

# A gendered assessment of EU policies for sustainable energy system (T1.4)

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### 1. Introduction

In the last years, the topic of the relationship between gender and energy has received growing interest from both the academic world and policymakers. However, a research gap still exists in the empirical analysis of energy policy through a gender lens (Carroll, Singh and Mangina, 2022). This is true especially for the Global North, where gender lenses for studying energy-related social dynamics were applied later compared to contexts of the Global South (Clancy and Roehr, 2003). The gender-energy nexus has been overlooked and there appears to be a paucity of literature from the Global North (Johnson et al. 2020).

In this perspective the gEneSys project is contributing to produce new knowledge on the gender and energy nexus. In particular this deliverable is devoted to analysing the EU policies focusing on National Recovery and Resilience Plans (NRRPs), a key policy instrument that supported, among others, the green transition in EU member states.

In this report we present the results of a comparative policy analysis of the National Recovery and Resilience Plans (NRRPs) elaborated by all the EU member states to map out and compare how the different countries have incorporated provisions concerning the 'green deal', gender equality, and the mission to achieve the energy transition. The comparison has paid special attention to whether and to what extent gender equality, diversity, and inclusion have been accounted for, highlighting the dimensions in which gender mainstreaming needs to be strengthened. The Next Generation EU (NGEU<sup>1</sup>) and the new multiannual financial framework 2021-2027 are the largest and most ambitious tools to restart a greener, digital, and sustainable Europe after the Covid-19 pandemic. The Next Generation EU does not only aim to stem the damage caused by the pandemic but envisages real change for member states. Indeed, it is a huge step forward for the integration process, as it is not only a way to reduce the effects of the crisis, but a common long-term development plan. It is an unprecedented effort and an innovative approach, promoting convergence, resilience, and transformation in the European Union. The concern at stake covers two different needs of the EU: on the one hand, the need to repair the damages of the pandemic situation, on the other hand, to improve the future of the next generations and to make Europe greener, digital, and more resilient.

To benefit from the funds allocated by the EU institutions, each member state had to formulate a National Recovery and Resilience Plan, setting out a coherent package of projects and reforms for a greener, more digital, and resilient Europe. The Commission has offered several guidelines and criteria for the member states to shape their NRRP (European Parliament, 2021).

The main priorities settled were the digital transformation and the green transition. Regarding the first one, at least 20% of investments ought to finance the digital transition. The policy reform actions on energy transition contained in the NRRPs are a strategic priority of the European Union. Every NRRP should include no less than 37% of spending on green in line with the ambitious goal of zero emission until 2050. In line with the European Green Deal, the Paris Climate Agreements, and the Fit for 55 commitments, the energy transition measures must focus on three main areas of intervention: energy efficiency, renewable energy, and decarbonization of the industrial sector.

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<sup>1</sup> See: [https://next-generation-eu.europa.eu/index\\_it](https://next-generation-eu.europa.eu/index_it).

The EU aims to reduce energy consumption by 32.5% in the timeframe 2007-2030, and to achieve a 32% share of renewable energy in gross final energy consumption by 2030 (European Parliament, 2023). To achieve this goal, policies have been introduced such as the obligation for member states to reach certain national targets on renewable energy, the promotion of renewable energy through market mechanisms, and support for research and development in this sector.

Several areas of intervention were defined by the Commission as priorities such as:

Employment and smart, sustainable, and inclusive growth: this pillar refers to economic cohesion, inclusive job market, development and innovation, and sustainable firms. A special focus is on employment policy which has to be redefined according to the green and digital transformation.

Social and territorial cohesion: the NRRP must consider local, regional, and national disparities in terms of infrastructure and demography.

Health and resilience: as mentioned above, resilience means the capacity to address and be prepared for future crises. Health is related to the Covid-19 crisis, in which we faced all the vulnerabilities of our system in a pandemic framework.

Policies for the next generation: among other things, such as education and skills, include gender equality. It is worth highlighting that this last area represents a horizontal priority, meaning that it shall be considered in the program assessment and evaluation.

The energy transition was a priority of the National Recovery and Resilience Plans, which must include a series of provisions regarding equality. As pointed out by the European Gender Equality Strategy (2020: 15) “The core challenges affecting the EU today – including the green and digital transitions and demographic change – all have a gender dimension”. The inclusion of a gender perspective in all EU policies and processes is essential to reach the goal of gender equality. We want to understand to what extent this has been acknowledged by EU member states in designing the strategic policy plan defined in NRRPs.

EU member states must promote gender equality and equal opportunities for all, in line with principles 2 and 3 of the European Pillar of Social Rights (EPSR), UN SDG 5, and, where relevant, with the national gender equality strategy (EIGE, 2023). Notwithstanding, the report by EIGE (2023) highlights how Member States did not systematically adopt a gender perspective in measures on green transition funded by the Recovery and Resilience Fund.

With this endeavor, we aim to offer empirical support for the assertion and help bridge the gap in gender analysis concerning the green policies of EU member states, particularly those pertaining to

energy transition, with a specific focus on NRRPs. This undertaking marks the inaugural attempt to conduct a policy analysis on NRRPs from a gender perspective, intending to gauge the extent to which EU countries adhere to the equality principles articulated in national, European, and international gender equality strategies.

The Deliverable is designed as follows. The report will first present an overview of the literature regarding the gender dimensions in EU energy policies. Secondly, it will present the NRRPs' Gender-Energy Assessment Framework (NRRPs GEAF) specifically designed for this task. Thirdly, it will describe the data collection process and the methodology employed in the analysis. Fourthly, we describe the results of the analysis. In the last section, we discuss the results and provide some conclusive remarks.

## 2. An Overview of the Literature on the Gender Dimension in European Energy Policies

The nexus between gender and energy in the context of the energy transition is gaining attention and an increasing corpus of knowledge has been produced in the last decade. Also at policy level, the recent study published by the Joint Research Centre (Murauskaite-Bull et al., 2024) reports that a shift toward implementing energy transition measures according to gender equity principles is underway at different levels. At the international and European levels, the increasing number of policy initiatives and directives demonstrates that there is a political commitment to a just energy transition (Murauskaite-Bull et al., 2024).

From the review of the literature on energy policies, we identified several areas covered: energy poverty, women labour force and the just energy transition concept promoted in the EU.

Concerns about the need for engendering energy policy, however, are not new. More than 25 years ago, Skutsch (1998) noted that the expectations and roles of women and men concerning energy need to be carefully considered. Feenstra (2002) proposed the formulation of a gender-aware energy policy by defining its main characteristics and analyzing under which conditions such a policy can be realized, with a particular focus on South Africa and Uganda.

In recent years, coincidental with the emergence of green, climate, and energy policies and agreements, studies have deepened the link between gender and energy, especially in the form of policy analyses. In 2017, a study commissioned by the European Parliament Policy Department for Citizens' Rights and Constitutional Affairs presented an overview of EU legislation and policy to address energy poverty together with an analysis of the interpretation and implementation of EU legislation at the national level (Clancy et al., 2017). This study found that in the European context, there was little data available on the nexus between gender and energy and a lack of awareness

amongst politicians, advisors, and researchers about the gendered aspects of energy poverty. Indeed, despite the recommendation of the Inter-Agency and Expert Group on Sustainable Development Goals indicators and EP FEMM Committee, this study highlighted the surprising lack of systematic collection of sex-disaggregated data on energy poverty (Clancy et al., 2017).

Two years later, the same EU Parliament Department commissioned a study reviewing the evidence on the role of women in the energy transition in the European Union and assessing the extent to which gender equality was embedded in the process, particularly in relation to the renewable energy sector (Clancy and Feenstra, 2019). The study identified gender inequalities preventing women from the involvement in the energy transition and career advancement in this domain and assessed how the transfer to the sustainable energy model is likely to affect gender equality and the role of women as actors of change (Clancy and Feenstra, 2019). The gender inequalities identified by this study concern the access to energy, the energy sector workforce and the energy decision-making process (Clancy and Feenstra, 2019).

The claim made by these studies is that to reduce the existing gender inequalities in the energy sector, as well as to allow both men and women to reap the benefits of the energy transition, and to avoid reproducing or even worsening such inequalities, policies considering the gender issues within the energy sector are needed. However, there is still a consistent research gap in the empirical analysis of macro-level energy policy through a gender lens (Carroll, Singh and Mangina, 2022), especially in the Global North where the attention to the gender dimension has been mainly posed on understanding how gender is related to energy poverty and how to increase women participation in the energy sector workforce (Carroll, Singh and Mangina, 2022).

One of the most relevant and comprehensive analytical efforts to bridge the gap of knowledge is carried out by Feenstra and Özerol (2021). The authors develop and apply a gender-just energy policy framework that allows for the systemic analysis and comparison of national energy transition policies. The gender-just energy policy framework encompasses provisions for engendering the energy policy (women empowerment, gender mainstreaming, social inclusion) and for including in its energy justice principles (recognitional, distributional, procedural).

Some analyses have been recently performed on European energy and climate policies and their implementation by EU member states. In particular, the National Energy and Climate Plans (NECPs) have been the most investigated. Feenstra and Özerol (2021) analysis of five national case studies concerning energy justice (Bulgaria, France, the Netherlands, Spain, and Sweden) concluded that these countries' NECPs mostly do not use gender-disaggregated data nor a gender mainstreaming approach, but they employ a general social inclusion approach. This approach, however, does not allow to address gender-specific needs and challenges.

Another recent gender assessment of the Fit for 55 package (the EU's target of reducing net greenhouse gas emissions by at least 55% by 2030), found that there has been some attempt to include a gender dimension, however, there is limited recognition of gender and other social categories in terms of the potential impacts of the initiatives contained in the package, as well as the roles that different groups of citizens can play in making the energy transition work (Clancy et al., 2022).

EIGE (2023) also reached similar conclusions with its recent report, *Gender Equality Index 2023. Towards a green transition in transport and energy*. The thematic focus of this report is precisely on the green transition linked to energy systems and transport. The report shows a picture in which current European policies have not truly integrated the gender perspective as promised, risking an EU-funded gender-blind green transition.

The European Green Deal seems not to have comprehensively recognized the connection between its policy areas and gender equality. The commitment of the Commission to mainstream gender into all its major initiatives is represented by the European Gender Equality Strategy (European Commission, 2020) as well as flagship project funded under the Technical Support Instrument (TSI). Notwithstanding such commitment, EU member states' energy strategies takes a weak stand on gender equality (EIGE, 2023).

European energy policies are dominated by men even quantitatively: although 43% of senior ministers with responsibilities for energy in EU member states are women (EIGE's data from November 2022), the representation of women in national parliamentary committees working on energy was only 29% in September 2022 (EIGE, 2023). Furthermore, the report states that Member States did not systematically adopt a gender perspective in measures on green transition funded by the Recovery and Resilience Fund (EIGE, 2023), and this seems to contradict EU policy to mainstream gender into all aspects of the budget.

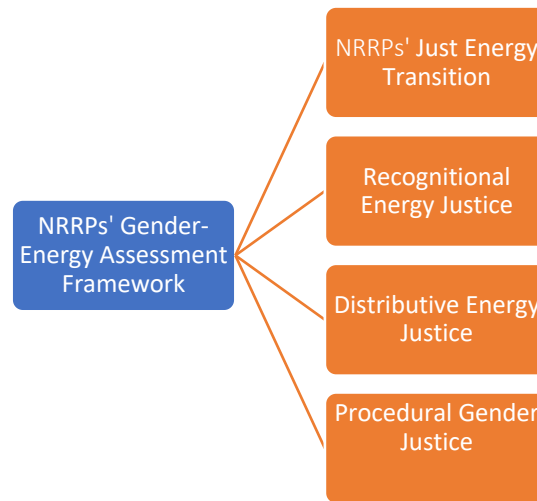
With this work, we propose to provide evidence to support this statement and contribute to filling the gap in gender analysis of European green policies, especially those focused on energy transition.

### 3. NRRPs' Gender-Energy Assessment Framework

In this section, we present the analytical framework developed to analyze the NRRPs. Our framework is built upon the framework proposed by Feenstra and Özerol (2021) for the analysis of NECPs. Taking from there, we added the clusters identified in the systematic literature review of the gender-energy nexus carried out in Task 1.1 of the gEneSys project (gEneSys, 2023). These clusters included:

Transition to modern energy, Behaviors, Knowledge, Employment, Health, and Empowerment (for a complete explanation of the clusters, see gEneSys, 2023).

Figure 1: NRRPs' Gender-Energy Assessment Framework and its dimensions



Source: authors' elaboration

The NRRPs' GEAF consists of 4 dimensions (Figure 1), each of which is composed of different sub-dimensions (6 in total) and indicators (12 in total). Each indicator can be broken down into one or more questions (19 questions in total). The dimensions are: 1) Just Energy Transition; 2) Recognitional Energy Justice; 3) Distributive Energy Justice; 4) Procedural Gender Justice (Figure 1). Below we describe each dimension, sub-dimension, and related indicators and research questions.

### 3.1 NRRPs' Just Energy Transition

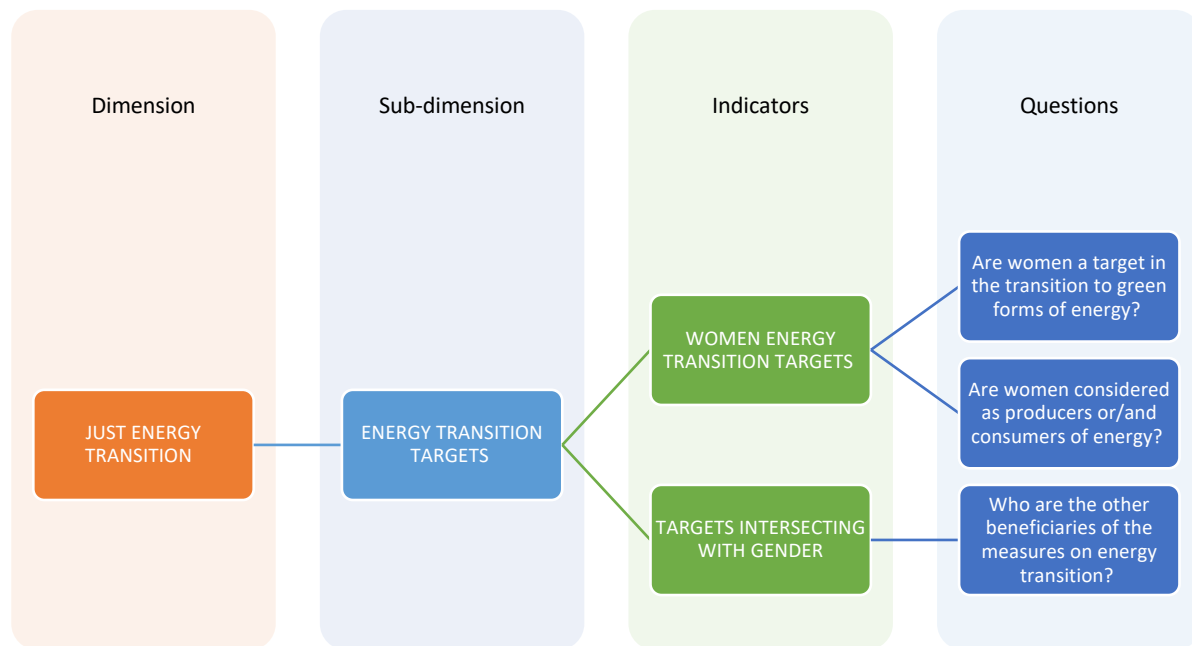
The first dimension, NRRPs' Just Energy Transition (Figure 2), refers to the general structure of the energy transition targets and main beneficiaries. The term "Just" refers to the social equity that the energy transition must aim for, in addition to the objectives of environmental and climate sustainability. The International Labour Organization define a Just Transition as greening the economy in a way that is as fair and inclusive as possible for everyone concerned, creating decent work opportunities and leaving no one behind (ILO, 2024). The meaning of Just Transition of the EU commission operationalized by the Just Transition Mechanism (JTM) and its first pillar, the Just Transition Fund (JTF), is broad, referring to the concept of justice between territories differently impacted by the transition towards climate neutrality (EU Commission, 2024). A just transition, according to the EU Commission, can reduce regional disparities (EU Commission, 2024).

The energy sector has so far been characterized by processes of social and gender exclusion. A recent study funded by the European Climate, Infrastructure and Environment Executive Agency (Gareis, 2023), confirms how women are still underrepresented in the energy sector workforce within EU



countries. The persistent gender inequalities in the energy sector have been summarised as: gender gaps in energy access; gender gaps in the energy labour market; gender gaps in energy-related education; and gender gaps in decision-making (EIGE, 2016). “A just and inclusive transition should enable and even encourage stronger engagement of women in the energy workforce by promoting and supporting women’s roles as engineers, policymakers, and entrepreneurs” (United Nations, 2021: 33).

Figure 2: NRRPs’ Just Energy Transition dimension of the analytical framework



Source: authors' elaboration

### 3.1.1 Energy Transition Targets

The Energy Transition Target indicator defines the beneficiaries of the measures financed by the plans. First, with a gender lens, this indicator allows us to recognize in which NRRPs women are acknowledged as a specific target group.

#### Women as energy transition targets

Here, we focus on the roles implicitly assigned to women within each plan in the context of the energy transition. More specifically, we examine whether women are mostly depicted as beneficiaries of initiatives and innovations (energy consumers) or as agents of the ongoing transformation efforts (energy producers). To identify women as energy consumers, we have taken into consideration the presence in the plan of measures concerning access to energy (e.g., subsidies) or measures to support energy consumers (e.g., energy bonus for energy efficiency) specifically aimed at women. To identify women as energy producers, we have considered two strongly connected aspects: measures to

increase the number of women trained in STEM subjects and measures aimed directly at encouraging the presence of women in the energy labour market. The extent to which each indicator is covered in the plans is analysed in a disaggregated form in the section relating to Distributive Energy Justice (see below, sub-section 3.3).

#### Targets intersecting with gender

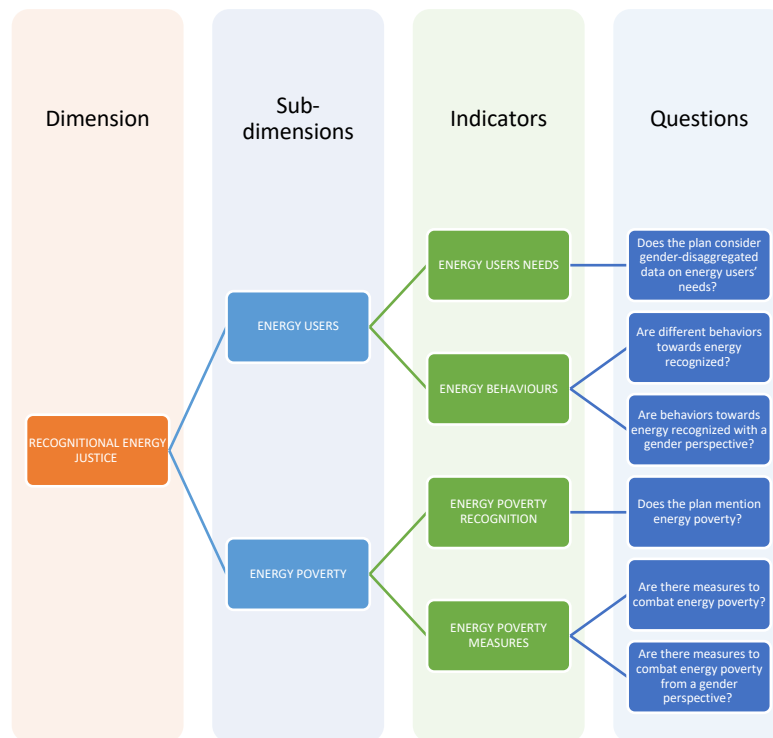
By adopting an intersectional lens, we evaluate whether gender intersects with other inequality axes (e.g., disability, class, ethnicity, race, age, nationality, etc.). The questions that guided the data extraction on this aspect are therefore the following: (i) Are women mentioned as a target in the energy transition? (ii) Are women considered as producers or/and consumers of energy? Are women considered with other intersectional axes? If women are not mentioned, who are the stated beneficiaries of the measures on energy transition?

### 3.2 Recognitional Energy Justice

The second dimension of the framework, Recognitional Energy Justice (Figure 3), focuses on the extent to which the plans recognize the gender-differentiated needs and behaviours of energy consumers and highlights the gendered aspects of energy poverty. The challenge is to go beyond the level of the household understood as a monolith, to be able to recognize the needs and behaviors at an individual level, and thus discern gender inequalities - together with other axes of inequality - inherent in energy poverty. Addressing inequalities at this level is critical for a gender-just energy transition (Feenstra and Özerol, 2021: 89).

The sub-dimensions that compose Recognitional Energy Justice are: 1) energy users, whose indicators are energy users' needs and energy behaviours, and 2) energy poverty, whose indicators are energy poverty recognition and energy poverty measures.

*Figure 3: Recognitional Energy Justice dimension of the analytical framework*



Source: authors' elaboration

### 3.2.1 Energy Users

The central idea driving this sub-dimension is that energy consumption is not gender-neutral and it is determined by social norms that in turn regulate behaviour and influence the needs of individuals. As several studies show, gender roles come into play in energy consumption, e.g., women spend more time than men on domestic work related to energy consumption, while men have more decision-making power regarding the technologies in the household. The fact that gender differences have a differentiated impact on energy consumption implies that the costs and benefits of the energy transition will also be distributed differently among genders.

At a policy level, therefore, Recognitional Energy Justice requires that energy users are recognized as subjects with different needs and behaviours concerning energy (for more on the relevant literature, see Feenstra and Özerol, 2021: 85).

#### Energy users' needs

The energy users' needs indicator is aimed at detecting whether gender-disaggregated data on needs related to energy consumption are used to draft the plans (data on energy consumption rates by gender). For an energy policy to be gender equitable, there needs to be a recognition that women and men have different energy needs in their daily lives (Clancy and Feenstra, 2019).

This indicator allows us to probe the following question: Do the NRRPs include gender-disaggregated data on energy users' needs?

### Energy behaviours

The energy behaviour indicator assesses whether the differences between women and men regarding behaviours related to energy are recognized in the NRRPs. This indicator allows us to explore the following: Are different behaviours towards energy recognized?

#### 3.2.2 Energy Poverty

Energy poverty is a complex, multidimensional concept, which has been defined differently by authors from countries with different energy contexts; therefore, even the indicators for measuring it and the discussion of its causes are not homogeneous in the literature. In the effort to combine the different definitions and embrace the different meanings of energy poverty, we consider energy poverty as the inability of a household to secure a socially and materially required level of energy services in the home (Bouzarovski and Petrova, 2015). Energy poverty has been largely explored in the context of the Global South where barriers to energy access are linked to poor infrastructure and low incomes, but it has been scarcely studied in Europe. As a result, there is only limited data available on gender and energy poverty in Europe (Clancy et al., 2017).

However, the data that is available shows that energy poverty exists in all countries in the EU; although the highest levels of energy poverty are recorded in the countries of Eastern and Southern Europe (Clancy et al., 2017). A recent review of the literature shows that the distribution of energy poverty is linked to social and geographical dimensions of inequality. For example, energy poverty is prevalent among women -particularly in Mediterranean and Eastern EU countries- elderly people, disadvantaged social classes and low-income people, and among those living in certain territories of Europe mainly Mediterranean, Eastern European countries, and certain areas of Greece (Ballesteros et al., 2022).

### Energy poverty recognition

Energy poverty became part of the vocabulary of the EU institutions in 2009 with the formulation of the Third Energy Package (Bouzarovski et al., 2012). Electricity Directive (2019/944) is the earlier legislation referring to the concept of energy poverty (Clancy et al. 2017; Widuto, 2023). This directive obliged the Commission to guide the definition and calculation of the number of households in energy poverty (Article 29). Also, the Natural Gas Directive (2009/73/EC) refers in similar terms to energy poverty and vulnerable consumers. These EU Directives generally mention vulnerable consumers, but these are not clearly defined and identified in gender terms (Clancy et al. 2017). Energy poverty is also

mentioned in the *Clean Energy for all* Europeans package proposed (2016); as well as in the Regulation on the Governance of the Energy Union and Climate Action (the Governance Regulation, 2018/1999) (Widuto, 2023). The NRRPs fit into this growing recognition of energy poverty as a problem to be addressed at a community and national level. Based on the above, we focus our analysis on understanding the following: does the plan mention energy poverty? Does the plan mention energy poverty with a gender perspective?

#### Energy poverty measures

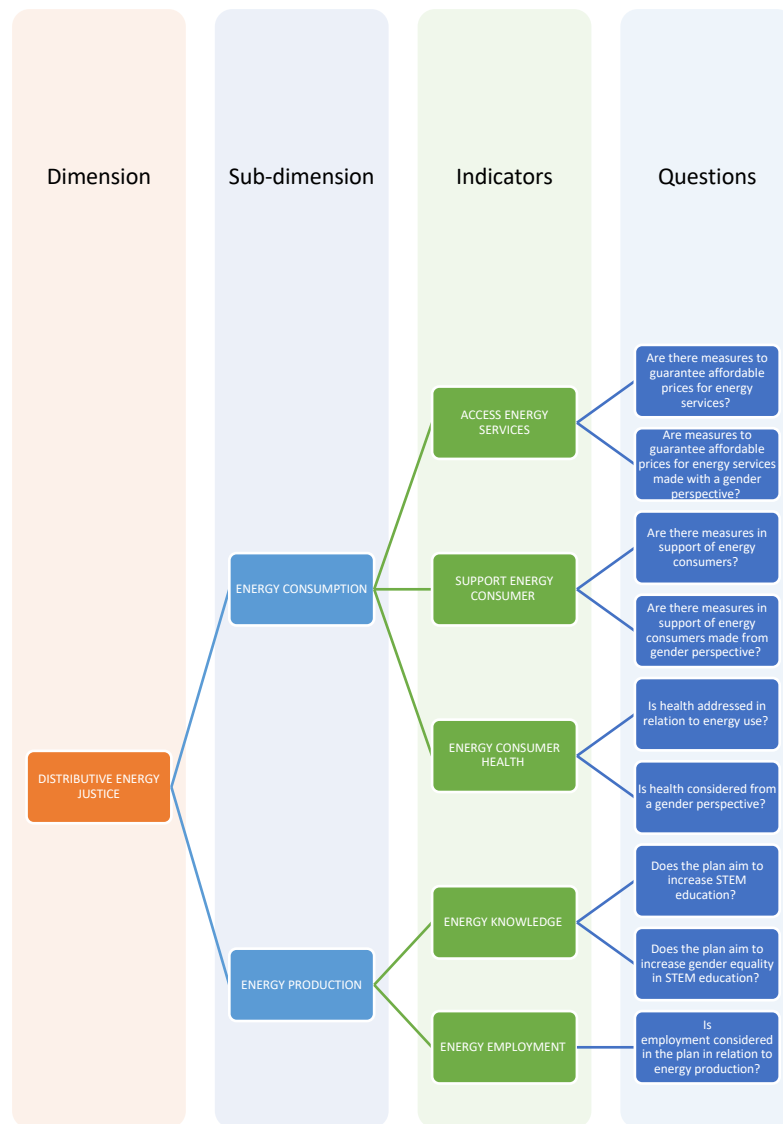
The corollary of the recognition of energy poverty is the formulation of measures to reverse it. The Energy Efficiency Directive and Energy Efficiency of Buildings Directive require measures to alleviate energy poverty. The 'renovation wave' initiative under the European Green Deal aims to boost structural renovation in private and public buildings, while the Social Climate Fund includes households in energy poverty among its main beneficiaries (Widuto, 2023). Measures to alleviate energy poverty are also present in the NRRPs, but here we are interested in investigating whether these are formulated from a gender-sensitive perspective. We therefore investigate the following question: Are there measures to combat energy poverty with a gender perspective?

### 3.3 Distributive Energy Justice

The third dimension of the framework, Distributive Energy Justice, is central as this is where the presence - or conversely the absence - of gender-sensitive energy measures in the NRRPs is concentrated. Distributive justice identifies where the injustices in the energy system are located in terms of the access to energy services, in the labor markets; and in the multi-level governance (Jenkins et al. 2016). By Distributive Energy Justice we mean investigating how the resources, incentives, and opportunities linked to energy transition are distributed among the different participants in energy transition.

Womens' role in energy transition has been defined as agents of change. There are three roles they could have as change agents: energy consumers, energy professionals, and energy decision-makers (Clancy and Feenstra, 2019). In this framework, we focus on the first two, which emerge from the analysis of two indicators: energy consumption and energy production.

*Figure 4: Distributive Energy Justice dimension of the analytical framework*



Source: authors' elaboration

### 3.3.1 Energy Consumption

The energy consumption indicator helps to inform the framework on the dimension of Distributive Energy Justice through a gender lens as it allows to identify unequal energy access of women and men (Feenstra and Özerol, 2021: 91). From this perspective it is possible to recognize whether the issue of unequal access to energy based on gender is addressed in the NRRPs.

#### Access to Energy Services

The energy consumption that we are interested in analysing, as suggested by Feenstra and Özerol (2021: 91), is that relating to the micro-level of the private sphere of individuals and households. The indicator named “Access to Energy Services” is intended to measure the presence of measures (e.g. subsidies) in the NRRPs that guarantee affordable prices for energy services from a gender perspective. The related research questions are the following: Are there measures to guarantee

affordable prices for energy services? Are these measures formulated taking gender differences into account?

In addition to distributive justice in access to energy for consumers, there is also the aspect of consumer support, for example in terms of energy efficiency bonuses, housing renovation/reconstruction loans, grants, incentives, and all measures that promote energy savings for consumers. Therefore, another analysis indicator of energy consumption is “support energy consumer” and the associated question is: Are there in the NRRPs measures in support for energy consumers made with gender perspective?

### Energy Consumer Health

Gender differences in energy consumption intersect with the dimension of energy poverty. One of the impacts of energy poverty on energy consumption can be found in health. This brings us to the indicator "Energy Consumer Health". Worldwide, women and children accounted for over 60% of all premature deaths from household air pollution (HAP) related to the combustion of fuel for cooking in 2012 (WHO, 2016). For women in Low- and Middle-Income Countries, HAP is the single leading cause of noncommunicable diseases like stroke, chronic obstructive pulmonary disease, lung cancer, and heart disease (WHO, 2016). In the Global South, many households rely on wood and other forms of biomass which is strongly associated with health issues for women (Clancy et al., 2017).

A scoping review recently carried out on the state of knowledge on the energy poverty-health nexus, shows the negative effect of energy poverty on physical and mental health and its association with higher odds of being exposed to health risks such as indoor inadequate temperatures, allergens, increased risk of mouldy and damp conditions, or food insecurity (Ballesteros et al., 2022). This review also shows that the distribution of energy poverty and its effects on health are linked to dimensions of inequality. Higher energy poverty prevalence is found among women -particularly in Mediterranean and Eastern EU countries-, elderly people, disadvantaged social classes and low-income people, and those in certain territories of Europe -mainly Mediterranean, Eastern countries, and certain areas of Greece (Ballesteros et al., 2022).

### 3.3.2 Energy Production

The other aspect of Distributive Energy Justice concerns energy production, which includes knowledge of technological innovation on the one hand, and employment opportunities in the sector on the other. In terms of employment, the energy sector is one of the most gender-imbalanced sectors in the economy globally and within the European Union (Clancy and Feenstra, 2019). At the same time, it is one of the sectors where strong growth is expected in the near future. It is estimated that globally the

number of jobs in renewables will increase from 10.3 million in 2017 to nearly 29 million in 2050 (IRENA, 2019).

### Energy knowledge

In addition to the gap in the employment sphere, it is also essential to address the root of the problem, which lies in the gender gap in energy-related education, with the small number of women with an educational background appropriate for a technical career in the energy sector (Clancy and Feenstra, 2019). The need to include women in education careers related to the energy sector is also confirmed by the CEDEFOP (2024) Skill forecast and projections on the future trends in employment, which indicates that such competences will be increasingly required in the next future.

We therefore considered it necessary to explore to what extent the plans are aimed at increasing and strengthening STEM education and doing so according to gender equality criteria. The “Energy Knowledge” indicators and the related questions (“Does the plan aim to increase STEM education?” and “Does the plan aim to increase gender equality in STEM education?”) are used here to collect data on the presence of measures aimed at reducing the gender gap in science, technology, engineering and mathematics education.

### Energy employment

With the "Energy Employment" indicator and the related question "Does the plan aim to explicitly increase the presence of women in the energy labour market?", we try to shed light on the degree to which the NRRPs have taken into account the gender gap in the energy labour market.

## 3.4 Procedural Gender Justice

The last dimension of the analytical framework is Procedural Gender Justice which relates to the decision-making process that led to the development of the plans. We referred to Jenkins et al. (2016) interpretation of procedural justice understood as a fair policy process in which all groups and stakeholders can equally participate in decision making. The three mechanisms of inclusion identified to achieve procedural justice are local knowledge mobilization, greater information disclosure, and better institutional representation (Jenkins et al. 2016).

In the framework built by Feenstra and Özerol (2021), this dimension is defined as Procedural Energy Justice, but in this work, it has been redefined as Procedural Gender Justice. Indeed, it was not possible to infer the participation of groups and organizations focusing on gender equity specifically in the design of energy-related measures. We have therefore considered the participation of these groups in the formulation of the overall plan, as reported in the Consultation Process section of the document.



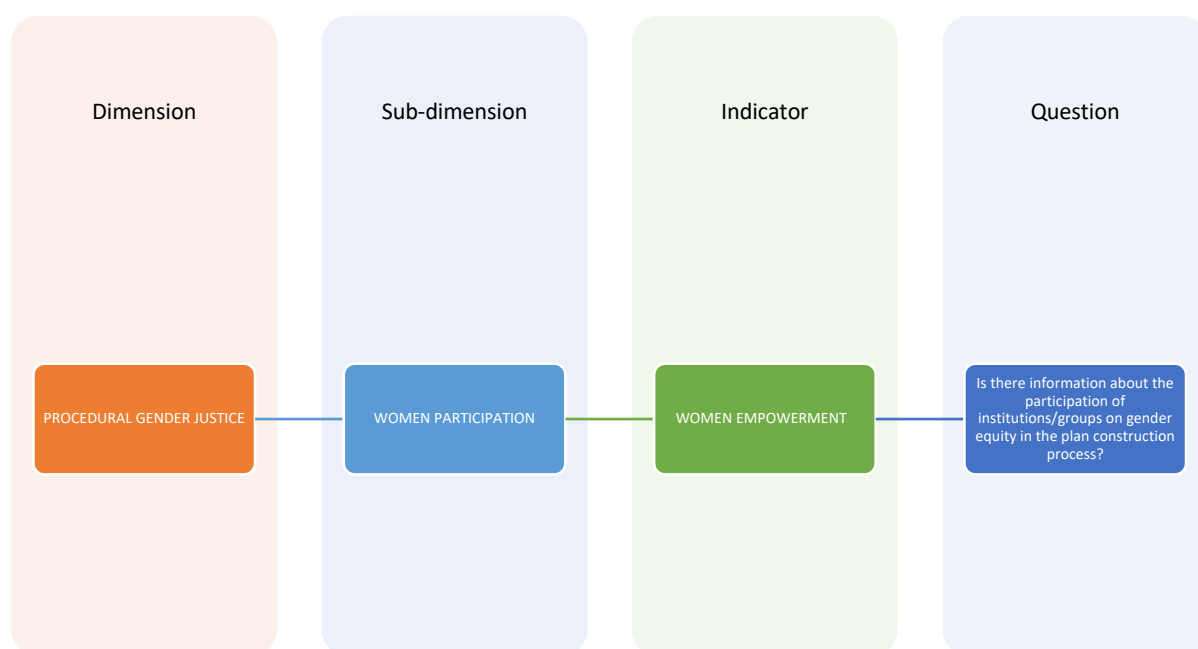
### 3.4.1 Women participation

The sub-dimension of Procedural Gender Justice included in this framework is women's participation, that is the involvement of institutions/groups on gender equity in decision-making processes related to the formulation of the NRRPs.

#### Women empowerment

To ensure that women become active contributors to energy transition efforts, they must participate in policy decision-making processes. Thus, this indicator aims to detect the aspect of female empowerment and to explore the question: Is there any reference to the participation of institutions/groups on gender equity in the process of the plan's design?

Figure 5: Procedural Gender Justice dimension of the analytical framework



Source: authors' elaboration

## 4. Methodology

We conducted a comparative policy analysis of all European countries' NRRPs on the energy transition and gender equality nexus. To this end, we decided to analyse the original version of the NRRPs<sup>2</sup> rather

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<sup>2</sup> The original version of the plans was found from the official website: [https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages\\_en](https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages_en)

than the revised ones in order to capture the countries' positions before the revision by the EU Commission.

We retrieved the original version of the NRRPs from the EU-dedicated website<sup>3</sup>. Since most of the plans retrieved from the EU website were in the countries' official language and due to time and budget constraints, we opted to translate all plans to English using automatic translation services, in particular Google Translator. To code and analyse the information, we purposively created an NRRPs GEAF that built on the *Gender just energy policy framework* elaborated by Feenstra and Özerol, (2021) and integrated the clusters identified in Deliverable 1.1. of the gEneSys Project (gEneSys, 2023).

Once the framework has been finalized, we proceeded to the collection of the information from the NRRPs. Due to their qualitative nature, data have been manually collected, by the means of an Excel matrix, by the CNR team members. Operatively, it has been created with each row representing a country and each column representing a dimension identified in the framework, with each dimension containing one or more indicators. A set of NRPPs was first randomly assigned to each CNR team member for scrutinization and then re-assigned to another team member for cross-validation.

Qualitative data collected from the NRRPs have been combined with some quantitative data retrieved from different sources. In particular, the 2023 EIGE gender equality index has been retrieved from the EIGE website<sup>4</sup>. The EU Recovery and Resiliency Scoreboard<sup>5</sup> was used to gather data on the total grants allocated to each country, the ratio between funds allocated and countries' GDP, the share of the plan's estimated expenditure contributing to green transition, and the share of NRRPs' measures with a focus on gender equality<sup>6</sup>.

Data have been analyzed with a mix of qualitative and quantitative methods. From a qualitative perspective, we performed a content analysis of the plans against the dimensions, subdimension, and indicators identified in the framework. It is worth highlighting that, when mentioning parts off the plans, the citations are English translations of the original documents and therefore they should not be considered as textual quotations.

On the other hand, from a quantitative perspective, we calculated the frequencies of occurrence of the dimensions and indicators identified in the framework and created an index that assessed the extent to which NRRPs incorporated the gender dimension as part of their energy transition measures.

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<sup>3</sup> [https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages\\_en](https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages_en)

<sup>4</sup> <https://eige.europa.eu/gender-equality-index/2023>

<sup>5</sup> [https://ec.europa.eu/economy\\_finance/recovery-and-resilience-scoreboard/index.html?lang=en](https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/index.html?lang=en)

<sup>6</sup> [https://ec.europa.eu/economy\\_finance/recovery-and-resilience-scoreboard/index.html?lang=en](https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/index.html?lang=en)

The index has been created by assigning equal weight to each of the twelve gender-related indicators of the analytical framework and normalizing the values to a base of 100 according to this formula:

$$\text{Framework Index} = \left(\frac{100}{12}\right) * X$$

where X is the number of framework dimensions incorporating a gender perspective within each NRRP. The index, therefore, can vary from a minimum score of 0 to a maximum score of 100.

Also, we correlated our index with the EIGE index to verify whether the countries that performed well on the latter matched with the ones that exhibit better performances on the former.

## 5. Analysis

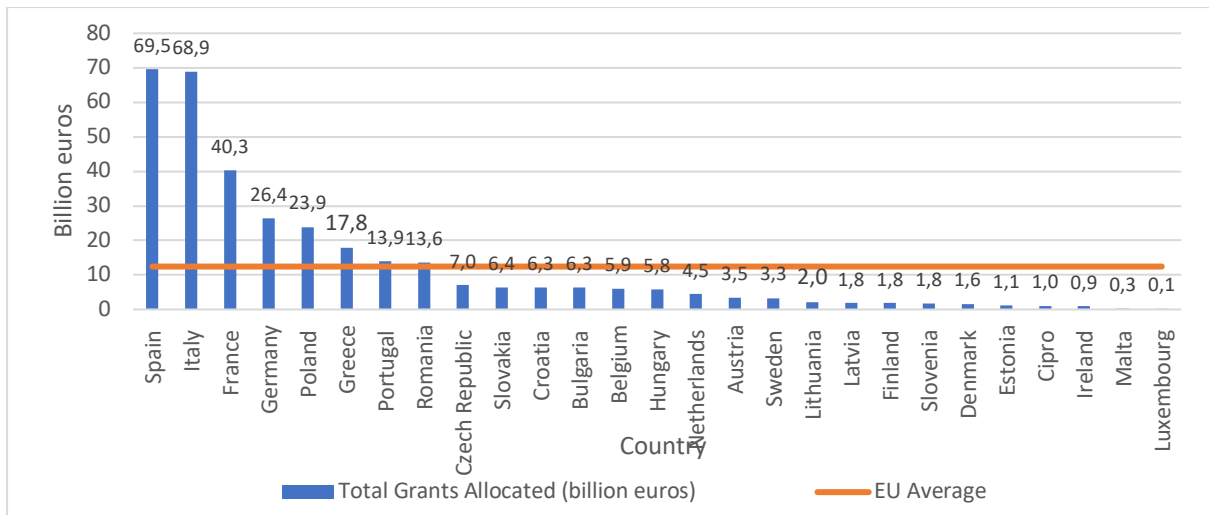
In this section, we present the results of the analysis. The data is presented against the structure of the analytical framework elaborated. Therefore, the section will delve into the following topics: Fund allocation, General Data, NRRPs Just Energy Transition, Recognition Energy Justice, Distributive Energy Justice, and Procedural Gender Justice.

### 5.1 Funds Allocation

Before moving to the analysis of the plans we report available data concerning the economic dimensions of the plans. This provides a picture of the amount of funds requested by each country and how the different countries decided to allocate them based on their priorities.

The NRRPs allocate huge resources precisely for the shift to renewable energy, energy efficiency and for the decarbonization of industries; in fact, at least 37% of total resources of each NRRP had to be allocated to finance measures for the green transition (Article 3 of the RRF Regulation). In particular, the plan envisages measure related to, for example, the creation of new renewable energy installations, the modernization of electricity networks, and the support of R&D in this sector in addition to investments to improve the energy efficiency of buildings, transport, and industries; incentives for the purchase of electric vehicles.

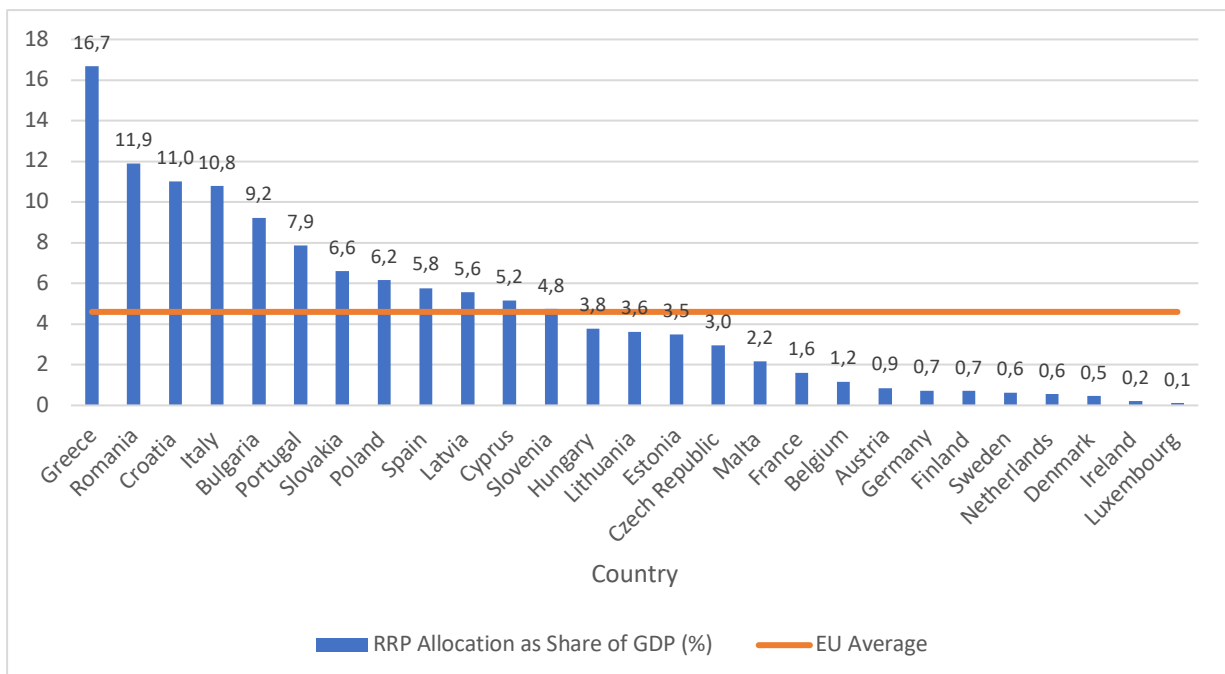
*Figure 6: Total Grants Allocated in the NRRPs (billion euros)*



Source: Authors' elaboration

Figure 6 shows the total funds allocated for each NRRP in billion euros. Data illustrate how the amount of funds granted to each country varies considerably from 0.1 billion to Luxembourg to 69.5 billion to Spain, with an average EU allocation of 12.4. Eight countries out of twenty-seven received a total amount of funds higher than the average, with Spain, Italy, France Germany, and Poland receiving twice or more than the average value.

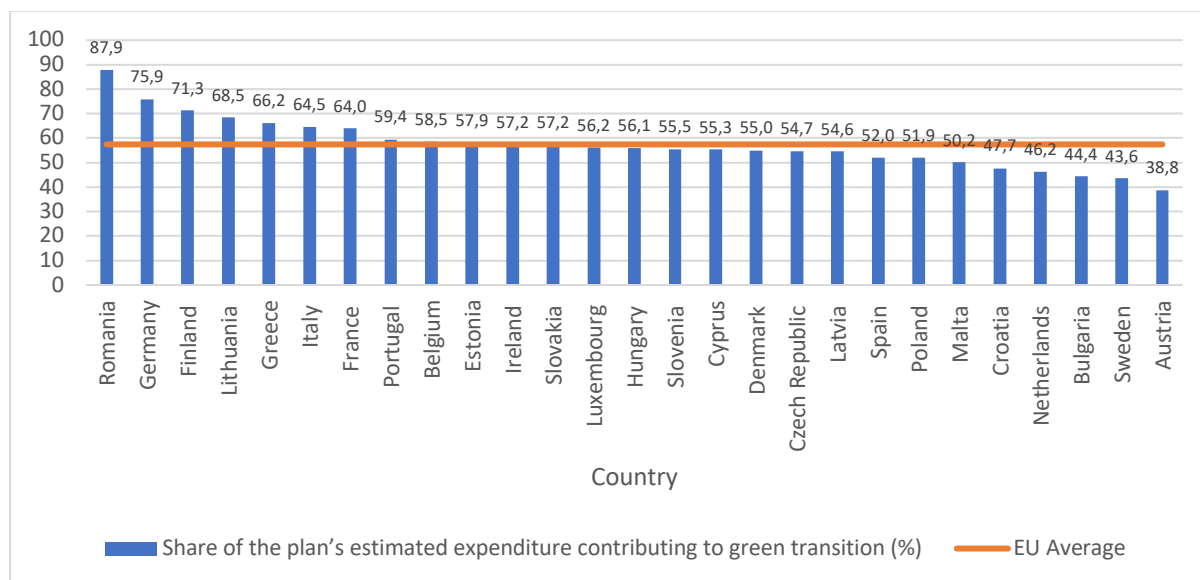
Figure 7: NRRPs' Allocation as Share of GDP (%)



Source: Authors' elaboration

Looking at the NRRPs allocation in terms of countries' GDP, Figure 7 shows how the average share of GDP allocated is 4.6 varying from 0.1 for Luxembourg to 16.7 for Greece. The allocation of funds, therefore, seen through the lens of the share of countries' GDP seems to be less skewed and more equilibrated.

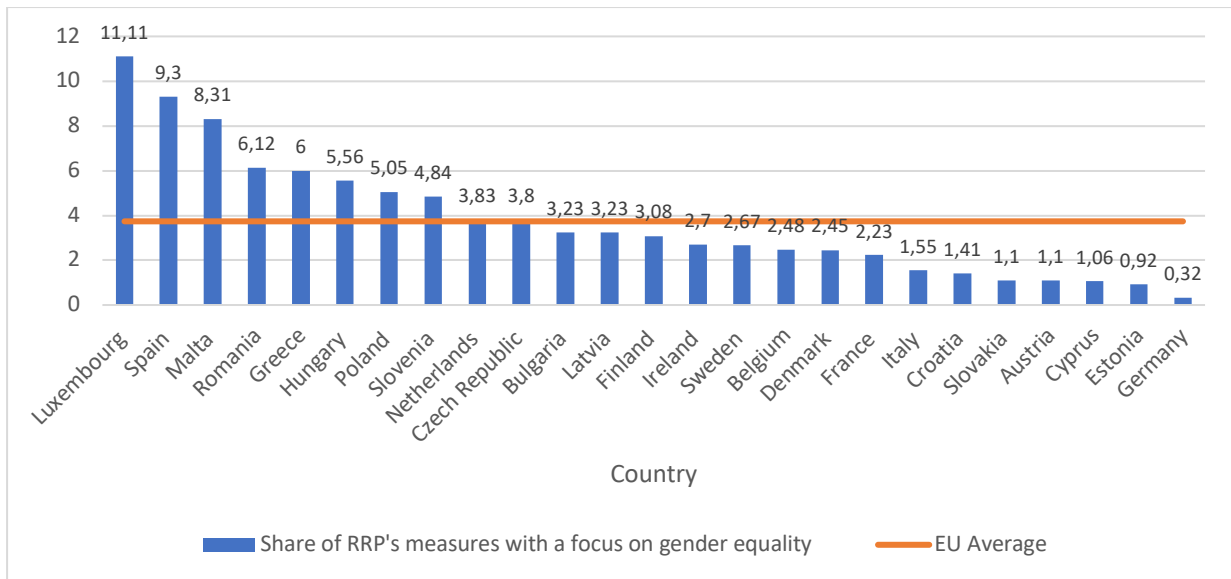
Figure 8: Share of NRRPs estimated expenditure contributing to green transition (%)



Source: Authors' elaboration

Figure 8 reports the data on the share of the plans' estimated expenditures devoted to the measures for the green transition. In light of the fact that each country had to compulsorily allocate at least the 37% of total resources to measures for the green transition, it is interesting to note that some countries such as Austria, Sweden, and Bulgaria devoted a share of the total funds close to the required minimum (respectively 38.8%, 43.6% and 44.4%) while others such as Romania and Germany went well beyond doubling the required budget (respectively 87.9% and 75.9%). Overall, the share of the total budget allocated for the green transition has been relatively high across all the EU countries with an average of 57.43%.

Figure 9: Share of NRRPs measures with a focus on gender equality



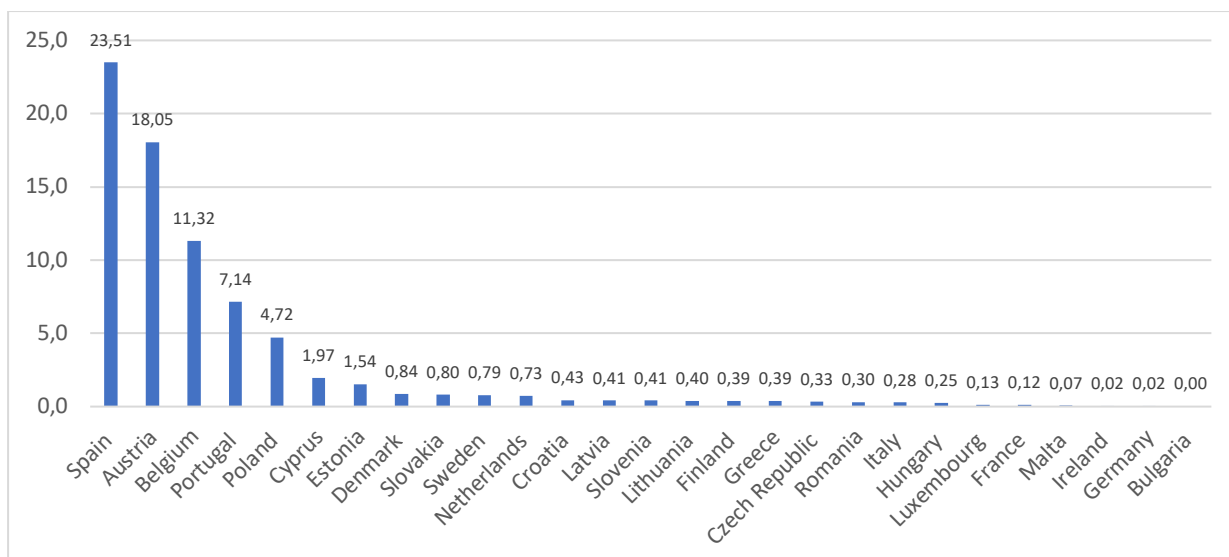
Source: Authors' elaboration

Figure 9 reports the data on the share of NRRPs' total funds allocated to implement measures aimed at increasing gender equality. It is important to stress that these data refer to all the measures foreseen in the NRRPs and not only those concerning the energy transition. However, the Figure shows how the percentage of resources within the RPPs dedicated to increasing gender equality considerably varies among EU countries from 0.32% of Germany to 11.11% of Luxembourg, with an average of 3.73%.

## 5.2 General Data

To assess to what extent the gender dimension was considered within the NRRPs, for each country we calculated the number of entries that appeared in the documents for the terms “gender”, “woman”, “women”, “female” and “sex”. Given the different lengths of the NRRPs we normalized the values for the number of words of each NRRP and we multiplied it by one thousand for the sake of better visualization. Data are reported in Figure 10.

Figure 10: Number of entries for the terms “gender”, “woman”, “women”, “female” and “sex” by countries' NRRPs



Source: Authors' elaboration

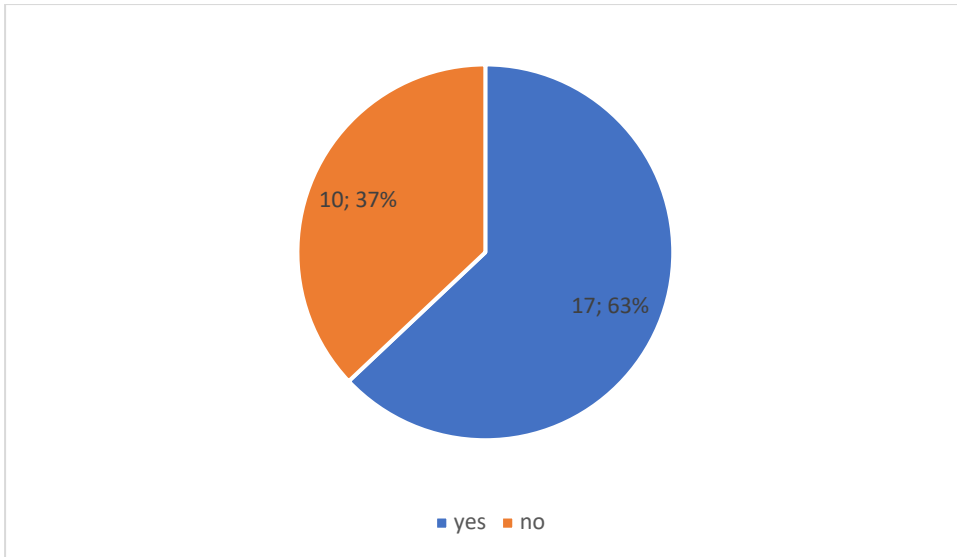
Concerning the terms considered, the analysis shows that their usage varies from 0 per thousand of the Bulgarian RRP to 23.51 per thousand of the Spanish RRP. Five countries (Spain, Austria, Belgium, Portugal and Poland) employed the considered terms more than 4 times per thousand while four countries (Bulgaria, Germany, Ireland and Malta) employed it equal to or less than 0.1 times per thousand. It is worth stressing that the number of the terms “gender”, “woman”, “women”, “female” and “sex” employed are referred to the entire NRRPs and not only to the parts devoted to the energy transition.

### 5.3 NRRPs' Just energy transition

As mentioned in the introduction, the components of the NRRPs referring to the energy transition are framed in the European macro-objectives such as the net zero target by 2050. Therefore, all the plans, even though with different degrees of details contain measures related to the just transition inscribed in the European mandate of climate neutrality, low carbon economy, and energy efficiency. The main forms of energy mentioned in the plans are green hydrogen, solar, wind, biomass, and geothermal.

In the NRRPs, gender equality is treated as an issue that cuts across all the plan's components. Despite this, our analysis revealed that gender appeared more frequently in the plan in relation to macro-themes such as social care, employment, disability, and health. Unsurprisingly, these are also the themes traditionally more linked to social vulnerability. Conversely, innovation and sustainability themes, of which the energy transition is a concrete example, are less gender sensitive.

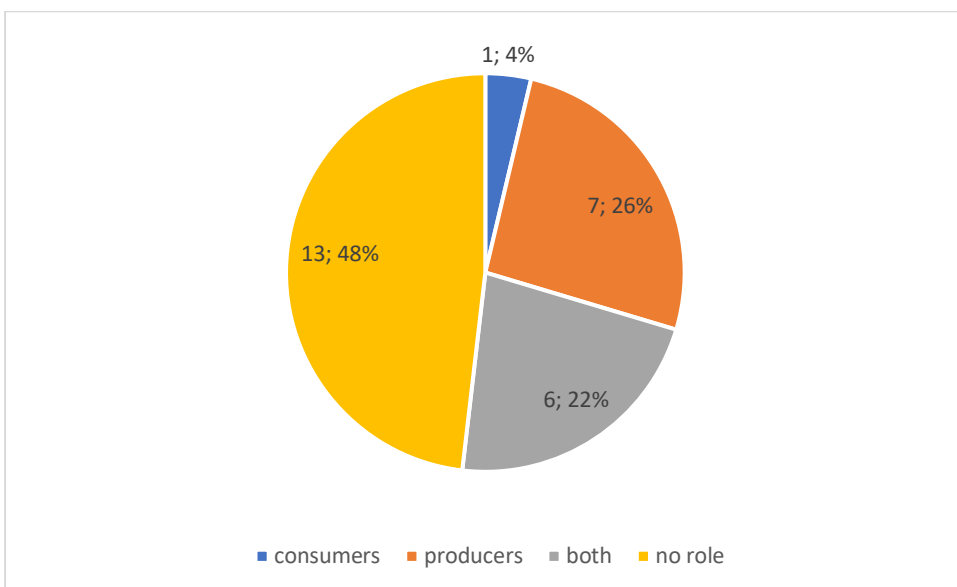
Figure 11: NRRPs in which women appear as beneficiaries of the measures for the energy transition



Source: Authors' elaboration

As shown in Figure 11, women are mentioned as beneficiaries of measures linked to the different dimensions of the energy transition in just over half of the NRRPs (17 countries, 63%). 10 countries (Bulgaria, Finland, France, Germany, Greece, Hungary, Lithuania, Luxembourg, Malta, Poland, and Romania) which account for the 37% of the total do not highlight gender and gender equity as a relevant aspect of the energy transition.

Figure 12: Role of women in energy transition according to the NRRPs

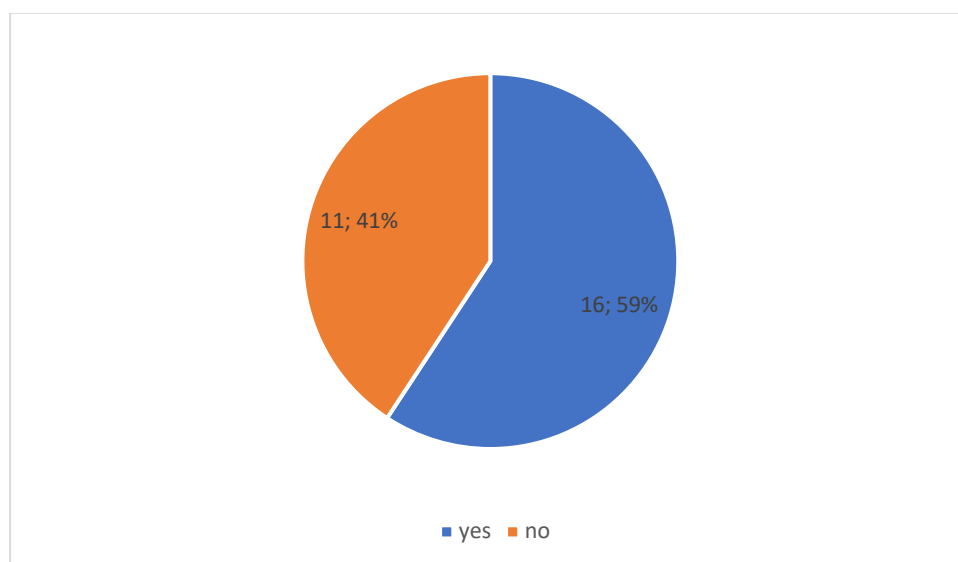


Source: Authors' elaboration



Another important consideration that came out from our analysis pertains to the representation of women in the energy transition. As reported in Figure 12, the NRRPs analysis shows a picture of the European energy transition in which women are not considered either as consumers or producers (13 NRRPs, 48%). Notwithstanding, in other countries women are depicted either as energy producers (7 NRRPs, 26%), consumers (1 NRRP, 4%), or as both energy consumers and producers (6 countries, 22%). It is interesting to note that, among the NRRPs accounting for the role of women in energy transition, with the exception of Netherlands, women are depicted not only as consumers but also as agents of change, with an active role in the energy production and the technology development sectors.

*Figure 13: Targets intersecting with gender in energy transition NRRP's measures*



*Source: Authors' elaboration*

In 16 NRRPs (59%), gender inequalities are considered, through an intersectionality lens, alongside several other axes of inequality. The most mentioned are the following: being a single parent, having a disability, economic status, ethnicity, migrants, age, youth, nationality, and regional divide (Figure 13).

The Estonian Plan, for instance, recognizes the need for intersecting gender with several other characteristics. The plan claims that to create equal opportunities for people of different gender, nationality, age, racial or ethnic origin, religion or belief, special needs or sexual orientation to participate in activities and to share in the results, the needs of the participants, which arise from their membership in different social groups, are analyzed and taken into account, and barriers are reduced,

that prevent underrepresented groups from participating in activities or benefiting from benefits deriving from the energy transition (Estonian RRP, p. 218).

Similarly, the Spanish Plan accounts for the necessity of using an intersectional approach, describing how the intersectional gender perspective will be incorporated to include, beyond women as victims of gender violence, other groups. Of especially vulnerable women such as women with disabilities, long-term unemployed, mothers raising their sons and daughters alone, older women in single-person households, immigrants, including seasonal workers, refugees and those belonging to minorities (Spanish RRP, pp. 108-109)

Another example is represented by the Irish Plan, which declares that Ireland is strongly committed to the advancement of gender equality and equal opportunities for all, including in the context of the National Recovery and Resilience Plan. Equality is promoted through a range of cross-Governmental equality strategies which aim to address the particular needs of specific groups, including women and girls, those with disabilities, Traveller and Roma inclusion, LGBTI+ inclusion and migrant integration (Irish RRP, p. 14).

The analysis, therefore, shows how most NRRPs do consider the gender issue with an intersectional approach, indeed, targeting different vulnerable groups according to each diverse national context.

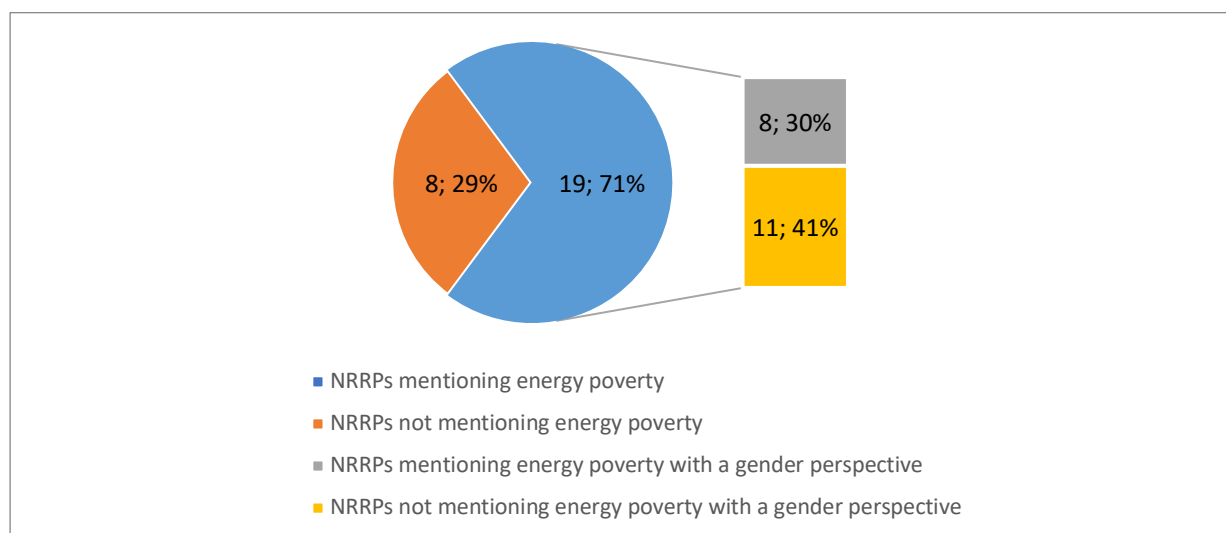
#### 5.4 Recognitional Energy Justice

“Understanding, recognizing, and targeting the needs of energy users is at the core of recognitional justice” (Feenstra, 2021: 89). For this reason, it is compelling to rely on gender-disaggregated data on the differential needs of energy consumers. Despite that, only two plans out of 27 (Belgium and Spain) contain gender-disaggregated data on energy user's needs. The Spanish plan mentions the existence of disaggregated data regarding a greater energy expenditure of single mothers, elderly women, and dependents of people with disabilities, but the source of the data is not cited. The Spanish plan recognizes that it is necessary to keep in mind that energy poverty affects women to a greater extent. The data are clear: single-parent mother households, those in which at least one person with a disability lives, and especially households of older women who live alone, have energy expenditure on electricity and heating higher than the national average and present indicators higher than average risk of energy poverty (Spanish RRP, p. 310). The Belgian plan in turn recognizes that single-parent households and people aged over 65 are particularly affected by energy poverty. Women are over-represented in these two categories (with 75% and 56% respectively) (Belgian RRP, p. 24, French version).

Different behaviors towards energy are recognized in 8 out of 27 countries (30%); of these, only half (15%) incorporates a gender lens. Some of the gender-differentiated energy-related behaviors relate to mobility: for example, in the Austrian plan, it is mentioned that women use public transport in a higher proportion than men. The Austrian Mobility Master Plan 2030 anchored in the recovery and resilience plan aims to increase the proportion of walking and cycling, public transport, and shared mobility through different innovations and improvements in the mobility system: the introduction of the 123 climate ticket, investments in zero-emission buses, the construction of new railway lines and the electrification of regional trains, the use of public transport will become easier. This creates mobility options for women who travel an above-average number of journeys without a car and people with low incomes in urban areas (Austrian RRP, p. 46).

Croatia's RRP, however, recognizes differentiated needs that could be better satisfied thanks to energy efficiency. The plan says that bearing in mind the division of household responsibilities in the family and the fact that women stay at home to a greater extent, using different energy sources for food preparation, heating, and lighting, investments to strengthen energy efficiency in the heating sector contribute to increasing their quality of life (Croatian RRP, p. 451). In the Croatia's plan, it is also recognized that in the workplaces linked to services' sector, whose staff is predominantly female, energy efficiency could benefit precisely this group of workers, as stated: enhanced energy efficiency measures in service industries, it opens up the possibility of higher incomes for employees among whom the majority of the workforce is female (Croatian RRP, p. 451).

Figure 14: Energy poverty recognition in the NRRPs



Source: Authors' elaboration

71% of the plans mention energy poverty (19 out of 27), of these, however, only 8 (30% of the total) highlight the connections between energy poverty and gender inequality (Figure 14).

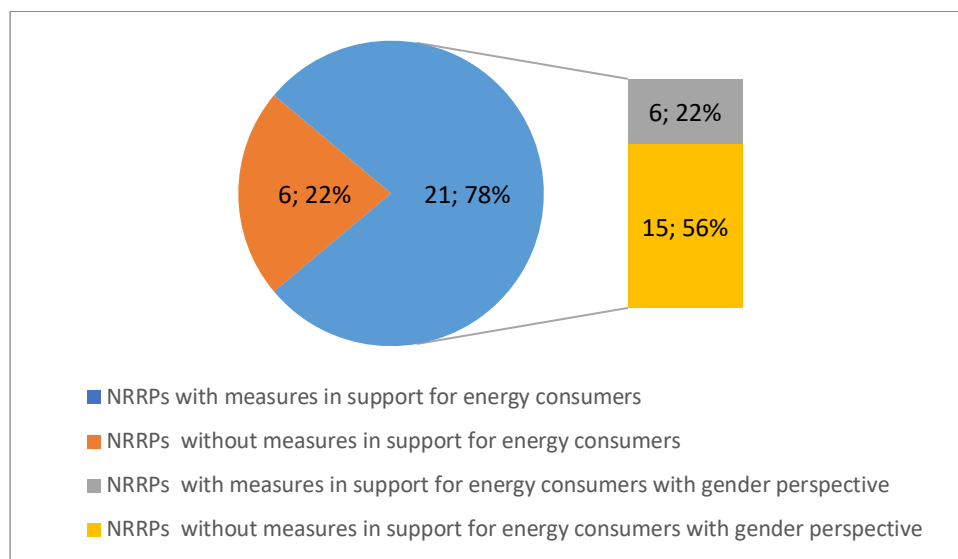
## 5.5 Distributive Energy Justice

Distributive justice refers to how the resources, incentives, and opportunities linked to energy transition are distributed between men and women. In our framework, distributive energy justice has been articulated in terms of energy production and consumption.

Concerning energy consumption, we addressed energy access and support to energy consumers, and health aspects related to energy consumption. Firstly, we consider whether NRRPs incorporate measures to guarantee energy access through affordable prices for energy services, such as subsidies to reduce energy costs. In this respect, 15 out of 27 NRRPs do mention such kind of measures. However, even if these measures are often directed to firms or generally to families and households, none of them incorporate a gender perspective.

Secondly, we assessed whether the Plans mention any measures aimed at financially supporting energy consumers, such as energy efficiency bonuses, housing renovation/reconstruction loans, grants, and incentives. As reported in Figure 15, 21 out of 27 NRRPs contain such measures. Among these 21 NRRPs, only 6 (Austria, Belgium, Croatia, Italy, Slovenia, and Spain) incorporate a gender perspective.

Figure 15: Measures in support of energy consumers in the NRRPs



Source: Authors' elaboration

In general terms, to support energy consumers, the different plans provide similar measures focused on the improvement of energy efficiency through the offering of wide-ranging incentives for the renovation of private buildings. In light of the over-representation of women in energy-poor households, especially in those single-parented, as well as the gender-segregation in family and

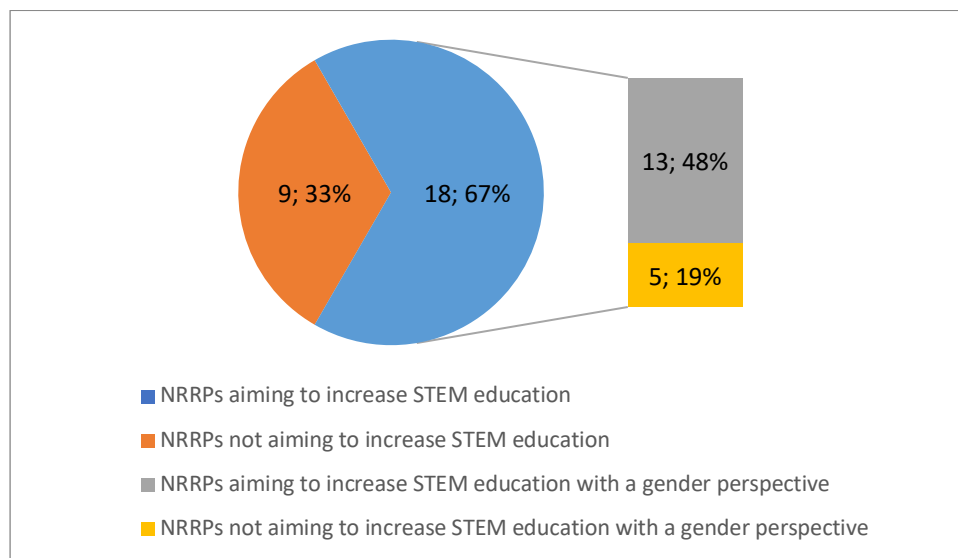
household activities, these measures have relevant gendered implications. Some differences can be noted concerning the different intersectional approaches used by the NRRPs. The Austrian Plan targets older women and low-income households. The Belgian and the Spanish Plans focus on gendered energy poverty. The Italian Plan focuses on single-parent families, poverty, and housing shortage.

Thirdly, we investigate whether the Plans incorporated measures related to the energy-health nexus. Out of 27 NRRPs, only 4 account for a relation between energy and health: Cyprus, Denmark, Lithuania, and Slovakia. However, none of the Plans incorporate a gender perspective within these measures.

Regarding energy production, we analyzed the commitment of the NRRPs to promote and improve equal access to knowledge on technological innovations in order to guarantee equal employment opportunities for women in the energy sector.

In this respect, we first consider whether the NRRPs foresaw measures to increase participation in STEM disciplines. As shown in Figure 16, out of the 27 plans analyzed, 18 do mention some measures to increase access to STEM disciplines. Among these, 13 NRRPs formulate measures with a gender perspective: Austria, Belgium, Croatia, Cyprus, Denmark, Estonia, Italy, Latvia, Portugal, Slovakia, Slovenia, Spain, and Sweden.

Figure 16: Measures in support of increasing women in STEM education in the NRRPs



Source: Authors' elaboration

The measures considered here are predominantly directed at combatting gender stereotypes, mitigating the risk of increasing inequalities due to the increase of jobs requiring knowledge and skills

linked to STEM disciplines, and in general increasing women's participation in all those subjects connected with the energy transition.

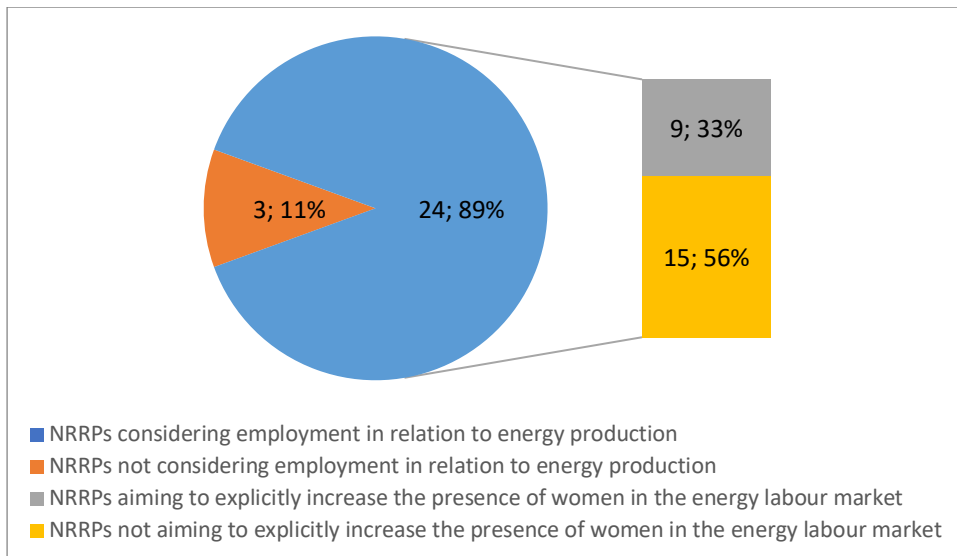
For instance, the Belgian Plan reports that the orientation of public investments in the Plan could potentially create a significant demand for labour in predominantly male sectors (construction, energy, STEM/ICT, green jobs, circular economy, etc.). To mitigate this risk, additional attention will be paid to the integration of the gender dimension in the planned education and training measures, in order to combat stereotypes and promote the presence of girls and women in the economic sectors of the future. In addition, the gender dimension will be taken into account in monitoring the plan to ensure that the implementation of the plan is aligned to promote gender equality (Belgian RRP, p. 28).

Similarly, the Austrian plan claims that the RTI Strategy 2030 (3.A.1) and the measures based on it not only ensure a successful research, technology, and innovation policy for Austria but also aim to increase the proportion of women among graduates in technical subjects by 5 to increase percentage points (Austrian RRP, p. 49).

The Portuguese Plan mentions removing limitations to integrated use of technological and digital equipment and eliminating the lack of specialized equipment for developing digital skills. It also mentions encouraging continuation of STEM careers, promoting equal participation of girls and boys, creating conditions for integrated use of different technological equipment in teaching-learning - face-to-face, mixed and distance learning - and for the participation of male and female students in specific projects promoting development of digital skills (Portuguese RRP, p. 200).

Secondly, we assessed whether the NRRPs envisaged measures to increase women's participation in job markets related to energy transition. As shown in Figure 17, out of the 27 plans analyzed, 9 mention some measures to increase women's participation.

*Figure 17: Measures considering employment concerning energy production in the NRRPs*



*Source: Authors' elaboration*

In general, on the one hand, these measures are aimed at fostering women's entrepreneurship in the context of the energy transition, while, on the other hand, at increasing the share of women working in the green energy labor market to reduce the gender gap affecting the sector.

For instance, the Cypriot RRP includes financial schemes promoting women entrepreneurship, education, and training programs for women on ITC. The measures aim to enhance productivity, effectiveness, and efficiency (e.g., by accelerating the digital transformation, improving the recruitment and promotion procedures, and reforming the performance appraisal system), increase participation of women in paid work and representation in decision-making positions, as well as reduce gender segregation in certain occupations and improve working conditions (Cypriot RRP, p. 37).

## 5.6 Procedural Energy Justice

Procedural justice is usually described as the sense of justice in the processes that distribute advantages and disadvantages. In the context of the energy transition, it encompasses the process with which decisions about energy issues are made and to what extent the procedures used by decision-makers are considered just (Jenkins et al., 2016).

To assess to what extent NRRPs have been approved following a procedural just process, we looked whether their drafting has been carried out by including stakeholders' participation and consultations. Stakeholders' consultations are essential to allow policymakers to gain an understanding of, and possibly account for, the different needs of diverse groups of citizens, making the policy process more just.

In the present analysis, procedural justice was assessed by verifying if the NRRPs have been drafted based on stakeholder consultation. Taking a gender perspective, we gauged whether, among the stakeholders included in the consultation process, there were institutions or groups with a focus on women.

Overall, 22 out of 27 NRRPs mentioned some sort of stakeholder consultation process used during the drafting process. Within all EU countries, only Bulgaria, Hungary, Latvia, Luxembourg, and Malta do not mention any stakeholder consultation.

However, applying our gender lens, we found that only 7 NRRPs (Cyprus, Czech Republic, Estonia, Ireland, Lithuania, Netherlands, and Portugal) explicitly mention the inclusion of stakeholders that have a specific focus on gender issues. For instance, the Cypriot Plan included the National Mechanism for Women's Rights to design the RRP measures related to gender equality (Cypriot RRP, p. 35); while the Czech Plan was discussed at the round table of the Government Council for Sustainable Development. The plan was then also submitted to the Government Council for Gender Equality (Czech RRP, p. 8).

## 5.7 NRRPs' Gender-Energy Assessment Index

In order to assess and visualise to what extent EU countries' NRRPs incorporate a gender dimension within the measures concerning the energy transition, as described in the methodology in Section 4, we created an index based on the results of the analysis of the framework presented in Section 3. The index also allows us to compare the considered countries and to look at to what extent the countries that perform better on gender mainstreaming according to the EIGE index match with the countries that incorporate a gender perspective into the NRRPs to a greater extent. Table 1 reports an overview of the number of NRRPs assessing the gender-related questions as formulated in our theoretical framework. Figure 18 visualizes on a map the framework index countries' score calculated on the basis of the gender-related questions.

*Table 1: Number of NRRPs assessing the different indicators of the theoretical framework elaborated*

<b>Dimension</b>	<b>Sub-dimension</b>	<b>Indicator</b>		<b># NRRPs</b>
JUST ENERGY TRANSITION	Energy Transition Targets	Women as energy transition targets	Are women a target in the energy transition?	17



		Targets intersecting with gender	Are women considered with other intersectional axes?	16
RECOGNITIONAL ENERGY JUSTICE	Energy Users	Energy users' needs	Does the plan consider gender-disaggregated data on energy user's needs?	2
		Energy behaviour	Are behaviors towards energy recognized with a gender perspective?	4
	Energy Poverty	Energy poverty recognition	Does the plan mention energy poverty with a gender perspective?	8
		Energy poverty measures	Are there measures to combat energy poverty from a gender perspective?	7
DISTRIBUTIVE ENERGY JUSTICE	Energy Consumption	Access energy services	Are measures to guarantee affordable prices for energy services made with a gender perspective?	0
		Support energy consumers	Are there measures in support of energy consumers made with a gender perspective?	6
		Energy consumers health	Is health considered from a gender perspective within the energy context?	0
	Energy Production	Energy knowledge	Does the plan aim to increase gender equality in STEM education?	13
		Energy employment	Does the plan aim to explicitly increase the presence of women in the energy labor market?	9
PROCEDURAL ENERGY JUSTICE	Women Participation	Women Empowerment	Is there information about the participation of institutions/groups on gender equity in the plan construction process?	7

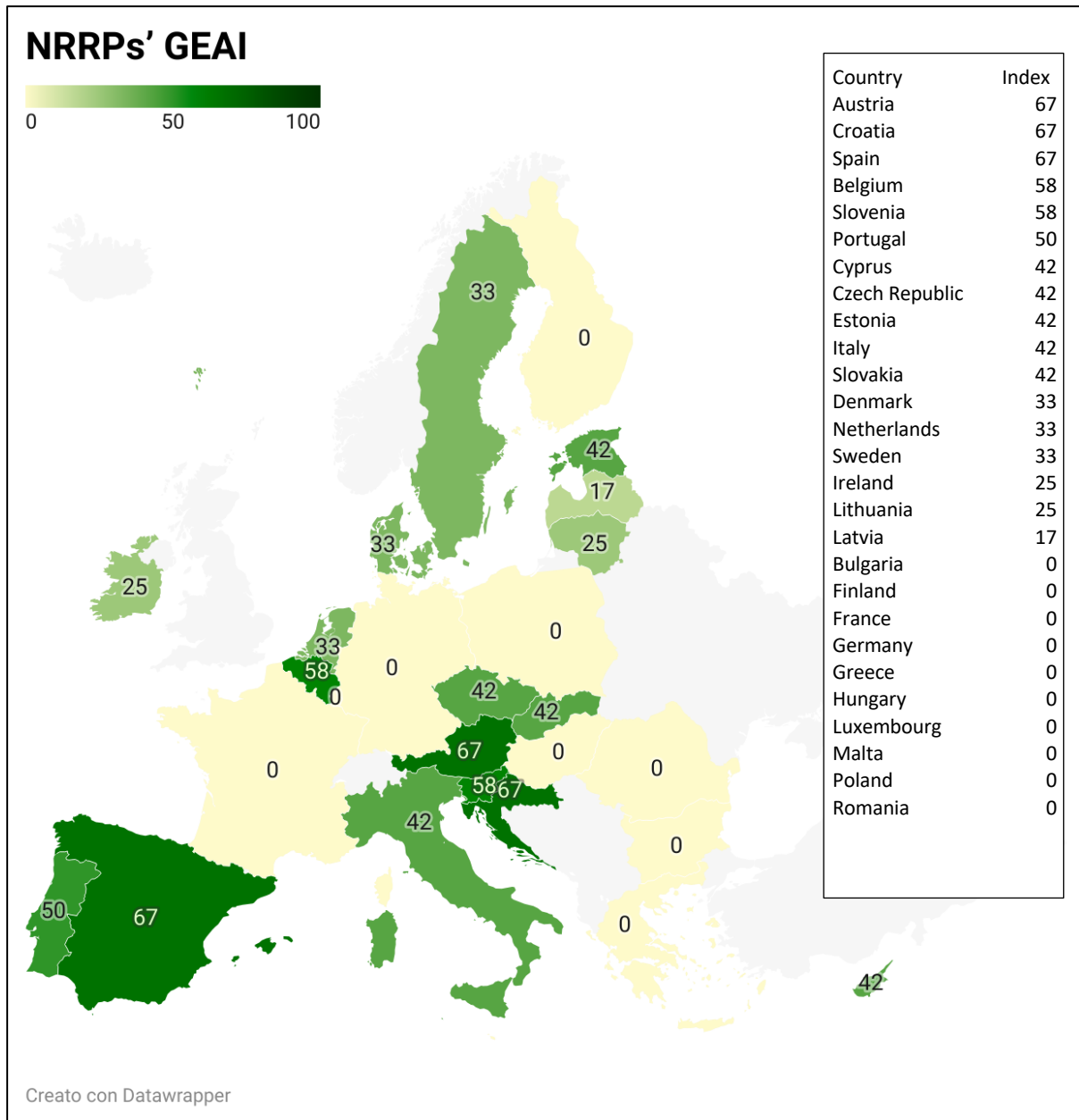
*Source: Authors' elaboration*

The table shows that, the EU level, except for the questions related to the dimension of Just Energy Transition, which has been assessed by most of the NRPPs, the questions considered in the framework have been largely overlooked. Some questions have been addressed by none of the NRPPs such as the one related to the measures to guarantee affordable prices for energy service, and that referring to the health issues as related to energy. On the contrary, the question on the increase of women in STEM education, and the one on the energy labor market are the ones that have been more frequently addressed by more countries, (respectively by 13 and 9 countries).

The index within the countries considered varies from a minimum of 0 to a maximum of 67. While none of the countries considered scored the maximum possible, 10 countries (Bulgaria, Finland,

France, Germany, Greece, Hungary, Luxembourg, Malta, Poland, and Romania) scored 0. On the other side of the spectrum, with an index of 67, the best-performing countries have been Austria, Croatia, and Spain.

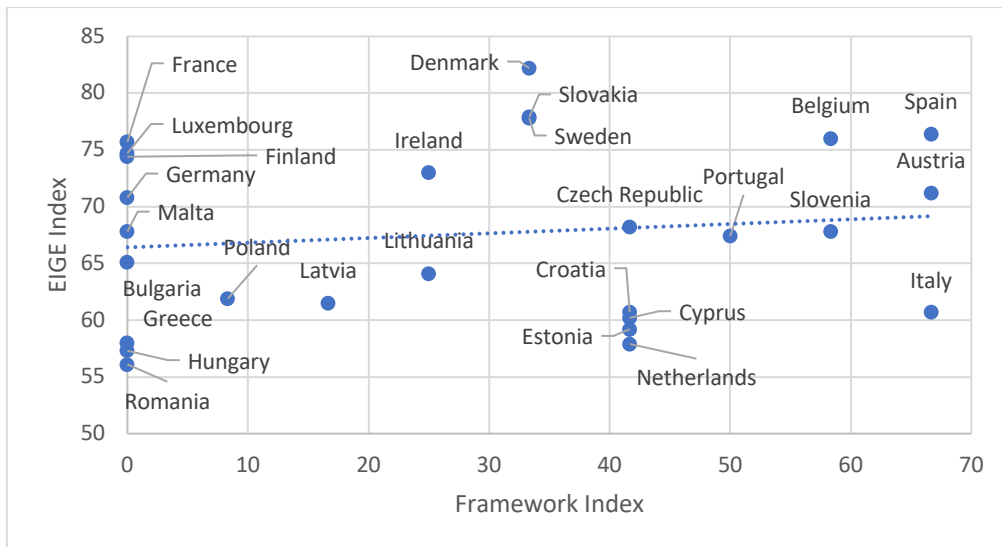
Figure 18: NRRPs' Gender-Energy Assessment Index (NRRPs' GEAI)



Source: Authors' elaboration

It is interesting to note that the elaborated NRRPs' GEAI and the EIGE index present a positive but very low correlation, as reported in Figure 19.

Figure 19: Correlation between the NRRPs' GEAI and the EIGE Index



Source: Authors' elaboration

The positive correlation means that increasing the score of the Framework Index is associated with an increase in the EIGE Index, however, the correlation coefficient is only 0.14. The results, however, are not surprising. The positive correlation could be explained by the fact that both indices assess how the gender dimension is considered within a national framework. The very low correlation, on the other hand, could be explained by the fact that our index has a very specific focus on the presence or absence of a gender perspective within the energy transition in the NRRPs. Another possible explanation is that some of the countries scoring low on our index are those that are already more advanced in terms of gender mainstreaming (with higher EIGE Index values) and therefore have not feel the urgency to incorporate specific gender measures within the energy related policies in their NRRPs, for instance Germany and Finland.

## 6. Discussion and Conclusion

In this section, we discuss the results of the policy analysis of the first approved version of the NRRPs with the intent to compare to what extent the EU member states incorporated provisions concerning gender equality in the context of the energy transition. This work represents a first attempt to analyse the energy transition measures and dimensions in the NRRPs from a gender perspective.

To do so, we developed an analytical framework that, based on the framework proposed by Feenstra and Özerol (2021) for the analysis of NECPs, was tailored to the specificities of NRRPs and expanded with the clusters identified in the systematic literature review carried out in the task 1.1. of the gEneSys project (gEneSys, 2023).

Such a framework, referred to as the NRRPs GEAF, thoroughly described in Section 3, is made of 4 dimensions, each of which composed by different sub-dimensions and indicators. Each indicator, in turn, is broken down into one or more questions that allowed us to collect and systematize the qualitative data employed in the present analysis. The methodology employed is detailed in Section 4. Except for some quantitative data related to the amount of funds allocated to the NRRPs that we retrieved from the EC databases, the framework guided all the collection of the information from the NRRPs.

Concerning the funds allocated to NRRPs, the analysis shows a high degree of variability both in terms of absolute values and shares of countries' GDP. It is interesting to note that out of a total of 335.5 billion budgeted for all the EU countries, 274.1 billion (81.7%) was allocated to only eight countries (Spain, Italy, France, Germany, Poland, Greece, Portugal, and Romania). As mandatorily required by the EC, data also showed that all the countries allocated more than 37% of the funds to measures contributing to the green transition. However, while countries such as Austria and Sweden allocated a share of funds very close to the mandatory requirement (respectively, 38.8% and 43.6%), other countries such as Romania, Germany and Finland decided to dedicate more than twice the requirement (respectively 87.9% and 75.9%). Lastly, considering not only the energy transition but all the themes included in the plans, data on the funds allocated shows that countries dedicated varying shares of the total funds to measures focusing on gender equality, with an EU average of 3.37%.

#### Just energy transition

Moving to the results of the analysis carried out through the lens of the NRRPs GEAF, we observed that, with the notable exception of Bulgaria, all the NRRPs made some references to measures directed towards women, in particular in the contexts of social care, employment, disability, and health, but only 17 (63%) countries out of 27 explicitly adopt a gender perspective within the measures concerning the energy transition. In the attempt to explain the lack of provisions concerning the gender-energy nexus we can formulate at least two hypotheses. On the one hand, most EU countries may not recognize the importance of designing gendered policies on energy transition. On the other hand, the NRRPs could be reproducing the pattern of gender segregation of societal sectors whereby some sectors (e.g., those related to care and employment) are traditionally regarded as gender-sensitive and others (e.g., those related to infrastructures) as gender-neutral. This may be a legacy of the way energy policies have been conceived in the countries of the Global North, where energy has long been considered a sector of technical expertise, divorced from social policies.

Furthermore, the results highlighted that NRPPs differently represent women in the energy transition. In fact, out of the 17 NRRPs that explicitly mention a gender perspective within the measures

concerning the energy transition, 7 NRRPs consider women as producers of energy, and 6 consider them as both producers and consumers. It is interesting to note that among the 11 NRRPs that recognize a role of women in the energy transition, just one of them consider women only in the role of consumers. This seems a positive sign of the increasingly recognised active role of women as energy producers.

### Recognitional energy justice

Even in the dimension of Recognitional Energy Justice (i.e. the recognition of gender-specific needs and behaviors among energy consumers), our analysis reveals that the Plans are still far from achieving it. Among the 27 NRRPs, only two include gender-disaggregated data regarding energy user's needs, 8 of them recognize different behaviors towards energy, among which only 4 incorporate a gender lens. This deficiency stems from the widespread absence of gender-disaggregated data on these aspects.

This lack of data is constantly reported in the scientific literature and policy documents on the gender-energy nexus. Numerous publications of grey and scientific literature highlight the challenge of implementing gender-responsive policies due to the lack of data (see gEneSys, 2023). Data can be defined as a driver to unlock policymaking (GWEC, 2021). According to the grey literature on the gender-energy nexus, sex-disaggregated and gender-relevant data are essential for visualizing skills and workforce equality gaps, identifying women's needs to enhance energy access, evaluating the gendered impacts of energy infrastructure projects, and measuring gender inequalities and energy poverty. Recognized as a crucial driver for policymaking, gender-disaggregated data and indicators should undergo continuous monitoring and regular publication, including in annual national gender reports (gEneSys, 2023).

The lack of data and lack of analysis of available data reinforce the invisibility of women's energy poverty (Hagenmaier, 2023). One major issue with current data collection methods on energy poverty in Europe is that they predominantly gather information at the household level rather than individual level (Hagenmaier, 2023). This approach assumes income distribution is uniform among all adult household members, disregarding that, in some contexts, women do not have power over the decisions regarding household's expenditures. Additionally, it assumes that gender relations within mixed-sex households are symmetrical, overlooking the financial disparities and decision-making dynamics that often exist between men and women within households (Hagenmaier, 2023).

Regarding the recognition of energy poverty through a gender lens in the NRRPs, we found that although 71% of plans mention energy poverty, only 30% highlight the connections between energy

poverty and gender inequality. This seems to confirm that, as noted by Murauskaite-Bull (2024), energy policies often overlook the identity of energy consumers, resulting in a failure to address gender-specific needs. Without disaggregated data, it is challenging to understand the complexity of the issue beyond income poverty, gauge its extent, and devise appropriate interventions in both scope and implementation methods (Clancy, 2022). Precise definitions and data are needed because using terms like 'vulnerable households' allows for broad interpretation and risks ineffective actions towards gender equality (Carroll, 2022). Without clearer definitions and data, interventions targeting vulnerable citizens may miss the mark addressing gender equality (Carroll, 2022).

### Distributive energy justice

The analysis of the dimension of distributive energy justice showed that despite that more than half of the NRRPs include measures to guarantee energy access such as subsidies to reduce energy's costs, none of them incorporates a gender perspective. On the contrary, 6 out of 27 NRRPs (Austria, Belgium, Croatia, Italy, Slovenia, and Spain) mention measures supporting energy consumers that incorporate a gender perspective, such as energy efficiency incentive for buildings' renovation. The plans, however, mostly encompass measures directed to the improvement of buildings' energy efficiency. This is indeed a good starting point, since as illustrated by previous analysis (Ballesteros et al., 2022; Murauskaite-Bull, 2024) women are over-represented in low-income poor households, especially in single-parents ones, thus being more affected by energy poverty.

Distributive energy justice also assessed the extent to which NRRPs incorporated measures focusing on the nexus between energy and health. In this respect, it is interesting to note that EU countries were blind to such a nexus. In fact, only 4 NRRPs (Cyprus, Denmark, Lithuania, and Slovakia) do account for a relation between energy and health. Surprisingly, none of them included a gender perspective. Most EU countries, apparently, do not recognize the role of energy in health issues, and the few that acknowledge this nexus, do not adopt a gender lens. This result, however, could also be linked to the scarcity of gendered data on these themes in the EU.

Lastly, distributive energy justice included dimensions concerning the commitment to promote and improve equal access to knowledge on technological innovations, and to guarantee equal employment opportunities for women in the energy sector. From this perspective the analysis shows, compared with the other dimensions considered, a more positive picture. Indeed, 13 out of 27 NRRPs do mention some measure aimed at increasing women's access to STEM disciplines. In general terms, NRRPs recognize as a challenge the low participation rate of women in STEM disciplines. As a matter of fact, most NRRPs provide measures aimed at increasing their presence, often also in the perspective of increasing their participation in energy sector-related jobs. Nevertheless, we found that only 9

(33%) Plans mention measures to increase women's participation in the energy job market. In most of the cases, these measures are aimed at, on the one hand, fostering women's entrepreneurship in the context of the energy transition, and, on the other hand, increasing the share of women in the workforce to reduce gender imbalances in the sector. Overall, therefore, the plans seem not to guarantee what we have defined as distributive energy justice creating the risk of increasing gender inequalities due to gender-blind measures.

#### Procedural energy justice

The last dimension considered by our framework concerns procedural energy justice, defined as the process by which decisions about energy issues are made and measured in relation to what extent the procedures used by decision-makers are considered just (Jenkins et al., 2016). To assess it through our gender lens, we considered whether NRRPs have been drafted in tandem with institutions or groups whose mission focused on the promotion of women's empowerment. The results that show only 7 NRRPs (Cyprus, Czech Republic, Estonia, Ireland, Lithuania, Netherlands, and Portugal) have consulted these groups. This may prove particularly problematic since, when designing policies, it is of outmost importance to include the viewpoints of all the stakeholders that might be potentially affected by such policies.

#### NRRPs' Gender-Energy Assessment Index

Overall, the results show that most of the EU countries' NRRPs consider women as a subject of the energy transition, but with quite different degrees of involvement. The elaboration of the index based on the theoretical framework (Figure 18) graphically displays such variegated picture. The index, ranging from 0 to 100, namely from not considering gender in any indicator to considering gender in all the indicators, illustrates that, while none of the countries scored the highest possible value, 10 countries scored 0. The rest of the considered countries' scores varies from 17 for Latvia to 67 of Austria, Cyprus, and Spain. We can therefore highlight how, overall, even in the cases NRPPs take a partial stand on gender equality when it comes to energy transition.

#### Concluding remarks

This analysis provides a glimpse into how and to what extent countries have planned for the transition towards sustainable and socially just energy systems. In line with the literature, our analysis was guided by the hypothesis that we cannot assume that the energy transition will spontaneously bring along more gender equality. The benefits and the negative impacts of the transition will not be distributed equally between genders; on the contrary they may reinforce existing inequalities. Women's empowerment in the energy sector must be bolstered through policy instruments

specifically designed for or, at least embedding, gender equality principles and objectives. Only a policy-oriented energy transition designed in a gender-sensitive manner will be able to truly reduce the gender imbalances in the sector.

In the framework of the NRRPs, the present analysis demonstrates how this has been done only partially. On the one side, many countries did not include any gender perspective in the provisions concerning the energy transition, not explicitly recognizing the different energy needs that women and men have and the roles that women can play to actively participate in the transition. On the other side, many of the countries that included to some extent a gender perspective in the provisions concerning the energy transition have done so partially, incorporating only some of the dimensions of the NRRPs GEAF.

This result could depend on the fact that policymakers have a little awareness of the gendered dimensions of the energy transition and therefore do not deem it necessary to include gender-specific measures. Consistently with the “no data, no problem, no policy (or sometimes “no action”)” principle, this lack of recognition could be reinforced by the dearth of gender-disaggregated data that can substantiate the need for gender-sensitive policies. This seems somehow confirmed by the fact that the dimensions of the energy transition in which the gender dimension have been most recognized, such as education and employment, are also those in which most gendered data are available. However, we cannot draw any conclusive remarks on this aspect, and future research is needed to verify it.

Lastly, the little inclusion of a gender perspective into many NRRPs could also be attributed to the peculiar nature of NRRPs that are simultaneously a policy instrument and a programmatic document. On the one hand, they set up a normative framework guiding the subject matters included in the document, while on the other hand, they enucleate a series of principles that underpin the allocation of the funds. This consideration, together with the Commission’s requirement of considering the gender dimension as transversal through the plan, opens up the possibility that EU member states will decide to include the gender dimension as a criterion for the selection of the projects that will be funded under NRRPs, rather than just mentioning it in all the dimensions of the energy transition included in the NRRPs.

Due to the lack of open data on NRRP’s funded projects in each country, however, we were not able to assess the extent to which the mandate for gender mainstreaming was clearly stated as a criterion for the projects to be funded. This limitation of the analysis opens a venue for further research on the implementation of the NRRPs through gender-sensitive analytical lens. For future monitoring and evaluations and of the impact of the plans we propose the following research questions: has the



inclusion of the gender dimension been required for the project to be funded under the NRRPs and, if so, to what extent? Are there specific NRRPs' funded projects assessing the gender dimensions of the energy transition? What are the most successful projects financed by the NRRPs and the good practices to be replicated for a just transition from a gender perspective?

If not accompanied by the systematic collection of disaggregated data and addressed through gender-specific measures, the gender mainstreaming runs the risk of becoming a buzzword useful for fulfilling the EU's mandatory requirements, but not sufficient to redress gender power inequalities. Furthermore, as we have observed, the gender perspective is not transversal homogeneously along all the components of the plans. On the contrary, some components are highly gendered, while others are barely touched by the gender perspective. The dimensions identified in the analytical framework regarding the energy transition are among the least gendered ones.

### Policy recommendations

The national recovery and resilience plans are policy documents developed in the wake of the covid-19 pandemic, which added to the adverse effects of the ongoing climate change, the energy crisis, political instability and social inequalities. These are therefore one-of-a-kind documents through which member countries were granted access the largest funding programme ever financed by the EU. These documents represented the opportunity to reframe development in a sustainable and just manner; yet, as demonstrated in this study, there are still many gaps that need to be filled. Below we highlight some suggestions for the development of gendered policies in the context of the energy transition.

Seemingly, data reveal a pattern between the availability of data and the inclusion of certain dimensions in sector-specific policies. In fact, most of the dimensions of NRRPs GEAF addressed in the PNRRs are also those for which more data is available. On the contrary, the less studied topics, therefore less known, are those less addressed by the Plans. As suggested by several authors, policies addressing a just energy transition should include the financing of research to generate of gender-disaggregated data, especially on aspects considered less, such as women's health, gendered energy needs and energy poverty (European Court of Auditors, 2021). Further research is needed on the energy practices and lived experiences of vulnerable energy users as data could shed light on existing injustices and inequalities in energy access (Morauskaite-Bull, 2024).

Since the term STEM encompasses various disciplines, but not all of them present gender imbalances in terms of representation of men and women. In some disciplines women are more represented than in others. For instance, biomedical science reports higher shares of women compared to technology,

mathematics and engineering (European Commission, 2021). To increase career opportunities for women in the field of energy innovation and technologies, there is a need to support their presence in the respective STEM disciplines. We therefore suggest designing specific policy measures to reduce the gender gap in higher education and in initial professional career's choices (for instance through tailored intervention in primary and lower secondary schools) to make energy transition jobs more inclusive and gender balanced.

Some dimensions of the energy-gender nexus are not recognized and addressed in the Plans, namely the energy consumers' health, the inequalities in access to energy services and the energy user's needs. We suggest that these issues are addressed as an integral part of the just energy transition if we are to realize an energy transition that is fair and avoid producing disparities between 'winners' and "losers".

Finally, in the context of climate change and air pollution, the link between energy and health is becoming increasingly more evident. It is therefore necessary to study and address in public policies the relationship between energy poverty and vulnerability to increasingly extreme temperatures, such as heat islands in urban contexts, as well as the link between energy poverty and indoor air pollution linked to the use of wood as fuel in rural Europe.

## List of Acronyms

**CEDEFOP:** European Centre for Development of Vocational Training

**CINEA:** European Climate, Infrastructure and Environment Executive Agency

**EIGE:** European Institute for Gender Equality

**EC:** European Commission

**EU:** European Union

**EP FEMM:** European Parliament's Committee on Women's Rights and Gender Equality

**GDP:** Gross Domestic Product

**HAP:** Household Air Pollution

**ICT:** Information Communication Technology

**ILO:** International Labor Organization

**IRENA:** International Renewable Energy Agency

**NECP:** National Energy and Climate Plan

**NGEU:** Next Generation EU

**NGO:** Non-Governmental Organization

**NRRP:** National Recovery and Resilience Plan

**NRRPs' GEAF:** NRRPs' Gender-Energy Assessment Framework

**NRRPs' GEAI:** NRRPs' Gender-Energy Assessment Index

**RRF:** Recovery and Resiliency Facility

**RRP:** Recovery and Resiliency Plan

**SLR:** Systematic Literature Review

**STEM:** Science, Technology, Engineering, Mathematics

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