GENDER POWER

The energy transition through a gender lens

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Introduction

"Drill, baby, drill!" [1]

Somewhere between a frenzied call for the extraction of fossil fuels and a sexual metaphor, the phrase "Drill, baby, drill!", a slogan of the American Republicans under Donald Trump, neatly illustrates the proximity between the subject of energy and that of gender inequalities[2].

The urgency of the climate emergency and the need to stay within planetary boundaries require the rapid implementation of an energy transition away from fossil fuels (coal, gas, oil). But, as the Green European Foundation (GEF) has already stressed on several occasions, particularly in *The Future of the EU's Energy Project: Social dimension*[3], the success of this transition depends on social justice. A socially just transition means leaving no one behind, taking into account the vulnerabilities of all consumers and workers in the carbon-intensive sectors that will have to be transformed if the European Union is to achieve carbon neutrality by 2050. It means making sure not to widen pre-existing inequalities, but to combat them, while avoiding generating new ones.

In 2025, the vast majority of energy and climate policies drawn up by the EU institutions, and implemented in the Member States, are still not sufficiently centring the social dimension of both the climate emergency and the transition.

This is all the more regrettable given that equality between people is one of the foundational values of the European Union, enshrined since 1957 in the Treaty of Rome. Article 8 of the Treaty on the Functioning of the European Union states that *"in all its activities, the Union shall aim to eliminate inequalities, and to promote equality, between men and women*".

In 2019, the appointment of Ursula von der Leyen, the first woman to hold the post of President of the European Commission, and the creation of the post of a Commissioner for Equality could seem like a positive entry point for the full integration of the gender issue into European environmental and energy policies. All the more so since the European Commission adopted a Gender Equality Strategy for the period 2020-2025.

Yet the gender issue has remained a blind spot in energy and climate policies, despite the fact that the decarbonisation of our economies and societies represents an unprecedented opportunity to eradicate gender inequalities. While most energy and climate policies are presented as gender-neutral (i.e. as having a uniform impact on men, women and non-binary people who identify as neither male nor female), they are in fact based on the male norm, understood as a universal standard, without considering the differentiated impact they may have on women and non-binary people.

In 2025, economic and social inequalities between the sexes more generally remain significant, despite some positive changes for most European women (right to vote, access to financial independence, right to reproductive health, etc.) since the 1950s[4]. Many of these inequalities are rooted in political, economic and energy systems that are dependent on fossil fuels, which leads to the question: How might a society low in natural resources and powered by renewable energies be able to proactively eliminate gender inequalities?

Several academic and institutional studies, on which this essay is based, show that access to and use of energy are linked to age, ethnicity, socio-economic background and gender[5]. According to the European Institute for Gender Equality, women appear to be particularly vulnerable to energy poverty because of their lower incomes, their responsibilities for family care and housework and the fact that they are more likely than men to be single parents. What's more, the energy sector is no exception to the gender inequalities found elsewhere in society and the economy: women account for just 22% of the workforce in the global oil and gas industry, and 32% in the renewable energy industry. They are paid less than men, occupy the majority of administrative and public relations jobs and are few in number in technical, engineering and management positions[6]. In addition, the majority of national and local elected representatives responsible for energy in the EU Member States are men.

Energy underpins the material functioning of our societies and is at the heart of a large number of contemporary geo-political conflicts. It is therefore democratically problematic that more than half of the European[7] (and global) population does not participate fully in the political and economic direction of the sector, all the more so when it suffers the consequences on a massive scale. Moreover, women and non-binary people are heterogeneous groups who may face intersectional discrimination based on several personal characteristics. This is why it is important to take into account the intersection between gender and other grounds of discrimination, such as racial or ethnic origin, social class, religion, disability, age or sexual orientation[8].

The aims of this essay are in line with those of the Green European Foundation: to move the political and public debate forward, towards a more social and sustainable Europe; to support elected representatives and local actors

in implementing a just transition; to promote inclusive policies to achieve Europe's climate and energy objectives; and to ensure that the energy transition does not amplify social, ethnic and gender inequalities and can, on the contrary, help to reduce them. It is based on the available scientific and institutional literature on the subject, as well as interviews conducted with stakeholders on the ground as part of a *Knowledge Community*. The Community brought together representatives of civil society, research centres, local authorities and elected representatives between September 2023 and April 2024 to discuss the gender dimension of the energy transition in the French and European context[9] and resulted also in the policy brief Gender at the Heart of the EU Energy Transition: Key learnings from the French case.

This essay is divided into three chapters, which take stock of gender inequalities in Europe, analyse the links between fossil fuel energy systems and gender inequalities, and then identify ways of avoiding their reproduction in a model based on sufficiency[a], efficiency and renewable energy. The aim is also to show how transition policies, and in particular energy sufficiency policies, can be levers for reducing gender inequalities. Finally, we will set out the political conditions necessary for the fight to preserve the environment and the societal fight for gender equality to go hand in hand.

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a Sufficiency policies are described by the Intergovernmental Panel on Climate Change (IPCC) as a "set of measures and daily practices that avoid demand for energy, materials, land, and water while delivering human well-being for all within planetary boundaries" (Climate Change 2023 Synthesis Report). Sufficiency is a way of reimagining our relationship with energy, space, time, wealth, and well being – delivering greater equality in a context of limited resources.

Chapter 1
The fuel of inequalities

1.1. Energy, the driving force behind history

Energy is essential to the functioning of our societies: without solar energy, life on our planet could not have developed; without energy in the form of food calories, our human organisms could not survive. More generally, the use of energy resources, whether renewable (wind, water, sunlight, biomass, etc.), fossil (coal, oil, gas) or fissile (uranium), determines our capacity to transform ecosystems and satisfy our needs. As the philosopher Pierre Charbonnier points out in his books[10], the extraction and consumption of fossil fuels are the foundation on which our system of political and social rights and the balance of the international system inherited from the Second World War are built. From abundance comes freedom and peace.

Over the centuries, the extraction and use of these different resources have shaped lifestyles, the economy and regional planning. While the main energy resources used for thousands of years have been human power, animal power, wood and wind[11], the consumption of natural resources has grown steadily over the centuries.

We are now totally dependent, both materially and economically, on fossil fuels (accounting for 86% of the energy mix worldwide[12] and for 71% of gross available energy

demand in the European Union in 2022[13]), whose exploitation and combustion are responsible for climate change. But energy and matter evolve in symbiosis, as the science historian Jean-Baptiste Fressoz[14] reminds us. Despite the efforts of decarbonisation policies since the link between carbon emissions and global warming was made, particularly in the EU, we are still completely dependent on fossil fuels. While renewable energy in Europe has been growing steadily since the late 1990s, it still accounts for only a small proportion of the energy resources consumed worldwide. What we are seeing is an increase in the consumption of energy, both fossil and renewable, rather than any substitution between them. In fact, we are now consuming much larger quantities of coal and wood than we did in the 19th century, when coal was first used, precisely because fossil fuels have not yet been effectively replaced by renewable energy. And so energy consumption continues to rise[15] and plunge our societies into a state of energy exhaustion.

Today, most people in Western countries take energy for granted. But the ease of access to energy within the home and more generally across the so-called developed countries is fairly recent. The following examples illustrate the services that energy resources, and in particular renewable energy, provide us today.

In the 1940s, the American architect and designer Richard Buckminster Fuller developed the concept of the 'energy slave', dividing a country's annual energy consumption by the amount of daily work a human being could produce[16]. He came to the conclusion that in 1940, some 36.85 billion inanimate slaves were involved in the smooth running of the world's thermal-industrial civilisation - quantities that were already considerable even before the Trente Glorieuses (the name given in France to the 30 years of economic growth post-1945) and widespread globalisation had taken place.

In 2011, energy specialist David Hughes updated these figures and calculated that it would take an average of seven years and four months of cycling (taking into account weekends and public holidays and pedalling 8 hours a day) to produce as much energy as is contained in a barrel of oil (159 litres). A nation of 300 million people like the United States would thus rely on the work of 27 billion virtual workers[17]. Energy historian Vaclav Smil also offers an illustration of the power of mechanisation and the use of fossil fuels: to produce the same amount of grain as a modern American farmer in 2 hours with a combine harvester, a Roman farmer would need to work 350 hours[18].

Over the course of the twentieth century, energy consumption, and oil consumption in particular, exploded, with global energy demand increasing sevenfold in the space of a century[19]. The demographic explosion, which has seen the world's population rise from around 1.5 billion in 1890[20] to 8 billion in 2022[21], is not the only explanation. In the last two centuries, the world's population grew at an average annual rate of 1%, while energy consumption increased by 1.7%[22]. In the post-war period, territories were developed based on the use of automobiles, which made it possible to meet the new needs that the new consumer society was creating.

With the democratisation of the private car, millions of Europeans were able to live, work and consume in areas several kilometres apart, transforming the shape of towns and cities, especially their outskirts, as well as rural landscapes. The productivity of labour facilitated by oil has generated a surplus of capital that has been invested in education, as well as in health and social protection systems, leading to an increase in life expectancy.

However, the increase in economic and social inequalities between the countries of the Global North, engaged in industrial development, and those of the Global South is also

characteristic of this energy inebriation. And so is the perpetuation of gender inequalities, particularly to the detriment of women and sexual minorities, despite some progress[23]. In this context, the possible links between the struggle for women's rights and the rights of gender minorities and this history of energy are worth examining. What role have women and gender minorities played? In what way have the socio-economic models associated with fossil fuels been able, or not, to support the emancipation of people who do not identify with the male gender? Have they been a breeding ground for pre-existing gender inequalities? While the history of energy from a gender perspective remains to be written, there are a number of pivotal periods and social developments that have contributed to greater recognition of the rights of women and sexual minorities.

From the eighteenth century onwards, a number of philosophical movements have questioned the place of women in society and their access to civil rights, going beyond the idea that their sole social contribution is linked to their ability to bear children.

In response to the Declaration of the Rights of Man and of the Citizen, published in 1789 following the French Revolution, which totally omitted women, the writer Olympe de Gouges published a *Declaration of the Rights of Women and of the Female Citizen* in 1791. In 1790, the Englishwoman Mary Wollstonecraft published the *Vindication of the Rights of Woman*, a work in which she denounced patriarchal society and argued for the education of women to treat them as rational beings[24].

In the nineteenth century, after several centuries of debate, it was accepted that women were part of humanity, but their role was confined to the reproduction of the species and the domestic sphere, while men were allowed to flourish in the public sphere. The first International

Congress on Women's Rights was held in 1878 and focused on improving the daily lives of women by demanding their right to education, work, equal pay and recognition of the burden of domestic work.

The lack of objective data on women's work since the first Industrial Revolution means that their economic contribution to European pre-industrial and industrial societies has long been underestimated[25]. However, there had been a gradual shift from the domestic system to the factory system[26]. The industrialisation made possible by coal mining was based in part on extremely harsh working conditions for children women and men from the proletariat (some began working at the age of six). It led to a major rural exodus to urban centres and industrial regions throughout Europe, making housing and living conditions particularly difficult in some cities (substandard housing, overpopulation, almost non-existent hygiene conditions, etc.).

Capitalism associated women with labour and the reproduction of the masses[27]. At the same time, the urban bourgeois classes made massive use of domestic service, with hundreds of thousands of women moving to urban centres to work as maids, chambermaids, cooks or nannies. Up until the 1950s, the agricultural sector was also a major source of employment, relying on both male and female farm labourers, although not for the same wages.

Thousands of women worked in coal mining. In the 19th century, women at the bottom of the mine were putters, meaning that they carried the coal or pulled carts through the mine galleries to the shaft entrances. They brought the coal to the surface by climbing up long ladders that ran all the way up the mine shafts, carrying a hood on their backs held by a strap fastened around their foreheads. In 19th-century England, women's work was questioned by certain political leaders, who criticised them for abandoning their homes and going

against the welfare of their husbands and children[28] by taking up a professional activity. They were gradually exempted from going down into the mines and, until the 1950s, were responsible for sorting and crushing lumps of coal to extract fuel from the ore, as well as distributing lamps to the miners. From the 1960s onwards, mechanisation led to the gradual disappearance of women's work in European coal mining. Although some women held technical positions alongside mining engineers from the 1900s onwards, it was not until later that they were formally recognised as such. Thus, it would not be until 1969 that the first woman was officially appointed as a mining engineer in France[29].

From the end of the nineteenth century, the movements for workers' rights and women's rights collided, despite the sexism of the organisations defending the working class. In particular, the aim was to combine class struggle with the abolition of the exploitation of women. Many female workers were exposed to extreme working conditions and toxic substances; they paid with their health and their lives for the growth of a number of industries (for example, exposure to phosphorus in match factories or radium in watch factories)[30].

In the Europe of the 1960s, women became truly emancipated through work, particularly with the explosion of the service sector. Access to education and training was made available. The struggle for rights continued: calls for equal pay for equal work, legalisation of divorce, access to contraception, decriminalisation of abortion and homosexuality...

Progress has been made on both sides of the Iron Curtain, with women's rights sometimes more progressive in Communist countries than in the Western bloc[31]. In particular, the productivist dimension of the Communist model may have led to easier access to childcare or public services despite greater material difficulties[32] than in capitalist countries. At the same time, the consumer society and the advent

of home economics contributed to reducing the time women spent on domestic work, which made it easier for them to access paid employment and financial independence.

However, despite improvements in living conditions throughout the twentieth century, the development of telecommunications, the rise of digital technology and access to increasingly abundant energy resources, European societies remain profoundly unequal and patriarchal.

1.2. Gender inequalities amplified by the environmental crisis

Gender *inequality* refers to all the social, economic and legal disparities that place one sex at a disadvantage compared to another. It coexists with other structural inequalities, including social class, ethnic origin, nationality, health, sexual orientation, age and place of residence. Some people may be affected by an accumulation of inequalities, and this is known as intersectionality.

Gender *equality*, on the other hand, is about giving the same rights, freedoms and social opportunities to men, women and non-binary people so that they can fulfil their potential and contribute to and benefit from society[33]. Gender *equity* is the process of being fair to women, men and non-binary people. To ensure equity, measures often need to be taken to compensate for (or reduce disparities in) the historical and social disadvantages that prevent women, non-binary people and men from being considered on an equal footing.

Gender inequalities place women and non-binary people in situations of fragility and social and economic vulnerability. Climate change amplifies this dynamic, and if the energy and ecological transition remains blind to it, the situation is likely to worsen.

Before exploring this further, the following section gives an account of the state of play of gender inequality in European society today, across three key areas: the workplace, the home and the public sphere.

Unequal access to employment and income

- In all EU Member States, the employment rate for women is lower than for men: in 2023, 66% of women were employed, compared with 75% of men[34].

- In 2023, women earned on average 12% less than men for the same work, with the largest pay gap in Latvia (19%) and Austria (18%) and the smallest in Luxembourg, where women are slightly better paid than men, with a gap of -0.9% in favour of women[35]. These differences in pay can be explained by lower levels of qualifications amongst women and less access to managerial and executive positions. But they may also be due to gender discrimination by certain companies, which tend to overvalue men's work compared with women's work at equivalent levels of qualifications and tasks.

- Women are also more likely to work part-time, particularly to care for young children, disabled people or people losing their independence. This may be due to a lack of public services to take on this work, or to a lower wage offer for women, leading households to choose to prioritise the job held by the man. In 2022, 28% of women worked part-time, compared with 8% of men in the EU[36]. Here too, there are major disparities between countries, with 63% of women working part-time in the Netherlands, compared with around 40% in Austria and Germany[37] in 2022.

- However, more women than men have higher education qualifications. In 2020, 46% of European women aged between 25 and 34 had a degree, compared with 35% of men in the same age category[38]. However, fewer women than men take science, technology, engineering and mathematics (STEM) courses, which typically lead to the best-paid jobs. According to Eurostat, in 2021, 33% of STEM graduates were women[39].

- Women's lower access to work and lower incomes mean that their standard of living differs from that of men by around 4% in Europe. There are also disparities between countries: the gap is 7% in Bulgaria, 6% in the Czech Republic and Latvia, 4% in Sweden, 4% in Italy, 1.8% in Spain, 1% in France and 0.3% in Ireland[40].

- As a result, women have fewer financial resources than men and are therefore more likely to experience situations of precariousness. The average risk of poverty for women in the European Union is 17% in 2019 compared with 16% for men[41], although there are significant disparities between countries: in Latvia, for example, the figure is 25% for women and 20% for men[42], and in Bulgaria 24% for women and 21% for men[43], while it is 16% for women and 15% for men in Sweden[44]. Women over 65 are particularly affected by the risk of poverty and social exclusion[45]. In 2024, with the exception of Luxembourg, where men (10%) are at the same risk of poverty and social exclusion a women (10%), European women over 65 are more likely to fall below the poverty line than men. In France, the gap is three percentage points (16% for women and 13% for men). The figure is similar in Denmark, Italy and Germany, although the general risk of poverty is much higher there (23% for women over 65 and 19% for men in Germany). In other countries, however, the disparities between women and men over 65 remain much greater. Examples

include Bulgaria (11 percentage point gap) and Romania (9 percentage point gap). The over-65s are particularly at risk of economic insecurity in the Baltic States, with a 46% risk of poverty and social exclusion: 44% in Lithuania, 47% in Estonia and 47% in Latvia. These three countries also have the highest at-risk-of-poverty rate gap in the EU between men and women over 65, at 12 percentage points difference in Latvia, 14 in Lithuania and 20 in Estonia[46].

- Economic inequalities between women and men are also reflected in ownership of property and financial assets. While most couples buy a property jointly, when they separate, women become poorer and have more difficulty finding a home than men. The gender pay gap also leads to differences in the ability to save and, therefore, to have financial capital. We also note that although European legislation prohibits favouring men over women when it comes to inheritance, in reality, family strategies are often implemented, more or less consciously, to ensure that a greater portion of the inheritance benefits men. Finally, banking institutions are more likely to suggest higher-risk (and higher-return) financial investments to men, while proposing lower-risk and lower-return investments to supposedly risk-averse women[47].

Unequal division of household tasks

- In 2024, the Centre for Demographic Studies in Barcelona conducted a survey on the distribution of domestic tasks (shopping, cleaning, preparing meals) among 74,000 heterosexual couples in fifteen European countries[48]. In France, women spend an average of 3 hours 20 minutes a day on domestic chores, compared with 1 hour 50 minutes for men. The gap is widest in Greece, where

women spend an average of 4 hours a day on domestic chores, compared with 59 minutes for men. This can be explained by a high unemployment rate, lower pay for women (13% less than men) and a glaring lack of public childcare services, which leads Greek households to favour keeping the man's job over the woman's. Statistics show that, on average, 79% of European women (with or without children) do the housework and cooking on a daily basis, compared with just 34% of men. The gap is smallest in Sweden, where 74% of women do these tasks regularly, compared with 56% of men. In Greece, 85% of women are responsible for household chores, while 16% of men are involved.

- According to Eurostat, in 2016, around 92% of women aged 25-49 with children under 18 looked after their children on a daily basis, compared with only 68% of men. In Greece, the disparity is wider, with 95% of women looking after their children, compared with 53% of men. Malta has similar figures, while in Sweden (96% of women and 90% of men) and Slovenia (88% and 82%) childcare responsibilities are much more balanced[49]. It is also worth noting that 85% of single-parent families in the EU are headed by women[50].

- Women are much more likely than men to be victims of domestic violence: in 2023, one in five women in the EU "*have faced physical or sexual violence from their partner, a relative, or another member of their household*"[51]. In addition, 35% of women have already been victims of sexual harassment at work, the same number have suffered physical violence or threats as adults, and one in six has suffered sexual violence, including rape[52].

Unequal representation in public and economic life

- Although women made up 51% of the 447 million people living in the EU in 2021[53], women are under-represented in political office. In the EU as a whole, 33% of ministers, 33% of members of parliament and 35% of local councillors are women[54].

- Of the members of the boards of directors and senior management of major European companies, 34% are women[55]. 29% of central bank directors are women[56].

- In the field of research, women represent 43% of the decision-making members of major laboratories[57]. In the field of information and entertainment, women account for 38% of the members of the boards of public media[58]. In sport, women account for 22% of decision-making members of sports federations and Olympic bodies[59].

In order to document all of these inequalities, the European Union set up the *European Institute for Gender Equality* in 2006. Its role is to produce comprehensive and reliable databases to provide an annual overview of gender inequality in various fields (employment, the economy, domestic work, education, political and media representation, etc.) in all EU Member States. It is on the basis of this data and this work that public policies to combat gender inequality can be implemented. It is also through observation and research that it is possible to assess the impact of climate change and, more generally, of the breaching of planetary boundaries on women.

Gender inequalities amplified by the environmental crisis

While climate change, the collapse of biodiversity, pollution, and the destruction of ecosystems (soil, water system, atmosphere) impact all living beings on our planet, many international institutions and scientific publications note that women are particularly affected.

The 17 Sustainable Development Goals (SDGs) defined by the United Nations set out a number of targets to be achieved by 2030 to reduce both poverty and environmental degradation on a global scale. These include gender equality (SDG 5), access to clean and affordable energy (SDG 7), reducing inequality (SDG 10) and combating climate change (SDG 13). For the UN, *"Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world. (…) Women and girls represent half of the world's population and therefore also half of its potential. But gender inequality persists everywhere and stagnates social progress"* [60].

In addition, the 2015 Paris Climate Agreement stresses *"the importance of breaking down silos and developing solutions that both limit climate impacts and rebalance gender power relations"* [61]. As does the Intergovernmental Panel on Climate Change (IPCC), which in its 6th report on climate change, published in 2022, points to a broad scientific consensus and substantial evidence that empowering women contributes to climate change mitigation and adaptation, insofar as women tend to take environmental issues into account in their voting, their consumption practices, their activism and their professional and domestic lives. In addition, the IPCC states that giving greater importance and resources to marginalised populations (due to ethnicity, race or disability) helps to increase the positive effects of climate policies[62].

The following examples illustrate how environmental crises particularly impact women:

- 70% of the world's poorest people are women. Their economic vulnerability is exacerbated by climate change, all the more so given that they hold most of the jobs in subsistence farming in the Global South[63]. In rural areas, they are also responsible for supporting their families by taking care of water, wood and energy chores, as well as food production and preparation. According to UNICEF, every day women and girls spend 200 million hours, or more than 22,800 years, collecting water - time that is not spent on education, paid work or rest[64]. They are therefore particularly vulnerable to droughts and floods. By 2050, climate change could push 158 million more women and girls into poverty than today, and 236 million into food insecurity. The United Nations agency for gender equality and the empowerment of women, UN Women, notes that *"the climate crisis fuels increases in conflict and migration, as well as exclusionary, anti-rights political rhetoric targeting women, refugees, and other vulnerable groups"*[65].

- In Europe, the forms of poverty are less dramatic, but the inequalities are just as pronounced: energy poverty affects women, especially older women, more than men. In 2022, 44% of single mothers and 31% of single women said they had difficulty paying for energy, according to a report by the European Parliament's Committee on Women's Rights and Gender Equality[66]. And a study carried out in Barcelona revealed that 70% of subsidies granted to social services to combat energy poverty went to women[67].

- According to the United Nations, 80% of climate refugees are women. During climate-related disasters, women and children are "*14 times more likely to die than men, mostly due to limited access to information, limited mobility, decision-making, and resources*"[68]. Hundreds of millions of women around the world are dependent on their husbands, fathers or brothers for access

to a vehicle or permission to leave their homes. They are also the first to fall victim to disruption of education and health systems after a climate disaster, and are more likely to be confronted with violence in situations of shortages and population displacement.

- The impact of climate change on women's health is not the same as that of men. Periods of extreme heat and heatwaves are more lethal for women. They are more prone to dehydration and cardiovascular problems than men, are more likely to live alone and are more likely to engage in physical activity to meet the daily needs of the household, making them more vulnerable to heat. For example, during the 2003 heatwave in France, women were 15% more likely to die than men of the same age[69]. A study by the *Barcelona Institute for Global Health* showed that the summer 2022 heatwave in Europe was much more fatal for women than for men, particularly in the south of Europe[70].

- The mental burden of adopting environmentally friendly behaviour falls mainly on women in households. As they generally manage the household budget, it is often up to them to make responsible consumption choices, whether in the purchase of food, everyday products, clothing, or even in the management of energy consumption and expenditure within the home.

Because of the social roles culturally assigned to women and their greater economic vulnerability, they are more affected than men by health[71], economic and geopolitical[72] crises, especially when these have consequences for the cost of living (and energy in particular) and access to healthcare.

To fully understand where these inequalities come from, it is necessary to look back at the economic and energy systems that underpin them.

1.3. The essence of patriarchy

Analysing the relationship between how the fossil energy systems and the patriarchy have developed sheds new light on gender inequalities.

A growing body of academic and institutional literature identifies a strong correlation between the use of fossil fuels, capitalism, patriarchal social systems and persistent economic and social inequalities between the sexes.

Patriarchy is one of the normative frameworks structuring our contemporary societies. British sociologist Sylvia Walby defines patriarchy as *"a system of social structures and practices in which men dominate, oppress, and exploit women,"* operating both in the private sphere, where it is based on household production and the control of women directly and indirectly by a patriarch in the home, and in the public sphere through the public institutions that contribute to its maintenance[73].

This domination of a male elite over women also applies to men and non-binary people who do not identify with the images of masculinity conveyed by patriarchy, which is seen as an oppressive system. As the academic and journalist Francine Sporenda points out, "*the main myths and beliefs of patriarchal ideology seem invisible because they are omnipresent, deeply infused into all social structures, conveyed by the multiple channels (media, films, social networks, etc.) of mass communication, accepted without thought and often requiring no justification because they are so self-evident*" [translated from the French by the editor][74].

In Europe, we live in an energy-hungry society, ultra-dependent on fossil fuels. And this society largely excludes women. It is fuelled by fossil fuels, and conveys representations and narratives based on carbon that promote power, speed and domination of nature, very similar to the values

supposedly associated with masculinity (shows of virility, physical strength, domination of women).

"Petro-masculinity", as defined by the American political science professor Cara New Daggett[75], identifies the close relationship between fossil fuel systems on the one hand, and the establishment and preservation of patriarchy as a system of domination over nature and other genders on the other. Starting from the American context and analysing Trump supporters in particular, she notes very close links between the defence of exaggerated masculinity, sexist and aggressive behaviour towards women and sexual minorities, unconditional support for carbon-intensive industries (oil extraction, shale gas drilling, the automobile sector, etc.), and climate scepticism.

This petro-masculinity seems to find followers in Europe in the form of a hatred of renewable energy, climate scepticism or even a latent climate conspiracy in a large number of supporters of identitarian and nationalist movements[76]. Challenging environmental regulations, but also questioning the rights of women (access to reproductive rights in particular), sexual minorities and migrants is the very basis of the ideology conveyed by most European ultra-conservative parties.

The historian and anthropologist Timothy Mitchell also demonstrates in his work how the reign of oil can give the false impression that it is the *sine qua non* for upholding the democratic system in the West[77]. Yet the opposite is true. Unlike coal, which requires a large workforce capable of going on strike and obstructing a nation's energy supply to achieve social progress or better pay, oil extraction is almost entirely automated and is based on a violent imperialist system in which the balance of power revolves around an economic and military *status quo* between the producer countries, the oil companies and the consumer countries.

The dominance of fossil fuels, and oil in particular, in virtually all areas of life is not a "natural process" or "historical imperative", but the result of political and economic choices. The first electric car appeared in 1834, while the first internal combustion engine was not developed until 1861. The purchase and dismantling of tramway systems in the United States by tyre and oil companies at the beginning of the twentieth century was intended to promote the car as the only alternative to declining public transport[78].

For the proponents of petro-masculinity, the prospect of seeing oil and the pleasures it has brought disappear in favour of renewable energy and the sensible use of natural resources is unbearable. Stephanie LeMenager, a professor of literature and environmental studies, uses the term "petro-melancholy" to describe the state of mourning into which an inevitable end to the use of oil would plunge us, mirrored in the state of mourning into which the destruction of ecosystems is tipping us[79]. As Charbonnier says, it is intellectually inconceivable for most of us to imagine a world without oil, when the whole of our contemporary existence is based on this resource, from the use of oil in agriculture in the form of fertilisers, to synthetic textiles derived from oil to the plastics in our everyday objects[80].

Cinema and advertising play a key role in disseminating these carbon imageries. Not only do car advertisements invite us to buy an experience or a social status rather than a vehicle, but they also mobilise very strong gender stereotypes according to which "true" masculinity could only be associated with the possession of an imposing, powerful and noisy vehicle[81]. Similar stereotypes are used to encourage women to buy small, compact vehicles that are easy to park, since sexist stereotypes suggest that women are poor drivers, despite the fact that since the 2010s, over 75% of road accident victims in Europe have been men[82].

Moreover, cinema, particularly through action films, projects very virile forms of masculinity in the form of muscular, testosterone-fuelled heroes and superheroes, multiplying their female conquests.

Films featuring scenarios of energy or resource shortages (such as George Miller's *Mad Max*, Kevin Reynolds' *Waterworld*, Richard Fleischer's *Green Sun*, etc.) or climatic cataclysms (Roland Emmerich's *The Day After Tomorrow*, Christopher Nolan's *Interstellar*, Ridley Scott's *Blade Runner*) convey this type of representation in particular. The American dream of the heterosexual couple living in a house with a garden, a dog and children, also relies on owning a car to get to work and overcome the urban sprawl made possible by oil, with the housewife doing the housework and looking after the children, who can't get around because they don't have a car... These ways of life and land-use planning that are so familiar to us, and sometimes so desirable, have been disseminated to Europeans through advertising and American cinema.

In a less explicit but equally influential way, architecture also helps to disseminate images of fossil fuels. Architectural historian Carola Hein shows us how the wealth derived from oil exploitation has shaped the architecture and urban planning of certain cities[83] to become models that can be replicated all over the world. She points out that oil companies were the first to set up their head offices in skyscrapers and to develop business districts (the first building to be constructed in the La Défense business district in Paris was by the oil company ExxonMobil), and she stresses the way in which architecture was used to serve this imaginary of power, even excess, not to mention the phallic nature of this type of building[84].

However, the development of this model of carbon-based society has not gone unchallenged. As early as the

1970s, many feminist activists and researchers identified an interaction between the exploitation of natural resources by capitalism, the exploitation of the bodies of certain populations and ethnic groups by colonialism and imperialism, and the exploitation of women's bodies by patriarchy[85]. A branch of feminism sensitive to the environmental cause, eco-feminism, has been behind movements against the construction of energy infrastructure and the destruction of ecosystems. In particular, women have mobilised against new nuclear power stations in France (e.g. the explosion at the construction site of the Fessenheim power plant in 1975; demonstration against the construction of a power plant in Plogoff, Brittany, 1975-1981[86]), against the installation of nuclear missiles on the Greenham Common military base in England (1981- 2000), against the construction of the Dakota Access oil pipeline on the Standing Rock site in the United States (2016) ... While this history of feminist struggles against fossil fuels and nuclear power remains to be written, women are paradoxically poorly represented in the energy sector.

Indeed, a 2017 study by the World Petroleum Council and the Boston Consulting Group indicates that the proportion of women working in the oil and gas sector worldwide is 22% and 15% respectively, much lower than in other sectors such as education, health or commerce[87]. These women work mainly in administration, public relations and communications. Although there are some female engineers in this sector, only 17% of women hold managerial, executive or board positions. The same study shows that, on average, there is one female for every 99 male executives.

There are several reasons for these disparities. First of all, gender stereotypes mean that girls are less likely to go into scientific and technical professions than boys. There are major disparities in the proportion of female

scientists and engineers between countries. In 2022, women in Denmark and Lithuania accounted for more than 50% of engineers, compared with 34% in Germany and 31% in Bulgaria[88].

Secondly, men are more likely to apply for jobs for which they do not have all the skills required, whereas women are more likely to apply only for jobs for which they feel they are fully qualified. Women are also less likely to negotiate pay and benefits. They have to prove themselves more than men in order to advance in their careers, especially in very male-dominated environments where they are expected to do well. It is worth noting, however, that since the start of the war in Ukraine, hundreds of women have replaced their husbands, sent to the front, in the coal mines[89].

The renewable energy sector is more job-intensive than the fossil fuel sector, which represents a greater opportunity for women. However, in 2019, only 32% of jobs in the renewables sector were held by women[90], predominantly in administrative departments and much less so in skilled technical and engineering jobs. Because working conditions are less difficult and more compatible with family life than in the fossil fuel sector, women are more likely to be attracted to the renewable energy sector[91].

But there is still a problem with the attractiveness of these jobs, as their technical nature is often associated with "masculine" skills.

In addition to their contribution to the energy sector, there is an "*eco-gender gap*" between women and men in terms of their environmental impact and the adoption of practices that contribute to the fight against climate change. Since the amount of greenhouse gas emissions an individual emits is linked to their income, and since women are poorer than men, they generally have a smaller carbon footprint. On the

other hand, a Swedish study has shown that men's average expenditure on consumer goods results in significantly more greenhouse gas emissions than women's for the same amount of expenditure[92 93]. Numerous scientific studies also show that there is a gendered relationship to food, with men eating more meat than women[94 95 96]. Beyond food consumption, attitudes to nature are clearly differentiated between the sexes, with the socialisation of girls and boys, around gender stereotypes leading the latter to adopt behaviours considered to be virile and generally more polluting (motor sports, flying airplanes and motorised vehicles, etc.). Gender stereotypes influence behaviour; associating environmental practices with women can reinforce a bias in men[97] who adopt more energy-consuming behaviours.

Today, it seems more necessary than ever to question how to construct solid and realistic low-carbon visions of the future. This is not only in the context of the climate movement finding itself on the defensive and renewed interest in fossil fuels, but also the scramble for minerals and metals central to techno-solutionist and extraterrestrial visions for the future.

Furthermore, bringing together the fields of *gender studies* and *environmental humanities* in order to produce a history of energy and the environment through a gender lens would enable critical reflection on power and domination. Indeed, one of the arguments put forward by the defenders of fossil fuel-based energy systems is beginning to be that a move away from fossil fuels would inevitably lead to a regression in the rights of women and sexual minorities. A simplistic vision of the transition that opposes "petro-masculinity" with "renewable feminism" should also be avoided. The political and social conditions that would enable an energy transition from fossil fuels to renewables that is *also* a transition from a patriarchal to an egalitarian system still need to be set out.

1.4. The high price of gender inequality

Living in an unequal society has a cost.

Firstly, there is a human cost linked to precarity, to difficulties in accessing employment or representation, which has an impact on the health and living conditions of women and non-binary people. As mentioned above, women and non-binary people are more exposed to energy poverty than men, particularly when it comes to access to energy. Energy poverty refers to a situation in which people find it difficult to heat their homes adequately, at an affordable cost. This situation has major social and health consequences. Living in a poorly insulated home can lead to high levels of exposure to damp and mould, with harmful effects not only on physical health, but also on mental well-being.

Poor housing can cause anxiety, psychological distress and even social isolation[98]. People living in energy poverty are also particularly vulnerable during heatwaves.

Scientific studies have also highlighted the differences in temperature perception between men and women. Thermal comfort can be perceived in different ways depending on the age, health, tiredness, metabolism and hormonal state of the individual. According to various studies, the ideal ambient temperature is between 22°C and 24°C for men, compared with 24.5°C and 26°C for women[99 100 101]. Yet heating and air-conditioning equipment is often designed according to male standards, based on individuals of average build and in good health[102]. As a result, heating and cooling systems can be ill-suited to the specific needs of women, the elderly and the frail, with repercussions for their health.

There are other major biases in the design of objects and spaces as a result of designers relying too often on standards that are thought to be "universal", when

in reality they are based on male standards. Many everyday objects and professional equipment are designed without taking women's morphology into account, leading to discomfort and even difficulties in use[103].

Examples include bicycle saddles, which are often poorly adapted to the female anatomy, and certain work clothes designed for male bodies. This is particularly true of full-body protective suits, which have to be removed entirely to go to the bathroom, posing problems of practicality and dignity[104].

A 2016 study by the trade union *Prospect* of women working in sectors such as emergency services, construction and energy in the UK found that on average, only 29% wore personal protective equipment (PPE) specifically designed for women[105]. This rate was lower in specific industries: among the survey respondents, less than 10% of women working in the energy sector and only 17% of those working in construction reported wearing PPE specifically made for the female body, creating safety risks at work.

Another example is vehicle interiors, which are mainly designed with male body shapes in mind, as the dummies used in crash tests do not have female body shapes. This approach compromises the safety of women, who are more exposed to risk in the event of an accident. Women are 47% more likely than men to be seriously injured, 71% more likely to be slightly injured, and 17% more likely to die as a result of airbag and seatbelt designs that are not adapted to their bodies[106]. In addition, the research highlights a structural bias in favour of traditionally male modes of transport in current urban and regional planning policies. The United Nations Commission on the Status of Women has highlighted the existence of a "gender bias" in transport planning, deploring the failure to take gender into account in the design of transport systems.

Travel practices differ according to gender. Men often prefer direct home-work journeys, while women tend to make more fragmented journeys: shopping, medical appointments, accompanying children or relatives which they are caring for.

These so-called "hub-and-spoke" journeys are linked to women's many care responsibilities, and require better adapted transport systems to these needs[107].

Furthermore, in many developing countries, women face difficulties in accessing energy, with major consequences for both their health and their access to education. The use of unsafe cooking equipment, often based on polluting fuels, exposes women to risks of poisoning and respiratory diseases. What's more, a lack of access to energy limits their ability to continue their education or take part in economic activities, pushing them deeper into a cycle of insecurity.

Gender inequalities also have an economic cost. The European Institute for Gender Equality (EIGE) estimates that reducing gender inequalities could increase the European Union's GDP per capita by 9.6% by 2050[108]. Currently, part-time work by women, often linked to family responsibilities, generates an annual loss of €370 billion for the European economy[109].

At the global level, a 2024 report by UN Women calculates an annual cost to the world economy of more than 10 trillion dollars due to a lack of investment in girls' education. Moreover, closing the productivity and wage gap between men and women in the food sector could increase global GDP by almost a trillion dollars, while reducing food insecurity for millions of people. Women's access to electricity, for example, increases their participation in the labour market by almost 20%, improving their financial independence and their families' food security[110].

Aside from employment, there is the impact of "virility" on public finances. The "virility cost" refers to the extra cost of anti-social behaviour by men compared with women. The cost of such behaviour is both direct for the state (law enforcement, justice, health) and indirect for society, affecting productivity and creating physical and psychological suffering.

In 2022, the *Fondation des Femmes* and the organisation *Genre et Statistiques* published a report estimating the cost of gender inequality in France at between €102 billion and €118 billion a year. These costs include: €3.3 billion for domestic violence, €89.3 billion for anti-social behaviour to the detriment of others and society (violence, risk taking), between €5 billion and €22.15 billion for economic inequality, and €3.6 billion for health. Unequal pay costs women around €5420 a year, while inequality can cost women in a couple €16 992 to 25 169 yearly[111].

The report defines "virility" as an ideal linked to strength, power and performance, contributing to the idea of male superiority. Manly behaviour, often responsible for violence and social risks, is associated with high costs. These are measured by expenditure in several sectors: defence, security, justice and health, including the costs associated with violence, delinquency, sexual crimes, road safety, drug trafficking and human trafficking.

Chapter 2
The urgency of fairness

2.1. Climate emergency, fossil fuel phase-out and gender equality

The 21st century will be the century during which Earth's planetary boundaries are exceeded. Climate change and the scarcity of certain natural resources that are essential to the functioning of our societies (water, cultivable land, metals) will radically transform the world as we know it today.

Against this backdrop, economic, social and environmental inequalities are likely to grow, as are gender inequalities. In order to help manage current and future crises, while anticipating the rarefaction or even scarcity of certain resources, sufficiency appears to be the way forward to avoid a total social divide between the richest and poorest populations (most of whom are women). It relies on lifestyle change for individuals and society, new norms and ways of seeing the world, to reduce resource consumption and guarantee the wellbeing of all, within planetary boundaries[112].

The reality is that not all eight billion human beings have equal access to natural resources such as energy sources. They are not evenly distributed across the globe: some can often be easily found (such as wood), while others (such as oil) are located in very specific places. These resources are also assigned a monetary value and therefore require financial

resources to acquire them. As a result, there are major global disparities in terms of the distribution and consumption of natural resources, but also in terms of the greenhouse gas emissions that their consumption produces.

In 2023, the activities of the G20 countries accounted for 77% of global emissions and are continuing to rise[113]. With 16 gigatonnes of CO_2, China emitted 30% of the countries' total, up 5.2% from 2022[114]. The United States saw its emissions fall between 2022 and 2023, but it remains the world's 2nd largest emitter with 6 gigatonnes of CO_2. Together with India (4.1 gigatonnes of CO_2, 8% of the total), these three countries emit more than half of the planet's greenhouse gases. Emitting 3.2 gigatonnes of CO_2, the 27-country EU bloc is in fourth place, but with a strong downward trend (-7.5%). The 55 countries of the African Union account for just 5% of global greenhouse gas emissions. Finally, the *Emissions Gap Report* predicts global warming of +3.1°C by the end of the 21st century if nationally determined contributions (climate commitments defined by the countries themselves) are not drastically and rapidly increased[115].

The impacts of climate change are global but particularly affect countries located in the tropics, which are often developing countries with low CO_2 emissions compared to more industrialised countries (Europe, the United States, Australia, Japan, China, etc.).

It is therefore these industrialised countries that need to make a rapid shift towards sufficiency in order to minimise the environmental impact of their populations' lifestyles - a concern that was at the heart of the policies of the European Green Deal, which sought to combine decarbonisation with a reduction in primary energy consumption in the EU. This is because the level of consumption of natural resources (in the form of objects, fuel, heating, etc.), and therefore of an individual's CO_2 emissions, is generally correlated with

their income level, age and family situation - although there may be exceptions. In his work on environmental inequalities, economist Lucas Chancel estimates that on a global scale, the richest 10% of people have an average income thirty times higher than the richest 50% and emit five times more CO_2[116]. This is reflected in energy-intensive lifestyles (regular air travel, multiple home ownership, consumption of luxury goods, etc.) and the investment of financial income with banks that invest in the extraction of fossil fuels or in industries that emit large quantities of greenhouse gases.

While the figures from the International Energy Agency effectively confirm the downward trend in the EU's greenhouse gas emissions[117], Europe remains one of the biggest emitters, if not through its direct production, then at least through its imported consumption[118] [119]. However, the aggregate figures conceal significant disparities within countries. According to the French Observatory of Economics (OFCE), in France in 2019, the poorest 10% of households emitted an average of 15 tons of CO_2 equivalent per year, compared with nearly 40 tons of CO_2 equivalent for the richest 10% of households[120]. To limit global warming, it is estimated that the average carbon footprint of a human being should be no more than 2 tonnes of CO_2 equivalent per year to meet the goals of the Paris Agreement[121]. With this target in mind, France Stratégie estimates that the poorest 50% of French people should reduce their carbon footprint by 4%, compared with 81% for the richest 10%[122]. The richest will therefore have to become the most sufficient. As highlighted in the Green European Foundation's study *A European Wellbeing Economy*[123], it is vital to combine the energy transition with a reduction in social inequalities.

Although there are currently no gender-specific data on carbon footprints, several scientific studies show that men tend to have more carbon-intensive lifestyles than women. There are several reasons for this, the first being

access to higher incomes and therefore greater purchasing power. Male stereotypes also promote risky practices, speed and power, achieved through means of transport (large engines, motorbikes, quads), as well as consumption practices (meat-based diets) and leisure activities that emit particularly high levels of CO_2 (motor sports, amateur aviation, travel). The concept of the "Androcene" weaves a very close link between the current environmental crisis and the patriarchal organisation of our societies, and complements the notion of the Anthropocene, which tends not to specify which population categories within the human species are particularly responsible for climate disruption and the collapse of biodiversity[124].

What's more, the functioning of our societies depends on the physical and economic availability of energy resources, which are essential to the smooth running of a capitalist economic system built around the production and consumption of goods and services. Indeed, energy is the driving force behind the economic system of Western societies; the price of energy and the level of economic growth are closely interdependent.

Our infrastructures have become a symbol of this inebriation with energy resources: whether it is ski slopes covered in artificial snow, surf parks set up in shopping centres, air-conditioning the streets of arid countries or heating outdoor terraces in winter, there is no shortage of examples to illustrate the over-consumption of energy resources that are still scarce and relatively cheap.

Our modern societies are largely influenced by technicist and generally masculinist visions that conceive technological progress as a perpetual movement that will enable us to meet the challenges facing the human race. Whether through geo-engineering, nuclear fusion, transhumanism or the conquest of space, technological solutionism today

proposes visions of the future based on an elsewhere or an otherwise that is extremely energy-intensive and very masculine. Whereas the global environmental crisis would require us to focus on local solutions based on sufficiency in order to "land", in the words of the French philosopher Bruno Latour[125], technological solutionism appears to be blind to its environmental impact and material feasibility (availability of sufficient natural resources, environmental impact, energy consumption).

However, improving the energy performance of technical systems appears to be a way of reducing our energy consumption. The term "energy efficiency" refers to the reduction in energy consumption by a piece of equipment (a building or a vehicle, for example) for an equivalent energy service, whereas "sufficiency" refers to changes in human organisation and behaviour aimed at reducing energy consumption.

This distinction means that technical improvements should not be seen as the only solution for reducing our energy consumption.

The benefits of improved energy efficiency may be limited by an increase in usage. This is known as the "rebound effect", also known as the Jevons Paradox, named after a British economist who put forward the concept as early as 1865[126]. Although energy efficiency has increased significantly since the 1970s, this has not prevented oil consumption from exploding over the last fifty years.

Thus, the energy transition can only be achieved in a fair way by mobilising three levers: the development of renewable energy, the pursuit of energy efficiency and the implementation of sufficiency measures. It is on this triptych that the *Clever*[127] energy forecasting scenario is based, built by 26 organisations (think tanks, research institutes, NGOs) from 20 European countries and coordinated by the

French NGO négaWatt. This scenario focuses on demand by first reducing energy needs to levels considered essential to provide a decent level of services for all (sufficiency). Sufficiency is then combined with a reduction in energy intensity through technological improvements (efficiency), thereby reducing the amount of energy needed to provide a decent level of services for all. Finally, the remaining energy demand is met by the production of renewable energy. This approach contrasts with the ones adopted by most institutional foresight scenarios, which generally prioritise decarbonising the energy supply, then complement this with efficiency measures, without considering sufficiency as an additional lever.

2.2. Towards an inclusive and sustainable society

Sufficiency looks at how we use energy and natural resources (water, soil, minerals, etc.), to consume the quantity necessary to satisfy human needs while limiting social inequalities and environmental impacts on non-humans and ecosystems.

Overeating at a family meal can lead to indigestion. On a planetary scale, over-exploiting the earth's natural resources leads to the destruction of ecosystems, the collapse of biodiversity, the disruption of the water and carbon cycles and increased inequalities between populations. Like a nutritionist for natural resources, sufficiency aims to reach the degree of fullness that will allow societies to recover from their over-consumption of energy, their over-production of waste, their squandering of non-renewable resources and the exploitation of the poorest populations. In practical terms, sufficiency means reducing our greenhouse gas emissions by changing our behaviour, lifestyles and organisational structures.

While sufficiency can be exercised at an individual level, the collective dimension of its implementation is key, insofar as individual lifestyles and behaviours are largely based on norms and frameworks imposed by socio-technical systems. These models of society guide and condition the way in which people live, and whether they adopt 'gendered' behaviour or not. Land-use planning determines where we live and how we get around; the organisation of work defines the time we devote to our loved ones and to leisure activities; the economic and monetary system impacts our purchasing and saving capacity…

Individuals evolve within specific frameworks that exert a strong influence on them. Committing to sufficiency, therefore means shaping individual and collective needs, regulations, social norms and the aspirations of the population in favour of a lower consumption of natural resources. Sufficiency requires us to collectively consider the vital needs of each and every one of us (food, shelter, transport, learning, self-fulfilment, etc.) and how to meet them in the fairest way while respecting all living things. To be truly effective and appropriate for everyone, sufficiency must be the subject of extensive consultation and democratic debate[128]. Implementing sufficiency necessarily calls into question social norms (in particular the relationship between property and work) and questions the relationships of domination and conflict between humans and non-humans.

Certain political leaders and journalists often have preconceived ideas about sufficiency. In this perspective, not to take a stance in favour of over-consumption and over-abundance would be tantamount to choosing lack, deprivation and poverty. The image of "turning back the clock" associated with sufficiency is absurd, insofar as fertile soil will not be recovered from the millions of hectares of concreted-over farmland, the oceans will not be emptied of the billions

of micro-particles of plastic with which they are now filled, and the tens of millions of tonnes of CO_2 emitted by the combustion of fossil fuels over more than two centuries will not be reinjected into the subsoil.

With sufficiency, we need to develop new indicators for assessing wealth, whether economic, social, environmental or human.

Measuring environmental and social progress together would make it possible to assess sufficiency's contribution to reducing social inequalities. Prosperity is not necessarily synonymous with material superabundance and an increase in GDP, an indicator whose ability to take into account environmental impacts, well-being and quality of life is highly debatable. Instead, it can be defined as a favourable situation that meets the expectations of individuals and societies and generates a sense of fulfilment.

The energy transition should make it possible to effectively combat social and environmental inequalities and to rethink policies for inclusion and the redistribution of wealth. Sufficiency is part of this rebalancing of access to resources, within the limits of the biosphere, by reducing the excessive consumption of a few in favour of a fairer distribution for all. This should make it possible to improve the quality of life of the most vulnerable and thus contribute to social progress. Sufficiency is not about going back to candles and carts. On the contrary, it's a way of rethinking our relationship with energy, space, time, wealth and quality of life. Based on in-depth research and scenario-building[129], the French association Virage Énergie has identified six strategic areas in which to initiate societal transformation to build a low-energy society. In concrete terms, these are embodied in local sufficiency policies that can act as springboards for reducing gender inequalities[130].

The first axis consists of moving from overabundance to material sufficiency. The mass consumer societies in which we live in the West are governed by the principle of "always more". The challenge here is to find a new balance between consumption and the satisfaction of needs.

This involves reducing the rate of material ownership; increasing repair, exchange, donation; reducing marketing and advertising incentivising consumption; reducing packaging volumes… In France, for example, at the end of 2021, the Lyon metropolitan area introduced local advertising regulations to reduce incentives to consume goods and services that are harmful to the environment and to social justice. The measures taken include the removal of at least 50% of existing outdoor advertising hoardings in the area, a reduction in the maximum size of advertisements from $12m^2$ to $4m^2$ and a ban on digital advertising screens in public spaces. This measure will also help to combat the sexist and misogynistic stereotypes conveyed by advertising.

The second axis consists of decentralising governance and relocating services. Shops, leisure facilities and business parks are often located a long way from where people live and require extensive infrastructure, particularly transport. Sufficiency means refocusing production and consumption activities as close as possible to where people live, following the principle of short-distance cities. In recent years, a number of French *départements* have set up buses to bring a number of public services (tax, social services, postal services) closer to hard-to-reach people, geographically or socially. This scheme reduces the need for people to travel by car to town centres where services are concentrated. It is of particular benefit to women in situations of vulnerability who cannot afford a car or do not have time to travel to carry out these administrative procedures in addition to their family responsibilities and domestic work.

The third axis involves questioning our relationship with individual property and moving towards more shared services. This shifts the focus to use rather than possession, sharing and pooling goods and services, and limiting over-consumption and the waste that the drive for material abundance generates. Economic models based on functionality and circularity partly meet these objectives. The Eurometropole Strasbourg currently has more than forty participative housing projects, helping to reduce pressure on land, create new forms of living and generate social links. In particular, these projects can benefit elderly and isolated women by giving them access to quality housing while sharing access to care.

The fourth axis is about examining the place and role of paid employment in relation to non-market activities that are sources of emancipation. This includes 'do-it-yourself' activities, voluntary work and free sharing of skills and knowledge that contribute to sufficiency. Working time and how people are paid are also areas to be explored from the perspective of planetary limits and the accentuation/reduction of social inequalities. Several local authorities are trying to incorporate these principles into the calls for tender and public contracts they award to their suppliers. For example, in 2021, the Paris City Council adopted a responsible public procurement plan that is part of a zero-waste trajectory, promoting reuse and repair activities, achieving 3 million hours of social inclusion by 2026, and doubling the number of purchases from inclusion structures. 75% of contracts must include at least one "Social and Solidarity Economy" clause, and 100% must include an environmental clause. This principle is also intended to boost proposals from suppliers committed to gender equality within their organisations.

The fifth axis questions our relationship and obsession with speed. People, goods and information are moving more and more, consuming more and more energy and natural resources. Slowing down, sharing and relocating are ways of moving towards more careful mobility. A responsible approach to digital technology can also help reduce the environmental and health impacts of our ultra-connected societies. The "Time Office" of Renne Metropole studies travel flows within the area and tries to provide organisational solutions that will reduce infrastructure requirements. For example, in 2014, Rennes' universities were asked to stagger the start times of their students' courses by a few minutes in order to smooth out the peaks in use of the Rennes metro system, thereby postponing the need for investment to reinforce the transport network by more than ten years. The scheme also makes it possible to study the distribution of family and domestic responsibilities within households and to combat gender inequalities by offering longer opening hours for administrative services, sports facilities, media libraries and markets, to enable women in particular to access these services while working.

Lastly, the sixth theme involves rethinking our relationship with nature in an era so strongly marked by the human footprint on ecosystems. Sufficiency encourages building new narratives and ideas to (re)create positive interactions between human beings and their environment.

Beyond reducing energy consumption and greenhouse gas emissions, sufficiency can generate significant health benefits (reduced air pollution, prevention of environmental diseases), economic benefits (job creation through relocation and the creation of new work areas), and social benefits (creation of social ties and solidarity) that generate prosperity and quality of life. It helps to reduce the negative externalities associated with an economic model based on the massive exploitation of natural resources.

As well as changing our individual and collective lifestyles to reduce our consumption of natural resources, the transition must also be based on moving away from fossil fuels and developing renewable energy. This type of energy is based on capturing natural resources that are constantly renewed (wind, heat from the ground, ocean currents) or over a very short period of time (energy from the sun with alternating day and night, plant growth). Using renewables means adapting to their availability and ensuring that production facilities are close to the places where they are consumed, so as to guarantee maximum use of the energy produced by limiting electricity or heat losses. Since 2019, the European Union has recognised the importance of mobilising local players (local authorities, residents, civil society organisations, businesses) to contribute to the development of renewable energies. The EU's legislative proposal *"Clean Energy for all Europeans"*[131] authorises the creation of "renewable energy communities" and "citizen energy communities". These groups of citizens and local players can acquire land and buildings to develop renewable energy production units such as wind turbines, solar panels, wood-fired boilers, etc., and encourage the creation of local energy short circuits where consumers invest in the means to produce their own energy[132]. There are now more than 3,500 cooperatives in Europe, although there are major disparities between countries.

In 2022, Greece had 884 energy communities, the Netherlands 705 and Austria 200, while Belgium had 66, Italy 39, Spain 20 and Slovenia only two[133]. Women are also under-represented in energy communities, due to a lack of available time and sufficient income to invest in projects, but also because energy is often perceived as a technical and masculine subject that is inaccessible to non-specialist women[134]. This opportunity to relocate energy networks and develop much more democratic modes of governance and resource management by directly involving citizens must be inclusive

and accessible to everyone. All the more so since self-producing renewable energy leads to a change in the way energy is used in the home, which is still largely based on a gendered division of household tasks[135]. For example, in the case of using the electricity or hot water produced by solar panels installed on the roof of one's home, it is most efficient to use the washing machine or dishwasher when the weather is good and the panels are producing a lot of energy.

2.3. The benefits of a fair energy transition

The European Union has set itself the goal of achieving carbon neutrality by 2050 through a fair energy transition, in line with the strategic objectives of its cohesion policy 2021-2027. In addition to reducing carbon emissions and limiting the environmental impact of the European economy and society, the transition must also meet social justice objectives to support all sections of the population in the economic and social transformations needed to respond to the climate emergency, particularly the most vulnerable.

According to the European Institute for Gender Equality, greater participation of women in the labour market could generate 3.5 to 6 million jobs by 2050[136]. Many of these jobs would be linked to the energy and ecological transition, due in particular to significant relocation of activities in the agricultural and manufacturing sectors, but also in the public transport and the bicycle repair sector, in building renovation, and energy-saving and eco-management consultancy. Europe's ageing population will also mean a greater need for staff in the care and home support professions.

Some sectors, such as construction, currently lack the workforce needed to meet the targets set by the European Union. The *Renovation Wave* programme aims to renovate 35 million

buildings by 2030, which will require 1.5 million more workers to be trained[137]. The challenge is to make construction jobs attractive to women by highlighting the progress in reducing the strenuous aspects of this work (less heavy loads to carry, construction of certain elements off-site in warehouses, working hours adapted to seasonal variations, etc.) and combating gender stereotypes and sexist behaviour in the sector. Furthermore, the European Central Bank estimates that if women had access to employment under the same conditions as men (same recruitment process, same access to job offers, same pay), the European Union could see an increase in its gross domestic product (GDP) of around 10% by 2050[138]. It would also bring in several billion euros in additional tax revenue if more women joined the labour market. In particular, this could make it possible to strengthen public services caring for young children and people with impaired autonomy, reducing the need many women feel to go part-time to look after their relatives, for a lack of alternatives. Greater access to employment and higher wages could also help to reduce gender inequalities among retirees. This would greatly improve the quality of life of retired women, who would benefit from a better pension, which would reduce the need for social assistance and redirect it towards funding health facilities or supporting other economically vulnerable groups.

Furthermore, most of the measures likely to reduce gender disparities could benefit everyone, and men in particular. The creation of childcare facilities and the extension and upgrading of parental leave would have an impact on all parents. Greater flexibility in the workplace (valuing part-time work, removing obstacles to career development, flexible working hours) would have an impact on all workers, who would be able to devote more time to activities outside of work. Moreover, the fight against sexist stereotypes and discrimination of all kinds creates a calmer working environment and reduces psychosocial risks[139].

Taking better account of gender inequalities would also make buildings more inclusive and more energy efficient. In 2023, the construction sector was the fourth largest industrial energy consumer[140] while the buildings sector as a whole represented 34% of energy-related emissions in 2022[141] (due to heating, air conditioning, and the use of electrical appliances).

Limiting heating and air-conditioning temperatures was one of the main recommendations of the French energy management plan (plan de sobriété énergétique). As noted above, not everyone perceives temperature variations in the same way. Numerous studies show that women's body temperature is 1.5°C lower than men's due to their different perspiration systems. They are more vulnerable to high temperatures, especially after the age of 65, because of their reduced body temperature regulation function[142]. As women tend to live longer than men and are more likely to fall into energy poverty as they age, European countries are facing a health and social time bomb. But there is currently a lack of data on the vulnerability of the population beyond the male-female binary.

These gender inequalities can be observed in office buildings, where users rarely have access to the temperature control system. A French research project led by the Catholic University of Lille and the French Agency for Ecological Transition is currently showing that intelligent buildings can be inefficient and create inequalities between building users. Engineers have realised that the expected reduction in energy consumption from energy efficiency in intelligent buildings is not always achieved, because the actual behaviour adopted by users has been poorly anticipated. For example, the building is only really efficient if the windows are constantly closed or if the temperature is the same everywhere, regardless of the temperature sensitivity of the users.

Combating energy poverty also involves renovating homes. Energy poverty is a gender issue, and many of the people affected do not have the financial means to have their homes renovated by professionals. For example, a group of social workers, designers, engineers and local decision-makers are working together in the town of Faches-Thumesnil (northern France) as part of the "Casbah" project to help people in energy poverty, particularly single mothers, implement "low-tech" solutions to cool their homes during heatwaves without having to resort to air conditioning, which they cannot afford anyway.

Training and support can enable people in energy poverty to acquire the skills to take control of their living space and energy consumption. Governments must step up with financial support for households that cannot afford to pay for energy efficiency improvements themselves, to ensure a more inclusive renovation wave. A best practice example for these issues is the French NGO Les Compagnons Bâtisseurs, which helps single mothers in energy poverty to insulate their homes, while training them in building renovation. Some of them then follow further training to find jobs in the building industry.

Along with the construction sector, mobility is a key sector for the energy transition. Several studies show that there are gender inequalities in access to transport. For economic reasons, women are the main users of public transport, and they are the most likely to travel several times a day to carry out domestic tasks and look after children and the elderly.

In order to promote the inclusion and accessibility of low-emissions transport, women and non-binary people from all social classes and backgrounds must be included in user consultation and decision-making bodies for planning and organising alternative mobility solutions to the private car.

Cycling facilities are being developed across Europe, but they are not always adapted to all genders. The feeling of safety when cycling and in urban traffic can be different depending on gender, age, physical and psychological ability, social class or ethnicity. A number of factors in cycling facilities can counter inclusion and therefore discourage people from taking up cycling as a mode of transport. These include the speed of motorised vehicles, the proximity of cars and other cyclists, cycle paths that are not suitable for transport bikes or for accompanying young children by bike, etc. Also equally important is creating links between urban centres and the surrounding suburbs and villages, to ensure that all genders and minority groups can access easier and safer mobility options, including rural communities. The French bike user federation (*Fédération française des usagers de la bicyclette*) has published a number of recommendations for local government and CSOs to enable women to play a greater role in the development of cycling policies (meetings at lunchtime or after children's bedtime, childcare solutions, cycle rides focusing on how infrastructure is perceived from a non-male perspective, etc.).

Encouraging women to adopt soft mobility options (walking, cycling, public transport) means providing infrastructure and places where they can feel comfortable and safe from verbal or physical aggression. The private car should not be a refuge from unsafe public transport. This requires a gender-sensitive approach to the design of spaces and infrastructure to ensure that they are as open and accessible as possible. Public transport staff can also be trained to deal with sexual and racial abuse, and signs can be put up in the public transport network (buses, underground stations, offices) to indicate where to find safe spaces and how to contact the gender safety coordinator.

The roll-out of low-emission zones (LEZs) must take into account the fact that, because of lower incomes, women are more likely than men to own polluting cars and to work in certain economic sectors (health, care, education) where working hours make it difficult to use public transport or to work from home. Indeed, they end up penalising people who live far from city centres (often for economic reasons) and who cannot afford to buy an electric car. Consideration of this dimension is currently absent from LEZs.

Furthermore, the installation of electric charging points in Europe is still in its infancy, and they can be difficult to find in rural areas. This creates a two-speed energy transition, with affluent people living and working in city centres who can afford to buy an electric car and have access to public transport, and on the other hand, people held hostage by their old, polluting car, living far from their work, unable to change vehicles, and being very vulnerable to fluctuations in petrol prices and taxes on polluting vehicles (which was the breeding ground for the *Gilets Jaunes* movement in France in 2018).

A just energy transition will require a better distribution of resources between those who do not have access to enough energy to meet their basic needs and those who have too much and are massively overconsuming energy. This is where sufficiency can help to improve the quality of life of all sections of the population while combating poverty.

Numerous scientific studies show that the most egalitarian societies are also those with the best quality of life[143]. In developed societies, once a certain level of material wealth has been reached, it is not the additional material and financial wealth that improves quality of life, but the distribution of this wealth. Greeks have a longer life expectancy than Americans, while the United States is richer and spends twice as much per capita on healthcare.

Epidemiologists Richard Wilkinson and Kate Pickett point out that in the most unequal countries, compared with the most equal, infant mortality doubles, mental illness triples, while homicides, teenage pregnancies and prison populations increase tenfold[144].

Many of the most egalitarian societies in the world are located in the European Union. The two researchers observe the following quality of life factors: friendships; low levels of stress linked to the fear of social decline and judgment; and quality of public early childhood services, which allow parents greater access to employment, but also allow all children, regardless of their social background, to be in better health and achieve better academic results.

This also requires the introduction of public policies that are particularly committed to combating gender inequalities.

Chapter 3
Gender mainstreaming in the energy transition

3.1. The crucial role of public authorities

How can we ensure that the energy transition helps to combat gender inequalities?

Gender-mainstreaming is a practice which has been spreading for several years within the European institutions and which is based on "*the (re)organisation, improvement, development and evaluation of policy processes, so that a gender equality perspective is incorporated in all policies at all levels and at all stages, by the actors normally involved in policy-making*" (Council of Europe)[145]. It is a strategy that aims to strengthen equality between women, non-binary people, and men in society in a preventive manner, by integrating gender into the content of public policies.

The transition away from fossil fuels will only succeed if it helps reduce the current gender inequality in access to energy and decision-making spaces, while at the same time making gender an integral dimension of decarbonization and energy sovereignty policies.

States and local authorities have an important role to play in promoting lifestyle changes and ensuring that the 'losers'

in the energy transition and the climate crisis, often women, are given the necessary support so as not to amplify pre-existing inequalities and/or generate new ones.

Public authorities also have a role to play in ensuring people's safety. Moving away from fossil fuels requires far-reaching changes in society, whether in terms of the economy, the organisation of work, land-use planning or public services. In order to guarantee social stability, equal access to services and redistribution of wealth, energy transition and gender policies must be approached together, for example by analysing support schemes for renovating housing, changing vehicles, low-carbon transport, etc. How are people affected by these policies based on their gender? We need to put on our 'gender glasses' when drawing up public policies, to go beyond what is supposed to be a 'universal' perspective, but is in fact male.

To do this, three moments appear to be particularly important for integrating gender:

- Public policy design: What are the objectives? What resources should be allocated and what indicators should be used? What are the risks for women and non-binary people? What are the risks of amplifying/creating gender inequalities?

- Public policies implementation: Are there any practices/reactions that had not been anticipated? Are there negative/positive rebound effects on women and non-binary people?

- Public policy evaluation: How can the policy be improved? What changes should be made? What should be maintained? Have co-benefits been identified? The introduction of a gender-sensitive budget, for example, could make it possible to assess public spending in terms of the gender of the public affected.

Public authorities have a social role to play in combating energy poverty. Introducing measures aimed at women responds to the need to protect people, and children in particular. Anticipating the ageing of the population in Europe and the fact that this primarily affects women, who have a longer life expectancy than men, must be at the heart of long-term transition policies. Carrying out gender-sensitive energy and climate forecasting studies now is key to enabling governments and local authorities to make the necessary investments to guarantee the elderly people's quality of life in an environmental and climatic context that is set to change radically.

Alongside systematically integrating gender into the development of all public policies, states and local authorities must review their own practices of inclusiveness and parity amongst their elected executive teams, management and employees. They have a duty to set an example and must contribute to building a common culture around the just energy transition.

Just transition must be more than an intention or a slogan. To ensure accountability, authorities should document the concrete actions that have been undertaken and the impact they have had. Furthermore, they can develop a cross-generational approach, looking at the way in which combating gender stereotypes from early childhood helps to build a more equal society. How can the fight against sexism and gender inequality be pursued at a time when the rights of women and sexual minorities are being challenged by certain political and ideological movements (extreme right, masculinism, religious conservatism, …)?

Combating gender-based violence and promoting gender equality require investment in public services, health, education and awareness-raising, women's economic empowerment and social security. In 2007, Belgium

adopted a law to strengthen equality between women and men by integrating gender into federal public policy. *Gender mainstreaming* can therefore become a legal obligation by imposing a framework for action on the government and public administrations. But there are major differences in the legislation of the Member States of the European Union. In recent years, conservative and nationalist political movements have come to power in a number of European countries, and their presence in the European Parliament has increased. This has led to a reduction in the rights of women and sexual minorities in several circumstances, and to a rise in "Femonationalism" to justify xenophobic and discriminatory policies on the grounds of gender to "protect" women[146]. Prison or security feminism also constitutes a manifestation of this ideology by proposing a strengthening of defence methods and video surveillance to guarantee women's safety[147].

These policies are often essentialising and infantilising, helping to perpetuate a certain number of gender stereotypes (such as "women are vulnerable and must be protected by men") and racist prejudices (such as "men of certain ethnic origins are particularly dangerous to women").

Some public organisations may pursue gender parity objectives by introducing quotas. Several OECD countries have set targets for increasing the number of female engineers and technicians. Countries that have introduced mandatory quotas for women on the boards of public bodies and companies have achieved this objective much more quickly than countries that have only introduced incentives such as the "*comply or explain"* principle, which requires organisations that do not have parity to justify the under-representation of women, particularly on their governing bodies.

The energy crisis in the winter of 2022-2023, during which gas and electricity prices soared across the EU and pushed millions of Europeans into energy poverty, led to various policies aimed at managing the risk of shortages at EU and Member State level.

In addition to the REPowerEU plan to accelerate the energy transition and the measures to reduce gas consumption, the European Union could boost its energy security by adopting a European sufficiency strategy. Extensive work by research centres and NGOs already exists, such as the CLEVER (Collaborative Low Energy Vision for the European Region) scenario[148], which shows that a more "energy sufficient" Europe, with renewable energy production, would also be more robust in the face of climate change impacts and current and future geopolitical conflicts.

3.2. Inspiring initiatives

Although taking gender into account in the energy transition is still an emerging issue, a number of projects and initiatives driven by local authorities, associations and businesses are showing how the decarbonisation of European society can go hand in hand with inclusiveness.

3.2.1. EmpowerMED: Combating energy poverty among women

The European EmpowerMED project (*Empowering women to take action against energy poverty in the Mediterranean*) is based on the fact that women are disproportionately affected by energy poverty and are more at risk of poverty and social exclusion than men[149]. The project, to be carried out between 2019 and 2023, provides support to people in vulnerable situations, particularly women, so that they

can regain control of their energy consumption while improving their living conditions and state of health.

The coastal areas of six Mediterranean regions were used as test sites: Vlore in Albania, Zadar in Croatia, Marseille in France, Padua in Italy, Koper in Slovenia and Barcelona in Spain[150].

Energy poverty expresses itself in a very specific way in this region of Europe: the difficulty of cooling homes during summer heat waves, ageing and expensive pre-installed central heating systems or electric heating systems, poorly or uninsulated homes, and homes in poor condition. The most vulnerable parts of the population are also faced with over-indebtedness and the risk of energy cuts due to unpaid bills. What's more, these areas face high levels of housing pressure due to their attractiveness to tourists and the presence of a large number of low-quality, insecure jobs (particularly in the tourism and port sectors).

The project focused on testing practical solutions to enable people affected by energy poverty to better manage their energy consumption and gain access to affordable heating and cooling resources.

It has also made it possible to support women as a group particularly affected by energy poverty, and to include gender indicators for project evaluation. Based on this practical experience, the project assessed the impact of various measures and used this to formulate policy recommendations for combating energy poverty at the local, national and European levels.

Several initiatives were carried out as part of the project, such as home energy audits, DIY workshops to reduce energy consumption (maintaining faucets, insulating windows,

using ceiling ventilation, planting greenery on balconies/windows, installing shade), understanding how renewable energy works, raising awareness among healthcare professionals about energy poverty, and organising group advice meetings.

These initiatives involve organising discussion groups of between 20 and 30 people in or at risk of energy to encourage the transfer and exchange of knowledge and skills on energy use, reading bills, implementing simple energy-saving measures, changing energy supplier, organising collective purchases of electricity and gas and any other action likely to reduce the effects of energy vulnerability. The participants were able to exchange advice and support each other. They were also put in touch with energy suppliers, who were able to modify their contracts and resolve some debt situations.

In the end, the project made it possible to implement practical solutions for more than 4,200 households (mainly women) affected by energy poverty; to assess the effectiveness and impact of practical measures to reduce energy poverty and empower women; and to make local, national and European policy recommendations to 220 policymakers, 560 social actors, 100 public services, 180 health experts and 100 energy poverty experts[151].

3.2.2. Women's work in post-coal communities in Poland

Along with Estonia, Poland is the European country that emits the most CO_2 to produce its electricity: coal accounts for 70% of electricity generation[152]. In order to comply with European targets for carbon neutrality, Poland plans to phase out its use of coal by 2049.

This transformation of the Polish energy system means anticipating the need to retrain workers in the mining sector. Although still predominantly male (over 80% of jobs are estimated to be held by men[153]), many women work in companies and services dependent on the coal sector, without being able to benefit from European or Polish government (re)training schemes.

The mining sector has one of the highest pay gaps of any industry. In general, women in the coal industry are poorly paid and work in menial, informal or paid-daily jobs. They often take on several jobs in the case that their spouse is made redundant, leaving them with the double burden of professional and domestic work. This double burden is exacerbated by the fact that men often do not take on more domestic tasks after being made redundant[154].

If no plan is put in place to address the gender pay gap, the benefits of a green transition away from coal will not be shared equally[155]. A study by the German Institute for Economic Research in 2021 shows that in European coal-mining regions there are few jobs outside the coal industry, which leads many women to do mainly unpaid domestic work. When they do take up work outside the home as part of their region's energy transformation, women often find themselves in low-paid, unstable service sector jobs, on top of their family responsibilities[156].

Furthermore, mining communities often share a strong attachment to the heritage and culture associated with coal mining. It can be difficult for some people to dissociate their identity from an activity that is set to disappear. One solution to this can be to start collecting memories and to make this transformation part of a process of moving "from black to green". This has been done in Loos-en-Gohelle in the coalfields of northern France, telling the story of the area and using culture as a healer[157].

The energy transition must be seen as an opportunity to improve the situation of women in the labour market in general, not just in industry. Opening up to tertiary sector businesses, retailers, and services, and establishing childcare and childcare infrastructure, such as subsidised daycare centres and nurseries, is essential. According to the *Just Transition Impact Advisory Hub* of the Polish think tank Instrat, there is a strong correlation between the unemployment rate and the proportion of women among the unemployed. For example, in the Konin region, the unemployment rate is 6.5%, with women making up 61% of this group[158].

The European Union's Just Transition Mechanism aims precisely to ensure that the transition to a low-carbon economy and lifestyles leaves no one behind. In this case, it involves supporting people working in a "brown" sector, coal mining, to find jobs and maintain their standard of living by pursuing a "green" activity that generates few greenhouse gas emissions. In this context, it is all the more important to pay particular attention to women's access to quality, well-paid jobs[159].

This approach is part of the European strategy for gender equality, which aims to significantly advance equality between women and men in the EU by 2025 by putting an end to gender-based violence, challenging sexist stereotypes, reducing gender gaps in the labour market, particularly in terms of pay and pensions, promoting equal participation of women and men in different sectors of the economy, and achieving parity between women and men in European decision-making and political life.

Job losses also lead to a loss of identity and sense of belonging to a community developed around work, which means that the obstacles to women's employment in coal-mining regions need to be considered. The *Job After Coal* programme is a good example of a

just transition approach that takes gender into account. Implemented in eastern Poland by the energy company ZE PAK and 14 trade unions active in the mining sector, it offers financial support and professional retraining to mine and power plant workers and their families, including 7600 women[160]. The renewable energy sector, as well as energy efficiency and energy saving professions, can provide an outlet for people working in the mining sector if the necessary training and refresher courses are provided.

3.2.3. REScoop: Combating gender inequality in renewable energy cooperatives

For several years, European institutions have been trying to facilitate access to the energy market for citizens, communities, and economic stakeholders by moving away from the monopolistic and centralised approaches that have long prevailed in energy production. Citizen energy communities and renewable energy co-operatives make it easier for citizens to take back control of their energy destiny by placing them as investors in renewable energy infrastructure.

Unfortunately, just as in the energy sector as a whole, there is an inequality of participation between men and women. More men than women participate, hold shares and have responsibilities within energy communities. These communities are encountering difficulties in making the subject of energy attractive to women and attracting women particularly vulnerable women, even though they are the main people affected by the energy transition and its impacts. As a reminder, 50 million people in the European Union are living in energy poverty, the majority of whom are women.

REScoop is the European federation of renewable energy cooperatives; it federates more than 2500 energy communities and structures in Europe and represents more than 2 million citizens invested in these initiatives.

To combat the under-representation of women in citizen energy cooperatives, REScoop has become a signatory to the *Charter of Commitment on Equality between Women and Men in Cooperatives* drawn up by Cooperatives Europe[161].

The Charter is aligned with UN Sustainable Development Goal five on gender equality and is based on ten major commitments:

- Collect gender statistics
- Promote work-life balance, diversity management and women in top level positions
- Promote awareness raising on gender equality with our members
- Promote a culture of equality at 360°
- Ensure a gender balanced participation, visibility, communication
- Support women's employment and cooperative entrepreneurship
- Fight against any form of harassment and violence
- Share and value best practices
- Advocacy at national and European level to promote gender equality
- Cooperate with the International Co-operative Alliance, UN system, and NGOs in promoting an ever more gender balanced world

Equal energy communities promote acceptability and trust, and tend to be more effective and have a wider range of activities. Involving people of all genders in the energy transition creates a wider pool of expertise and a greater capacity for action. It helps to make the energy sector fair and inclusive,

free from all kinds of discrimination linked to ethnic origin, age, social background, nationality, level of education, etc. This combines the need to reduce greenhouse gas emissions with the need for social justice, creating jobs and promoting access to locally-produced energy at a controlled cost.

REScoop has also set up a working group called *Gender Power* (from which this book takes its name), which proposes to develop *gender mainstreaming*, i.e. a strategy for strengthening the equality between genders in society by integrating the gender dimension into the content of public policies (as discussed above)[162]. The task of this working group is to map the gender issues facing energy communities and to provide a forum for exchanging and sharing best practices. It also serves as a platform for sharing tools and methodologies to help communities feminise their governing bodies and membership base.

The *Gender Power* working group has drawn up a declaration of intent committing energy communities to ensuring gender equality and representation for all. The measures advocated by REScoop include the use of gender-sensitive language (particularly for languages using the feminine and masculine such as French, Spanish and Italian); the collection and analysis of data disaggregated by age, sex and socio-professional categories; and the introduction of temporary measures, such as quotas or promotional offers, to accelerate parity in cooperatives (ending these measures once the parity objectives have been reached).

REScoop is also committed to going beyond the principle of "women's empowerment" approach, which can be infantilising and in fact disempowering. It aims to contribute to societal changes and cultural shifts that will make energy communities more inclusive, not only from a gender perspective but also in terms of all the social injustices that exist today and those that could emerge in the near future.

3.2.4. Reykjavik Energy: Ensuring equal pay in the energy sector

Reykjavik Energy is a state-owned company that supplies energy to Iceland's capital. In 2008, it adopted a pay policy aimed at establishing strict pay equality between men and women working for the company. To achieve this, Reykjavik Energy has equipped itself with software that enables real-time analysis of the effects of each pay decision on the gender pay gap. As a result, in the space of 10 years, the gender pay gap narrowed from 8.4% in 2008 to 0.3% at the end of 2017[163], and half of all management positions are now held by women. An equal pay audit is carried out on a monthly basis to ensure that no unexploited gender pay gap exceeds 1%[164].

The company is also committed to ensuring a balance between the professional and personal lives of its employees, promoting a culture of non-discrimination, raising awareness and providing training in gender equality and the fight against sexual harassment, and guaranteeing easier access to the workplace for people with different physical and mental abilities.

To combat stereotypes and prejudices in decision-making, the company ensures that parity is respected in management positions and recruits women with technical and engineering backgrounds. To this end, every 18 months, the company offers four men and four women the opportunity to join the company in order to ensure parity and access for women to technical positions for which they are trained but have difficulty finding a job in the energy sector that matches their skills.

Reykjavik Energy has received several international awards for its commitment to gender equality, has been a *Universal Fair Pay Leader* since 2021, is a member of the United Nations Convention on Gender Equality and received an equality award from *Rise and Lead Women* in 2023.

3.2.5. Thinking about spatial planning from a gender perspective in Vienna

The Austrian capital is one of the pioneering cities in implementing gender-sensitive urban planning policies, having been working on this since the 1990s. In 1991, the organisation of the exhibition *"Who owns Public Space - Women's Everyday Life in the City*?" led to numerous debates on the place of women in public space, culminating in the creation the following year of a Women's Bureau, responsible for integrating the gender dimension into urban planning and mobility[165]. At the time, the city council saw gender policies as a means of *preventing* inequalities between people rather than for *repairing* systemic inequalities. It aims to produce public spaces and transport systems that are accessible to all, regardless of gender, income or physical condition. The idea is not so much to pursue feminist policies as to have an inclusive vision of urban planning.

Initial work focused on women's and girls' sense of safety in public spaces, and led to the redesign of certain spaces and pedestrian walkways, and a change in public lighting policy. Municipal services are developing a guide to ensure that all developments carried out by the city properly incorporate the subjective feeling of security, particularly in relation to the lighting of public spaces.

The *Seestadt Aspern* district is today the best example of integrating gender-sensitive lighting standards in the city of Vienna. Thousands of street lamps have been upgraded or reinstalled, ensuring that the pavements and sidewalks are better lit. Several surveys were carried out among the population to ensure that the new installations were working properly. They revealed that between 2008 and 2013, residents' satisfaction with the safety of their neighbourhood increased by 6 percentage points (from 64% to 70% for women, and from 68% to 74% for men)[166].

Another focus was transport, a sector particularly marked by gender inequalities. The authorities found that two-thirds of journeys made by car in the city were made by men, while two-thirds of journeys made on foot were made by women.

A pilot project called "*Fair Shares in the City*" was set up in the *Mariahilf* district to observe the daily routines and needs of different target groups, according to their gender, age and socio-cultural background, with a view to producing inclusive urban developments[167]. As a result, some sixty audible devices to help pedestrians cross the road were installed, 40 new pedestrian crossings were built, 1,000 metres of pavements were widened, street lighting was revised, and access ramps for pushchairs, bicycles, and wheelchairs were installed. Street furniture, in particular benches, was installed along routes that are particularly popular with the elderly: the presence of a bench can increase use of certain areas and the feeling of safety. This initiative contributes to a better use of low-carbon transport by avoiding a shift to the car for safety reasons.

The city has set up a service to collect and analyse gender-specific data, enabling it to continuously improve policymaking. It has also introduced a set of guidelines to ensure that inclusiveness principles are respected in all development projects undertaken by the city. One of the methods used is to ask male elected representatives and technicians about the developments they would like to see for their daughter, niece, mother or sister, to create a feeling of empathy and tangibility. Another technique is to ask "*Who gets what? Why? Why not?*" to ensure that the needs of the whole population are taken into account, and not just the (male) standards that are often mistakenly considered to be universal.

Training for municipal staff also helps to build a shared culture of accessibility and gender equality. The "Vienna sees things differently" campaign has helped to raise awareness of *gender mainstreaming* issues among a wide audience by proposing new signage (e.g. work signs showing a woman with a shovel, posters showing a man changing a baby to indicate nursery areas in public buildings), reversing the stereotypical images commonly proposed.

The introduction of a gender budget in 2005 enables each city department to audit its projects twice a year to identify expenditure that benefits both men and women. The city also subsidises new property projects subject to compliance with accessibility and gender-sensitivity criteria.

3.2.6. Making cycling accessible to all: lessons from Lyon

In France, 65% of daily cyclists are men, 35% are women[168]. This is mainly due to the unequal distribution of parental and domestic responsibilities within the household, which means that women make several journeys a day (school, work, shopping, extracurricular activities), whereas men make more linear home-work journeys. There is a decline in cycling among French women after the age of 30-35, i.e. when their first child is born. This is not offset by a return to cycling by older women[169]. What's more, the social norms of the working world expect employees to arrive at their jobs looking presentable (clean and ironed clothes, hair and make-up in place), which is sometimes made difficult by cycling, especially in wet weather, and all the more so when workplaces are not equipped with showers and changing rooms. Since the 1970s, cycling policies in France have mainly been developed by men for men[170].

In order to reduce these inequalities, in 2022, Lyon embarked on a huge plan to redevelop the region's cycle paths, adding 350 km of gender-neutral and inclusive cycle infrastructure known as "Les Voies Lyonnaises" (The Lyonnaise Ways) by 2030[171]. By proposing wider, better-lit cycle paths, the public authorities aim to reduce the number of narrow paths, which are ideal for fast, sporty cycling, but which are not very accessible to families with children (and therefore to women, who tend to spend more time caring for them), people with disabilities and the elderly. Lighting cycle paths at night helps to reduce the feeling of insecurity around cars and facilitates sharing spaces with pedestrians (who may also feel unsafe with regard to cyclists). The development of dedicated cycle paths not shared with motorists and pedestrians also reduces the risk of accidents and disputes in which sexist behaviour and remarks are regularly observed.

Cycling facilities designed to accommodate different types of bicycles (cargo bikes, children's bikes, bikes for people with reduced mobility, etc.) safely encourage women to cycle by generating a critical mass effect: the more women cycle in public spaces, the more other women will also start cycling. And generally speaking, the more people cycle as part of their daily commute, the more the car's place in urban spaces will decline, which will help to decarbonise transport and reduce air pollution in urban centres.

3.3. Proposals for a fair and inclusive energy transition

This paper presents six proposals to combat gender inequalities currently at work in European society and create the political, social and economic conditions for a fair and inclusive energy transition.

Raise awareness of gender inequality

Gender inequality is currently a blind spot in policymaking for the energy and green transitions.

To change this, we need data that can quantify, prove and illustrate these inequalities. After all, what is not measured tends to "not exist". Collecting and analysing data is the basis for most policymaking: inequality between women and men, between the elderly and young, between rich and poor must be identified if it is to be properly addressed. Gender-specific data in all policy areas (housing, transport, employment, education, health, etc.) is essential in order to understand how gender inequality works and counter it. The role of gender inequality in the energy transition and the fight against climate change is currently little known or understood, mainly because of a lack of data, but also because of restricted access to existing literature. The *European Institute for Gender Equality* could play this role of data aggregator by extending its field of expertise to public policy in general, and in particular policy linked to the energy and green transition. Creating gender inequality observatories on in each Member State, using the same format as EIGE, could help to identify specific national particularities and contribute to European data by enabling analysis by theme and by country.

This paper would not have been possible without an abundance of scientific and institutional literature on the subject of gender inequality. However, much of this literature is currently only available in English. Although English is the official working language of the European Union institutions and is often considered a universal language, it is far from being mastered by all 450 million Europeans.

Multilingualism is one of the founding principles of the European Union and is enshrined in the *EU Charter of Fundamental Rights*. The translation of at least the documents produced by the European Commission and the European Parliament on gender issues into the 24 official languages of the Union could help to improve dissemination of knowledge on this subject among national and local decision-makers, non-governmental organisations, trade unions and economic representatives.

Combat gender stereotypes through training and education

Increasing the number of women in the energy sector means training women engineers and technicians and encouraging young girls to take up scientific and technical subjects. Companies and public bodies can contribute to this rebalancing by presenting careers in schools and by proving that a certain number of gender stereotypes are wrong (such as "energy is a male subject", "mathematics and science are more for boys than girls", "only men can deal with the tough working conditions in certain industries", etc.). They should highlight the female profiles already working in the sector and focus on eliminating sexist working environments and working conditions that are incompatible with a fulfilling personal life.

Opening the energy sector to professionals trained in the humanities and social sciences (sociology, geography, political science, economics, design, etc.) could enable more women to join the sector while moving away from a purely technical vision of the energy transition.

Technical infrastructures (renewable energy production units, electricity grids, transport networks, etc.) are needed to successfully complete the transition, but so are profound societal transformations that require understanding of individual and collective behavioural change.

Gender equality education and deconstruction of gender stereotypes must begin at the earliest possible age. By the age of four, children have already assimilated these stereotypes through their family environment, school and storytelling[172]. It must be extended to all school and university courses and be offered as part of vocational training. As mentioned above, the male norm is generally considered to be the universal norm, which can make gender inequalities difficult to perceive for people who identify with the male sex. A reminder of the legal framework relating to gender discrimination and sexist and sexual violence, as well as testimonials from people who have experienced these issues, can raise awareness among men who feel remote from or even hostile to these questions. For example, as part of the vote on a draft law introducing menstrual leave in France, several male MPs were able to spend several hours wearing a belt that simulated the pain felt by women during menstruation. This experience changed their perception of the subject and enabled them to see that it was indeed very painful, if not impossible, to work properly while enduring such suffering[173].

Improving education about gender equality and how to make it happen can help centre it in energy transition policy, and make it an integral part of a just and inclusive transition, by mobilising framework analysis tools and intersectional policies.

Evaluate and finance green policies that promote gender equality

Ensuring a fair and inclusive energy transition means analysing sweeping policies for potential negative impacts associated with specific groups, whether economic risks linked to the decarbonisation of certain sectors or social risks of environmental regulations and taxes. Measures to decarbonise and support behavioural changes must take into account the situation of all Europeans to avoid creating "losers" from the transition, who are likely to develop strong resentment towards public authorities and environmental issues[174].

Evaluating public spending with gender-sensitive budgets helps to identify risks of amplifying or creating inequalities. Analysing public funds' contribution to reducing gender inequalities and greenhouse gas emissions is one of the foundations of a fair and inclusive transition. It cannot be overstated how important making the right investments is to driving the energy transition forward. The estimates of what is needed are huge. And even if the EU Council forecasts a budget of 666 billion euros for 2025[175], political uncertainty, spending efficiency, and particularly fair distribution remain central issues – as the Green European Foundation has already addressed in its report "A European Wellbeing Economy", which advocates for investments that do not reproduce the "old models of resource grabbing".

Create the conditions for women to participate more in democratic processes and public debates on energy

Inequalities experienced by women are often invisible because they participate less in consultative bodies. As women are often responsible for domestic chores, childcare, support and care for the elderly or sick, they have less time than men to take part in public meetings, get involved in citizens' movements and make their voices heard. Putting in place logistical solutions such as childcare facilities, organising events outside working hours or providing financial rewards for civic involvement can help to increase women's participation and representation in public bodies. For example, the French government and several French local authorities, such as the Lyon metropolitan area, organised citizens' climate conventions in 2019 and 2024, randomly selecting citizens to form panels representative of society. Offering compensation (several tens of euros) for taking part and getting involved in the work of these bodies has made it much easier for women to attend, particularly those with young children. The remuneration can be used to offset the cost of professional leave or childcare, and thus remedy the pay and family inequalities observed between women and men.

The Irish model of citizens' assemblies for constitutional reform, which does not offer compensation, records a lower level of involvement among people with family responsibilities (particularly women between 25 and 40) and people working weekends[176].

Public speaking can also be a barrier to women's participation. The over-representation of men in public debate and the media, and the sexist rhetorical devices often used, can discourage women from speaking out. Public speaking and media training can help women develop their skills while giving them the confidence and tools to respond

to sexist attacks. This should be part of traditional school and university curricula as well as professional training. Mentoring and support systems for communicating publicly and launching initiatives can also help to improve women's representation in participatory democracy.

Strengthen the representation of women in governance bodies and the media

Achieving parity in all representative and decision-making bodies in the political and economic spheres will help to reduce gender inequalities. The likelihood is that if more women hold positions of responsibility and contribute to the design of public policies, women's needs and experiences will be better taken into account. In addition, appointing women to elected positions in charge of "technical" portfolios such as finance, town planning or energy, and men to "social" issues such as education, health or early childhood, helps to combat gender stereotypes.

Although women's participation in public life has come a long way in Europe since the mid-twentieth century, nothing has been achieved once and for all, and in many European countries, women's rights are now being eroded, as is their presence in some national and European parliaments. In 1979, 16% of MEPs were women, compared with 40% in February 2024[177] [178]. The June 2024 European elections brought the proportion of women MEPs down to 39%, a slight drop on the previous term and still far from perfect parity[179]. On average, the proportion of women in the national parliaments of the Member States of the European Union was 33% in 2024. The best performers are Sweden (45.6%), Finland (45.5%) and Denmark (44.7%); Hungary (14.6%) and Cyprus (14.3%) are at the other end of the scale[180]. At the beginning of 2025, 9 of the 27 energy ministers in the European Union were women[181] and in almost

60 years, only two women have held the post of European Commissioner for Energy[182] compared with thirteen men.

Women are also underrepresented in the media. In 2018, the *European Journalism Observatory* conducted a study in 11 European countries, which concluded that there is parity between the number of female and male journalists. However, editorials and articles on politics and business are still dominated by male journalists.. In 2018, an average of 43% of photos published in the European press showed groups made up entirely of men, compared with 15% of photos showing groups made up entirely of women. It should be noted that women are on the frontline of online harassment; 85% of women report having experienced online violence or witnessed online violence against other women[183].

Make the energy transition a springboard for gender equality

Moving away from fossil fuels and questioning our relationship with energy as we decarbonise European society represents an unprecedented opportunity to promote gender equality. The growing importance of renewable energy and energy sufficiency are challenging lifestyles and the way society is organised. This is generating a new relationship with energy, with the consumption levels required to satisfy our basic needs, and the recognition of planetary boundaries. These things are the basis for a new social contract in which patriarchy, the pillaging of natural resources, and discrimination against the most vulnerable are no longer considered universal norms that cannot be changed. Ultimately, the change is not so much a transition as a transformation. Not just "changing fuels" and replacing fossil fuels, but reassessing the ways that human activities impact ecosystems and create and amplify inequalities between people.

Conclusion

"Gender equality is a core value of the EU, a fundamental right and key principle of the European Pillar of Social Rights. It is a reflection of who we are." [184]

This extract from the European Gender Equality Strategy takes on particular significance as these words are reiterated in the Roadmap for Women's Rights in the spring of 2025.

After declaring a "national energy emergency", effectively relaunching the massive extraction of oil and gas, putting an end to the *Green New Deal* energy transition programme and launching a moratorium on the installation of wind turbines on federal land and coastlines, the second Trump administration is working to remove the words "women", "gender", "equality" and "climate" from scientific research programmes funded by the US federal government[185].

Moreover, access to energy and mineral resources is at the heart of Russia's military aggression against Ukraine, as is the war being waged on Ukrainian women and sexual minorities through the massive use of sexual violence by Russian soldiers[186].

But also within the Union there are dynamics that hinder a speedy gender-mainstreamed energy transition. Strong scepticism about renewable energy persists among European conservative and nationalist parties,

and ideological positions that are against women and the LGBTIQ+ community are far from eradicated.

And yet, the European project can offer a resilient, sustainable and socially robust alternative that breaks radically with these dynamics. By doubling down on the Gender Equality Strategy, reaffirming its intention to move away from fossil fuels and strengthening its energy sovereignty, the EU can provide a sustainable, fair and inclusive counter-model to current and future authoritarian regimes, and to the deadly petro-masculinity they foster.

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Notes

1 To drill can have an explicit sexual connotation, depending on the context. The phrase "drill baby drill" was first popularised by Sarah Palin, John McCain's running mate in 2008.

2 For the purposes of this essay, gender is understood as a culturally constructed system defining roles, privileges and relational norms between men, women and people identifying as non-binary.

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Gender often remains a blind spot in energy policies of the European Union and its Member States. Yet, our relationships to energy are deeply gendered. Women are, for example, disproportionally affected by energy poverty and climate change, while remaining underrepresented in the energy sector and its governance. These inequalities are rooted in our society's dependence on fossil fuels and the patriarchal systems that sustain them.

The energy transition offers an opportunity to change this. But to effectively dismantle traditional dynamics, intentional policy is essential. This essay explores how the shift toward renewable energy. energy efficiency and sufficiency can be made truly fair and inclusive, paving the way for greater gender justice and equality.

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