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Gender Equity in Brazilian Energy Transition

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This paper examines the intersection of gender equality and energy transition within the Brazilian context. It offers a comprehensive review of the existing literature on energy transitions and their associated gender perspectives, while also identifying significant gaps and challenges specific to Brazil. The authors conducted systematic searches across several databases. The search yielded 9,012 studies after applying stringent inclusion criteria. The review encompasses various discussions surrounding key concepts such as gender, equity, equality, empowerment, and patriarchy. It highlights dynamics that foster girls' leadership and the formation of gender-equitable groups, as well as the importance of promoting respect for diverse identities. The energy sector emerges as a critical area, offering future employment opportunities for both men and women. Additionally, the paper emphasizes the value of initiatives such as site visits to renewable energy institutions and the facilitation of talks by women professionals in STEM and renewable energy fields. In conclusion, this work underscores the necessity for further research aimed at enhancing legal frameworks that support gender equality within the oil, gas, and energy sectors, ultimately contributing to a cleaner and more sustainable future.

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1. INTRODUCTION

Six main factors propel the global energy transformation. The first is the national authorities' efforts to tackle climate change, in accordance with the Paris Climate Change Agreement and other international climate change frameworks.¹ A considerable increase in domestic energy demand is the second factor.² The third is the necessity to address the global issue of rising energy poverty. The profound awareness that oil and gas resources are finite and may run out in the next decades is the fourth factor behind the global low-carbon transition.³ The fifth is the disparities in national circumstances regarding energy security and developmental needs.⁴ The sixth is the role of gender equality in the energy transition to ensure that no one is left behind, particularly vulnerable populations such as women.⁵

This paper recognizes that different countries present different realities, and sectoral demands for energy. It focuses on gender equality and energy transition in the context of Brazil. Following the introduction, the next section presents the current state of knowledge on energy transition and the related gender perspectives, including gaps and challenges in the Brazilian context, based on an integrative review of the scientific literature. Furthermore, the third section addresses the Brazilian laws and politics on energy, oil, and gas, investigating the mainstreaming of gender equality politics. The final section of the paper presents the conclusion.

2. ENERGY TRANSITION AND GENDER PERSPECTIVES IN THE BRAZILIAN RESEARCH CONTEXT

We performed an integrative systematic review (IR) of scientific literature to build a body of knowledge on gender equity in the energy transition in Brazil.⁶ IR is a scientific evidence based research method whose protocol involves six stages: develop the guiding question or hypothesis, determine the inclusion and exclusion criteria; search or sample in the literature, define the inclusion and exclusion

¹ Damilola S. Olawuyi, Eduardo G. Pereira (eds.), *Natural Gas and Global Energy Transitions: Law, Business, and Governance Dimensions* (Palgrave 2022).

² Ibid.

³ Eduardo G Pereira, Eddy Wifa and Jonathon W Moses, 'Designing Regulatory Governance Models for Managing Hydrocarbon Resources: Lessons Learned from Norway and the United Kingdom' (2022) 11(2) *The Journal of Sustainable Development and Policy* 251-299

⁴ MC Abraham-Dukuma, N Chinwa Ole, EG Pereira, *Avoiding the Tragedy of the Commons in a Low-Carbon Future: The Role of Energy Law* (OGEL, ISBN 1875-418X 2023).

⁵ Ibid.

⁶ Flávia Falci Ercole, Laís Samara de Melo, Carla Lúcia Goulart Constant Alcoforado. 'Integrative Review versus Systematic Review' (2014) 18(1) *REME - Revista Min Enferm., Minas Gerais* 1-260; Arlete Regina Roman, Maria Romana Friedlander, 'Integrative review of research applied to nursing' (1998) 3(2) *Cogitare Enferm* 109

criteria and the search strategies; collect data; critically analyze the included studies; results discussion; and the integrative review draft.⁷

The research problem, based on the TQO model,⁸ is: what are the Brazilian scientific literature perspectives on the connection between gender and energy transition? The research problem centres on the theme (t) energy transition, the qualifier (q) scientific literature, and the object (o) gender perspectives. The IR covers all relevant published studies on the subject, including experimental, non-experimental, qualitative, quantitative, empirical and reviews papers.

The search descriptors (DeCS)⁹ are: energy transition, gender, women, Brazil. The authors conducted two searches, in English and Portuguese. For the first search, the Boolean operator AND brought up studies that correlate energy transition and gender, AND for the link to Brazil, also OR between gender¹⁰ and women, as follows: (("energy transition") AND ("gender" OR "women") AND ("Brazil")); in Portuguese (("transição energética") AND ("gênero OR mulheres") AND ("Brasil")).

The second search involved the following descriptors: clean energy, renewable energy, gender, women, Brazil (energia limpa, energia renovável; gênero; mulheres; Brasil). The taxonomic search models are: (("clean energy" OR "renewable energy") AND ("gender" OR "women") AND ("Brazil")); in Portuguese: (("energia limpa" OR "energia renovável") AND ("gênero" OR "mulheres") AND ("Brasil")). Inclusion criteria entailed studies published in peer-reviewed scientific articles with open access in English or Portuguese, because it can be carried out by other researchers without funding and without having to invest in paying to read articles. The exclusion criteria are: duplicate studies, when the title or abstract do not directly address the research topic or do not thematize the Brazilian reality.

The authors focused on open access publications to ensure that their research is freely accessible to a wider audience, promoting greater dissemination of knowledge and fostering collaborative advancements in the field. This is beneficial as it removes barriers to information, allowing researchers, practitioners, and the public to access and build upon the work without restrictions.

⁷ Marcela Tavares de Souza, Michelly Dias da Silva, Rachel de Carvalho, 'Integrative review: what it is and how to do it' (2010) 8(1) *Einstein* 102 (São Paulo, 2010).

⁸ Samuel Marcos-Pablos, Francisco José García-Peñalvo. 'Information retrieval methodology for aiding scientific database search' (2018) 24(8) *Soft Computing* 555.

⁹ DeCS. <<https://decs.bvsalud.org>>

¹⁰ Gender is an analytical category (Scott, 1995), with more comprehensive dimensions than the internal coherence of the category woman, such as cultural, social and ethnic diversities, which cause different vulnerabilities, oppressions and axes of subordination (Crenshaw, 2020; Collins, 2021; González, 2020; Curiel, 2020); men, intersexuals, transsexuals, agender and other sexual diversities (Preciado, 2017; Butler, 2004). For this study, the focus is mainly on women.

The authors performed the searches in November 2023, in the following databases: *Scientific Electronic Library Online (SciELO)*¹¹; Capes Periódicos¹², OASISBR¹³, Open Global Trusted (DOAJ)¹⁴, Sistema Regional de Información en línea para Revistas Científicas de América Latina, el Caribe, España y Portugal (Latindex)¹⁵.

Table 1: Database searches for DeCS (("energy transition") AND ("gender" OR "women") AND ("Brazil"))

Language	Data Base	Studies Found	Included Studies	Excluded Studies	Quantitative
Data Base:					Soma:
▼ SciELO					0
Portuguese	SciELO	0	0	0	0
English	SciELO	0	0	0	0
▼ Capes Periódicos					0
Portuguese	Capes Periódicos	17.521	7.406	0	0
English	Capes Periódicos	3.175	1.583	0	0
▼ OASISBR					0
Portuguese	OASISBR	296	13	13	0
English	OASISBR	16	3	0	0
▼ DOAJ					0
Portuguese	DOAJ	0	0	0	0
English	DOAJ	7	7	7	0
▼ Latindex					0
Portuguese	Latindex	0	0	0	0
English	Latindex	0	0	0	0

The search did not result in any eligible studies. Using the descriptors, the authors found 21,015 studies. After applying the inclusion criteria, there remained 9,012 studies. However, when analyzing the titles and abstracts of the included studies, the authors discovered that none addressed the issue of correlating energy transition in Brazil with gender (or women). On the one hand, this gap is a scientific limitation of the research, which seems to indicate a lack of published studies on energy transition and gender in Brazil. On the other hand, the authors found some studies on the subject “energy transition” published in other countries, mainly discovered through the searches in English. Those studies seem to corroborate the hypothesis that there is a lack of scientific research on the

¹¹ SciELO. <<https://www.scielo.br>>

¹² Capes Periodicals. <<https://www-periodicos-capes-govbr.ez474.periodicos.capes.gov.br/index.php?>>

¹³ OASISBR. <<https://oasisbr.ibict.br/vufind/>>

¹⁴ DOAJ. <<https://doaj.org>>

¹⁵ Latindex. <<https://www.latindex.org/latindex/>>

subject connected to the Brazilian reality, though far more work is needed on this theme – energy transition – globally.¹⁶

As an example of the studies about other countries, Paula Carroll¹⁷ performed a systematic literature review and discusses the lack of factors related to gender dimensions in the European Union's reports and policy documents on energy transition. There is a scarcity of scientific research in Europe that interconnects gender dimensions and technologies for the transition to clean energies on the continent. Paula Carroll states energy cannot be understood as gender neutral because men and women have different energy needs and concerns. Conversely, the involvement of women can indicate more innovative and creative ideas for decision-making in the energy transition.¹⁸

With regard to Norway and the United Kingdom, Standal, Talevi, and Westkog address the correlation between the gender dimension and the energy transition vis-a-vis social practices, equity, and the sustainability of the planet.¹⁹ Correlations between sustainability, energy transition, and gender equity are also addressed in the case of Sweden,²⁰ Germany,²¹ Poland²² and South Africa.²³

In general, studies with an international focus mention the energy transition from fossil fuels to more sustainable systems based on renewable energies.²⁴ Above all, it is due to the commitment of countries to the Paris Agreement on carbon mitigation and the Sustainable Development Goals.²⁵ Worldwide, there is a gender

¹⁶ Paula Carroll, 'Gender Mainstreaming in the European Union Energy Transition' (2022) 15(21) *Energies* <https://doi.org/10.3390/en15218087>

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Karina Standal, Marta Talevi, Hege Westkog, 'Engaging men and women in energy production in Norway and the United Kingdom: the significance of social practices and gender relations' (2020) 60 *Energy, Research & Social Science* Doi: 10.1016/j.erss.2019.101338

²⁰ Mikael Ring, Emma Wilson, Kanchana Ruwanpura, Miriam Gay-Antaki, 'Just energy transitions? Energy policy and the adoption of clean energy technology by households in Sweden' (2022) 91 *Energy Research & Social Science* Doi: 10.1016/j.erss.2022.102727

²¹ Irmak Karakislak, Pantea Sadat-Razavi, Petra Schweizer-Ries, 'A cooperative of their own: gender implications on renewable energy cooperatives in Germany' (2023) 96 *Energy Research & Social Science* Doi: 10.1016/j.erss.2023.102947

²² Piotr Zuk, Anna Paczesniak, 'Sustainable development, energy transition, and climate challenges in the context of gender: the framework of gender determinants of environmental orientation in Poland' (2020) 12 (21) *Sustainability* doi: 10.3390/su12219214

²³ Josephine Kaviti Musango, Andrea M. Bassi, 'Towards a systematic assessment of gendered energy transition in urban households' (202) 14 (21) *Energies* Doi: 10.3390/en14217251

²⁴ Rebecca Pearl-Martinez and Jennie C Stepheins, 'Toward a Gender Diverse Workforce in the Renewable Energy Transition' (2016) 12(1) *Sustainability: Science, Practice, & Policy* 8-15 <https://doi.org/10.1080/15487733.2016.11908149>

²⁵ Ayesha Sadiqa, Tiia SahraKorpi, and Ilkka Keppo, 'Gender Vulnerabilities in Low Carbon Energy Transitions: A Conceptual Review' (2023) 18(4) *Environmental Research Letters* <https://doi.org/10.1088/1748-9326/acc819>

imbalance, in which women are less involved in the energy workforce and in decision-making.²⁶ However, in the past ten years, studies have focused on gender vulnerabilities, denouncing the under-representation of women in the energy.²⁷ This seems to indicate that this is a socio-technical and socio-political issue.²⁸

The mainstreaming of gender equity in the energy sector is essential for more sustainable energy practices, greater innovation, and more opportunities for women. Pearl-Martinez and Stephens attribute environmental, economic, and cultural improvements for women to greater gender inclusion in the energy sector due to the environmental benefits associated with women's leadership in companies, greater investment in renewable energies, and a greater propensity for environmental concerns.²⁹ In addition, Johnson, Han, Knight, Mortensen, Aung, Boyland, & Resurrección mention that gender diversity in companies enables better economic performance and innovation.³⁰

²⁶ Oliver W Johnson and others, 'Intersectionality and Energy Transitions: A Review of Gender, Social Equity and Low-Carbon Energy' (2020) 70 *Energy Research & Social Science* <https://doi.org/10.1016/j.erss.2020.101774>

²⁷ Ayesha Sadiqa, Tiia SahraKorpi, and Ilkka Keppo, 'Gender Vulnerabilities in Low Carbon Energy Transitions: A Conceptual Review' (2023) 18(4) *Environmental Research Letters* <https://doi.org/10.1088/1748-9326/acc819>

²⁸ Rebecca Pearl-Martinez and Jennie C Stepheins, 'Toward a Gender Diverse Workforce in the Renewable Energy Transition' (2016) 12(1) *Sustainability: Science, Practice, & Policy* 8-15 <https://doi.org/10.1080/15487733.2016.11908149>

²⁹ Ibid.

³⁰ Oliver W Johnson and others, 'Intersectionality and Energy Transitions: A Review of Gender, Social Equity and Low-Carbon Energy' (2020) 70 *Energy Research & Social Science* <https://doi.org/10.1016/j.erss.2020.101774>

Table 2: Database searches for DeCS ("clean energy" OR "renewable energy") AND ("gender" OR "women") AND ("Brazil")

Language	Data Base	Studies Found	Included Studies	Excluded Studies	Quantitave
Data Base:					Soma:
▼ SciELO					0
Portuguese	SciELO	0	0	0	0
English	SciELO	0	0	0	0
▼ Capes Periódicos					2
Portuguese	Capes Periódicos	8	7	7	0
English	Capes Periódicos	26	17	15	2
▼ OASISBR					1
Portuguese	OASISBR	30	7	7	0
English	OASISBR	3	1	0	1
▼ DOAJ					0
Portuguese	DOAJ	0	0	0	0
English	DOAJ	0	0	0	0
▼ Latindex					0
Portuguese	Latindex	0	0	0	0
English	Latindex	0	0	0	0

For this second search, the authors found 67 studies. After applying the inclusion criteria, 32 studies remained. Next, the authors analyzed the titles, abstracts, and content of the studies. At this stage, they excluded 29 studies. The reasons for exclusion were due to the fact that the subject had been approached in other countries not Brazil, or that gender-related factors had not been analyzed. In general, the studies were in the search because they mentioned the word gender. However, when the content was analyzed, the authors found that they dealt with non-human genders, such as plants and animals. Therefore, they selected only 3 studies for qualitative content analysis, all relating to the last four years (2019-2023).³¹

As a result, the authors understand that there is a gap in knowledge on the gender dimensions of the energy transition and this subject is under researched in scientific studies in Brazil or about Brazil. This is an important *gap* in studies, which indicates the need for new scientific research in the field. Although Sadiq,

³¹ Margriet J Goris and others, 'Resignification Practices of Youth in Zona da Mata, Brazil in the Transition towards Agroecology' (2019) 11 Sustainability 1-22 <https://doi.org/10.3390/su11010197>; Matheus Koengkan and others, 'The Consequences of Gender Inequality on Latin America's Economic Growth: Macroeconomic Evidence' (2022) 3 Sexes 396-412 <https://doi.org/10.3390/sexes3030030>; Martinho Marta-Almeida, 'Ocean Modelling in Brazil, a Quick Review' (2022) 55 Arq Ciên 338-344

SahraKorpi, & Ilkka mention in a study with an international focus³² the thematic importance and commitment of countries since the Paris Agreement and the Sustainable Development Goals, both from 2015. The three scientific studies found with a focus on Brazil date from 2019 and 2022, respectively.

Focusing on hydrodynamic numerical modelling, especially in Brazilian oceanography, the study by Marta-Almeida points to the predominance of men, with only a few women among the top twenty scientists in the field. Mention should be made of the oil sponsorship of Brazilian oceanography, which shows little interest in *offshore* renewable energies.³³ In particular, there is an international commitment to the development of renewable energies, but only two studies in Brazil on ocean renewable energies by 2022. The research indicates that a greater number of female scientists studying the oceans and climates could boost the country on the world sustainability stage, although the study does not explain the reasons behind this result.

The study by Margriet, Van Den Berg, Lopes, Behagel, Verschoor, and Turnhout thematizes the role played by young people in the transition to agroecology due to their participation in educational initiatives originating from Brazilian social movements.³⁴ This is qualitative research, understood as "action research" that strengthens the capacity to create films with young agroecologists from the Zona da Mata region in the state of Minas Gerais, Brazil. The result is that young agroecologists are more inclusive of different people, generations, and genders. The study thematizes the existence of prejudice against women, as well as the double workload, both domestic and non-domestic. It addresses the need to include women in agroecology, but there is no focus on the role played by women in the energy transition and there is no analysis of the correlation between gender and the energy transition.

Finally, the third study focuses on Latin America. Written by Koengkan, Fuinhas, Belucio, Kazemcاده, Poveda, Alavijeh and Santiano,³⁵ it presents the results of an analysis of the effect of gender inequality on the economic growth of Latin American and Caribbean countries between 1990 and 2016. The prosperity of societies is correlated with an increase in gender equality. As a result, there is a

³² Ayesha Sadiqa, Tiia SahraKorpi, and Ilkka Keppo, 'Gender Vulnerabilities in Low Carbon Energy Transitions: A Conceptual Review' (2023) 18(4) Environmental Research Letters <https://doi.org/10.1088/1748-9326/acc819>

³³ Martinho Marta-Almeida, 'Ocean Modelling in Brazil, a Quick Review' (2022) 55 Arq Ciên 338-344

³⁴ Margriet J Goris and others, 'Resignification Practices of Youth in Zona da Mata, Brazil in the Transition towards Agroecology' (2019) 11 Sustainability 1-22 <https://doi.org/10.3390/su11010197>

³⁵ Matheus Koengkan and others, 'The Consequences of Gender Inequality on Latin America's Economic Growth: Macroeconomic Evidence' (2022) 3 Sexes 396-412 <https://doi.org/10.3390/sexes3030030>

need for countries to develop policies that contribute to greater participation by women in the labor market, reducing the gender pay gap, promoting women's education, and increasing women's managerial positions, and decision-making. The issue of renewable energy sources is only tangentially analyzed and there are no isolated results for Brazil.

In this sense, in addition to the existence of a *gap* in scientific studies on Brazil that correlate gender equality with renewable energy sources, the three studies found and selected do not seem to contribute to the debate, failing to directly address the issue in a specific and forceful way. Therefore, this is a limitation found in this research, and scientific research in Brazil on gender perspectives in the energy transition is needed. We suggest qualitative and quantitative research, particularly in the fields of law, politics, and economics.

Besides the scientific publications, there have been other studies published by key stakeholders in the energy sector which offer useful insights into the gender dimensions of the energy transition. While such studies are not indexed in the scientific databases, they nonetheless contribute to the evolving discourse in the field of energy transition and gender equity. A study by the E+ Institute entitled *Energy Transition in Brazil*, mentions the country's structural advantages in the energy transition process, especially its renewable electricity matrix and low-carbon resources.³⁶ On the other hand, there must be social, racial, and gender equity in the sector. In this sense, Brazil's energy transition must be fair, aligned with labor qualification, social, gender, and racial equity.

In a text presented to the 9th Brazilian Solar Energy Congress, which took place from 23 to 27 May 2022,³⁷ the constitution of the Brazilian Network of Women in Solar Energy, called MESol, was indicated in 2019, as a result of the search for resilience and gender equity in the energy sector. This study indicates that by 2050, 90 per cent of the world's energy matrix will be electricity generated by renewable sources. The disproportionate participation of women in the sector must therefore be questioned, given that 40% of companies in Brazil that work with photovoltaic energy have no women on their staff. Furthermore, in those companies where there are women on staff, the percentage is tiny compared to men.³⁸

The study under analysis discusses the discrimination and inequalities faced by Brazilian women in the photovoltaic and energy sector, proposing the need for quantitative and qualitative research on the subject. In this sense, MESol actions objectives to promote gender equality and greater participation by women in the

³⁶ E+ Energy Transition Institute, *Energy Transition in Brazil* (Emaisenergia 2020)

³⁷ Held in the city of Florianópolis, state of Santa Catarina, Brazil.

³⁸ Aline Cristiane Pan and others, 'Perspectives on Gender Resilience: Actions of the Brazilian Network of Women in Solar Energy' (2022) IX Brazilian Solar Energy Congress, Florianópolis, 23-27 May 2022 1-9

field. Firstly, by mapping the profile of women working in the sector and the context of the inequalities they face, highlighting: gender, age, economic origin, regional origin, maternity, clothing style, sexual orientation, skin color, religion and ethnicity prejudices. Only 21.5 per cent of the women surveyed had not suffered discrimination, compared to 78.5 per cent who said they had. The actions developed by MESol to address gender equity include a video encouraging girls and women to participate in the field, the creation of a manual of good practices at events and fairs in the solar energy sector, and the encouragement of scientific publications by women.³⁹

The Primer on Energy Transition in Brazil, by Deloitte (2022), recognizes the Paris Agreement's recommendation on climate change and social and gender impacts, supporting the creation of gender policies in the energy field to guarantee equal opportunities for men and women.⁴⁰ On the other hand, it does not discuss the issue in depth or what these gender policies might be.

A guide to teaching materials for the city of Porto Alegre, state of Rio Grande do Sul, Brazil, with a focus on municipal schools, replicates the indicators of gender inequality, such as the greater susceptibility of women and girls to violence and discrimination, and the existence of gender inequality in the energy sector, in the labor market and in access to financial resources. On the other hand, unlike the Primer mentioned above, it proposes policies to include a gender component in education in order to maximize positive impacts in favor of equity and the inclusion of women in the renewable energy field.⁴¹

The aim of these policies is to reach 50,000 public school students in the city of Porto Alegre: (a) linking school activities with activities developed at the Renewable Energy Reference Centre⁴²; (b) linking school activities with activities developed by the Physics Institute of the Federal University of Rio Grande do Sul (UFRGS), in its "Girls in Science" extension programme, which aims to boost women's careers in STEM areas; (c) technical visits for students to learn about photovoltaic panels; (d) introducing students to efficient equipment with energy conservation labels and raising awareness of everyday energy conservation and sustainability practices. The aim of these practices is to encourage girls' interest in the energy sector, enabling them to choose a job in the sector in the future.⁴³

³⁹ Ibid.

⁴⁰ Deloitte, Pathways to the Energy Transition in Brazil: A Sustainable Energy Model for Brazil in 2050 (Enel Group 2022)

⁴¹ Yara Martinelli, Sustainability for Municipal Schools in Porto Alegre: A Guide to Teaching Materials (Financing Energy for Low-carbon Investment (FELICITY) 2022)

⁴² The Renewable Energy Reference Centre | Department of Economic and Social Affairs (un.org), accessed on the 24th of September of 2024

⁴³ Ibid.

Finally, a booklet from the Brazilian Ministry of Education (2023, p. 1-14) asks: who fits into your energy transition? ⁴⁴ It is based on the assumption that gender equality in the sector is both a social issue and an economic challenge. It is considered that there is a correlation between diversity and productivity in various economic areas, including the energy sector. Gender equality in the energy transition, in addition to enabling greater equality, promotes innovation in the energy sector. Therefore, greater gender equity has an impact on greater economic development, more sustainable management of natural resources and greater social cohesion and stability. The booklet, which seeks to promote girls' and women's interest in renewable energy through education, is therefore aimed at educators.

Education makes it possible to construct gender identities, which have an impact on future career choices and can bring people closer to or further away from professional interests. If education focuses on male characters, it pushes women away from careers stereotypically understood as masculine. Education should provide equal access to professions for children, boys and girls, without bias. ⁴⁵

It is proposed that Brazilian basic education should reflect on gender equality, enabling more equitable social and cultural understandings. Among the actions indicated, there are discussions on concepts (i.e., gender, equity, equality, empowerment, patriarchy); dynamics that create space for girls' leadership; formation of gender-equal groups; encouraging respect for identities; presenting the energy sector as an important area, considering the possibility of future work for men and women; presenting examples of renowned women in the STEM fields; promoting visits to institutions linked to renewable energies; encouraging talks by women workers in the STEM and renewable energy fields. ⁴⁶

In secondary school, the aim is to build a space of respect and gender equality, encouraging girls to choose careers according to their desires and potential. Among the actions indicated: reflect on diversity, sexuality and anti-racism; stimulate debates with representation and no interruptions; strengthen support networks; strengthen critical thinking and social awareness; promote debates on the limits imposed on women by gender stereotypes, including in the choice of careers, careers and hierarchical ascension; promote visits to enterprises and institutions linked to renewable energies; invite women professionals from the STEM and renewable energy fields to give talks on the sector; present the energy

⁴⁴ Ibid.

⁴⁵ Ministry of Education, Energy & Gender Equity: Education, Energy and Gender Equity in Building a More Sustainable Future. Who's in Charge of Your Energy Transition? (MEC 2023)

⁴⁶ Ibid.

sector as an important area; present examples of inspiring women in the sector; develop mentoring projects for girls in the STEM fields.⁴⁷

In technical and higher education, the aim is to encourage women into STEM careers, promoting gender equality. Thus, the goals are gender-equitable treatment in classes; encouraging women to persist in their chosen careers; debating the importance of overcoming prejudice and discrimination. In addition, organizationally, gender equity must be guaranteed in higher education staff and teaching staff; gender parity in research grants; gender balance in decision-making and career progression.⁴⁸

3. LEGAL FRAMEWORK

There are a number of legal developments in relation to the Brazilian oil, gas, and energy sectors, including regulations, resolutions, policies which regulate oil, gas, and energy activities in Brazil,⁴⁹ including the creating of the national regulators,

⁴⁷ Ibid.

⁴⁸ Ibid.

⁴⁹ See for instance, Law 9478/1997, regulates oil and gas exploration and production activities, creates the National Energy Policy Council (Conselho Nacional de Política Energética – CNPE) and the National Agency of Petroleum, Natural Gas and Biofuels (Agência Nacional do Petróleo, Gás Natural e Biocombustíveis – ANP); Law No. 9,074/1995: This law establishes the legal framework for the electricity sector, covering aspects like generation, transmission, and distribution; Law No. 9,427/1996, which creates the Brazilian National Agency of Electrical Energy (Agência Nacional de Energia Elétrica – “ANEEL”); Law No. 10.438/2002, which provides for the expansion of emergency electric energy supply, sets forth extraordinary tariff recovery and universalisation of the electric energy public service, and creates the: (i) Incentive Program for Alternative Sources of Electricity (“PROINFRA”); and (ii) Energy Development Account (“CDE”); Law No. 9,991/2000: Addresses measures for energy conservation and efficiency, contributing to sustainable energy practices; Law No. 11,097/2005: Regulates the production and commercialization of biofuels, including ethanol and biodiesel; Law No. 10,848/2004, which addresses the commercialisation of electricity in national territory; Law 12,276/2010, authorizes the Union to directly assign to Petrobras, with due compensation, the activities of research and production of oil, natural gas and other fluid hydrocarbons in areas that contain up to 5 billion barrels of oil equivalent; Law 12,304/2010, authorizes the Executive Branch to create the state-run enterprise Pré-Sal Petróleo S.A (PPSA); Law 12,351/2010, regulates the exploration and production of oil, natural gas and other fluid hydrocarbons, under the production share regime, in the Pre-salt polygon and other strategic areas; it establishes the Social Fund and amends provisions of Law 9478; Law 11,909/2009 deals with the activities related to the transport of natural gas, dealt with in Article 177 of the Federal Constitution, as well as on the natural gas treatment, processing, storage, liquefaction, regasification and commercialization activities. This act also changes Law 9478 of August 6, 1997, and makes other provisions. The Decree regulates Chapters I through IV and VIII of the Law; Law No. 14,120/2021 and ANEEL’s ruling No. 1,031/2022, which address the reduction of tariffs for the use of distribution and transmission systems for hydropower, solar, wind, biomass or qualified cogeneration energy projects; Law No 14.164/2021 (New Gas Law) and Decree No 10.712/2021, which regulates the activities related to the transportation of natural

conditions to explore, develop, market, distribute oil, gas and energy, among others. However, of the provisions address gender equality. This reinforces the concerns raised in this paper as there is a lack of research and legal developments in terms of gender equality participation and inclusion in the energy transition context.

Nevertheless, it is important to highlight that the gap in gender equality it not a specific challenge faced in the Brazilian context nor the oil, gas, and energy industry.⁵⁰ This is a major concern in a global scale and across different sectors as highlighted by the UN SDG 5⁵¹ and most recent Nobel price award for economic science by Claudia Goldin “for having advanced our understanding of women’s labour market outcomes”.⁵²

Overall, Brazil is making significant progress in its energy transition, with policies and investments that promote clean and renewable sources. Despite the well-known fact that these actions are essential to address global challenges related to climate change and ensure a more sustainable future for everyone, there are no developed policies or laws specifically enacted to promote gender equity in the context of energy transition in Brazil.

Notwithstanding the above, the energy transition theme is growing in the legislative houses of Brazil. In 2023, more than 200 bills of law were presented in the House of Representatives related to the matter⁵³. These present opportunities to gender equity legislations in the context of the energy transition. Bill 528/2020 which creates programs and incentives for the production of biodiesel, biomethane and SAF (less polluting aviation fuel).

gas, referred to in Article 177 of the Federal Constitution, and the activities related to the flow, treatment, processing, underground storage, packaging, liquefaction, regasification and marketing of natural gas; Law No. 14,300/2022 and ANEEL’s Ruling No. 1,000/2021 (as amended by ANEEL’s Ruling No. 1,059/2023), which set forth the current legal framework for distributed generation (net metering).

⁵⁰ UN Women, ‘Global Gender Equality in 2023: Urgent Efforts Needed to Reach 2030 Goals’ <https://www.unwomen.org/en/news-stories/feature-story/2023/09/global-gender-equality-in-2023-urgent-efforts-needed-to-reach-2030-goals#:~:text=Goal%205%3A%20Gender%20equality%3A%20Gender,gaps%2C%20and%20inadequate%20legal%20defences> accessed 15 December 2023.

⁵¹ UN Women, ‘Global Gender Equality in 2023: Urgent Efforts Needed to Reach 2030 Goals’ <https://www.unwomen.org/en/news-stories/feature-story/2023/09/global-gender-equality-in-2023-urgent-efforts-needed-to-reach-2030-goals#:~:text=Goal%205%3A%20Gender%20equality%3A%20Gender,gaps%2C%20and%20inadequate%20legal%20defences> accessed 15 December 2023.

⁵² Nobel Prize, Nobel Prize in Economic Sciences <https://www.nobelprize.org/prizes/economic-sciences/> accessed 15 December 2023.

⁵³ Folha, ‘Transição Energética Ganha Espaço no Congresso’ (13 March 2024) Mercado <https://www.uol.com.br> accessed 24 September 2024.

(a) Bill 327/21: Currently before the House, this bill creates the Energy Transition Acceleration Program (Paten). Paten aims to encourage the financing of sustainable development projects, especially those related to infrastructure, technological research and innovation.

(b) Bill No 2.308/2023 and 5.751/2023 that regulate and standardize what green hydrogen (hydrogen produced from renewable sources) is produced from renewable sources) and how its production and marketing should work.

Although there is no law specifically regarding gender equity in energy transition, as Brazil moves towards sustainable energy sources, there is a growing recognition of the need to address gender disparities and promote diversity within the traditionally male-dominated oil and gas industry.

By 2022, around 14,500 women held positions in the oil and gas sectors in Brazil - representing just 16.5% of the country's total workforce⁵⁴. And the national scenario is similar to the employee profile at Petrobras, which has around 7,670 female oil workers, or 17% of the company's workforce⁵⁵.

Low participation is also seen in management positions at Petrobras, with 19.4% of the seats occupied by women. In addition, by taking a statistical look at the ethnic-racial profile of women at Petrobras, the analysis shows that black women workers represent 0.04% of all managers at the company⁵⁶.

Initiatives such as gender-responsive procurement and gender lens investing are gradually transforming the sector, creating more space for women's participation and leadership⁵⁷. Moreover, the adoption of comprehensive gender policies by financing bodies for sustainable energy projects is leading to incremental advances in gender equality⁵⁸.

These efforts are not only crucial for the empowerment of women but also for the overall development and competitiveness of the energy sector in Brazil. By integrating gender considerations into the energy transition, Brazil is setting a precedent for a more inclusive and sustainable future in the energy industry. The shift towards a gender-balanced workforce is expected to bring about a more innovative, resilient, and dynamic oil and gas sector that can better respond to the challenges of the 21st century. Arguably, the energy transition in Brazil is contributing to gender equality in the oil and gas sector by fostering inclusive

⁵⁴ MegaWhat, 'Apenas 16,5% dos Cargos dos Setores de Petróleo e Gás são Ocupados por Mulheres no Brasil' accessed 24 September 2024.

⁵⁵ Inter-union Department of Statistics and Socioeconomic Studies (Dieese/section of the Unified Federation of Oil Tankers - FUP)

⁵⁶ Ibid.

⁵⁷ Ibid.

⁵⁸ Carla Kraft, Seemin Qayum, Katharina Prostler, and Carmem Schuber, Gender Equality and the Sustainable Energy Transition (UN Women and UNIDO 2023)

policies and practices that aim to empower women and ensure equitable opportunities.

4. IMPACT OF THE ESG AGENDA

As previously mentioned, Brazil currently lacks explicit regulations or policies dedicated to promoting gender equality within the energy sector. Despite this, there is a noticeable uptrend in the inclusion of women in both grassroots and executive roles. This positive change is largely influenced by the Environmental, Social, and Governance (ESG) principles that many companies in this field are now embracing. Such initiatives are crucial for fostering a more diverse and equitable industry.

Amidst the rising global emphasis on ESG principles, there is a discernible trend towards enhancing corporate reputations through dedicated ESG strategies. Furthermore, a robust link has been established between a company's dedication to ESG initiatives and its performance outcomes⁵⁹.

This correlation underscores the fact that integrating ESG considerations into business operations is not only ethically sound but also commercially beneficial. Companies that proactively adopt and report on ESG criteria are often rewarded with improved operational efficiencies, heightened brand loyalty, and increased investor interest, leading to better overall results.

The study conducted by McKinsey & Company provides a revealing insight into the corporate world, particularly in relation to women's issues. It found that within organizations that maintain ESG initiatives, a significant 82% have incorporated targeted strategies aimed at promoting gender equality and women's empowerment into their ESG frameworks⁶⁰. This statistic reinforces the growing recognition of the importance of diversity and inclusion in the corporate agenda, reflecting a progressive shift towards more equitable business practices. By integrating specific measures for women's advancement, these companies are not only committing to social responsibility but also acknowledging the substantial value that gender diversity brings to the table in terms of innovation, performance, and competitiveness.

In 2004, the Brazilian oil and gas industry took a significant step towards gender equality.⁶¹ The Ministry of Mines and Energy, recognizing the need for inclusive policies, convened key industry stakeholders to develop guidelines informed by

⁵⁹ McKinsey & Company, Home - Português - Diversity Matters - LatAm - 2022 <https://www.mckinsey.com> accessed 15 May 2024.

⁶⁰ Ibid.

⁶¹ Brazil. Presidency of the Republic. Special Secretariat for Policies for Women. National Plan of Policies for Women. – Brasília: Special Secretariat for Policies for Women, 2005. 95 p.

the First National Conference on Policies for Women⁶². These guidelines were instrumental in shaping the National Plan on Policies for Women (PNPM). The PNPM reiterated the commitment of the Brazilian Government to the incorporation of the gender and race perspective into public policies, recognising and facing the inequalities between men and women, black men and black women, within the context of the political project of governance, as State policies.

The Ministry, collaborating with entities in the electricity, energy, and mineral sectors, established a committee dedicated to actualizing the Federal Government's Public Policies.⁶³ This Committee's mission was to promote gender equality within corporations, ensuring a non-discriminatory environment regardless of origin, ethnicity, color, or gender. Furthermore, the Committee aimed to extend its influence beyond corporate walls, engaging with local communities, suppliers, and partners across government, private, and third sectors to foster dialogue on gender issues.⁶⁴ This initiative represented a proactive approach to dismantling systemic barriers and fostering a culture of equality within one of Brazil's most vital industries. It underscored the importance of cross-sector collaboration and set a precedent for other sectors to follow. By integrating gender equality into corporate policy and community engagement, the Ministry of Mines and Energy and its partners demonstrated a commitment to creating a more inclusive and equitable society.

Despite the considerable time that has elapsed since the establishment of the Committee, the level of female participation in the industry continues to be disappointingly low. This persistent gender disparity highlights the need for more effective strategies and policies that encourage and support women's involvement in the sector. It is imperative that industry leaders and policymakers collaborate to create an environment that is not only welcoming to women but also actively promotes their advancement. By doing so, we can harness the full potential of a diverse workforce, driving innovation and fostering a more inclusive industry culture.

5. CONCLUSION

Energy transition is an important topic and vulnerable groups such as women are often disproportionately affected. However, this paper highlights that the scientific literature on energy transition does not significantly capture the challenges of gender inequality. If any given country lacks research and critical thinking about a certain topic, then how are they expected to change such reality? So, there is a need for more studies and data about gender equality in Brazil and

⁶² Ibid.

⁶³ Ibid.

⁶⁴ Ibid.

practical actions of how woman can increase its participation in the energy sector and more specifically in the energy transition.

Consequently, some limits are highlighted by this research, including the *gap* in Brazilian scientific studies correlating the energy transition and gender. This indicates the need for scientific research on the subject in Brazil, in favor of equity and sustainability. The Brazilian studies found, not indexed in the databases, refer to primers and guides for education, and contribute to the theme. They highlight gender inequality in careers, especially in the Brazilian energy sector, in decision-making and access to financial resources.⁶⁵ This replicates the gender imbalance that is also evident worldwide.⁶⁶

The Brazilian studies mentioned above point to education as a way of transforming this reality, in favor of greater interest among girls and women in these careers and, consequently, greater inclusion of women in the energy sector. It is claimed that such inclusion would guarantee diversity, innovation in the sector and greater productivity, since greater gender equality has an impact on greater economic development and better sustainable management of natural resources.⁶⁷ These conclusions are in line with the international research found, which suggests a correlation between the involvement of women in the energy field, and more innovative and creative ideas,⁶⁸ more sustainable energy practices,⁶⁹ and better economic performance.⁷⁰

Similarly, the legal framework dealing with oil, gas and energy do not address gender equality issues and this seem to be a global challenge rather than a specific Brazilian gap. So, there is a need for further research to understand how those legal frameworks could be enhanced in order to assist this matter and reduce gender equality into oil, gas and energy developments towards a cleaner and more sustainable future, for men and women.

⁶⁵ Ibid.

⁶⁶ Rebecca Pearl-Martinez and Jennie C Stepheins, 'Toward a Gender Diverse Workforce in the Renewable Energy Transition' (2016) 12(1) Sustainability: Science, Practice, & Policy 8-15 <https://doi.org/10.1080/15487733.2016.11908149>

⁶⁷ Yara Martinelli, Sustainability for Municipal Schools in Porto Alegre: A Guide to Teaching Materials (Financing Energy for Low-carbon Investment (FELICITY) 2022)

⁶⁸ Paula Carroll, 'Gender Mainstreaming in the European Union Energy Transition' (2022) 15(21) Energies <https://doi.org/10.3390/en15218087>

⁶⁹ Rebecca Pearl-Martinez and Jennie C Stepheins, 'Toward a Gender Diverse Workforce in the Renewable Energy Transition' (2016) 12(1) Sustainability: Science, Practice, & Policy 8-15 <https://doi.org/10.1080/15487733.2016.11908149>

⁷⁰ Oliver W Johnson and others, 'Intersectionality and Energy Transitions: A Review of Gender, Social Equity and Low-Carbon Energy' (2020) 70 Energy Research & Social Science <https://doi.org/10.1016/j.erss.2020.101774>