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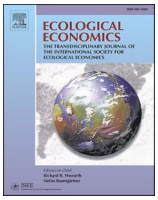

Leaders and laggards in the pursuit of an EU just transition

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ABSTRACT

The just transition from coal, oil, and gas to renewable energy sources involves commitment from all EU states. But who is leading, or lagging? We apply an innovative DeePeR framework to identify these states, using open-access quantitative global data from multiple sources, by evaluating the energy and equity dimensions of Distributive, Procedural and Restorative justice. Using rank percentile scores, we assessed EU nations' level of fossil fuel dependency (including both energy and financial dependency) and distributional inequality, their fossil fuel CO2 emissions, climate finance pledges and a calculated procedural justice score, and their commitment to modern renewable electricity output and rankings on fair and renewable jobs. We find that EU states' performances on just transition are distinct across four broad regions; Scandinavia, eastern Europe, western Europe, and the Mediterranean. We discuss the nuances of fossil fuel embeddedness in the EU. This is followed by reflection on the importance of embedding fairness in the deployment of new renewable jobs. Finally, we consider the implications for a better-targeted financial mechanism for just transition alongside a fossil fuel divestment strategy.

1. Introduction

The EU is one of the first multinational regions to commit to achieving a just transition away from fossil fuels. This policy aim is enshrined as part of the EU Green Deal (European Commission, 2021). There is, however, little reflection on what a 'just' transition should entail, what its key drivers are, and how it could be monitored (McCauley and Pettigrew, 2022). Existing research concentrates on the European institutions (Pianta and Lucchese, 2020; Gutiérrez and Tomassetti, 2021; Jaccard et al., 2021), rather than the extent to which member states can drive forward - or hinder - a just transition for the EU. Consequently, there is no existing academic research on the relative performance of all EU member states on just transition. We respond though a quantitative investigation into the leaders and laggards on the just transition. Understanding the relative performance of the member states holds the key to more effectively refocusing financial investment and policy responses in the EU.

The decision to embed just transition within its flagship EU Green deal programme has positioned it as a standard-bearer for its pursuance (Pianta and Lucchese, 2020; Jaccard et al., 2021; Mastini et al., 2021). The just transition platform identifies policy and financial solutions to the transition of what it sees as its most vulnerable regions away from fossil fuels. The EU just transition platform involves a dedicated Just Transition Fund, InvestEU and the EIB public sector loan facility (European Commission, 2021). These mechanisms are the backbone for territorial just transition plans which set in place strategic pathways for achieving decarbonisation (Pietzcker et al., 2021). However, basic questions remain about the implications for individual member states; who benefits, who misses out and why?

The just transition platform assumes that financial help is most needed in fossil fuel-dominated communities, since such areas of the EU are more vulnerable to changes in energy systems. This vulnerability can include multiple impacts such as economic, societal, or environmental damage (European Commission, 2021). This assumption results in an excessive focus on investing resources in a few regions believed to have embedded fossil fuel activities, typically in Eastern Europe (Voicu-Dorobanțu et al., 2021). This basic dichotomy of vulnerable fossil fuel communities hinders meaningful engagement on which member states are leading the broader just transition agenda, who is falling behind and ultimately where resources and policies should be targeted.

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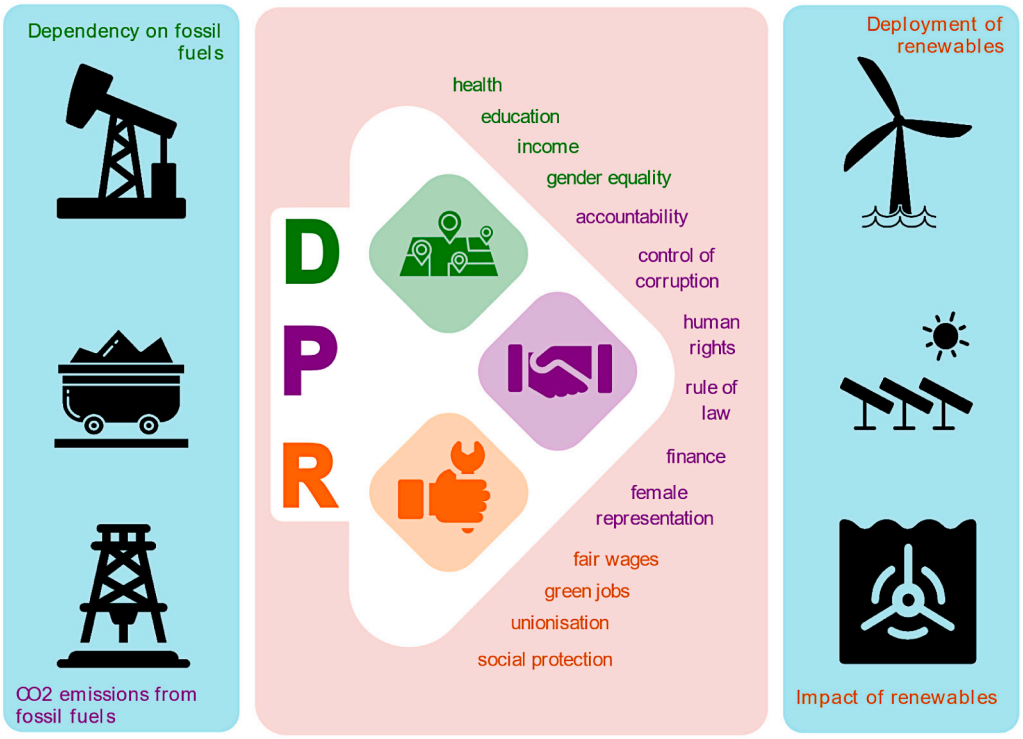

Fig. 1. The DeePeR model of just transition: This infographic represents the energy transition from the use of fossil fuel-based energy sources (oil, coal, and gas) to renewable energy technologies (wind, solar and tidal power). Our analysis investigates this transition through the lens of Distributional, Procedural and Restorative Justice (DPR), measuring national performances on a set of indicators (Source: authors).

Our overall aim is therefore to **assess which member states are leaders or laggards in the just transition for the EU**. We investigate if existing assumptions are correct when approaching the just transition, including and beyond the EU's fixation on the geographical distribution of fossil fuel dependency across EU member states.

Historically, the EU's narrow definition of just transition limited its potential (Heffron and McCauley, 2018, 2022). We aim to expand the narrow EU goal of helping a few ill-defined traditional fossil fuel-dependent regions. To achieve this, we employ a three-pronged approach to ensure a progressive view on just transition, incorporating distributional, procedural and restorative dimensions in line with McCauley and Heffron (2018). Distributional justice is a central tenet of just transitions research. It illuminates where inequalities occur – and not simply energy inequity (Menghwani et al., 2020). The EU sees the primary inequality as fossil fuel dependency, which varies in magnitude across member states. We include and expand on this view in our analysis.

A broader view of inequalities ought to consider such aspects as health, education, gender and income. Health inequalities are also a critical indicator of where targeted policy responses are needed to achieve a just transition (Gkiouleka and Huijts, 2020). High levels of fossil fuel-associated health vulnerability occur, for example, in eastern and southern Europe (Jutz, 2020; Petmesidou et al., 2020) and in Western Europe (Dragano et al., 2016). Educational systems increase the likelihood of a just transition, by delivering the skills required for a low carbon future (Sovacool and Ryan, 2016). Transitioning away from fossil fuels has gender inequality implications (Amate-Fortes et al., 2021) as well as for income inequality (Filetti and Janmaat, 2018) and energy poverty (Igawa and Managi, 2022). We adopt a comprehensive view on distributional dimensions of a just transition by asking: **Where do we find leaders and laggards in the EU with respect to educational, health and gender, income inequalities alongside fossil fuel dependency?**

A just transition also means participatory and inclusive decision-making (Schnaudt et al., 2021). This is a starting point for considering the second tenet of just transition, namely procedural justice. Existing research points towards variation in meaningful leadership across the EU on the core issue of reducing CO2 emissions from fossil fuels (Filetti, 2016; Šipulová and Smekal, 2021). Stakeholder inclusion must be complemented by accountable systems and structures in this venture (Sareen and Wolf, 2021). Scholars have pointed towards various levels of informal and formal corruption taking place in member states, most notably in Eastern Europe (Bates et al., 2020; Jastramskis et al., 2021). This relates to an additional element of procedural justice in the literature, namely political trust. High levels of trust in policymakers are needed for the long-term buy-in of a member state's populace on the subject of reducing fossil fuel-based CO2 emissions (Uslaner, 2017). In addition, an emerging issue in the literature regarding procedural justice is the level of climate financing pledged by a member state as a marker of their commitment to reducing CO2 emissions from fossil fuels (Pickering et al., 2015; Sayegh, 2018; Christophers et al., 2020). A combined view on these factors brings us to our second research question: **which member states are leading or lagging on delivering accountable, fair, and engaging climate action within the EU?**

A third tenet of just transition is restorative justice (McCauley and Heffron, 2018). It has a unique history within the trade union movement in Europe as referring to the substitution of employment lost as a result of the transition away from fossil fuels (Abraham, 2017); consequently restorative justiceand deals with justice issues that are closest to the current EU conception of the just transition. Literature points to varying employment policies in greening member states' economies (Sinha, 2017; Iudici et al., 2020; Hoicka et al., 2021), as well as investigations into the conditions of new jobs in the renewable sector (Goddard and Farrelly, 2018; Anxo, 2019). The types of employment in the renewable sector differ from those traditionally found in fossil fuel industries. This positions trade union representation and a government's commitment to employee conditions as critical to the assurance of rights protections in this new environment (Crouch, 2017; Thomas, 2021). Our third research

question is on **which states are leading or lagging on delivering renewable jobs**[1] **that are underpinned by fair conditions?**

We investigate the overall research aim and its three associated research questions through a deeper – or rather DeePeR – analysis of the 28 EU states between 2010 and 2020, providing quantitative insight into their just transition performance. Fig. 1 presents a transition from fossil fuels (on the left) to renewables (on the right), driven by the three dimensions of distributional, procedural, and restorative justice (DPR) which are the core focus of the DeePeR method. This analysis is a necessary contribution to provide an empirical body of data for a better understanding of the potential for a just transition in Europe. We understand that the categories are rather arbitrary at this early stage of development, built upon (1) the theoretical framework of just transition, (2) themes in related literature as outlined above, and (3) the availability of global open access data, and will be developed further in future work. We employ a ranked percentile approach to answering our three research questions, allowing us to identify relative leaders and laggards on the just transition in the EU.

2. Methods

In this section we outline in detail the rationale behind the design and implementation of this study, including the definitions, sources and calculations used to answer our three research questions.

2.1. Data sources, timeframe, data completeness

In our analysis we combine global open access data from multiple sources. This allows us to develop observations at both an EU and global level. We reviewed all available measures from the International Energy Agency (IEA, 2021) and the World Bank (WB, 2021c, 2021a, 2021b), our primary sources for energy and social data respectively. Measures were selected based on their relevance to our research questions. Using R, raw data files were cleaned and pivoted as necessary and combined into a single file based on location (i.e., state name) and year. We then supplemented these core data with additional measures from further global data sources where measures were structured on a national level and sufficiently complete for a set of 206 countries worldwide across our selected timeframe. These supplementary data sources include the International Renewable Energy Agency (IRENA), Integrated Carbon Observation System (ICOS), International Labour Organisation (ILOSTAT), Natural Resource Governance Institute (NRGI), Heinrich Böll Foundation (HBS), United Nations Development Programme (UNDP) and the United Nations (UNSTATS) (Fariss, 2019; ICOS, 2020; ILOSTAT, 2020; IRENA, 2020; NRGI, 2020; HBS, 2021; UNDP, 2021; UNSTATS, 2021).

We selected a timeframe of 2010–2020 for our analysis because 1) it is of sufficient length to capture an average across a decade and therefore minimize the effects of both sporadic missingness of data and any procedural irregularities in the manner in which it was collected, for example differences in data collection method from year to year, and 2) it was the most recent data available and therefore the most relevant to obtaining an up-to-date impression of recent member state performances. Our use of averaged data is also justified by the above explanation. Most indicators are available for the full 2010–2020 period. Some indicators are available across a slightly shorter time span but, as each country is assessed on the same basis, our method and the data used enables a fair comparison of member states.

Supplementary Data Table 1 in Appendix 2 summarizes the multiple indicators from different data sources, including the years for which data was available. Data for all measures were complete for the 28 EU states. One exception is Croatia, for which data was not available for climate finance pledges.

2.2. Percentile rank data analysis and visualization

A quantitative study of the just transition concept necessarily requires analysis of multiple data types (for example, energy units, social indices, and units of currency), which makes the calculation of compound measures more challenging. Consequently, and in line with recent literature (Kraipornsak, 2018; Mengova, 2019), we chose to take a rank percentile approach. A rank order-based method is often used in surveys where participants are asked to rank their preferences (Maruichi and Abe, 2019). National rank-based indices are becoming more common, developed from secondary data (Acharya and Porwal, 2020) or other existing indices to create a tailored meta-index (Gasser, 2020). We do not seek to create a policy- or sector-wide index or a meta-index, however; we merely aim to facilitate comparison of rank ordered measures.

We collected raw data from multiple sources which were relevant to our three research questions and indicators and calculated the percentile rank or rank order of each country for each indicator. The basic percentile rank formula is.

$$R = p/100\ (n+1),$$

where R = rank percentile, p = percentile, n = sample size.

We used data visualization software (e.g., Datawrapper https://www.datawrapper.de/) to generate figures and make initial observations. We did not investigate the statistical significance of our results, our focus being rather on a ranking of the performance of individual EU member states on key measures of the just transition.

2.3. The DeePeR model: calculations and key measurements

We present a novel model for understanding performance on the just transition: the DeePeR energy equity evaluation of Distributional, Procedural and Restorative justice. The dataset, prepared from ten open-access sources, and the overall model are summarised in Fig. 1. Our model focuses on topics fundamental to each of these dimensions: 1) Distributional: health, income, education, and gender equality; 2) Procedural: accountability, female representation in decision-making, corruption, finance, rule of law and human rights; and 3) Restorative: unionisation, fair wages, social protection, and green jobs. Below we provide a more detailed overview of the key measures and calculations generated in our analysis. The formulae are outlined in detail in Appendix 1.

2.3.1. Distributional justice and fossil fuel dependency

We derived four key measures to quantify distributional justice within the just transition. The first, *distributional inequality,* is an equity measure defined as the average rank percentile for (i) coefficient of human inequality (which includes health, education, and income inequality) and (ii) gender inequality index. Second is *fossil fuel energy dependency*, the aggregation of IEA data on coal products, natural gas, oil products and oil shale and sands, exports, imports, production and consumption, and heat and electricity output. Third is *fossil fuel financial dependency*, an average ranking of (i) all reported project- or government-based oil, coal and gas revenues accrued by companies at a national level, and (ii) oil, coal and gas rents (i.e., national earnings from the production of these commodities, minus the costs of production). The fourth measure is overall *fossil fuel dependency*, an aggregation of energy dependency and financial dependency.

2.3.2. Procedural justice and CO2 emissions from fossil fuels

Procedural justice is the average rank percentile for (i) control of

[1] We recognise that one could equally investigate the losses of fossil fuel jobs. As outlined in the methods, we were unable to find complete global level open access data on fossil fuel employment. We were, in contrast, able to use IRENA's open access data base on renewable jobs as outlined further in the methods.

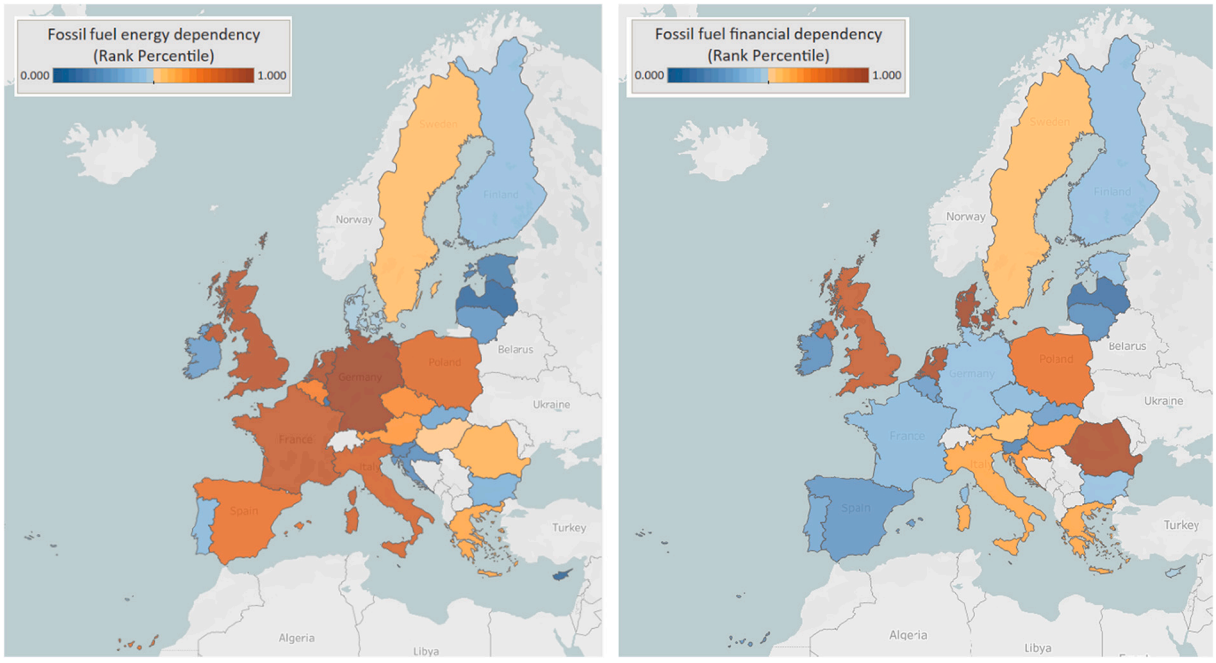

Fig. 2. Fossil fuel energy dependency and financial dependency, rank percentile of European Union member states (average data, 2010–2020): BLUE indicates LOWEST fossil fuel dependency and ORANGE indicates HIGHEST fossil fuel dependency. Fossil fuel energy dependency is defined as COAL, GAS, OIL AND OIL SHALE/SANDS imports and exports, production, total consumption, and electricity and heat output, (data from IEA, 2021). Fossil fuel financial dependency is defined as the percentage of fossil fuel rents by GDP (data from WB 2021) and company investment in USD (data from NRGI, 2020). Rank percentile data are listed in Supplementary Table 2. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

corruption, (ii) human rights, (iii) female representation at ministerial level, (iv) voice and accountability and (v) rule of law. Relating these equity metrics to climate change, we compared these rankings with a sixth ranked measure, (vi) national CO2 emissions from fossil fuels. Our second measure of procedural justice was *climate finance*, an average of pledged climate finance contributions to adaptation and mitigation activities, as well as REDD+ spending in accordance with the Climate Funds Update methodology (HBS, 2021). To ensure as fair a comparison as possible, we also use GDP as measure of variable ability to pledge.

2.3.3. *Restorative justice and renewable jobs*

Restorative justice is evaluated by three key calculations in this study. Two relate to measures of equity: *fair jobs* is the average rank percentile for (i) collective bargaining coverage rates, (ii) trade union density rates and (iii) labour share of GDP, while *renewable jobs* represents all jobs in the renewable sector, per capita. These metrics allow us to address the extent to which a state is committed to delivering non-fossil fuel focused jobs which are fair to workers. Our third measure, *modern renewable electricity output*, looks at the solar, wind and tidal energy output of each state, these being the fastest-growing sources of renewable energy. We were unable to source reliable open access data on fossil fuel employment. Existing sources from, for example ILO, were incomplete on a global level and included non-energy activities such as diamond mining. We therefore concentrated on renewable jobs.

2.4. *Limitations*

We selected data sources which provided complete data at a global level, not just the EU level. We have curated and prepared complete or near-complete data for a total of 206 states worldwide on the measures described. Our focus is on social and energy factors to the just transition. We do not include, for example, geological or physical geography measurements. The reason for this selection of worldwide data, rather than more detailed regional sources, is to allow comparability between states both within the EU and in a global context. There is an inherent trade-off between data coverage and the measures that we could include. We welcome future studies that could, for example, investigate policy effectiveness of existing measures taken by governments to pursue a just transition. This is outside the scope of this paper's methodology, which prioritizes comparability through open access global data.

The use of rank percentile scoring can limit the level of detail to which an analysis can delve (Kraipornsak, 2018; Mengova, 2019, 2020). However, we seek to identify broad trends in our data which will be valuable for future in-depth quantitative study using supplementary data sources. We acknowledge also the relatively arbitrary nature of our indicator selection based on (1) the theoretical framework of just transition (2) themes in related literature as outlined above, and indeed (3) available global open access data as described in our methods section. We encourage future work to refine the framework, and welcome alternative models.

3. Results

We outline the primary observations from our analysis of the data, in response to our three research questions. Our analyses are mainly presented in the form of rank percentile, and we indicate when we deviate from this strategy (i.e., raw data obtained directly from a single source). Data is summarised in tabular form in Supplementary Tables 2, 3 and 4.

3.1. *Distributional justice and fossil fuel dependency*

Here we make the assumption that the dependency on fossil fuels weakens commitment to a transition to renewables (Bianco et al., 2019; Pianta and Lucchese, 2020). In this study, fossil fuel dependency is defined as a composite of 1) the use of and reliance upon *fossil fuel resources*, and 2) the *financial resources derived from fossil fuels*. Fig. 2 shows the variation in both these aspects of fossil fuel dependency, across 28 EU member states, averaged across the second decade of the 21st century.

For *energy* dependency, the left-hand panel of Fig. 2 shows a high

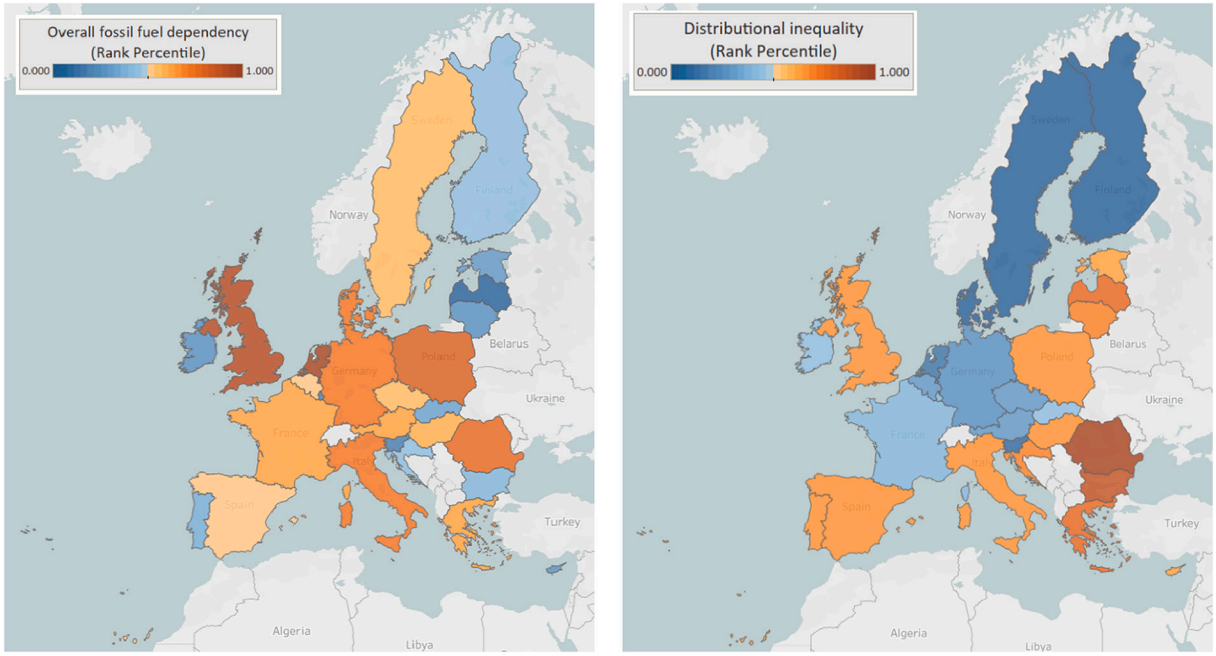

Fig. 3. Distributional Inequality, rank percentile of European Union member states, compared with overall fossil fuel dependency (average data, 2010–2020): BLUE indicates LOWEST, and ORANGE indicates HIGHEST distributional inequality, as defined by gender inequality and human inequality (education, income, and health) data (sourced from UNDP, 2021). Rank percentile data are listed in Supplementary Table 2. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

fossil fuel energy dependency across most EU states, particularly in Germany, the Netherlands, and the UK. States with a lower fossil fuel energy dependency tend to lie to the east (largely as less is consumed per capita in comparison to Western Europe), as well as Ireland, Portugal, and Denmark. Smaller EU states such as Luxembourg, Malta and Cyprus also have low fossil fuel energy dependency. In contrast, *financial* dependency is more concentrated in individual states (right-hand panel, Fig. 2). Denmark, Romania, and the UK all have a particularly high level of dependence on taxes and fees from fossil fuel companies due to low corporate tax rates, while the Netherlands is highly dependent on shipping and trade in fossil fuels. Latvia, Malta, and Slovenia are the least financially dependent among the EU states. Across most of the EU, we find that fossil fuel energy dependency is typically high, but financial dependency low.

In the left panel of Fig. 3 we see these measures combined. In this comprehensive spatial map of *overall* dependency, we see that the Netherlands and the UK are the EU states most highly dependent on fossil fuels during the last decade, both having high energy dependency and financial dependency. Alongside this dependency map, the right-panel shows the rank percentile of distributional inequality. There is a noticeable pattern of *lower* distributional inequality in the north and west (excepting the UK), and *higher* distributional inequality in the south and east (excepting Slovakia and Slovenia).

Examining the ratio of distributional inequality to overall fossil fuel dependency highlights some observations: while most of the EU member states have a ratio within one standard deviation of the mean, Denmark, the Netherlands, Sweden, and Finland have notably high fossil fuel dependency relative to distributional inequality. In several eastern EU states, this relationship is reversed. Latvia, Lithuania, Bulgaria, and Estonia all have comparatively high distributional inequality in tandem with low overall fossil fuel dependency. This observation can also be seen in smaller states such as Luxembourg, Malta, and Cyprus. Poland stands out as the exception of Eastern states where this relationship is reversed, i.e., comparatively lower distributional inequality in tandem with higher overall fossil fuel dependency.

In line with our stated assumption that fossil fuel dependency undermines a commitment to transition to renewables, we find the answer to research question 1 to be as follows: in terms of both low fossil fuel dependency and low distributional injustice, we find the *leaders* to be Ireland, Slovakia, Slovenia, Luxembourg and Finland, the *laggards* being the UK, Romania, and Poland, at the other end of the spectrum. Several states have high fossil fuel energy and financial dependency, but low distributional inequality (e.g., the Netherlands, Germany, France, and Sweden). Dependency therefore does not inherently weaken a commitment to distributional justice. We find Southern Europe is notably the least financially dependent area. Eastern EU states, excepting Slovakia, tend to exhibit the converse trend: low fossil fuel dependency but high distributional inequality in relative terms with Western Europe. Overall, we find that a commitment to a just transition is stronger in northern and western EU states, excepting the UK. However, the northwest region of the EU has a high long-term financial dependency on the fossil fuel industry which is severely damaging its role as a leader on the issue.

3.2. *Procedural justice, CO2 fossil fuel emissions and climate change action*

For a just transition away from fossil fuels to be achieved, there must be commitment to procedural justice (Schnaudt et al., 2021). We find observations on the relationship of the *global* (rather than European) ranking to be more conclusive. Our analysis focuses on EU states in procedural justice with their global ranking in fossil fuel CO2 emissions from fossil fuels per capita. In Fig. 4, the EU member states' rank percentiles of procedural justice are plotted against a ranking of the *lowest* CO2 emitters, as scaled against 206 states worldwide for which data were available. Our procedural justice measures plus CO2 emissions reflect also the issues raised in our literature review above. Taken together, this provides an indication of where commitment towards a low carbon approach can be seen.

From a global perspective, the EU is in the top 50% of nations for procedural justice but the bottom 50% for those with lowest CO2 emissions per capita (Fig. 4). Sweden and, to a lesser extent, France are

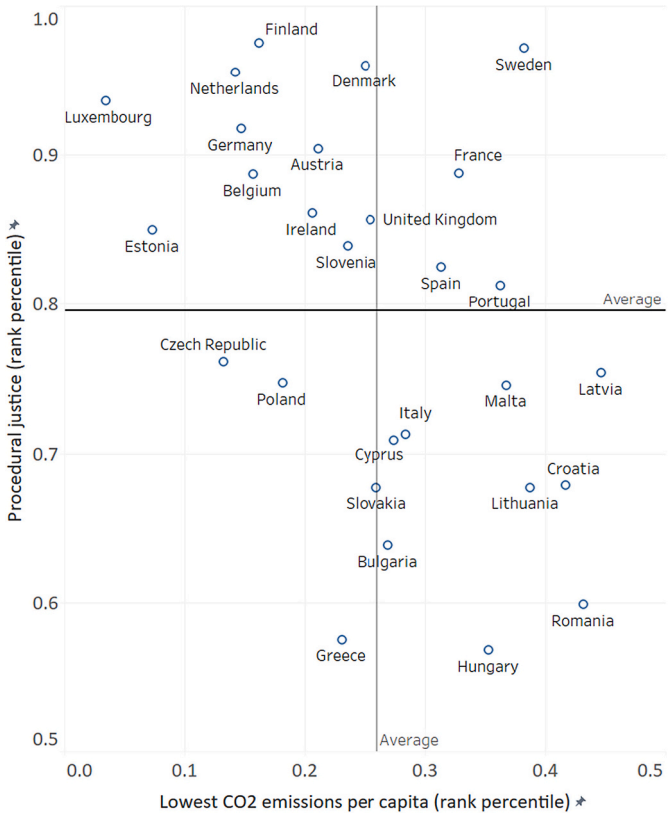

Fig. 4. Global ranking of EU member states for Procedural Justice and *lowest* Fossil Fuel CO2 Emissions per capita, average data 2010–2020: Procedural Justice rank percentile is a composite of (i) control of corruption, (ii) Human Rights Score (data from Fariss, 2019) (iii) percentage of women in ministerial roles, (iv) Rule of Law Estimate and (v) Voice and Accountability Estimate (data from WB2021c). CO2 emissions per capita is defined by average coal, oil, and gas CO2 emissions. Procedural Justice score and lowest CO2 emissions ranking are based on *global* comparisons of a set of 206 countries for which data was available, not just a comparison between the 28 EU member states themselves as is the case for Fig. 1 and Fig. 2. Axes are truncated to 0.5–1.0 for Procedural justice rank percentile, and 0.0–0.5 for 'Lowest CO2 emissions per capita' rank percentile. Rank percentile data are listed in Supplementary Table 2.

leaders in this respect, as states highly ranked for procedural justice, with comparatively low CO2 emissions per capita, globally. In general, the northern EU states rank highly for procedural justice, with southern and eastern states lagging on this measure. There are comparatively few EU states, on a global scale, with both poor procedural justice and high CO2 emissions (i.e., laggards), as can be seen from the bottom left-hand quadrant of Fig. 4. Greece, Poland, and the Czech Republic are the only states in this section of the plot.

An exploration of the ratio between procedural justice and fossil fuel CO2 emissions rank percentiles reveals several trends and subgroups of EU states. Firstly, the states with both low CO2 emissions and proportionally low procedural justice are Latvia, Romania, Croatia, Lithuania, and Hungary, as shown in the bottom right-hand quadrant of Fig. 4. Secondly, the states that are both mid-ranking for fossil fuel CO2 emissions and procedural justice are the UK and Slovenia (close to the mid-point of Fig. 4). Thirdly, the states with both high CO2 emissions and proportionally high procedural justice are Finland, Belgium, Germany, the Netherlands, and the Czech Republic, occupying the upper left-hand quadrant of Fig. 4. Luxembourg and, to a lesser extent, Estonia are extreme examples of this observation.

We further investigate the EU states' commitment to just transition by examining a second measure of equity within the procedural justice framework: climate finance pledges. This is especially important considering the observation that all EU member states are in the top 50% of global CO2 fossil fuel emitters. Fig. 5 compares member states' *fossil fuel* CO2 emissions per capita to their financial pledges (USD per GDP). Like in Fig. 4, this data is presented as *global* rank percentiles considering the global nature of climate finance pledges. Climate finance data was unavailable for Croatia, so it was excluded from this figure.

Sweden, France, and the UK are the leaders in terms of climate finance in relation to fossil fuel CO2 emissions, since they are both relatively 'low' emitters per capita and 'high' climate finance contributors. To correct for relative wealth and ability to pledge, this ranking assesses pledges in proportion to GDP. Sweden stands out among the EU member states in these rankings, being the highest contributor to climate finance and the fifth lowest CO2 emitter per capita, while the second largest financial contributor (the UK) is mid-ranking for CO2 emissions, and the third for climate finance (France) is seventh out of the 28 EU states for low emissions. At the laggard end of the spectrum, Estonia has the second highest level of CO2 emissions per capita in the EU but is mid- to low-ranking for climate finance pledges. Poland is a comparatively high CO2 emitter but contributes little to climate finance. The Czech Republic is the third highest emitter in the EU but is ranked nineteenth out of the 28 states for climate finance pledges.

To address research question 2: *which member states are leading or lagging on delivering accountable, fair, and engaging action on climate action within the EU?* we find that, in terms of CO2 emissions per capita, there is no very stark regional pattern. Northern, southern, eastern, and western EU states are quite broadly distributed across the rank percentile of the 28 states, on a global scale. However, in terms of procedural justice and climate finance pledges, there is a clear north-west/south-east axis. Northern and western EU states tend to have higher levels of procedural justice and to contribute more per GDP to climate finance.

3.3. *Restorative justice, fair and green jobs*

As employment is such an important aspect of just transition (Sulich and Zema, 2018; Hoicka et al., 2021), we examine the performance of EU states on fair jobs and renewable jobs (Fig. 6). It is notable that the trendline in Fig. 6 indicates a broadly negative correlation between fair jobs and renewable jobs in the 28 EU states; countries like Belgium, Italy and France are highly ranked for fair jobs but low for renewable jobs. Conversely, Bulgaria, Latvia, and Estonia rank poorly for fair jobs but highly for renewable jobs. For a just transition to occur, it is important that states focus both on fair jobs and renewable jobs.

These data therefore indicate which of these two aspects each state should target for improvement. It should be noted, however, that Denmark, Finland, and Sweden are exceptions to the trend, ranking highly for both measures. With regards modern renewable electricity generation per capita (as indicated by the orange-blue colour gradient), there is no clear correlation with fair or renewable jobs. States with the highest modern renewable energy output (in blue) include Denmark, Sweden, Spain, Germany, and Ireland, all of whom rank variably for fair and renewable jobs.

Our answer to research question 3 is that the three Nordic EU states appear to lead on delivering renewable jobs that are underpinned by fair conditions, while Ireland and the UK lag behind. Most EU states score well on *either* fair jobs *or* renewable jobs, but not both. This is excepting the 'leaders' (Denmark, Finland, Sweden, and Austria) and 'laggards' (Ireland, the UK, Poland, and Greece).

4. Discussion

The goal of this paper was to investigate which EU member states have been leaders and laggards in the delivery of a just energy transition during the period 2010–2020. We conclude on whether an individual country is leading, lagging, or in-the-pack in delivering the EU's just energy transition and the implications for the EU's approach to just transition.

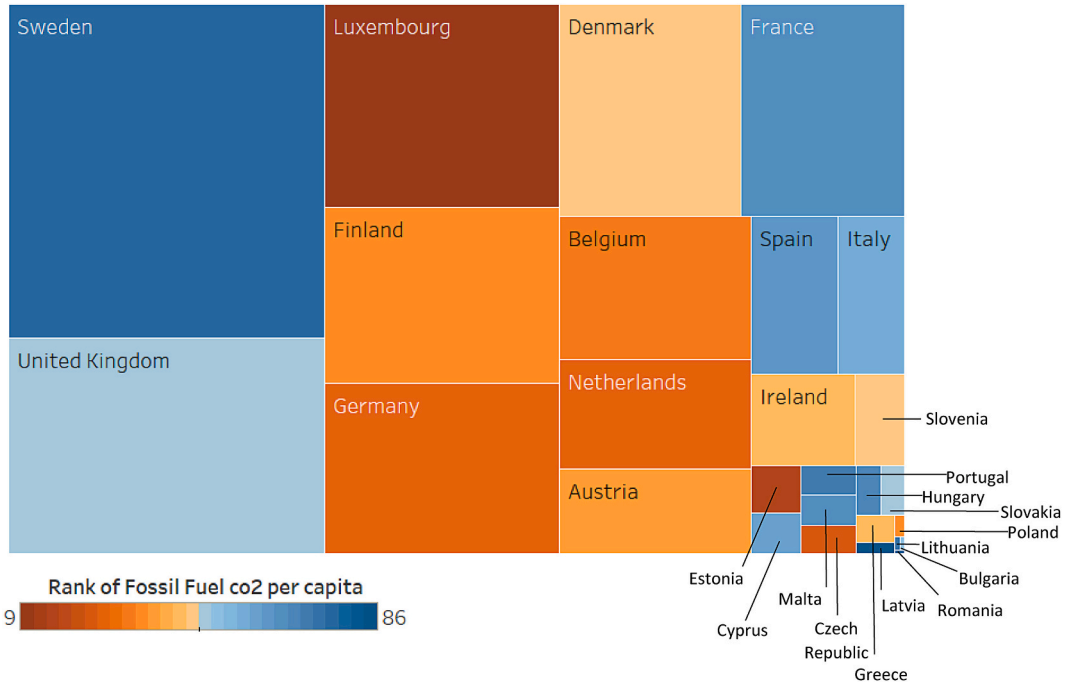

Fig. 5. Global ranking of climate Finance Pledges vs Fossil Fuel CO2 Emissions per capita, rank percentile of EU member states, average 2010–2020: Box SIZE indicates the scale of climate finance pledges in proportion to gross domestic product (data from HBS, 2021), the largest boxes indicating the largest climate finance pledges. Box COLOUR indicates CO2 emissions per capita; BLUE signifying LOWEST and ORANGE HIGHEST CO2 emissions per capita (as defined by average coal, oil, and gas CO2 emissions; data from ICOS, 2020, previously shown in Fig. 4). Rank percentile data are listed in Supplementary Table 3. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

4.1. Regional groupings and individual national records on just transition

Our quantitative analysis has provided insight on how EU member states perform on the just transition. Some of our findings mirror regional groupings, and this is not surprising since geographies, histories, and economies are more likely to be shared between neighbours than between distant relations (LaBelle, 2020). But a purely regional approach runs the risk of over-simplification, and our stated objective is to study the relative performances of individual member states. We therefore reflect both on the regional groupings and some of the variations within them.

Beginning with the regional picture, we identify four blocs of the EU, comprising Scandinavia, eastern Europe, western Europe, and the Mediterranean. Among these, Scandinavia is the leading region, supporting the findings of Tobin (2017). Our research points to the uptake of renewable energy, the pledging of funds to continue to do so, and the delivery of societal equality and fairness. Eastern Europe, in contrast, is more highly dependent on fossil fuels, less committed to climate pledges, and lagging on fair jobs. Western Europe is the most complex region, with considerable variations between member states including a high degree of linkage to the fossil fuel industries, yet with strong commitments to future climate pledges. And, fourthly, the Mediterranean region might best be termed middle-of-the-road, without no overall leading or lagging role demonstrated by Italy, Spain, or Portugal. This contrasts with existing literature (Liefferink et al., 2009; Knill et al., 2012), which positions this region as lagging. We focus on the first three regions in more detail.

Looking firstly at the Scandinavian group, the results show that Denmark, Sweden, and Finland all score highly on distributional equality, with Finland as a particular leader. They also score highly on societal fairness. On both procedural equality and climate financial pledges, Sweden is indicated as playing a leading role. Denmark shows a higher dependency on fossil fuel financing in this group, which it shares with several countries in the western Europe group.

Turning to the eastern European group, Romania, Bulgaria, and Greece are noted to have high distributional inequality. Romania and Poland are highly fossil fuel-dependant and are classed as laggards in both distributional equality and climate pledges. Hungary, Greece, and Romania are lagging in procedural justice, while Poland and Greece are noted as laggards with respect to restorative equality. It is therefore clear that eastern Europe exhibits a very high demand for social improvement compared to other European regions, and this observation supports the approach to funding adopted by the EU in supporting the energy transition.

But, in moving on to the western Europe group, we note that the UK and the Netherlands are also highly dependent on both fossil fuel energy and fossil fuel finances. Germany is also recorded as highly dependent on fossil fuel energy, but not fossil fuel finances. These are important observations in terms of the embeddedness of the fossil fuel industry, which is considered separately in section 4.2 below. The complexity continues in examining societal factors. The UK is identified as a leader in terms of climate pledges, while still classed as a laggard on both procedural equality and restorative equality. Ireland is a leader on procedural equality, but a laggard on restorative equality. And France is a leader on climate pledges, despite its low carbon emissions which are driven by its nuclear programme, a factor which does not arise to the same extent in any other EU member state.

4.2. Combatting the embeddedness of fossil fuel activities through adopting a comprehensive 'state divestment' principle in the EU just transition

A key issue which emerges from the above analysis is the extent to which individual member states in western Europe – notably the Netherlands, Germany and the UK – have a high degree of embeddedness of fossil fuel activity in their economies, supporting observations raised by Faehn et al. (2017). This relates not only to the extraction, sale, and use of such fuels, to but a host of ancillary activities including

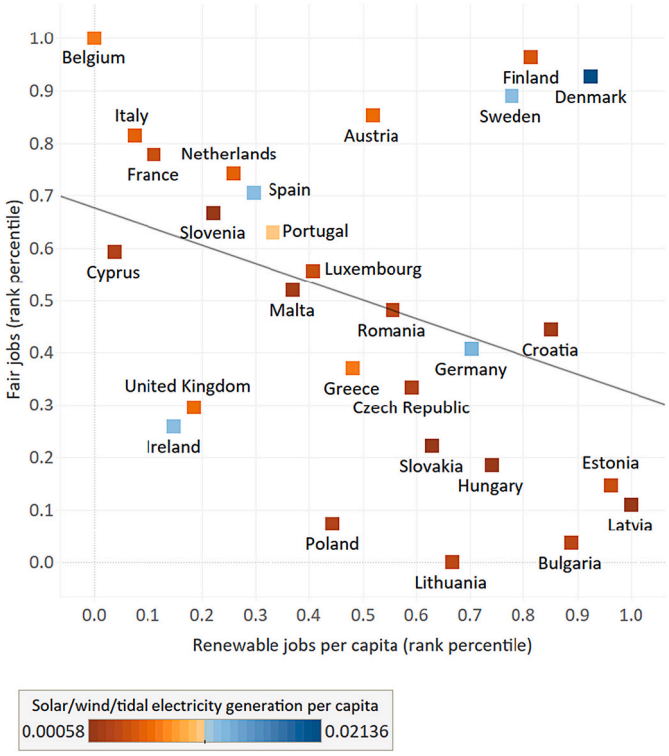

Fig. 6. Fair Jobs rank percentile vs Renewable Jobs rank percentile vs Total Renewable Electricity Generation per capita of EU member states, average 2011–2020: Fair Jobs is a composite of trade union density, collective bargaining coverage (data from ILOSTAT, 2020) and labour share of gross domestic product measures (in the form of social protection and wages; data from UNDP, 2021). Data on renewable jobs per capita was obtained from IRENA (2020). Solar/wind/tidal electricity generation per capita is a sum of solar (PV and TH), tidal and wind electricity output, including heat pump, boiler, and chemical heat (category 'SOLWIND', data from IEA, 2021 and WB, 2021c). Rank percentile data are listed in Supplementary Table 3.

research, financing, trading, shipping, and insurance services. This finding directly supports the research of Oxenaar and Bosman (2020) who argue that, in countries such as the Netherlands, it is not sufficient to promote renewable energy - it is necessary to actively break down and phase out fossil fuels. They point to the strong interdependencies between the Dutch Government and the fossil fuel industry, concluding that the government is tightly interwoven with all segments of the fossil fuel value chain.

That is why we argue – as set out in section 2 – that the EU has adopted too simple a criterion in its Just Transition Fund, which concentrates predominantly on supporting those regions most dependent on coal-mining activities. Lessons can be drawn from other just transition initiatives, for example among Small Island states (Scobie, 2017; Scandurra et al., 2020). It is essential to also address the more subtle embeddedness of fossil fuels in the economies of other member states. Divestment, as a global movement (Ayling and Gunningham, 2017; Healy and Barry, 2017; Healy and Debski, 2017), should not be limited to actions imposed on or volunteered by individuals, communities, businesses – but also states. Action by the EU should not be reduced to awarding funds to fossil-embedded member states; it has powers to compel as well as to fund, and such powers should be considered. This might be termed the governmental equivalent of the divestment campaign which has for some time been addressed towards private sector funding bodies in respect of the fossil fuel industry. For these member states to do otherwise is to run the risk of appearing to support the just energy transition while at the same time being a part of the 'incumbent resistance' which – wittingly or unwittingly – serves to impede the transition.

4.3. *Delivering new jobs that are fair, not only green*

So, in advocating a wider and more nuanced approach, we consider that, for the EU energy transition to be just, it is not simply a question of creating green jobs to replace those lost in the fossil fuel sector. That is a necessary but insufficient objective. The jobs transition should be conducted in a manner which redresses some of the national inequalities which our research has highlighted. As we have argued, these include inequalities in the distribution of benefits and burdens, in the procedures through which the transition is conducted, and in the fairness of the resultant green jobs. This will ensure that the opportunity of the energy transition is maximised, particularly as the advent of new energy systems invariably lock-in the new technology for perhaps a generation.

Put simply, the renewable revolution is an opportunity to imagine a better future rather than to replicate the poor conditions of the past. Employment is more than financial recompense. It shapes livelihoods, communities and embeds cultural norms and values.

5. Conclusion: policy implications for just transition initiatives

We conclude with broader policy implications of our research. Three points of reflection emerge on the *purpose*, *content*, and *context* of just transition initiatives. On *purpose*, our analysis suggests decision-makers need to embrace a comprehensive dual set of objectives on both justice and the energy transition. Existing initiatives rely too much on voluntary actions by energy companies on individual energy projects (Voicu-Dorobanțu et al., 2021), developing local or even national committees focused on bolstering justice rather than delivering energy transition outcomes (Goddard and Farrelly, 2018), or relying on the bottom-up actions of spontaneous community-based campaigns that oscillate between furthering issues of justice and better energy futures (Healy and Barry, 2017). Our analysis shows the relevance and importance of focusing on generating both justice and energy transition measures to ensure that policy actions are most effective.

This leads to reflections on policy *content*. A sustainable just transition is not inherently the adoption of renewables over carbon intensive sources. The policy focus on replacing old technologies is still dominating national energy priorities when justice deserves an equal footing (Hoicka et al., 2021). Our analysis shows that a narrow view of justice reduces the potential of action in this field. There is a tendency in just transition initiatives to focus either on reducing distributional inequalities or constructing new solutions to procedural inefficiencies and associated inequalities. The EU's just transition platform is an example of the former where considerable thought is dedicated to where coal mining regions are located, but the onus is on the project developer to include affected citizens. The Scottish just transition commission is an example of the latter (Dalglish et al., 2018). We show the importance of requiring both legislatively in any compensation schemes. In addition, restorative justice argues further to consider employment impacts. Additional justice dimensions could be incorporated in future research.

The *context* of a just transition initiative is key to mobilising the relevant actions where it is most needed. Each region and nation have distinct histories, cultures, and values. Existing qualitative research reveals that a one size fits all approach is unlikely to succeed (Delina, 2022; Malik and Bertram, 2022; Murphy et al., 2022). Our analysis adds to this discussion by arguing for a deeper awareness of context through quantitative assessment, in line with other such efforts (Bates et al., 2020). It allows us to argue for more issues to be considered under the just transition concept across a wider geographical area. This allows the emergence of much needed wider frames of action on job creation. Such frames should be supplemented by an explicit reduction in fossil fuels, not just coal. Both climate finance and citizen inclusion in decision making also need to be tackled by policymakers with equal levels of ardour. Further research is needed in this area, especially in

understanding the effectiveness of just transition policies on a cross- or multi-national basis.

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CRediT authorship contribution statement

Darren McCauley: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration. **Kerry A. Pettigrew:** Methodology, Software, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization. **Iain Todd:** Conceptualization, Writing – review & editing. **Christine Milchram:** Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data used are open-access, and can be found at the sources indicated in the manuscript

Data used in this study are openly available in public repositories as listed below:

Fariss, C.J. (2019) 'Yes, Human Rights Practices Are Improving Over Time', *American Political Science Review*, 113(3), pp. 868–881. doi: https://doi.org/10.1017/S000305541900025X.

HBS (2021) *Data Dashboard – Climate Funds Update*. Berlin: Heinrich-Böll-Stiftung. Available at: https://climatefundsupdate.org/data-dashboard/ (Accessed: 28 June 2021).

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Appendix A. Key calculations

A.1. Distributional justice

A.1.1. Fossil fuel energy dependency

Rank_Percentile Fossil fuel energy dependency = RANK_PERCENTILE([fossil fuel energy dependency]).

Where:

Fossil fuel energy dependency = RANK_PERCENTILE([Fossil fuel dependency, All]) Fossil fuel dependency, All = [Fossil fuel dependency, Coal only] + [Fossil fuel dependency, Gas only] + [Fossil fuel dependency, Oil only] + [Fossil fuel dependency, Oil shale and sands only].

A.1.2. Fossil fuel financial dependency

Rank_Percentile Fossil fuel financial dependency = RANK_PERCENTILE([FF rents calc]) * 0.5 + RANK_PERCENTILE([FF company invest calc]) * 0.5

A.1.3. Distributional inequality

Rank_Percentile Distributional inequality = RANK_PERCENTILE ([Gender inequality calc]) * 0.5 + RANK_PERCENTILE([Human inequality calc]) * 0.5

Where: Gender inequality calc = AVG([Gender Inequality Index])

Human inequality calc = AVG([Coefficient Human Inequality]).

A.2. Procedural justice

A.2.1. Climate finance pledged

Climate change finance pledged rank_percentile = RANK_PERCENTILE(SUM([CC finance Pledged (USD million current)]))

A.2.2. Climate finance deposited

Climate change finance deposited rank_percentile = RANK_PERCENTILE(SUM([CC finance Deposited (USD million current)]))

A.2.3. CO2 emissions per capita

Rank_percentile CO2 emissions per capita = RANK_PERCENTILE ([Per capita C02 calc])

Where: Per capita CO2 calc = AVG([Per capita CO2 emissions])

A.2.4. Procedural justice

Rank_Percentile Proced justice = ZN(RANK_PERCENTILE ([Control Corruption calc])) * 0.2 + ZN(RANK_PERCENTILE ([Human rights calc])) * 0.2 + ZN(RANK_PERCENTILE([Percentage women calc])) * 0.2 + ZN(RANK_PERCENTILE([Rule Law calc])) * 0.2 + ZN(RANK_PERCENTILE([Voice acc calc])) * 0.2

A.3. Restorative justice

A.3.1. Fair jobs

Fair jobs rank percentile = RANK_PERCENTILE([Fair jobs])

Where: Fair jobs = ZN(AVG([Collective bargaining coverage rate (%)]))

+ ZN(AVG([Trade union density rate (%)])).

+ ZN(AVG([Labour share of GDP, comprising wages and social protection %])).

A.3.2. Renewable jobs

Renewable jobs per capita rank percentile = RANK_PERCENTILE([Renewable jobs per capita])

Where: Renewable jobs per capita = SUM([Renewable Jobs (thousand)])/MAX([Population total]).

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ecolecon.2022.107699.

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