%	9.7%	281
1 st and 2 nd level skilled workers	3.3%	12.2%	363
3 rd level skilled workers and specialists	3.7%	7.7%	205
Low-skilled positions	6.4%	17.4%	272
Unskilled workers	3.3%	6.2%	190
Subordinates	7.9%	14.2%	180
Total	23.0%	36.5%	159

Source: Continuous Sample of Working Lives 2021.

The incidence of female part-time workers (23.1%) is more than three times higher than that for men (6.5%) in the energy transition as a whole, affecting all the analysed subsectors.

Regarding time working on the job, **part-time work** usually represents one of the major gaps between women and men. Thus, in the economy as a whole, 22.7% of women work part-time, compared to only 9.6% of men. But in transition activities the gap is even wider: 23.1% of women and only 6.5% of men work part-time.

Finally, with respect to the **gender pay gap**, the data for those employed in transition activities indicate that women working full-time earn on average 6% less than men with the same working day. This is a significantly smaller gap than that of the economy as a whole, which is 14%. This has to do with the fact that, as mentioned above, women working in the energy transition have a high level of education.

However, this results in the fact that, if the issue is analysed specifically in reference to employees with superior technical degrees or university degrees, **the wage gap clearly increases: women earn 25% and 21% less than men, respectively (see Table 5). Likewise, the gap is wide in high and medium-high skilled jobs.** For example, in the social security contribution groups of engineers, graduates, senior management and technical engineers, the wage gaps are 23% and 15%.



22.7%

of women work part time, compared to only 9.6% of men.

Table 5.

Gender wage gap in energy transition activities and in the economy as a whole. Full-time workers employed throughout 2020. Index number (male salary = 100).

	The energy transition		Economy as a whole	
	Men	Women	Men	Women
Total workers	100	94	100	86
Less than junior school education	100	90	100	78
Junior school education, basic and intermediate vocational training	100	90	100	76
Secondary school education and advanced vocational training	100	78	100	78
Superior technical degrees	100	75	100	77
Undergraduate and higher degrees	100	79	100	76
01. Engineers, university graduates, senior managers	100	77	100	77
02. Technical engineers, assistants with university degrees	100	85	100	83
03. Administrative and workshop managers	100	89	100	85
04. Assistants w/o university degrees	100	79	100	81
05. Administrative officers	100	79	100	83
06. Subordinates	100	91	100	88
07. Administrative assistants	100	88	100	87
08. 1st and 2nd level skilled workers	100	102	100	67
09. 3rd level skilled workers and specialists	100	99	100	74
10. Labourers and similar	100	89	100	84
Under 30 years of age	100	100	100	93
From 30 to 44 years of age	100	99	100	89
45 years and over	100	91	100	84
Electrical energy, power grids and self-consumption	100	91		
Energy renovation and the installation of heating and cooling equipment	100	93		
Energy efficiency in transport	100	93		
Energy audits and consulting	100	80		
Related activities	100	89		
Large cities	100	97	100	85
Intermediate cities and rural areas	100	88	100	86

Source: Continuous Sample of Working Lives 2021.

2.4

What position do women occupy in the specific training demanded by the energy transition?

There are multiple social and cultural factors involved in the persistence of gender gaps in the energy transition sector, but undoubtedly one of the basic underlying factors is the low presence of women in the technical studies that are demanded the most for these activities and, specifically, in the so-called STEM degrees. This acronym - formed from the words Science, Technology, Engineering and Mathematics - groups together a whole series of university studies that are characterised by being based on these competencies, with special emphasis on mathematics.

Does this mean that girls are worse than boys at mathematics? The data show that they are not. In 2018, **the percentage of students in the European Union who had acquired the minimum level of mathematical competencies by the end of compulsory secondary education was the same for males and females**, around 76%. In fact, half of the countries have negative gaps, that is, a higher percentage of competent women than competent men. As for Spain, in 2018 there was a small positive gap of 0.26, compared to 3.57 in 2015. This reduction in the gender gap is not due to the fact that women have improved but, above all, that men have worsened. In any case, it is clear that if there are gender differences in STEM degrees, they are not due to an absolute cognitive ability.

And yet, differences do exist, and they can be clearly seen. At the European level, 25.1% of university graduates in 2020 obtained **STEM degrees**. For men, STEM accounted for 39.5% of graduates, versus only 15.4% of female graduates. In Spain the situation is similar, although with slightly lower data: **the weight of STEM degrees with respect to the total number of graduates is 36% for men and 11% for women**.

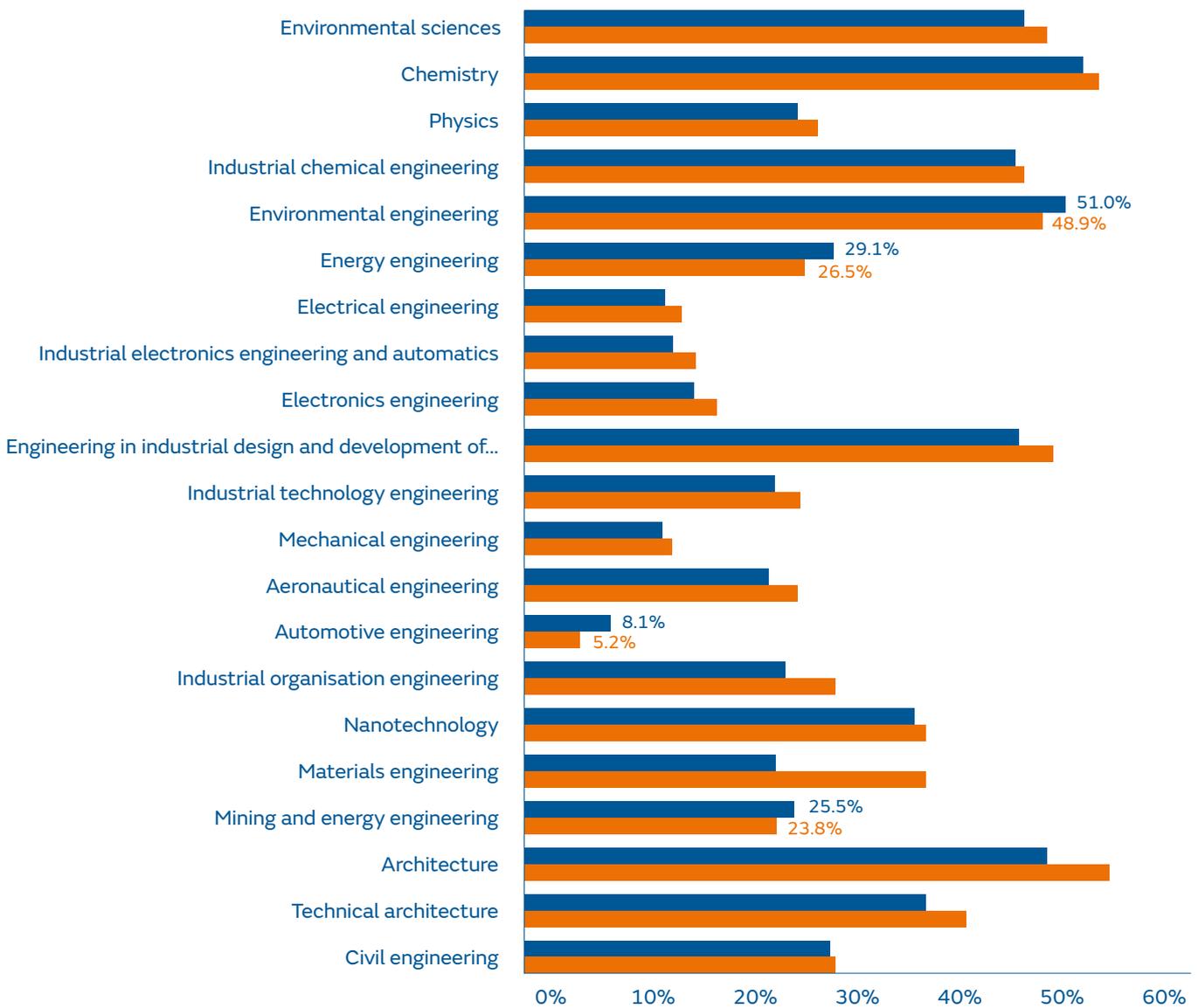
As for specific degrees related to the transition (see Graph 5), there are no gender gaps in some of the more traditional ones, such as Chemistry or Architecture, or in environmental engineering; a fact that is consistent with the greater sensitivity of women towards the environment, already detected in academic literature. However, in other STEM degrees that are especially oriented towards energy transition activities, such as Mechanical or Electrical Engineering, the percentage of women enrolled is below 20% or even 15%, with the aggravating factor that there are also some cases in which the evolution is negative.

The gender gap is even wider in Vocational Training linked to the energy transition. It should be taken into account that Vocational Training has experienced great growth in recent years and that women account for almost half of the student body. Conversely, if we focus on advanced level Vocation Training related to the transition, women accounted for only 7.9% of enrolments in the 2019-2020 academic year, with the aggravating factor that five years earlier they accounted for 9.5%. Even so, there are also large differences by subject family. In advanced level building and civil engineering, women represent approximately one third of the student body. However, in all other families involved in the transition (Energy and water, Transport and vehicle maintenance, Electricity and electronics, Mechanical manufacturing and Installation and maintenance), the situation is one of severe under-representation.

Graph 5:

Enrolment of women in university degrees related to employment in the energy transition. 2015-2021 period. Percentage of women out of the total.

2015-2016 / 2021-2022



Source: Prepared by Abay Analistas based on data from the Ministry of Universities.

Chapter 3.

Qualitative approach

3.1

How and why do women come to occupy jobs in the energy transition?

For the vast majority of women, especially those who occupy technical positions, the **path** that leads them to the energy transition sector begins with the choice of a specific training related to it. In the areas where Just Transition Agreements are being developed, women are also gaining access through retraining. On the other hand, the growing and progressive incorporation of women with other types of higher, non-technical training (economics, marketing, communication, etc.) is playing a dynamic role in the sector. Finally, it should be noted that role models in the family can also be a deciding factor for some women.

With regard to the **motivations** for seeking employment in this field, the women participating in the focus groups and interviews emphasise the specific contents of the more technical positions (for those who have had the appropriate training), as well as the breadth of the sector and the diversity of activities involved, something that allows for personal reinvention or, as stated in one of the testimonials, "one's own energy transition". But many of them also agree that the possibility of contributing to the sustainability of the planet and being part of the process of change is an incentive.

I got very excited to see that there is still much to be done in the sector. We're at a key moment, a crucial moment where the transition to renewables is key for humanity, key for the planet. (Technicians discussion group)

And the truth is that we do see many women who are on the front line in the whole area of the energy transition and the just energy transition, and that is also because of the transformative capacity (of the sector) and that transformative energy that we (women) have." (Executives discussion group)

3.2

What are the main obstacles encountered by women who are working in the energy transition?

Regarding this matter, it should be noted first of all that there are women who say they have not felt discriminated against or that they have encountered no specific obstacles different to those of their male counterparts. Even so, most of the testimonials do point to a significant number of obstacles.

The first one is that of gender **stereotypes and the lack of role models in the training**. We have already seen, in the quantitative analysis, how the participation by women in STEM university degrees is low, and even more so in advanced vocational training courses linked to the transition. For women who opt for these studies, often there is no family support, or support from the study centres themselves.

I did notice that, because I was a woman, I was the only woman, the first woman at that institute to study an advanced level. Yes, I have noticed, especially from a teacher who even told me that he didn't know what I was doing there, that our place was in the kitchen. (Los Barrios discussion group)

There are very few of us. And I believe that this is a fundamental problem that we've come across since the earliest stages of our lives, because there are no human resources, there are no girls who are passionate about the more technological, more technical side, and those who are good at science and mathematics always opt for careers in the bio-health field. (Individual interview)

This lack of role models often continues in the workplace. Many of the participants have been pioneers in their job positions and explain how difficult it is for both them and their male colleagues to face certain new situations. Moreover, a male image of these professions is perpetuated in industry forums and communication elements.

The public face is still very masculine. If you look at the panels [at an international trade show], sometimes there's a woman, but she's usually the one moderating." (Individual interview)

I, for example, look around me, I look a little higher up, at higher positions, and I see no female presence, or maybe one among 20 or 30 people, let's say.

(Technicians discussion group)

Another obstacle is the persistence of a **highly masculinised business culture**, which extends to the entire environment (suppliers, customers, etc.). This can translate into macho and even rude behaviour, as well as a questioning of women's abilities or their authority.

When a man walks into a work site and says, "Hello, I'm the project supervisor," no one disputes it: you are the project supervisor. Okay, if you're a bit young, they might kid you a bit, but because of your youth, right? But there are no jokes such as "you're on your period", "what you need is..." (Technicians discussion group)

I look around me and there are only men, and many of them are twice or three times my age. And I do my job without thinking about it, until, for example, someone calls me Sarita instead of Sara, you know? That's when you think: "Gee, I'm just a little girl to you. I'm your manager and you're calling me honey or Sarita, right?" Well, that's where I draw the line: "We have a professional relationship, and I don't like you addressing me this way." (Technicians discussion group)

This is a renewables research environment, which is all very "cool". And I've commented more than once or two or three times that I'm a bit overwhelmed because I have a meeting and I'm not well prepared, and then I have to listen to comments such as "Ah, don't worry, just smile a little, wear a short skirt, and keep going." And that's from my own colleagues! (Technicians discussion group)

One of the by-products of this masculine corporate culture is the importance **informal networks** in which women are much less present or even directly excluded. These networks are also vital for access to information, which can be key to possible promotions. Women often have the perception that progress in their professional careers depends more on these informal networks than on merit and ability.

It's true that men have the ability to network, to talk to each other, to form a group, to give, to find out... As women, I don't think we've reached this point. Often, these types of positions from one level up are not positions that are going to be advertised, but rather they are positions of trust: "I choose you."

(Technicians discussion group)

You have to do more in order to get to the same place that male colleagues can get to. Daily, continuously. There was always something holding me back, and I always thought it was me. And in the last two years I began seeing that I wasn't doing anything wrong, that what was happening was that I was a woman. That's what was happening. So it didn't matter what I did. And it was one of the reasons why I changed companies. (Nalón Valley discussion group)

Another type of obstacle reported by the participating women are those related to **motherhood and caregiving**. This obstacle is obviously not specific to energy transition activities, but, nevertheless, women in this sector do not see companies as supportive spaces on this issue, but rather to the contrary: their priority is often to demonstrate that motherhood and caregiving – which remain a largely female responsibility – will not affect professional performance.

The issue of work-life balance is such a private matter that changes may not be made within a company to facilitate those changes: not everyone would dare to talk about work-life balance at their companies, because that might limit their promotion at a certain time. You don't dare: you know it and, what's more, you see it. (Nalón Valley discussion group).

Sometimes the issue of having children is not so much what limits you, as the fact that maybe they don't offer you things because they say, "Well, she has two small children". I believe that there's a tendency to think that there is a greater willingness when you're a man than when you're a woman with respect to taking on certain positions with a certain dedication or certain hours of travel or postings overseas. (Technical discussion group).

Finally, they also speak of **educational and cultural obstacles** based on the traditional division of roles.

I think it's something that we've participated in unintentionally since we were little. And you grow up and you see that men do this and women do that...
(Los Barrios discussion group)

3.3

What are the women's strategies in this difficult scenario?

As we have seen hereinabove, in activities linked to the energy transition, the norm is that women's participation does not reach the critical mass level (30%), and it even frequently falls within what is technically considered severe under-representation (below 15%). We have also seen how academic literature has described the difficulties of these types of scenarios. On the other hand, the contributions of the women who participated in the focus groups and interviews point to four possible strategies to apply in these scenarios.

The first is a **strategy of adaptation and normalisation**, which is most common among older women and/or women who have been pioneers in their job positions. It is simply a matter of trying to adapt to the environment, including the normalisation of certain attitudes or situations.

When you're really alone, let's say, it's very complicated because you have to adapt to a situation where at first everyone perceives you as... "And this girl, what's she doing here?" I've encountered everything from people who see you as an exotic animal to people who make your life impossible or don't trust your abilities at all, as well as people who, on the contrary, encourage you a lot.

(Technicians discussion group)

Sometimes, when I have to visit a customer, I ask a male colleague to come with me. You take your employee with you because it gives your customers security, it gives them a certain peace of mind. So yes, if you want those gentlemen who may be older to say yes, you have to take a male colleague with you.

(Los Barrios discussion group)

The second option is the **strategy of visibility** through training and overexertion. In this case, women choose to overcome gender barriers through their own training and effort.

I've always based my professional competence on working harder than others. For example, I have three children (...) and the longest maternity leave I had was with the last one, for one month. For the girls it was one week and I was back in the office.

(Executives discussion group)

The **strategy of proceeding with discretion** would be, in a certain way, the opposite of the previous strategy: moving up within the company from a discreet position, without confrontation and attracting little attention.

Since I saw that being a woman and having aspirations was dangerous, I didn't even say that I had training... And I tried to play the little girl. But little by little, you learn to protect yourself, to say I'm going to stay in the background, see how this pans out and then I'll go. Because then there are many male colleagues who are very deserving, who acknowledge what you have, but even they are afraid, because taking a stand when they see that other men are wrong can often have consequences... And that's how I went on rising through all the key positions.

(Nalón Valley discussion group)

Finally, the **strategy of confronting situations of discrimination** consists of not accepting these situations and instead openly opposing them.

I have achieved things at the company that my male colleagues had not achieved. Why? Because I know what I'm worth and decided to showcase myself.. I went to the boss and I told him: "Look, excuse me, but I'm a senior technician, not a telephone operator." (Los Barrios discussion group)

3.4

Which enablers and supports are most valued by women and/or are helping with the change?

Throughout the interviews and the debates in the discussion groups, the participating women also talked about the elements of support that they've found in their careers, as well as those that are helping the situation to change little by little.

Regulatory changes are a basic element, especially those that affect men. In this regard, one of the most frequently cited measures has been the equalization of parental leave between men and women.

Certain novel dynamics in the sector are also facilitating the change in the gender gap. For example, **new energy production technologies** have favoured the entry of women in the sector, both because of the organisation of the production process of these technologies, with more office jobs, and because of the type of qualifications they require. The entry **by new companies into the sector**, such as cooperatives, with very specific principles and values and a business culture that is more favourable to gender equality, has also been noted. Finally, the natural renewal of the workforce is also a positive factor, with the progressive incorporation of young men who have been educated in cultural environments with greater equality.

At the same time, women recognise **the involvement and commitments made by many companies in the sector**, with corporate actions specifically aimed at closing the gender gap, such as quotas in executive positions and affirmative action in general. However, it should be noted that some women express reservations about this type of measure. Another enabler is **inclusive leadership**: the type of leadership exercised by the person to whom you report directly can be key.

But the truth is that it is something that is getting a lot of attention. Now there are many more women and I see it as, thanks to my job, I work with energy companies, and they interact more with women, which thrills me, because at the beginning, when I started working in this, it was all men. (Executives discussion group)

And, in general, my perception is that, many times, with all of this about positive discrimination or parity, the search for parity, there are questions about job positions being given to women who don't deserve them. While, many times, if a position is given to a man, no questions are asked, right? (Technicians discussion group)

In addition, many women emphasise the positive role that participating in **mentoring programs** related to education and work has played in their careers, as well as the **support from women's associations** or from associations led by women in the sector, which help to create points of reference and meeting spaces or, in general, the possibility of accessing **spaces for meeting and solidarity** with other women.

You meet many other women who are doing what we're doing, and here we can share almost all the same concerns and help each other. Also, in the business world where we work (...), when you see a woman who needs help, having a support network that can help you, that can give you that little bit of help you need, is very important. (Los Barrios discussion group)

Finally, greater **citizen involvement in the energy transition**, can also constitute a positive element of change, given that it's a problem that concerns society as a whole.

We (women) have more opportunities to participate if we take into consideration that the energy transition must involve all citizens, that citizen participation is essential, and it entails designing the model you want to implement: if you want a renewable energy model that is more centralised or more distributed or more democratic. I think there are more opportunities for women to participate, especially at the more local level. (Individual interview)

3.5

What are the needs and demands of the women who are working in the energy transition?

a) **Visibility in the education system and in society.** Women believe it is necessary to promote awareness-raising actions in order to break down cultural barriers and disseminate the sector's opportunities for women. These actions must be implemented in the educational sphere, but also having an impact on families, insofar as they influence their daughters' choice of studies. Even though one of the essential elements is to provide positive references of success, some women also point to the importance of highlighting the difficulties and obstacles that still exist.

The fact that a woman is giving such technical training is an example that might make other girls at the institute wonder: "Well there's a spot there for me." Let's give visibility to these initiatives where you see real women doing typically male jobs and let them be seen. We have it in our heads that these are male jobs, because they started doing them earlier, but jobs are jobs. (Nalón Valley discussion group)

b) **Programmes to combat the macho culture** in companies and institutions related to the sector. Despite the positive developments in recent years, women feel that these issues still need to be addressed.

And, as a society, we must be emphatic about these things. Just as racism is already unacceptable from every point of view, it is [also] unacceptable that we should have this intransigence about certain sexist comments regarding women.

(Technicians discussion group)

- e) Spaces for solidarity among women and networks.** Women demand their own spaces, where they can share situations, feelings, strategies or resources for support.

For me, for example, what I really miss is a space for solidarity among women, and it's what I'm trying to work on (to establish), something that we've done at the SME level. For me it's very important to find spaces for women who are in situations similar to mine. I guess it happens to all of us: you have friends from school, from university, all your life, and most likely your concerns and problems are often light years away. (Executives discussion group)

- d) Mentoring and support programmes among women.** They are especially valued by women who have already participated in one.
- e) Develop measures that involve men in reducing gender gaps,** so that the solution is shared.
- f) Retraining programmes** that favour the entry of women into the sector.
- g) Aid for training,** in the form of scholarships, also during the professional stage (e.g., for stays at laboratories, in other countries, etc.) and specifically targeted at women.
- h) Co-responsibility in caregiving.** This is not an explicit demand of the participants, but it does emerge from what many of them say. Co-responsibility would affect all the players involved: public administration,

Women believe it is necessary to promote awareness-raising actions in order to break down cultural barriers and disseminate the sector's opportunities for women. These actions must be implemented in the educational environment, but also having an impact on families.

Chapter 4.

Conclusions and proposals for the future

The different approaches taken in this project regarding the situation and position of women in the energy transition sector have shown that there are a multitude of wide gender gaps in the economic activities that must lead this transition process. The main gap, which sets the whole scenario, is the labour force **participation gap**. As we have seen throughout the report, **this gap is wide (women account for only 18.1% of employment in these activities) and persistent**, given that there has been little progress in the last decade. At the rate of progress recorded over the last ten years, it would take 265 years to achieve gender parity in employment in the energy transition. However, once this barrier to access is overcome, a number of gender gaps in employment can be observed, such as high levels of occupational segregation, over-qualification, high incidence of part-time work among women and the wage gap, which mainly affects higher-skilled positions.

However, as this project shows, the participation gap in employment is **a continuation of another gap that precedes it: the gap in participation in specific higher education**, which gives access to the most technical, high- and medium-skilled positions in the sector.

The qualitative analysis – the voices of more than 50 women who participated in the study from different positions in companies, research organisations and the education system – reveals that **both participation gaps (employment and education) share many characteristics, explanatory factors and transforming factors** that can help break down the significant barriers that women face in both areas.

The lack of reference points and gender stereotypes, still very present in society, in families, and in education and employment spaces, decisively affect the initial vocational decisions and interests of girls and young women throughout their education and employment trajectories. Male chauvinist attitudes and behaviours, although to a lesser extent, continue to exist in the sector's education and employment spaces, consequently underestimating the important contribution that women can make, generating stress and putting pressure on them that threatens their continuity in these areas. On the other hand, the severe under-representation of women in these activities has contributed to forging a **highly masculinised business culture**, with ways of doing, managing and relating to others that, in many cases, women feel are alien to them. Moreover, informal networks are a decision-making space that affects women's professional careers and in which they participate to a much lesser extent than their male colleagues. This masculinised corporate culture is shared by many of the players in the sector's companies (customers, suppliers, training centres, specialised media, etc.), thus helping to reinforce that culture. Finally, this sector, in addition to the specific problems derived from the high rate of masculinisation, is affected by social dynamics that affect economic activity as a whole, such as barriers and obstacles related to maternity, work-life balance and the care of dependents.

The results obtained throughout the project have also made it possible to identify **the main transforming factors in the scenario** of women employed in the energy transition, processes that are facilitating progress on the different gaps. These include the advance of renewable energies and new technologies with different production processes that seem to facilitate the incorporation of women, which already have participation gaps that are significantly smaller than those of more mature technologies. Some regulatory changes, such as: parental leave, which affect men; the growing involvement of companies through equality plans; the emergence of women's associations, which deploy actions in different areas and place gender gaps in the arena of public debate; the entry by social economy companies, with principles and values based on equal opportunities; the incorporation of more women into decision-making positions and workplaces in general, and the entry of young men, are other processes with the capacity to transform the scenario.

However, beyond the positive impact that the aforementioned processes could have, the deep participation gap and its slower progress in the last decade caution us about the magnitude of the challenge represented by closing gender gaps, while at the same time creating the employment opportunities of the transition and making it possible for the increased inclusion of women in those opportunities. **Addressing this challenge requires an "Integrated Action Plan", with simultaneous and far-reaching actions in all the areas involved, and that mobilises each and every one of the public and private players with the ability to introduce changes to the aforementioned scenario.** The implementation of such a plan goes beyond the objectives of this study, but, based on the results described in this report, some of the main lines of action that should be included are proposed below.

4.1 Visibility and public debate

- a) **Reinforce the visibility of the different roles played by women in the energy transition**, contributing their talent to the transition from different positions, especially through employment in technical positions. The most powerful way is still audiovisual modelling through traditional channels, such as cinema and TV. But action can also be taken building models thanks to the young women who are already in this world and who are acting as role models for it on TikTok and Meta (Instagram), who take on part of the activism of recruitment and modelling for future professionals and scientists.
- b) **Overcome the gender stereotypes that affect women who work in the sector to a greater extent and that determine the position of many key players in the transition** (households, neighbourhood communities and companies, in their role as demanders of goods and services related to the transition, the media, as well as companies throughout the value chain, and financial institutions).
- c) **Disseminate the employment and retraining opportunities** that the transition activities offer to women.
- d) **Encourage public debate on the importance of an inclusive and just energy transition.**
- e) **Promote associations, networks and initiatives** in favour of gender equality in the sector.

4.2

Formal education and training for employment

In this area of education, which would include both formal education and training for employment, the latter of which is called to play an important role in the retraining processes required by the energy transition itself, all the proposed actions should be focused on three specific areas that must be addressed simultaneously: the staff of the education centres (mainly teachers, but also non-teaching staff), families and students.

- a) **Actions aimed at overcoming gender stereotypes** that limit the number of women who enrol in the specialist training. A key role in these actions will be played by programmes for the creation of models and presenting the usefulness of technology as an effective tool in achieving any economic, social or environmental challenge.
- b) **Information programmes about employment opportunities in the energy transition**, aimed at students and families, with sufficient information on professional careers in the medium and long-term, working conditions, the range of occupations within these sectors and the contribution of these activities to the main social and environmental challenges.
- c) **Programmes to combat male chauvinist attitudes and behaviours**, aimed at teaching staff, non-teaching staff, as well as students and the companies that collaborate in internship programmes. These attitudes must be directly declared to be punishable and, in these programmes, visualization of the negative effects on female students should be a key part of the content.
- d) **Develop programmes that support the entry of women into degree courses** in which they are severely under-represented (less than 15%-20%), and that establish a follow-up on the environment these women face; establish a trusted figure with whom to share and/or denounce sexist attitudes; and provide women with the support they need in order to develop a training itinerary that is free of sexist attitudes. These programmes should involve the teaching staff and male students.
- e) **Promote STEM degrees among female students** through the creation of a programme of relevant role models and promotional campaigns that highlight the contribution of these degrees to the challenges of greatest interest to young women and that connect them to the values and purposes of these degrees.
- f) **Development of mentoring programmes within the training itinerary**, developed by women to help female students when choosing their degrees and that help solve their doubts and reluctance.

4.3

Companies and institutions related to the energy transition

Even though we have already commented on the growing commitment of companies to gender equality in their workforces, the qualitative analysis shows that many of the obstacles identified by women, to the development of their professional itineraries in the sector, are found in companies and institutions, in their workplaces, and wherefore these must be responsible for taking measures to prevent discrimination and advance towards less masculinised business cultures. These measures should include actions targeted at:

- a) **Correcting gender gaps** in a company by: identifying them; assessing their negative impacts on women employees and the company itself; analysing the best practices adopted by other industries and organisations; and implementing specific plans for gender equality.
- b) **Attracting female talent** through actions at training centres and through a greater collaboration with agents of the formal education and vocational training systems.
- c) **Retain female talent** through specific actions that favour equal opportunities in professional development, especially by designing transparent selection and promotion processes based on objective criteria, and the work-life balance for men and women. Retaining talent will probably also require opening up modes of management, labour relations and time organisation and management according to different parameters to those already existing.
- d) **Favouring access by women to decision-making positions** and promoting this access in the value chain of all companies.
- e) **Promoting access by women to technical positions** through training and skill development and by facilitating the retraining of women workers for these types of positions emerging in companies and organisations. Likewise, all subsectors of the transition should make a greater effort to eliminate false perceptions about technical manual labour, which increasingly requires less physical strength due to digitalisation and automation.
- f) **Promote campaigns of zero tolerance for sexist comments and attitudes**, making their negative impact visible.
- g) **Promote measures for work-life balance that** involve men and women equally, and evaluate their gender impact beforehand.
- h) **Design and implement mentoring actions** and role models that can defend equal opportunities within companies and institutions.

- i) **Take advantage of the driving effect that large energy companies can have on the cultural transformation of the entire value chain.** The available instruments are various and range from equality plans and affirmative action measures to awareness-raising measures for society and training specifically for women (at their own training schools). This training should favour the selection, hiring, promotion and professional development of women at these large companies or at companies throughout the entire value chain. These actions are already being promoted within the framework of negotiations between social agents.
- j) **Being accountable to stakeholders and to society as a whole** for the actions and progress made in relation to gender equality policies.

4.4

Research and evaluation

- a) **Support the development of more specific research** based on empirical evidence and on adequate statistics, which will provide a better understanding of gender gaps, their causes and effects on women and companies.
- b) **Emphasise evaluations that allow the design of interventions better suited** to the needs of training centres, companies and institutions in their fight against gender gaps in the energy transition.
- c) **Implement the evaluation of results and of the impact** of programmes implemented at the microeconomic level (in companies and institutions) and at the macroeconomic level (in the sector and in its subsectors as a whole).
- d) **Promote the preparation of sex-disaggregated statistics specific** to the energy transition sector, which will make it possible to analyse the evolution of its gender gaps.
- e) **Generate a panel of monitoring indicators**, based on the results of this study and other analyses of interest, which will make it possible to monitor the main gender gaps over time.



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