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Sustainable Energy Policies and Equality: Is There a Nexus? Inferences From the Analysis of EU Statistical and Survey Data

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Energy Justice (EJ) and particularly Energy equality (EE), arguably a radical conceptualization of energy justice, advocated for distributional justice and policies addressing distributional inequalities. Distributional policies are known to be contentious and often raise debates on the opportunity to interfere with the free-market allocation of goods in capitalistic economies. Whether EE inspired policies might be considered implementable or not depends on their social acceptability. Therefore, holding on to previous research findings pointing to the higher acceptability of equitable climate policies and the relationship between economic inequality and environmental degradation, we analyse EU data regarding income and income and wealth inequality and data from the H2020 ECHOES project, which consists of an extensive European survey of household energy consumption attitudes. We found that economic equality accounts for 41% of the variance explained at the country level of our sustainable energy care index (SECI), accounting for sustainable energy attitudes. We conclude that the interplay between economic equality and sustainable energy attitudes deserves further attention and might warrant a broader discussion about distributive policies within and beyond the energy sector.

Keywords: energy justice, equality, inequality, attitudes, energy policy, income, wealth, energy transition

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INTRODUCTION

In recent years, a flourishing scholarship based on the concept of energy justice (Guruswamy, 2010; McCauley et al., 2013; Jenkins et al., 2016; Sovacool et al., 2016; Pellegrini-Masini et al., 2019, 2020a) has been developed to tackle the ethical shortcomings of energy policies.

While the merits of this work are evident by its rapid growth, suggesting a large readership, energy justice (EJ) has not exhausted the debate on ethical aspects of energy policy, and it appears as a yet evolving area of research.

This paper will focus on distributional justice, one of the three tenets of energy justice (McCauley et al., 2013). To a lesser extent, we also talk of procedural justice and formal equality, being the concept of equality in a broad sense at the root of the concept of energy justice as elsewhere discussed (Pellegrini-Masini et al., 2020a).

In the first part of this article, we discuss the theoretical underpinnings of energy equality, its ethical merits, its potential of addressing contentious policy issues and its critical aspects.

In the second part, we present the analysis of a study using data from Eurostat and from the European project ECHOES, whose aim is to test the hypothesis that distributional equality and proenvironmental energy attitudes are correlated.

DO WE NEED ENERGY EQUALITY?

Energy equality lies in the same area of ethical reflection on energy policy issues developed around Energy justice, which was defined as a concept that "… aims to provide all individuals, across all areas, with safe, affordable and sustainable energy" (McCauley et al., 2013, p. 1). McCauley et al. (2013) further indicated that three tenets define EJ, namely "distributional justice," "procedural justice," and "recognition justice." Distributional justice regards equity in the distribution of goods and is defined as follows: "Distributional justice is justice in the distribution of economic goods between the members of a society" (Bojer, 2003). Procedural justice relates to fair processes; it is based on the concept of procedural or formal equality (Pellegrini-Masini et al., 2020a), while recognition justice deals with recognizing and repairing injustices suffered by some groups or places (Jenkins et al., 2016).

It could be said that energy equality takes a more radical stance than energy justice, particularly in terms of distributional aspects. While energy justice deals mainly with equity issues regarding the spatial distribution of the negative externalities of energy production (Jenkins et al., 2016; McCauley, 2018), energy equality goes beyond that into conceptualizing equality of opportunity of the fruition of energy services and embodied energy. Energy equality was defined as a concept advocating for "providing all individuals with equal opportunities to use energy services, energy technologies, and consuming energy and embodied energy to satisfy personal needs and holding capabilities" (Pellegrini-Masini, 2019, p. 144). It was argued earlier that energy justice (Pellegrini-Masini et al., 2020a)—like all theories of justice—is rooted in the concept of equality (Kymlicka, 2002); therefore, it is not inaccurate to consider energy equality as a radical conceptualization of energy justice. Nevertheless, energy equality could be considered unnecessary by some who might discount the need for policies that seek to establish equality as a guiding principle in energy policy. After all, libertarianism has long advocated against state interventions aiming at distributional justice policies while maintaining a need exclusively for procedural equality (Hayek, 1998; Bojer, 2003).

However, the need for emphasizing the importance of distributional justice and equality is also rooted in several considerations regarding current patterns of resource consumption and their environmental and social consequences (Sovacool et al., 2014).

It could be argued that environmental equalitarian instances are the only solution to the "tragedy of commons" (Hardin, 1968), i.e., the problem of collective goods being compromised by self-interest led actions. Environmental protection and the "polluters pay" principle have not been sufficiently enforced by national and international legislation on carbon emissions, although this approach has been advocated for (Caney, 2005). To date, societies and individuals can pollute the global atmosphere with minor consequences despite profound inequalities in emissions across individuals and countries (Pachauri and Spreng, 2012; Gore, 2015). In this context, scholars have made equalitarian stances (Langhelle, 2000; Mészáros, 2001) who argue that sustainable development is centered on social justice and substantive equality.

ENERGY CONSUMPTION INEQUALITY AND GREENHOUSE GAS EMISSIONS

Energy consumption has environmental consequences in terms of carbon emissions and resource depletion. Research data shows deep inequalities of energy consumption and CO_2 emissions across and within nations (Pachauri and Spreng, 2012; Gore, 2015; Ritchie, 2018). Research (Gore, 2015) indicates that about 50% of global carbon emissions are attributable to the 10% wealthiest individuals on the planet, while the 50% poorest of the global population only contribute to 10% of GHG emissions and reside in the most vulnerable countries to climate change. Other research (Ritchie, 2018) indicates that those classified by the World Bank as high-income countries contribute to about 38% of carbon emissions while comprising only 16% of the world population.

Further, several scholars have hypothesized that income inequality leads to environmental degradation (Boyce, 2003; Downey and Strife, 2010; Cushing et al., 2015; Downey, 2015). One of the main hypotheses of these scholars is that economic inequality originates an imbalance of power, which allows some wealthier and hence more powerful subjects to shift environmental costs onto others. Further, Cushing et al. (2015, p. 194) indicate that beyond the already mentioned effects arising from inequality and political power, it is possible to hypothesize "effects mediated by a relationship between inequality and the environmental intensity of consumption, and effects mediated by social cohesion and cooperation to protect common resources." The first explanation, pointing to an imbalance of power, is relatively intuitive: in this perspective, the wealthiest would protect themselves from environmental degradation, escaping environmental pollution residing in less polluted upmarket areas and imposing on low-income neighborhoods the negative externalities, i.e., pollution and unsightly facilities, as many environmental justice scholars have pointed out in several countries (Bullard, 2000; van der Horst and Toke, 2010). Further, the imbalance of power would result in a legal framework that would prevent an efficient affirmation and implementation of the polluter-pays principle, thereby allowing the wealthiest to avoid bearing most of the price of the pollution that they are causing (Cushing et al., 2015).

The second pathway regarding the relationship between inequality and intensity of consumption points to the argument that inequality leads ordinary people to increase their consumption to emulate the wealthiest groups of society (Veblen, 2017). This issue, in turn, would lead to an increase in average yearly worked hours (Bowles and Park, 2005), which appears to have adverse environmental consequences (Knight

et al., 2013), and particularly an increase in working hours leads to higher levels of consumed energy (Fitzgerald et al., 2015) and higher levels of carbon emissions (Fitzgerald et al., 2018). Finally, within the second pathway proposed by Cushing et al. (2015), it is also pointed out that income inequality slows down the diffusion of new technology, including environmental technologies (Vona and Patriarca, 2011), thereby causing further environmental harm. In fact, low-income households and societies have less possibility to invest in sustainable energy themselves, which means that they also will be the ones who benefit the least from any potential benefits of the energy transition (Sovacool et al., 2017; Pellegrini-Masini et al., 2020b).

The third pathway indicated by Cushing et al. (2015) argues that cooperation and social cohesion are hindered by inequality. This stance holds that inequality negatively affects trust, which appears to be the case along with increasing status anxiety (Delhey and Dragolov, 2014). In turn, it is argued (Cushing et al., 2015) that a lack of trust harms societal cooperation and that both trust and cooperation are necessary to face collective environmental challenges. Evidence has emerged that trust is an essential variable in generating social acceptance of climate change policies (Harring et al., 2013; Drews et al., 2016; Fairbrother, 2016), and it appears to be a key variable in local acceptance of renewable energy installations (Huijts et al., 2012; Pellegrini-Masini, 2020).

The hypothesis that inequality in a society favors environmental degradation has been supported by empirical research, albeit still limited (Wilkinson and Pickett, 2010a,b; Wilkinson et al., 2010). Wilkinson and Pickett (2010b, p. 40) show that for countries with higher equality, measured as the ratio of most affluent 20% to most deprived 20%, the kilograms of carbon emissions for every $100 of income generated is lower. It appears that high levels of economic inequality are positively correlated to higher levels of per capita carbon emissions both in mature and developing economies (Zhang and Zhao, 2014; Grunewald et al., 2017; Knight et al., 2017). The evidence is particularly compelling for top income inequality, i.e., the share of income received by the wealthiest 10% of the population (Hailemariam et al., 2020). Other indicators that support the hypothesis of a causal relationship between inequality and environmental degradation are also presented in the literature (Islam, 2015), such as the link between income inequality and higher loss of biodiversity. Specifically, it was found (Mikkelson et al., 2007) that any increase of one per cent in the Gini coefficient, which measures economic inequality, leads to a 2% rise in the number of threatened species.

Also, research investigating the relationship between pro-environmental attitudes and equalitarian values has been conducted for long and appears well-established. Scholars (Drews et al., 2016) point out that evidence has emerged in multiple studies in several western countries that progressive political values, of whose equalitarian views are a core value (Neumayer, 2004; Illuzi, 2014), lead to a broader acceptance of climate policies or a broader belief in climate change (Hornsey et al., 2016). Similarly, evidence has been presented (Franzen and Vogl, 2013) and reviewed from multiple studies (Gifford and Nilsson, 2014) that in several countries, political orientation correlates with environmental attitudes, with progressive individuals displaying higher levels of pro-environmental attitudes. Regarding precisely energy policies, Carlisle and Smith (2005) found that egalitarians tend to support increasing gasoline and energy taxes, reducing the standard of living, slowing population and industrial growth, while they tend to oppose nuclear power.

Given that there is only limited research on the relations discussed in the previous sections, especially from large-scale datasets, we utilize a combinbation of several of such datasets to shed some more light on the relation between the level of inequality in a country and sustainable energy attitudes (here operationalized as energy use attitudes, behavior, and support for energy policies).

HYPOTHESES AND METHODS

In this study, we hypothesize that countries with higher levels of economic equality, i.e., income or wealth equality, which express in their economic and social fabric egalitarian values, will show higher levels of pro-environmental attitudes regarding energy consumption behaviors and actions. Further, in order to contextualize the results in the longstanding debate that postmaterialist values in higher-income countries lead to widespread pro-environmental attitudes (Inglehart, 1990; Franzen and Vogl, 2013), for which mixed evidence has been presented, mainly when referred to support of pro-environmental policies (Kahn, 2007) or attitudes (Schultz and Zelezny, 1999), we also include measures of country wealth into our analysis, i.e., GDP per capita and median income.

To test our hypothesis, we are mainly using a dataset from the H2020 ECHOES project[1] combining data from an extensive multinational survey conducted in 2018 across 31 European countries (EU-28, Norway, Turkey, and Switzerland) during 4 months, with about 600 respondents recruited in each country through a random sampling procedure, and a total sample of over 18,000 respondents. The survey targeted individuals' energy-related behaviors, attitudes covering six main areas of life (housing, mobility, diet, consumption, leisure, and information acquisition). The dataset was then integrated with statistical data sourced at the country level regarding the Gini coefficient of equivalized disposable income[2], the Gini coefficient of wealth distribution[3], both for the year 2018, GDP PPS per capita[4] and country median income. The Gini coefficient of equivalized disposable income (which for Germany is limited to the territory

[1] https://echoes-project.eu/

[2] "The Gini coefficient is defined as the relationship of cumulative shares of the population arranged according to the level of equivalised disposable income, to the cumulative share of the equivalized total disposable income received by them". Source of data: Eurostat, available at: https://ec.europa.eu/eurostat/web/products-datasets/-/tessi190

[3] Source of data: Credit Suisse Global wealth databook 2019, available at: https://www.credit-suisse.com/media/assets/corporate/docs/about-us/research/publications/global-wealth-databook-2019.pdf

[4] In PPS, purchasing power parities, year 2018. Source of data: Eurostat. Available at: https://ec.europa.eu/eurostat/databrowser/view/tec00114/default/table?lang=en

TABLE 1 | Gini coefficient of equivalized disposable income of European countries 2018.

Country	Gini disposable income 2018
Slovakia	20.9
Slovenia	23.4
Czechia	24.0
Norway	24.8
Belgium	25.7
Finland	25.9
Austria	26.8
Sweden	27.0
The Netherlands	27.4
Denmark	27.8
Poland	27.8
France	28.5
Hungary	28.7
Malta	28.7
Ireland	28.9
Cyprus	29.1
Croatia	29.7
Switzerland	29.7
Estonia	30.6
Germany (until 1990 former territory of the FRG)	31.1
Portugal	32.1
Greece	32.3
Luxembourg	33.2
Spain	33.2
Italy	33.4
United Kingdom	33.5
Romania	35.1
Latvia	35.6
Lithuania	36.9
Bulgaria	39.6
Turkey	43.0

TABLE 2 | Gini coefficient of wealth distribution.

Country	Gini wealth distribution
Slovakia	49.8
Belgium	60.3
Malta	64.0
Croatia	64.5
Romania	64.7
Greece	65.4
Bulgaria	65.9
Slovenia	66.2
Hungary	66.3
Lithuania	66.3
Italy	66.9
Luxembourg	67.0
Poland	67.7
Portugal	69.2
Spain	69.4
France	69.6
Switzerland	70.5
Estonia	71.6
Czechia	72.5
Austria	73.9
Finland	74.2
United Kingdom	74.6
Latvia	78.9
Turkey	79.4
Ireland	79.6
Norway	79.8
Cyprus	80.1
Germany	81.6
Denmark	83.8
Sweden	86.7
The Netherlands	90.2

of the former FRG[5]) shows a coefficient ranging from 21 for Slovakia, with a relatively higher level of equality in distribution of disposable income, to 43 for Turkey with a relatively less equal distribution (see **Table 1** for a list of all countries included in the analysis). Country wealth inequality often has a different pattern than income inequality. In this case, we can appreciate the difference for the countries considered, with countries with a relatively more equal distribution of disposable income, such as e.g., Norway, which shows instead a relatively more unequal distribution of wealth (see **Table 2**).

ANALYSIS

This section explains the primary statistical operations; for the full details regarding the statistical methods, please see the Stata syntax file in the **Appendix** in Supplementary Material. Firstly, we created a sustainable energy caring index (SECI) with the eight items listed in **Table 3** taken from the ECHOES survey[6]; to see how the average SECI and economic inequalities vary across European countries (see **Figure 1**). For the analysis, we combine them into one aggregated index variable. Factor analysis indicates that all items load sufficiently on one factor to justify this simplification. Also, Chronbach's alpha for the resulting index was 0.85, suggesting a solid index for energy care.

To remove the impact of slightly different sample sizes per country (very small countries were only represented with about 200–300 participants in the ECHOES survey), we weighted the participants, so all countries had an equal contribution to the analysis. We argue this is more suitable for answering our research question, as we investigate the existence of a relationship

[5]Nevertheless the current population of the territory of the former FRG corresponds to about three quarters of the whole German population.

[6]Please be aware that they were constructed initially to capture different (but related) constructs around support of the energy transition.

TABLE 3 | Items included in the sustainable energy caring index (SECI).

Item	M	SD
I feel proud if other people save energy	3.8	1.04
I am angry about the fact that many people in do not save energy	3.7	1.08
The use of more renewable energy sources will benefit the environment.	4.3	0.92
The use of more renewable energy sources will create new jobs	3.6	0.98
I feel a personal obligation to be energy efficient (e.g., using public transport instead of a personal car, turning off lights when leaving the room, using technical appliances which help to save energy).	3.9	1.00
I feel a personal obligation to support energy policies that support the energy transition.	3.7	1.02
I intend to use energy in a way that helps bringing the transition to a renewable energy system.	3.8	0.87
I would accept energy policies that protect the environment even when these induce higher costs (e.g., policies that increase the prices of fossil fuels).	3.3	1.13
Sustainable Energy Caring Index (SECI)	3.7	0.71

and not the strength of a relationship across a whole area[7]. We produced three multilevel regressions models with the SECI as the dependent variable, where the countries acted as the level two units: one empty model to estimate variance on both levels of analysis, which was later used to calculate explained variance, another model with only the covariates used in the analysis (see below), and finally one full model to see the explanatory power of income and wealth inequality on the country-level SECI variation. Variables used in the regression are listed in **Table 4**. To estimate the difference in explained variance between the models, we calculate the difference in unexplained variance divided by the unexplained variance of the empty model (as suggested by Mehmetoglu and Jakobsen, 2016). Finally, we calculate the standardized coefficient to make the effect size of variables comparable.

RESULTS AND DISCUSSION

Multilevel regression analysis suggests that income and wealth distribution explain 41% of the 8% of the total SECI variance allocated to between-country factors (see **Figure 2**).

GINI income and wealth are remarkably better predictors of energy caring than the median income of a country (see **Table 5**). Model 1 shows that only 8% of the observed variance in SECI is at the country level, while 92% is at the individual level. In models 2 and 3, individual-level variables account for 4% of the variance at the individual level; thus, most of the variance in the SECI scores between people in a country is explained by variables not included in the model. In model 2, the median income accounts for 22% of the between-country variance in SECI scores. When adding the GINI variables in model 3, a significant increase of explained variance can be seen, where the country-level variables together explain 41% of the between-country variance.

Additionally, we see that the median income becomes non-significant when accounting for the GINI variables. In other words, the degree of equality in disposable income and wealth in a county are better predictors of a country's average level of SECI than the median income. However, while more equality in disposable income decreases a country's SECI, more equality in wealth distribution increases it (while controlling for equality in disposable income and the covariates in the analysis).

The findings of this study are to an extent supportive of our hypothesis that higher levels of economic equality would increase pro-environmental attitudes, albeit modestly. The most striking result is that economic equality variables explain 41% of the sustainable energy caring index variance at the country level, suggesting an important role of economic variables in explaining differences across countries.

That economic inequality could influence negatively prosocial behaviors, particularly of high-income households, appears to have found lately empirical evidence (Côté et al., 2015; Duquette, 2018; Du et al., 2020), albeit not consistently (Schmukle et al., 2019). Our research could be seen as further supporting evidence that favorable attitudes toward a specific subset of pro-environmental behaviors, regarded by many as a specific type of prosocial behaviors (Kollmuss and Agyeman, 2002), appear to be possibly reduced by higher economic inequality. Nevertheless, that high-income households might be less disposed toward pro-environmental behaviors is not confirmed in our sample. Our model and the correlation tests that we run between self-reported "social status" and SECI (0.084, $P \leq 0.01$) found a negligible positive relationship between higher social status and higher SECI. The same was found when we checked the correlations between self-reported income thresholds and SECI, with individuals having a higher income than the third quartile threshold of national income distribution negligibly but positively correlating with higher SECI scores (0.045, $P \leq 0.01$).

The opposite sign that we found in the model of the relationships between the Gini wealth and the Gini income indexes with the SECI is puzzling. The first has a negative relationship, meaning that with the growth of the Gini wealth, i.e., more wealth inequality in a country, the SECI score is lower for the sample's surveyed country respondents. Inversely when the income inequality is higher, the SECI score would appear higher too. However, it has to be said that in our model, this last relationship is borderline significant ($P = 0.047$), although if tested through a Pearson correlation test, the relationship appears significant ($P \leq 0.01$) and still positive.

It is difficult to speculate on these opposed signs; perhaps what could be said is that wealth, which comprises assets, inherited or accumulated, explains significantly more perduring social inequality than income because it usually generates income by itself and significantly expands the abilities to sustain consumption beyond the income level of households (Islam and McGillivray, 2020). While income is mainly tied to an individual's professional choices and achievements, wealth might only loosely relate to it (Berman et al., 2016). In fact, countries

[7]Researchers that aim to answer questions such as "What is the relationship between income and wealth equality and energy caring in Europe/Asia/Africa" should weigh according to population.

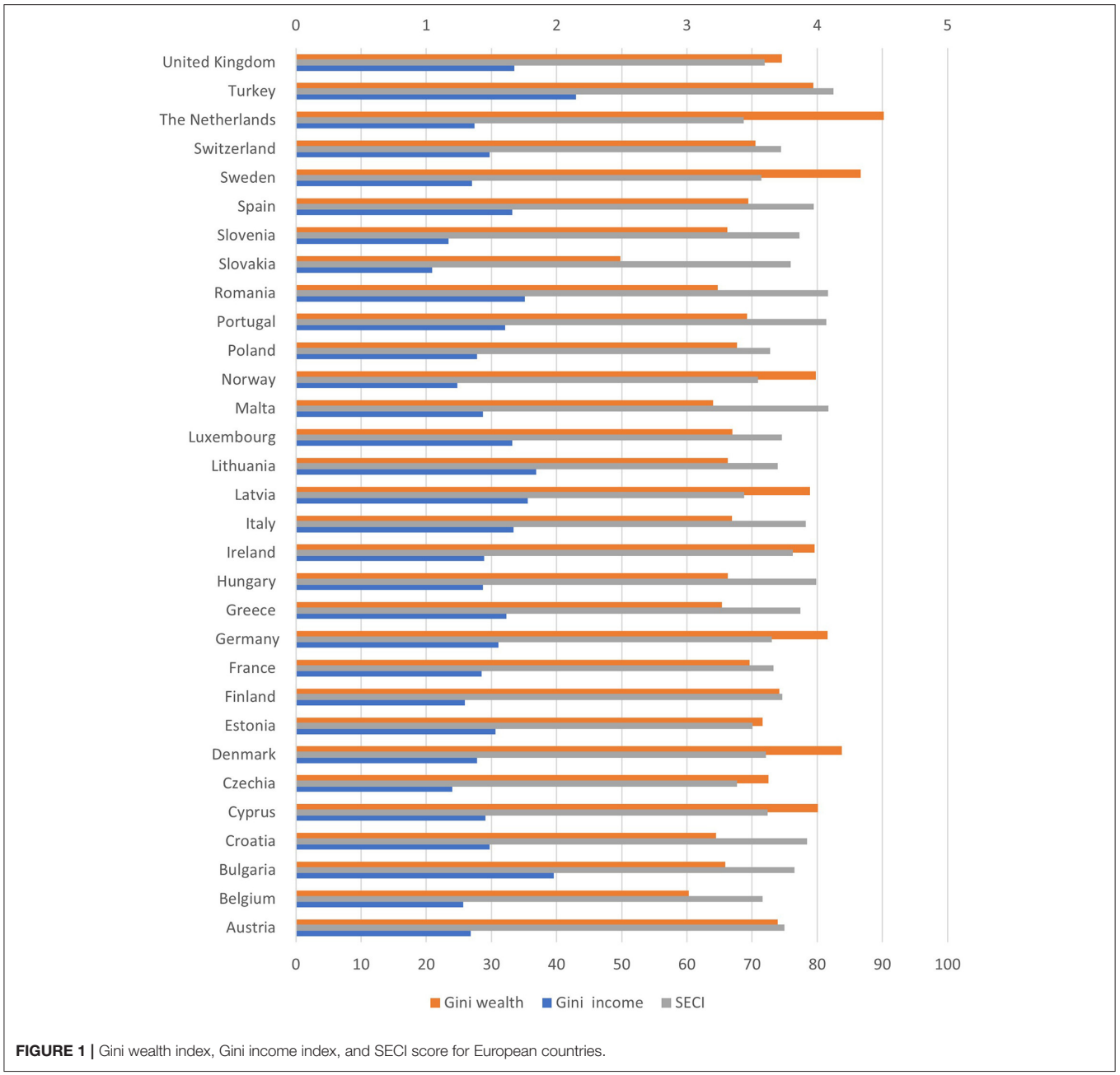

FIGURE 1 | Gini wealth index, Gini income index, and SECI score for European countries.

with progressive income taxes appear to be efficient in reducing income inequality but not wealth inequality (Berman et al., 2016). If income inequalities have been considered, to some extent, by economists as a necessity to increase economic efficiency (Okun, 2015), wealth inequalities have been criticized for producing inefficiencies and slowing down economic growth (Islam and McGillivray, 2020). Income inequalities, to an extent, increase economic efficiency and, therefore, growth, although excessive income inequality appears to hinder growth too (Cingano, 2014).

In our sample, interestingly, countries that have higher GDP PPS per capita correlate negatively with SECI, although very modestly (-0.076, $P \leq 0.01$), this appears to contradict the established view that environmental concern is higher in higher income per capita countries (Inglehart, 1990; Franzen and Vogl, 2013). Similarly, very weak but still negative is the correlation between the median income of countries and the SECI score (-0.106, $P \leq 0.01$). When we look at how measures of societal wealth, GDP per capita and median income, correlate with wealth and income inequality Gini indexes, we find that higher wealth inequality correlates positively with median income (0.387, $P \leq 0.01$) and with GDP PPS per capita (0.302, $P \leq 0.01$). However, the opposite is true for the Gini income index, i.e., income inequality, which negatively correlates with median income (-0.339, $P \leq 0.01$) and GDP PPS per capita (-0.217, $P \leq$

0.01). In sum, our data suggest that there might be a connection between higher wealth inequality, higher GDP per capita and higher median income, and lower SECI. Considering the weak or modest correlations found, these findings need to be explored and probed in further studies.

Less surprisingly, we found that individuals with right-wing social and economic outlook are less concerned with sustainable energy (correlations coefficients are respectively -0.123, $P \leq 0.01$ and -0.125, $P \leq 0.01$), which appears coherent with previous research (Franzen and Vogl, 2013; Gifford and Nilsson, 2014; Drews et al., 2016). While, higher educated individuals and women in our model appear more caring of sustainable energy, which, again is consistent with previous research on environmental attitudes (Franzen and Vogl, 2013). Finally, it is also unsurprising that right-wing social and economic outlooks are negligibly but positively correlated with social status (respectively 0.064 and 0.093, $P \leq 0.01$).

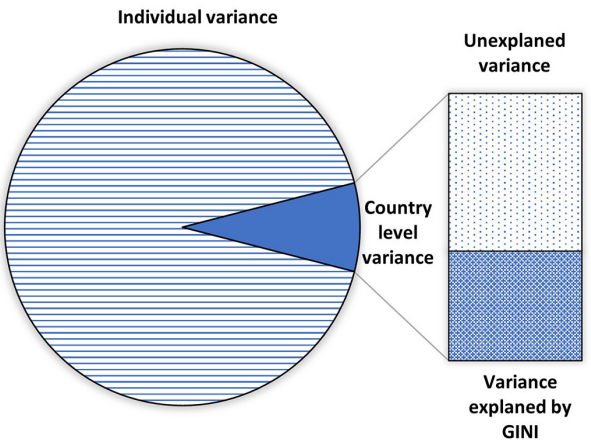

FIGURE 2 | Share of variance explained by GINI wealth and income coefficients.

CONCLUSIONS

This research has attempted to develop, from ethical considerations regarding energy justice, a focus on energy equality and the intersection of distributional injustices and sustainable energy policies. The current debate on energy justice needs to rest on empirical evidence supporting the shift advocated by energy justice scholars toward just energy policies, which ultimately are policies inspired by equalitarian principles (Pellegrini-Masini et al., 2020a). In this paper, our focus has been on energy equality and distributional justice. Finding empirical evidence supporting a nexus between sustainable energy attitudes and reduced economic inequalities has returned complex results; nevertheless, distributional patterns appear to explain a large amount of variance of sustainable energy attitudes at the country level in our sample. These findings support the view that a nexus between economic inequality and sustainable energy attitudes is indeed present, although the relationships of income and wealth inequalities with such attitudes need further research to be fully explained. What appears evident, and coherent with previous research, is that equalitarian values in the shape of progressive social and economic outlooks seem to underpin sustainable energy attitudes, thereby lending further credit to the importance of promoting these values in order to further the energy transition and the shift toward a society implementing sustainable energy policies.

How do these findings sit in the context of the energy justice research debate? In our view, they strengthen the need for an

TABLE 4 | Variables included in the regression analysis.

Item	Question	Scale
Age	How old are you?	18–34; 35–44; 45–54; 55+.
Gender	Please indicate your gender	1 Female; 2 non-female*
Education	Which of the following best describes you?	Elementary or secondary school; Professional training; A-Levels; University or college degree*
Social status	Where would you place yourself on this ladder?	1 worst off; […] 5 best off
Economic outlook	How would you describe your political outlook with regard to economic issues (e.g., taxes, cooperative vs. protective foreign economic policy, etc.)?	1 Left; […] 5 Right
Social outlook	How would you describe your political outlook with regard to social issues (e.g., family, religion, traditional values, etc.)?	1 Left; […] 5 Right
Personal income	Is your household's monthly net income less that [quartile income of country]?	1 <1st quartile; 4 >3rd quartile; 5 >90th percentile income
Median Income	Median monthly net income of the country the respondent belongs to	–
GINI Income	[Insert GINIindex2 explanation]	–
GINI Wealth	[Insert GINI_wealth2 explanation]	–

**See syntax file for further details.*

TABLE 5 | Multilevel regression on the sustainable energy caring index (SECI).

Variable	Model 1	Model 2			Model 3		
		Coef.	C-Z	*P*	Coef.	C-Z	*P*
I - Age		0.039575	0.0461163	<0.0005	0.0395191	0.0460512	<0.0005
I - Gender		0.0852198	0.0426076	<0.0005	0.0852352	0.0426153	<0.0005
I - Education		0.0612678	0.0648487	<0.0005	0.0610339	0.064601	<0.0005
I - Personal income		0.0201653	0.0279445	0.001	0.0200394	0.0277701	0.002
I - Social status		0.0693078	0.0526277	<0.0005	0.0694507	0.0527362	<0.0005
I - Economic outlook		−0.0430792	−0.0490509	<0.0005	−0.0430929	−0.0490666	<0.0005
I - Social outlook		−0.035707	−0.0418444	0.001	−0.0357621	−0.0419091	0.001
C - Median Income		−0.005866	−0.0658983	0.018	−0.0010803	−0.0121361	0.689
C - GINI Income					0.0139574	0.066903	0.047
C - GINI Wealth					−0.0097319	−0.0824155	0.002
Constant	3.748259	3.345039	3.746914	<0.0005	3.540807	3.746918	<0.0005
Residual country variance	0.0397338	0.0307504			0.0234518		
Residual individual variance	0.4572319	0.4373367			0.4373366		
Share of country variance explained		22.6%			41.0%		
Share of individual variance explained		4.4%			4.4%		

I, individual factor; C, Country factor; C-Z, Standardized coefficients. Share of variance explained indicates how much of the variance attributed to individual factors (92%) and country factors (8%) is explained by the variables in the regression. All models apply country as level 2 indicator.

approach to energy justice that stresses the importance of aiming at equalitarian policies addressing distribution inequalities. This approach emphasizing the need for redistributive policies has been argued to be desirable concerning energy policies (Galvin, 2019; Pellegrini-Masini, 2019; Pellegrini-Masini et al., 2020b), but it has also been advocated concerning sustainable development (Langhelle, 2000; Mészáros, 2001; Pereira, 2014; Grossmann, 2021).

More broadly, our findings join growing empirical evidence about the nexus between environmental sustainability and distributional equality (Wilkinson and Pickett, 2010a,b; Wilkinson et al., 2010) that could strengthen the political argument in favor of redistributive policies within the energy sector and society at large. This area of research is crucial because so far, debates on the importance of a socially just energy transition have been chiefly relying on ethical arguments, which have been suggested to be ineffective in shifting the policy consensus (Galvin, 2019). This stance is disputable because cultural debates never cease to influence political decisions. However, it is fair to assume that providing empirical evidence of a nexus between environmental sustainability and contained economic inequality might have a far greater impact on the politics of sustainability than philosophical arguments alone.

Inevitably this work comes with some limitations, the main one being that we looked at the relationship between economic inequalities and attitudes; while it is well-known that attitudes do not always translate into behaviors, the so-called "value-action gap" (Kollmuss and Agyeman, 2002). Nevertheless, pro-environmental attitudes translate into sustainable behaviors, at least in perceived low-cost situations (Diekmann and Preisendörfer, 2003; Pellegrini-Masini, 2020) and specifically regarding energy consumption behaviors (Von Borgstede et al., 2013). Further limitations regard our focus on the country level of analysis and economic inequality; this deliberate choice omits empirical analysis and even considerations on individual and country level variables, i.e., cultural differences across countries, which would possibly explain more of the variance.

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. This data can be found at: https://db.echoes-project.eu/echoes/raw-data.

AUTHOR CONTRIBUTIONS

GP-M conceived and redacted most of the article. LE carried out the data analysis and contributed to writing the results section. CK and EL reviewed the manuscript provided comments and suggested modifications. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frsc.2021.663000/full#supplementary-material

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