



HAL
open science

Stepping into the just transition journey: The energy transition in petrostates

Qaraman Hasan, Raphael J Heffron, Soran Mohtadi, Brian D Blankenship, Indra Overland, Johannes Urpelainen

► **To cite this version:**

Qaraman Hasan, Raphael J Heffron, Soran Mohtadi, Brian D Blankenship, Indra Overland, et al.. Stepping into the just transition journey: The energy transition in petrostates. *Energy Research & Social Science*, 2024, 113, pp.103553. 10.1016/j.erss.2024.103553 . hal-04566489

HAL Id: hal-04566489

<https://hal.science/hal-04566489v1>

Submitted on 2 May 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



Original research article

Stepping into the just transition journey: The energy transition in petrostates

Qaraman Hasan^{a,e}, Raphael J. Heffron^{b,*}, Soran Mohtadi^a, Brian D. Blankenship^c,
Indra Overland^d, Johannes Urpelainen^a

^a School of Advanced International Studies (SAIS), Johns Hopkins University, Washington, DC, United States

^b Université de Pau et des Pays de l'Adour, E2S UPPA, CNRS, TREE, Pau, France

^c Department of Political Science, University of Miami, Florida, United States

^d Center for Energy Research, Norwegian Institute of International Affairs (NUPI), Oslo, Norway

^e Department of Law, College of Human Sciences, University of Raparin, Kurdistan Region, Iraq



ARTICLE INFO

Keywords:

Just transition
Petrostates
Climate change
Energy justice
Climate impact

ABSTRACT

With the transition towards a low carbon economy underway, the notion of ensuring that it is a just transition – one that is fair and equitable – has captured significant attention in recent decades. Although petrostates are a central part of the fossil fuel-based global economy, they have been largely ignored in discussions of a just transition. This article explores what should characterize a just transition in petrostates, as they face challenges that are distinct from those faced by major producers of other fossil fuels such as coal. We argue that the just transition should be understood comprehensively to cover climate, energy, and environmental justice. Economic reforms, particularly investment diversification, institutional reforms, and the inclusion of women, youth populations and indigenous people are practical steps for achieving a just transition within petrostates. The importance of this research is to highlight that petrostates need to begin their just transition journey. There is limited time for this to happen, and taking steps into the just transition journey will have many benefits as identified in this research such as, socio-economic, impact on public health and an increase in inward-investments. The research involves utilizing the energy justice framework and assessing the five energy justice principles: procedural, distributive, restorative, recognition and cosmopolitan. In order to assess these we utilize data from the United Nations and World Bank to explore the key issues as asset diversification, employment and recognition issues. Finally, a just transition pathway is presented for petrostates to follow on the basis of the results.

1. Introduction

Just transition is the key process for achieving a transition toward a low-carbon economy in society today. While still a new concept, it has garnered increasing attention in the last decade because millions of people still lack access to energy, and millions of jobs in the fossil fuel industry will be affected by the energy transition [1]. The emergence of a just transition is paralleled with the increasing global awareness of environmental problems in the late 1970s and early 1980s, particularly under the influence of trade unions [2]. However, discussions around justice in transition and justice in responsibility for polluting the planet date back to 1972, with the Working Group on the Declaration on Human Environment, though the Declaration was criticized for ignoring

“ecological justice” [4:309].

In the beginning, the scope of the just transition was narrow: to ensure justice for workers, as discussed in the Conference of the Parties in Cancun [6]. But the scope of a just transition should be broad enough to cover all aspects of decarbonization and be sufficiently comprehensive to cover Climate, Energy and Environmental (CEE) justice [7,8]. Presenting just transition to cover CEE can be an umbrella for the energy community, energy democracy and energy poverty because people who are most vulnerable to climate change in the short and medium term – those whose energy consumption is lower – are the ones who are least responsible for it [9]. However, the discussion on the framework in the most available literature is restricted to identifying the problem of injustice, particularly in the energy sector [10]. Here, then, we define a

* Corresponding author.

E-mail address: raphael.heffron@univ-pau.fr (R.J. Heffron).

<https://doi.org/10.1016/j.erss.2024.103553>

Received 18 August 2023; Received in revised form 10 April 2024; Accepted 17 April 2024

Available online 24 April 2024

2214-6296/© 2024 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

just transition as a fair, equitable and inclusive process of moving toward a post-carbon society [11].

This article focuses on examining the role of major oil producers (“petrostates”) in the just transition. As the production and consumption of petroleum is a primary source of emissions, a global just transition should include a focus on justice in petrostates in parallel with justice at the global level. For petrostates, the effects of the energy transition are likely to fall much harder than in other states because their economies are strongly linked to fossil fuels. Compared to the production of coal, which is more labor-intensive and has employment effects that are geographically concentrated at the subnational level [12,13], the production of oil is more capital-intensive and is associated with high levels of macro-level economic dependence at the national level, with oil revenue accounting for a large proportion of petrostate GDP and typically an even larger share of government revenue [14]. Thus, compared to coal, which has been more central in scholarship on the just transition [13], oil presents a unique set of challenges that merit study in their own right.

Moreover, most of the countries classified as petrostates are located in the Global South, recent attempts to address the petroleum industry and just transition failed to cover major petrostates and primarily concentrated on the global north [16]. For example, oil and gas in the context of just transition have been discussed as it pertains to Norway [17], Scotland [18] and Ireland [19], but major petrostates are still largely absent from the literature. On many occasions and in negotiations related to climate change, countries in the Global South have attempted to centre justice as an essential consideration in achieving climate goals at the international level, but justice at the domestic level and within countries’ borders is also important. In petrostates, national oil companies supervise petroleum-related activities, but the energy transition does not have a strong position in their agenda for most of them. In this case and significantly, revenue depletion, bankruptcy, removing managers and, more possibly, litigations against the national oil companies is predicted in the near future [20]. Here, the research aims to fill the gap and answer two main questions: what should characterize a just transition in petrostates, and how could petrostates approach it? As well as suggesting the CEE justice as an integrated approach, we propose several steps to move toward energy transition justly.

We advance that just transition should be conceptualized differently for petrostates, whereby it is seen as a journey that they must begin as soon as possible. Petrostates face a variety of constraints including rentierism [21], the Dutch disease [22], and the resource curse [23] that have been extensively discussed. Except for Norway, most petrostates have suffered from adverse political and economic effects of oil rents [24]. Solving these deep structural challenges to the political economy of petrostates is ultimately outside this paper’s scope. Our aim is more modest: to bring petrostates more centrally into the literature on the just transition and lay out what a just transition agenda might look like for them. Nevertheless, we point to diversification and strengthening institutional quality as significant steps to deal with these issues in general and the issue of justice in particular. The just transition can be achieved in two directions in petrostates, detailed in later sections: the first focused around distributive, procedural and restorative, and the second on recognition and cosmopolitan justice.

The remainder of the paper proceeds as follows. After discussing the

concept of justice and integrating CEE justice in Section 2, we present an agenda for implementing just transition in these states by concentrating on five elements with detailed steps to support each of the elements. Section 3 asserts the importance of CEE in sections for a broader understanding of the just transition from different aspects. This involves utilizing comparative data by analyzing petrostates with more than 10% of their GDP from oil rents between 2000 and 2020.¹ Section 4 then presents a realistic agenda for petrostates to deal with the just transition from their economic, political and legal systems to move toward just outcomes among various social groups.

2. Justice and the just transition

2.1. The forms of justice in the just transition

As stated earlier, the term used here to define a just transition is that it is a fair, equitable and inclusive process of moving toward a low-carbon economy [25]. The process is likely to involve fundamental changes to the structure of the energy system’s generation, distribution, and storage while also “safeguarding social justice, equity and welfare” The just transition should change the current and traditional understanding of the energy transition, which is based on providing greater supply of energy to a greater number of people, toward a transition in fairness where no one should be left behind [26]. According to the latest Intergovernmental Panel on Climate Change (IPCC) report, nearly half of the world’s population are highly vulnerable to climate change [27].

More specifically, just transition means the shift of understanding from the utilitarian perspective of the energy transition to reflect “justice as fairness,” as generally introduced by John Rawls [28]. Rawls’s three principles of justice—equality, fairness, and access—guide to a degree what ‘justice’ is in the just transition. The transition should not only concentrate on energy access and providing jobs but, more broadly, should cover four major justice aspects of the energy system; procedural, distributive, recognition, and restorative justice [29,30]. As the IPCC defines it defined, just transition is “A set of principles, processes and practices that aim to ensure that no people, workers, places, sectors, countries or regions are left behind in the transition from a high-carbon to a low-carbon economy” [27, 2022:2925].

The concept of a just transition should also cover justice among and across states (cosmopolitan justice) and extend to justice within each state because the implications of the energy transition could be quite significant for some marginalized groups inside petrostates, such as women, youth, and indigenous populations (recognition justice). This is the central gap in the literature due to limited empirical research and studies from non-democratic countries, including most petrostates. Moving from fossil fuel to clean and renewable energy raises significant challenges at national and individual levels in these state [30]. In addition, the implications of the transition to a low/zero carbon economy and reducing consumption of petroleum products will have effects beyond petrostates. The transition will affect all countries with petroleum-related sectors, such as the automobile sector or countries that depend on oil and gas for electricity production [33].

Without a just transition, the energy transition can potentially deepen economic inequities in petrostates and countries with sectors closely tied to the petroleum industry. However, much of these inequities are not between countries, but rather within countries at the

¹ Iraq, Libya, Kuwait, Congo, Rep., Saudi Arabia, Oman, Angola, Equatorial Guinea, Gabon, Azerbaijan, Qatar, Yemen, Rep. Iran, Islamic Rep., Algeria, Venezuela, RB, United Arab Emirates, Norway, Brunei, Darussalam, Kazakhstan, Bahrain, Turkmenistan, Nigeria and Ecuador. We follow Collier and Hoeffler in defining oil-dependent countries as those where resource rents account for at least 10% of GDP Collier, P., & Hoeffler, A. (2009). Testing the neocon agenda: Democracy in resource-rich societies. *European Economic Review*, 53(3), 293–308.

domestic level because carbon emissions and the consequences of both climate change and the energy transition are not distributed equally inside states. For example, the top 10 % of carbon emitters contribute to approximately 45% of total global emissions [34]. In addition, the carbon emissions gap among individuals in each state is quite large, which is lected to inequality in the economy, gender, class and race [9]. The just transition can include all injustices, not only energy injustice but, more comprehensively, climate and environmental injustices; and this is the focus of the next sub-section.

2.2. Just transition to cover climate, energy and environmental (CEE) justice

The just transition requires integrated efforts of scholars from Climate, Energy and Environmental justice (CEE), as illustrated in Fig. 1 below. Currently, there is a divergence of understanding on justice in the energy transition due to discussion on the three topics as separate and independent branches. For some scholars, energy justice is a contemporary branch of environmental justice [33]. Indeed, environmental justice has had a long history and emerged before energy and climate justice as an attempt “to uncover the underlying assumptions that may contribute to and produce unequal protection” [37]. However, the need for clean energy and the threat of climate change consequences require scholars and policymakers to broadly evaluate justice in the three areas. Just transition has the clear potential to integrate all three areas.

As mentioned above, environmental justice is the earliest attempt to discuss the just transition by balancing environmental protection and jobs affected by the transition. It has been discussed from all three dimensions (distribution, participation and recognition) and in various sectors, including environmental justice in the mineral sector [38,39], and in the coal industry in both developed and developing countries [40,41,42]. Environmental justice in the petrostates has received some attention in the literature [43,44], but the energy transition’s effects on various vulnerable groups in these states have been largely ignored. A strong relationship between environmental justice and energy justice, which can be extended to universal justice, is essential for discussing many issues of the public and private sectors in the energy system [45].

In addition, concentrating solely on environmental justice is insufficient for several reasons. Firstly, proponents of environmental justice have not succeeded in framing it as part of a broader push for social justice, as they dismissed many groups globally [46]. Environmental justice is also theorized based on Western norms but largely applies to Global South [47]. Secondly, determining the extent of environmental

injustice is not an easy task. Thirdly, work in this area have yet to present a clear agenda or policies to redress injustice or provide practical solutions for these injustices [48]. Finally, it is not realistic to discuss environmental justice and climate justice and dismiss the energy sector, as the energy sector is responsible for most environmental damages and increasing global emissions and therefore, a focus on ‘energy justice’ can have a major positive impact on achieving environmental and climate justice [49]. As well as raising the voices of social and political groups for climate and environmental justice, energy justice can elaborate on the environmental, economic and health costs of energy policies and technologies that affect particular social groups [45].

Early literature on energy justice discussed the energy sector’s challenges under the umbrella of energy justice [51]. As it is a hot and popular topic in both developing and developed countries, it has been discussed extensively from a theoretical perspective [52,53] as well as from policy and practice perspectives [54,55]. In the energy sector, just transition concerning fossil fuel workers is mentioned in the literature, but without covering major petrostates [13]. Also, the crucial role of national oil companies in addressing the just transition is covered by Heffron (2023), but without taking into the broader perspective of society.

Climate justice concentrates on the injustice in the consequences and impacts of climate change by providing justice and fair solutions for this uneven and disproportionate phenomenon [57]. To achieve climate justice, reforming the climate change negotiation system is crucial to give more power to vulnerable groups such as women, NGOs and other non-state actors [58]. Climate justice focuses on changes in behavior for governments, businesses, and consumers, and also focuses attention on the rights of migrants and those affected by climate change the most [59].

As the climate, energy, and environment are strongly interconnected, developing policy in any of the three areas depends on deep knowledge and the relationship between the three areas. Integrating and linking the CEE to achieve better outcomes for just transition is growing theoretically and practically due to the urgency and uncertainty of the speed of transition [7,25,62]. Yet most available literature on just transition is focused on the Global North and the coal industry. Surprisingly, just transition for major petrostates and oil and gas workers is largely absent in the literature and policy agenda [13]. This article aims to fill this gap. Similar to LaBelle et al. (2023) who propose radical energy justice by combining both top-down and community levels to achieve a broader perspective of just transition in the coal sector, we also extended just transition to include disadvantaged groups such as women, youth populations and indigenous people in petrostates. The transition to a lower carbon economy will result in losers and winners [33], and if petrostates do not have a proper agenda in the coming decade, they could become among the biggest losers in the lower carbon economy. There is as stated earlier a key need for petrostates to following steps that are crucial for meeting climate goals under the Paris Agreement and to begin that journey to achieve a just transition to a low-carbon economy.

3. Method & theory

3.1. Method: Data collection & analysis

The focus of this study is on major petrostates—those that depend largely on oil rents to support their economies and government revenue. Following a large body of literature [65,66], we focus on petrostates where oil rents constituted 10% of their GDP or higher between 2000 and 2020, using data from the World Bank’s World Development

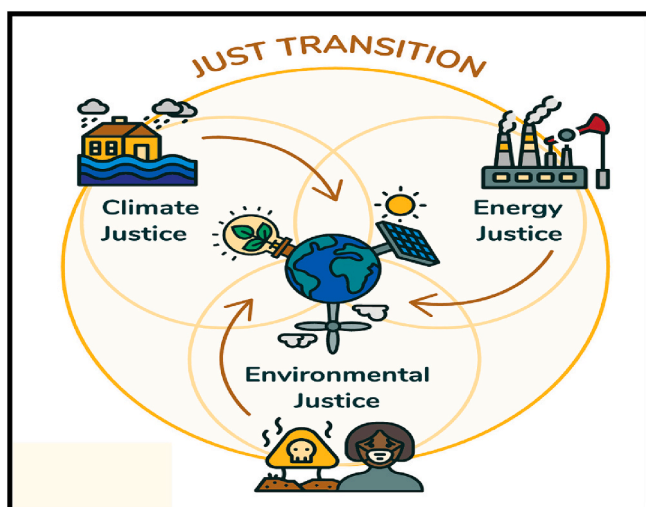


Fig. 1. Just Transition and CEE justice - Source: The Energy Justice Workbook 2019.

Indicators.² Following the convention in much of the literature, we select petrostates whose oil rents were above 10% of GDP *on average* over 2000–2020 [67,68]. We do so because petrostates' oil revenues are quite volatile from year-to-year based on variation in oil prices, and using oil rents in any single year risks unduly including minor oil producers or excluding some petrostates. This leaves us with twenty-three petrostates, listed in Appendix 1. The other data used in the paper are similarly averaged over 2000–2020 unless noted otherwise.

In turn, we are interested in how petrostates compare across areas that will be essential components of a just transition: economic diversification; developing a robust legal and institutional capacity; and including women, youth, and indigenous peoples. To this end, we use a variety of measures. First, we used the United Nations Conference on Trade and Development's (UNCTAD) Export Diversification Index data to measure export diversification. We took an average of export diversification in the selected petrostates for the same period, which is between 2000 and 2020.³ The export diversification index is a significant indicator of overall economic diversification performance. The data shows how countries diversified their export portfolio by exporting several products or concentrating on a few or mainly on one product, such as oil, in most petrostates (Fig. 2). Notably, higher values represent lower diversification.

Second, we used the Political Risk Components from the International Country Risk Guide (ICRG) to evaluate the institutional quality of petrostates. Many scholars have used Worldwide Governance Indicators (WGI) from the World Bank to determine petrostates' institutional quality, but unlike the ICRG, the WGI data is not available for all the counties and for all years.⁴ Appendix 2 explains the components of the ICRG. Third, we used data on female participation in energy-related sectors such as mining, electricity, gas, and water supply between 2000 and 2020 based on the International Labour Organization (ILO) data.⁵ Fourth, to know the unemployment rate among youth, we used the unemployment rate among 15–24-year-olds, with data coming from the World Development Indicators.⁶

3.2. Theoretical framework – Justice principles

The paper has an overall focus on the just transition and utilizes the energy justice principles that are in widespread use across research and practice. These key just principles are: procedural, distributive, restorative, recognition and cosmopolitan. They have been well researched in the literature for over a decade and more recently placed into policy in the United States by their Department of Energy which focuses on four of them: procedural, distributive, restorative, and recognition. Further, these principles are also in use in Colombia and South Africa. This also is reflected in the earlier aforementioned Energy Justice Workbook. The

² The data are from the World Bank (Oil rents (% of GDP)). Available at: <https://data.worldbank.org/indicator/NY.GDP.PETR.RT.ZS> (last accessed 7 December 2023).

³ The data is available at: <https://unctadstat.unctad.org/wds/TableView/tableView.aspx?ReportId=120> (last accessed 7 December 2023).

⁴ The PRC has five main components; Government Stability, Socioeconomic Conditions, Investment Profile, Internal Conflict and External Conflict. Each of them accounted for twelve points. It also has another seven subcomponents; Corruption, Military in Politics, Religious Tensions, Law and Order, Ethnic Tensions, Democratic Accountability, and Bureaucracy Quality, with six points for each. This equals 100 points, and countries are ranked based on these twelve components and subcomponents. Available at: <https://www.prgroup.com/wp-content/uploads/2022/04/ICRG-Method.pdf> (last accessed 7 December 2023). Note that Equatorial Guinea and Turkmenistan were excluded because their data was unavailable from the ICRG.

⁵ The data is available at: <https://www.ilo.org/global/statistics-and-databases/lang-en/index.htm> (last accessed 7 December 2023).

⁶ The data is available at: <https://data.worldbank.org/indicator/SL.IND.EMPL.ZS> (last accessed 7 December 2023).

perspective on each principle that we utilize has been referenced in Section 2 and also in the next results and discussion section in Section 4.1.

4. The just transition in the petrostates

4.1. Introduction

While petrostates are a primary source of climate change-causing fossil fuels, they themselves face a variety of inequities and injustices that could be exacerbated due to the energy transition, and which a broadly-defined just transition could ameliorate. For example, consider three key issues of this that can be immediately identified below:

- (i) **Energy Poverty** where in some petrostates, a large proportion of the population lacks access to electricity. According to World Bank data, only 46.9% of the population in Angola, 49.5% of the Republic of Congo, 55.4% of Nigeria, 66.7% of Equatorial Guinea, 69.7% of Libya, and 73.8% of Yemen had access to electricity in 2020 [69].
- (ii) **Gender Inequality** where in the Middle East, women's participation in the workforce is relatively low. Moreover, most employed women in the region work in the public sector, and few hold senior positions or in decision-making [70]. According to The World Economic Forum's Global Gender Gap Report 2021, low levels of women's labour force participation in the Middle East and North Africa (MENA) are an important driver of the lack of economic participation [71].⁷
- (iii) **Growth of the Grey (Informal) Economy** - there is a strong possibility that inequities in the current grey economy in these states will increase during the transition period and in the green economy in the future. The experience of the transition to renewables in major developed countries' economies supports this argument. For example, women and people of colour have meagre participation in the solar industry in the United States, which is lower than the average of US citizens [33]. Globally, women have few seats on boards of the top major 200 utility companies [73]. Therefore, the Paris Agreement encourages states to consider vulnerable groups such as youth, women and indigenous people in taking action to mitigate climate change consequences [74]. Consistent with these obligations, just transition should ensure including these groups in the workforce and decision-making in the renewable energy sector.

Here, therefore we advance that five central elements should guide a just transition in petrostates, as shown in Table 1 below. The first is changing the economic structure from fossil fuel dependency toward a circular economy and asset diversification. The second is strengthening institutional and legal capacity. Together, these two steps are important in redressing the other three central elements of a just transition in petrostates: addressing inequities facing women, youth populations and indigenous people in the current energy system.

4.2. Distributive justice: Asset diversification

Petrostates are heavily dependent on commodities such as oil and gas as a main source of income, and revenue from these products has a crucial role in the economy of these states, such that many of them have been characterized as "rentier states" [75]. In the last half a century, they have continuously attempted to diversify their economy because of

⁷ The region's average participation rate is 31%, and seven of the 19 countries (Egypt, Algeria, Iran, Jordan, Syria, Iraq and Yemen) in the region have 20% or less of women participating in the labour market, the lowest rates in the world

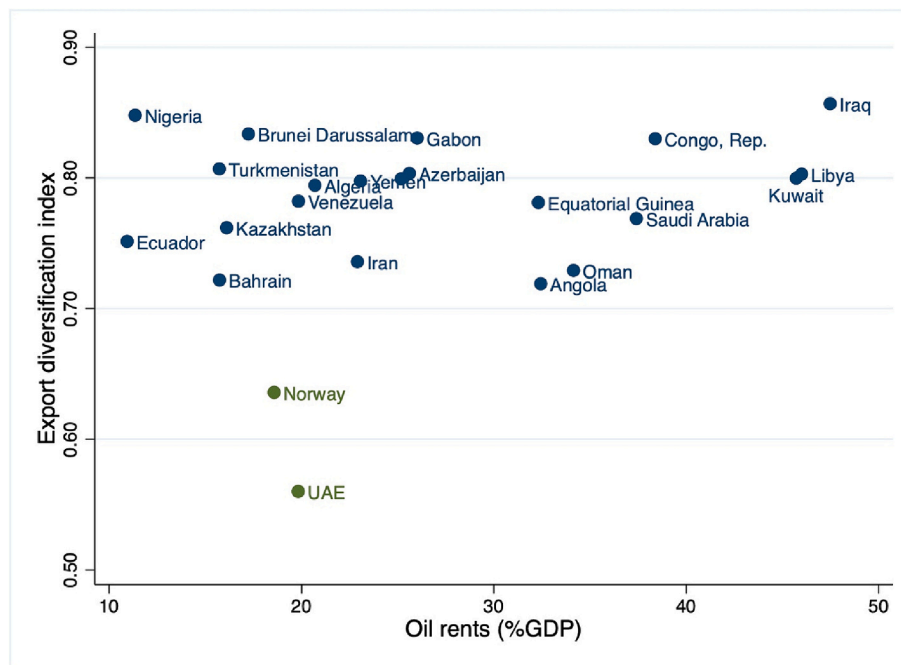


Fig. 2. Export concentration and diversification index for selected petrostates. Higher levels refer to greater levels of concentration, and thus lower levels of diversification. Created by Authors 2024.

Table 1
Just transition actions for petro-states.

Justice principle	Justice issue	Actions	Societal goal
Distributive Justice	Asset Diversification	Invest in the non-fossil fuel industry, renewable energy, and energy efficiency	Just Transition to a low carbon & sustainable economy
Procedural Justice	Legal & Institutional Capacity	Enact new laws and regulations to CEE	
Recognition Justice	Female Inclusion Inclusion of young people in labour Indigenous people	More job opportunities for woman; engage young people in labour market; reduce unemployment	
Restorative Justice	Reduce environmental impact	New laws and finance for responding to environmental impacts; compensation payments	
Cosmopolitan Justice	Response to 2015 Paris Agreement	Create new medium to long-term policy energy and climate plans	

Source: Created by Authors 2023.

the volatility in commodity prices and terms-of-trade shocks [67,76]. However, in most cases, these efforts have achieved only limited results [68,78,79].

To show the relationship between oil rents and diversification, Fig. 2 presents data from the UNCTAD’s Export Diversification Index for 23 petrostates (lower values mean more diversification). We took an average for the export diversification index for each county between (2000–2020). The world average for the diversification index is 0.66, a level that only two petrostates are below: the UAE (0.56) and Norway (0.63). Thus, the majority of petrostates still suffer from high concentration rates, confirming the urgency of economic reforms in the petrostates by diversifying and investing in renewable to avoid resource

depletion and meet climate targets in the coming decades. In the coming decades, the risks to petrostates of not having diversified economies will only grow, as the global economy’s moves to achieve climate targets create enormous risk of leaving petrostates with stranded assets. Thus, economic transformation is likely to be necessary to shield them from the consequences of a transition toward a low-carbon economy.

There are two key steps petrostates can take to introduce more distributive justice to begin their journey to a just transition. The first as stated above is diversifying their energy portfolio. A large body of literature points to economic diversification as a necessary step for a transition toward a low-carbon economy in petrostates [81,82]. However, economic diversification would not be sufficient if petrostates do not take *asset diversification* as a strategy for two main reasons. Asset diversification refers to diversifying, investing in renewables, and moving away from fossil fuels, and is distinct from “traditional” diversification, which refers to diversification in the petroleum-related sectors such as petrochemical and refineries [83]. The first reason asset diversification is important is that many petrostates, particularly in the MENA, are quite vulnerable to climate change [84]. Under the Paris Agreement, they are responsible for mitigating climate change consequences [74]. The second is that asset diversification will more effectively insulate petrostates from declining fossil fuel demand and enable them to build a more resilient economy. This economic diversification step is therefore vital to establishing a resilient economy, more distribution of wealth and more justice in society.

A second and related step is to develop a Circular Carbon Economy (CCE) by capturing carbon in the air or permanently storing carbon [86]. The CCE is a necessary option for petrostates for many sectors, such as iron, steel, cement and other chemical industries, which require substantial energy resources. Due to the limitation of swapping fossil fuels for renewables in these sectors in the near future, the CCE could be an appropriate option [87]. The idea is borrowed from the circular economy but concentrates on carbon emissions. The CCE’s scope can also be broadened to cover Carbon Capture, Utilisation and Storage (CCUS) and hydrogen. Major petrostates, such as Saudi Arabia, are attempting to apply the CCE at the local level [88]. In turn, as the first step toward the energy transition and achieving a just transition, asset diversification and the CCE facilitate the implementation of other steps: female

inclusion, opportunities for the young generation and constituting robust legal frameworks and institutions.

4.3. Procedural justice: Developing institutional and legal capacity

Institutions have a significant role in creating justice in society. According to Rawls, the conditions that are crucial in this regard are that (1) everyone accepts and knows that others accept the same principles of justice, and (2) the basic social institutions generally satisfy and are generally known to satisfy these principles [28: 4]. Moreover, institutional quality is strongly linked to economic growth and avoiding the resource curse [90,91,92,93,94]. Low institutional capacity leads to a loss of capability to implement policies and environmental destruction in most emerging economies [95].

Fig. 3 below presents data showing how the petrostates selected for this study compare on their institutional capacity and legal framework, using data from the ICRG. Among the 23 countries with oil rents greater than 10% of GDP, only Norway scored more than 80 points, then Brunei with 79 points and the UAE with 77 points (all coloured in green). In addition, only nine of the petrostates have recorded scores for above the world average (65). Thus, the majority of the petrostates lack strong institutional capacity. Comparing the data in Fig. 3, our analysis also points to the role of institutional capacity in avoiding the resource curse and its link to economic diversification. Many of the same countries lacking in institutional capacity are also poorly diversified. Not coincidentally, for example, Norway and the United Arab Emirates are two of the petrostates that have had the most success in diversifying their economies, and also score comparatively highly on measures of institutional quality [90,96]. However, countries such as Saudi Arabia has not successfully diversified their economies despite diversification efforts dating to the 1970s [98].

The implications of the lack of robust institutions and sufficient legislation are substantial for petrostates because oil revenue will remain concentrated in a relatively small number of powerful groups in these states. As revenue is not equally distributed, economic growth will be slow [91]. Even in times of higher oil revenue, a substantial amount of that revenue tends to flow disproportionately to groups and individuals with close government ties [100]. This tends to inhibit not

only diversification away from petroleum, as well-connected actors can derive benefits from petrodollars, but also the creation of laws and institutions that manage oil revenues impartially [93].

The energy transition is likely to put downward pressure on petrostate revenue in the coming decades. As a result, petrostate governments will likely have to find other income sources, including collecting taxes [102]. One element of a just transition for petrostates is thus how to ensure that governments have enough revenue without unduly burdening lower- and middle-income citizens. Institutional capacity could be key here, as governments may need to devise complex taxation schemes to efficiently extract revenue from wealthy citizens and businesses so that poorer and smaller businesses do not bear the brunt of new revenue schemes. Here, institutional capacity is influential in developing effective taxation regimes, and at present most petrostates lack complex taxation systems [103]. Without robust institutional capacity, it is more difficult to establish the fiscal capacity, including taxation, to support the market [104].

In addition, improved and new institutions can also be vehicles for creating new innovations, and fostering the creation of new firms that will be essential for the transition to a green economy. It is vital that institutions have the strength and capacity to deliver new business opportunities as that will be key to ensuring investor confidence in a country and therefore attracting vital inward investment to the country [105].

4.4. Restorative justice

Petrostates have taken divergent methods to remedy the negative impacts of petroleum activities in their countries. Countries with solid institutional capacities and that are less dependent on oil revenue have better regulatory frameworks for imposing carbon taxes at high rates. In 2018, Canada enacted Greenhouse Gas Pollution Pricing Act (GGPPA, 2018) which extends a federal tax on major industries, particularly in provinces and territories that lack carbon tax regulations. According to Schedule 4 of the Act, the 2023–2030 federal benchmark starts with CA \$20 per CO₂e Tonne in 2019 and CA\$65 in 2023 to reach CA\$170 in 2030. In addition, provinces and territories have their carbon tax regulations should amend their regulations to be consistent with the

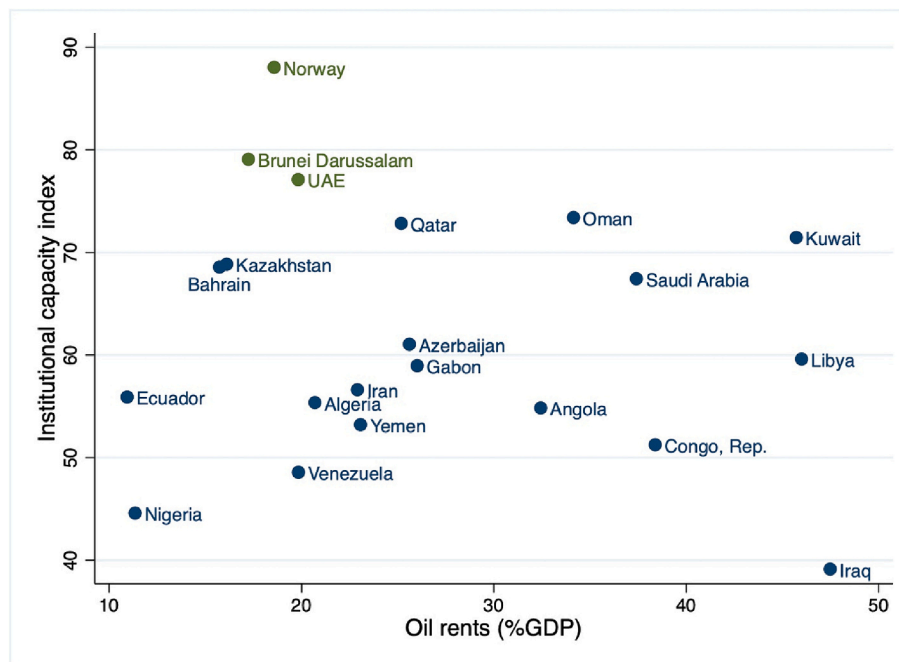


Fig. 3. Institutional capacity of the selected petrostates. Higher levels refer to a better quality of institutions. Created by authors.

GGPPA's carbon pricing.

Norway also took a similar approach in implementing a carbon tax at a high rate and increasing it significantly by 2030. The country is at the top of the list of OECD countries for carbon pricing. Climate Action Plan 2021–2030 of Norway, aims to raise carbon pricing from NOK 590 (\$69) per CO₂e Tonne in 2021 to NOK 2000 (about \$ 233) by 2030. As well as covering most of the country's emissions, Norway's nominal carbon pricing is the highest among the EU countries. Carbon pricing or taxes are crucial for reducing carbon emissions and a practical strategy for supporting and encouraging the renewable energy industry.

The UAE is among the petrostates contributing to climate adaptation funds both inside the country and globally. In November 2022, the UAE signed a memorandum of understanding with the US to invest \$100 billion in renewable energy projects globally. In the coming year, the fund will be allocated to support the public and private sectors to promote clean innovation and carbon and methane management in the two states and other countries worldwide.

With large oil reserves and production, Iraq has not taken any strategic or serious steps to remediate the negative environmental impacts of petroleum. The only federal region in Iraq, the Kurdistan Region, obliged international oil companies to allocate environmental funds to mitigate environmental damage as stated in the Oil and Gas Law of the Kurdistan Region of Iraq. However, these provisions of the Law have not been implemented due to a lack of solid institutional quality in the oil sector in the region [106]. Like Iraq, Kazakhstan as one of the major oil producers in Central Asia; Azerbaijan and Turkmenistan have not yet introduced carbon taxes in their policies or legislation. Their governments have not yet provided significant funds to stimulate climate and environmental projects.

4.5. Recognition justice

Recognizing the inequities faced by many marginalized groups in society, whether in terms of gender, class, or other minority status, has a critical role in avoiding new inequities and redressing existing ones not only in the petrostates but also at the global level. While it is a vital issue for promoting justice, it has not been covered adequately in the literature, mainly due to the an underplaying of power dynamics and sources

of power and inequalities [107]. Recognition justice provides opportunities for marginalized and disadvantaged groups to share their understanding and perspectives for better energy policy and a just transition [108].

4.5.1. Female inclusion: Gender and justice

Female participation is very low in the traditional fossil fuel energy sector. According to the International Energy Agency, women's participation in this sector is 22% worldwide [109]. The energy sector remains one of the least gender-diverse sectors, and closing this gender gap will be vital as women's inclusion is a key driver of innovation. Most countries have a significant gap between male and female participation which has contributed to the CEE injustice. While the energy sector provides a large portion of government revenues, women also account for only a tiny percentage of total employment in many petrostates - for instance, Kuwait's state-owned energy sector consists of mostly Kuwaiti nationals at 94.4% (81.7% male versus 12.7% female), while the remainder are expatriates (4% male versus 1.5% female) [111]. Fig. 4 shows the percentage of women in the energy sector over all sectors in our sample of countries. As can be seen, women have hardly ever contributed to this sector. In all 23 petrostates, female participation in the energy-related industry is more than 5% only in Qatar, Brunei and Kazakhstan (all coloured green).

As well as lower participation in the current energy system, women in the global south do not have a significant role in management and decision-making in the renewable energy sector [112]. Adding to that, they will face more injustice because of the consequences of climate change [113]. Without mitigating efforts, inequities in the current energy system run the risk of recurring in renewable energy. For example, in South Africa, black women still suffer from discrimination in the industry, where white males dominate leadership and management [112]. Thus, without taking gender equality into account and including more women in climate mitigation and adaptation, any just transition is incomplete [113]. In petrostates, women are among the most vulnerable groups facing the most significant challenges of climate change in the short and long term [115].

As described above, the economies of most of the petrostates are heavily dependent on oil rents and not diversified [68,116]. Reducing

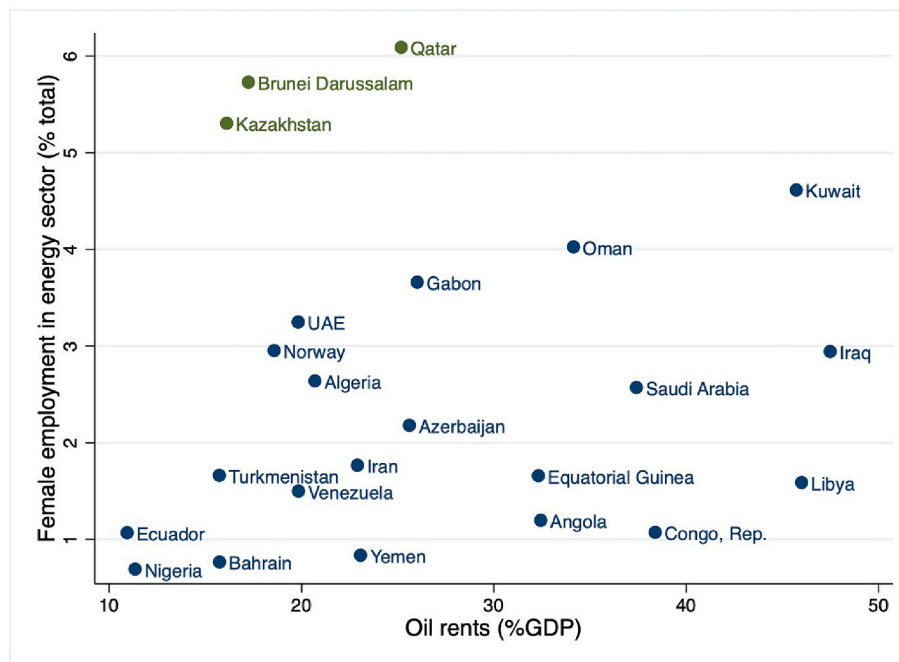


Fig. 4. Women's employment in mining, electricity, gas and water supply. Higher levels refer to greater participation of women in the energy sector. Created by authors.

demand for oil in the coming decades will negatively impact women in these countries because it will lead to the depletion of oil rents, putting pressure on state finances and ultimately household finances by reducing the state's ability to finance welfare states. Making matters worse, many women who are employed work in the public sector. As oil revenue declines, governments will face pressure to reduce the size of the public sector, forcing women (and men) to seek employment in the more competitive private sector.

Therefore, this suggests that oil producing countries should reconsider the nature of their labour forces and have equal opportunities for both men and women. There will not be a just transition without increasing female participation and actual involvement in the labour force and decision-making. The energy transition provides an opportunity for governments in the petrostates to avoid repeating inequities in the current fossil fuel economy and provide more opportunities for women to gain skills in the early stages of the renewable industry.

4.5.2. Inclusion of young people in labour and policymaking

A few years after adopting the Paris Agreement, youth populations across various countries pressured their governments to respond to climate change. The year 2019 saw school strikes in more than a hundred countries and 1700 cities around the globe [118]. The youth population's main concern is that they have to face the worst consequences of climate change despite having comparatively less of a role in causing it [119]. Despite support from scientists and the wider public to their concerns, future generations are among the most vulnerable groups in society that do not have much ability to protect themselves [120].

With the vulnerability and serious concerns of the future generation, there has been surprisingly little focus in the literature on the role of the youth population in the energy transition. Among 198 studies regarding vulnerable groups in political ecology and climate mitigation, Benjamin Sovacool found only five studies on children and young people globally [121]. In terms of providing solutions for future generations in petrostates to be more active in the energy sector, a few major international oil companies have attempted to reduce unemployment among the youth in the host countries by providing training and vocational courses. Still, their contributions are minimal and insufficient for meeting the challenge of youth employment [43].

As well as the vulnerability to climate change consequences and exclusion in decision-making, unemployment is quite high among youth, particularly in petrostates. As shown in Fig. 5 below, which presents the unemployment rate from 2000 to 2020 using data from the World Bank for 15–24 year olds, the youth unemployment rate is relatively high and above the world average in many petrostates. Iraq, Saudi Arabia, the Congo, Libya, Iran, Gabon, Algeria, Yemen and Brunei had a

higher than 20% average youth unemployment rate. Only six petrostates have a youth unemployment rate lower than 10% on average between 2000 and 2020 (all coloured green). However, all six countries are very small in terms of population except Ecuador and UAE; the other four countries have a population of around or under five million people. In addition, youth unemployment in the six countries increased in the last five years due to the volatility of oil prices and Covid-19. For example, youth unemployment in the UAE increased from 5% in 2014 to 9% in 2020, in Norway from 7% to 11%, and in Ecuador from 9% to 11% in the period. Making matters even worse, petrostates, particularly those in the MENA region, have among the largest youth populations compared to any group of states or regions in the world. The young population accounts for 60% of the total population in the MENA [123].

Youth should be at the heart of policy design and decision-making in changing the energy system because it is essential to mitigate inter-generational injustice [124]. The young population and future generations are expected to face most of the consequences of the future risks of climate change [9]. Neglecting their capacity and voice in the energy transition may only deepen inequities in the future. Empowering young people and providing opportunities are crucial in moving toward a lower carbon economy.

4.5.3. Indigenous people

The discussion surrounding a just transition would be incomplete without a focus on indigenous peoples, whose contribution to climate change is comparatively small but who nevertheless face its negative consequences [126]. Despite that, we have to distinguish between two different types of injustice toward indigenous people: the injustice that exists regardless of the energy transition and injustice that could be caused or exacerbated by the energy transition. Inequities involving indigenous peoples long predate the energy transition. With the colonialization of their lands and resources, indigenous people were displaced from their lands and resources, disconnecting them from their traditional knowledge by forcing them to adapt to colonial knowledge and schools [127].

How is the energy transition likely to change the status quo? The energy transition has the potential to positively affect indigenous people if indigenous people have a role in broader framework of just transition. This means considering them in procedural, distributive, recognition, and restorative justice [29,30]. The Paris Agreement urges state parties to adopt traditional indigenous knowledge in climate change strategies and adaptation. This is clearly mentioned in Article 7 (5) of the Agreement (Paris, 2015). Thus, the countries are responsible for considering indigenous worldviews and their traditional customs in the transition toward a low carbon economy.

However, depending on each case, the negative and positive consequences of energy transition should be taken into account. For example, in Norway, indigenous Saami (Sámi) people have faced a double threat of climate change. Global warming threatens their reindeer's pasture; at the same time, they have to leave their land for aluminium factories to extract materials that are necessary for the renewable industry [130]. In Ecuador, the government and international oil companies are still continuing oil exploration and drilling without the consent of indigenous people in their territories [131].

The role of indigenous people in the energy transition requires more attention to avoid previous mistakes and achieve a just transition for all. In the previous decades, indigenous people have been viewed as victims of climate change consequences, but yet they are also recognized as agents for combating climate change and protecting the environment.

4.6. Cosmopolitan justice

Depending on institutional capacity, oil reserves and production, petrostates' perspectives on climate change responses and obligations are diverse. Climate change and sustainability concerns have been reflected in the new constitutions of small petrostates in the Gulf. For

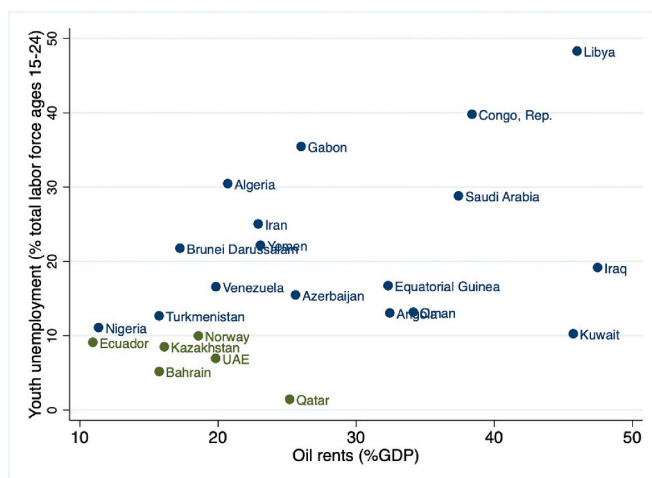


Fig. 5. Youth unemployment (% of the total labor force ages 15–24). Lower levels refer to higher youth employment. Created by authors.

example, Article 33 of Qatar’s 2003 Constitution and Article 9 (h) urges the state to protect the environment and future generations [133]. The Constitution of Ecuador is one of the obvious examples of a constitution to guide the state regarding climate change mitigation and adaptation, obliging the state to reduce greenhouse gas emissions, where Article 414 states that: “The State shall adopt adequate and cross-cutting measures to mitigate climate change, by limiting greenhouse gas emissions, deforestation, and air pollution...” (“Constitution of Ecuador,” 2008).

Despite that, primary legislation for renewable energy and climate change is limited among petrostates. Governments of petrostates have filled the gap in a similar way by designing long-term policy instruments to achieve climate targets, including Saudi Arabia’s Vision 2030, which was introduced in 2016; Oman’s Vision 2020 and Vision 2040; Qatar’s National Vision 2030; UAE’s Vision 2021; and Bahrain’s Economic Vision 2023. According to the Grantham Research Institute database (2023), which recorded around five thousand laws and policies for all countries worldwide, Iraq and Libya have two, Congo, Rep. and Turkmenistan have four; Azerbaijan, Qatar and Brunei Darussalam have six; Kuwait, Equatorial Guinea, Yemen, Rep., Algeria and Bahrain have seven (Fig. 6). In contrast, Spain has 66 climate laws and policies, the United Kingdom 61, France 66 and Israel 24 [134]. The enactment of legislation and the design of policies related to climate change and renewable energy are among the early stages of knowing the motivations and seriousness of each country regarding climate goals and energy transition, but turning these policies and legislations into action is essential.

Most of the Gulf Cooperation Council (GCC) countries are active in international climate change mitigation and adaptation but do not intend to reduce oil production, which the Paris Agreement in essence requires. Saudi Arabia, for example, is concentrating on projects such as Carbon Capture and Carbon Storage which have been introduced a part of the Circular Carbon Economy (CCE) [88]. At the same time, the Kingdom introduced the Saudi Green Initiative (SGI) and Middle East Green Initiative (MEGI) in 2021 to meet zero emissions by 2060. The SGI aims to increase protected areas to more than 30%, planting 10 billion trees and reducing carbon emissions by 278 mtpa in the Kingdom by 2030 in order to achieve the targets of the Kingdom’s Vision 2030 (SGI, 2022b). The Kingdom also aims to achieve similar goals in cooperation with other Middle East countries as part of the MEGI [136] – this is an

active example of cosmopolitan justice in action.

Other petrostates have supported renewable energy sources and markets. Norway and UAE are leading in this area among the petrostates due to their strong institutional quality and large sovereign wealth funds. Norway is the leader among EU countries by increasing sales of EV to 88% in 2022 due to the government’s regulatory support for the EV market. The UAE is working on the world’s largest single-site solar site, Mohammed bin Rashid Al Maktoum Solar Park. The project started in 2013 with the target of reaching 5000 MW by 2030 [137].

Nigeria has made similar attempts, but with mixed results. Its Electric Power Sector Reform Act 2005 (EPSR) was an ambitious reform to establish several entities and change the old structure of the electric sector, but it did not provide a framework for stimulating renewable energy [138]. Many policy regulations and government policies were designed to fill this gap, but they failed until regulations on feed-in-tariff for renewable energy sourced electricity were enacted in 2015. The regulation supports small projects by integrating them as renewable energy automatically, while large electricity plants above 30 MW require a competitive procurement process. It confirmed an increase in renewable energy to 10% of the total energy supply in Nigeria by the end of 2020 (Commission, 2015, S. 8(a)). Nigeria also enacted the Climate Change Act in late 2021 to achieve net zero emissions between 2050 and 2070 (“Climate Change Act,” 2021, s. 1(f)). However, due to low institutional quality (see Fig. 4) the country has not achieved most of the goals of supplying electricity to all Nigerians and promoting renewable projects.

5. Conclusion

The focus of the study is to open discussion and research on how petrostates can respond and play a role in their societies’ just transition to a low-carbon economy. In exploring central principles of justice, we then advance an initial roadmap for ensuring that energy transition is also a just transition. After defining just transition and extending it to the broader meaning of justice to integrate the CEE justice, we develop the agenda for a just transition in petrostates. We based the agenda on two interconnected levels; from a structural perspective, economic and institutional reforms are crucial elements for the energy transition. Secondly, the transition would not be just if vulnerable groups in the

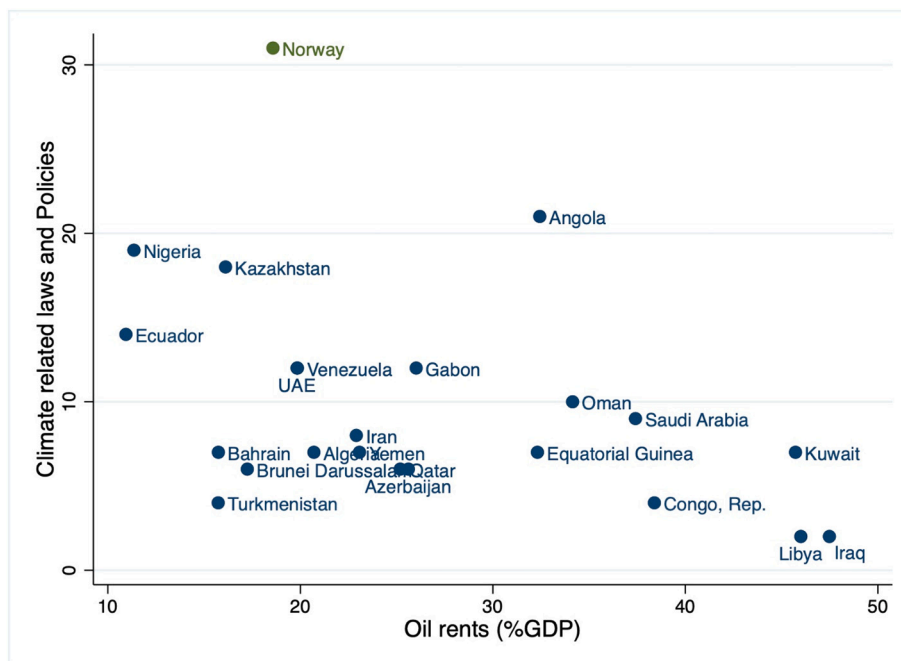


Fig. 6. Number of climate related laws, Policies and Documents submitted to the UNFCCC (including NDCs).

petrostates' societies, such as women, future generations and indigenous people, do not actively participate in the labour force and decision-making in the transition toward a low carbon economy. We presented data illustrating the magnitude of these challenges and explored pathways through which petrostates might manage them.

The originality of this research is to focus on petrostates and assess how injustices can be addressed. We go beyond just identifying injustices in CEE and offer a roadmap to a just transition. Moreover, we do so specifically among petrostates, which despite being key actors in the energy transition have been largely neglected by existing literature on just transition. The research also offers a mix of qualitative and quantitative data to create a roadmap for petrostates in a just transition, and this moves beyond the majority of existing literature on the just transition which tends to focus primarily on qualitative evidence. The aim also is to ensure that petrostates begin their just transition journey and therefore move simultaneously toward achieving a low carbon economy and socio-economic justice.

The argument and descriptive data have significant implications for a just energy transition. Except for Norway and the UAE, which succeeded in reducing oil rent dependency and economic diversification, most petrostates are far behind in distributive justice (Fig. 2). Most petrostates, in particular Iraq, Nigeria, Venezuela, Algeria, Yemen and Angola, face institutional capacity deficiencies, which put hundreds of millions of people at risk with respect to procedural justice (Fig. 3). Additionally, restorative justice and recognition justice are not satisfactory in most petrostates except for a few. Female participation in energy-related sectors is almost invisible in most petrostates, being less than 7% in all 23 petrostates included in Fig. 4. Youth unemployment is still high in many petrostates, including those with large populations like Iran, Saudi Arabia, Iraq, and Algeria (Fig. 5).

Therefore, a just transition away from oil and gas should be taken seriously and treated differently than the transition away from other fossil fuels like coal. Oil rents contributed 20% of GDP or more in sixteen states across 2000–2020 (see Appendix 1), accounting for more than 35% in Iraq, Libya, Kuwait, the Republic of the Congo, and Saudi Arabia. As oil production is more capital-intensive than labor-intensive and produces greater windfalls than coal, the challenge for petrostates is one of shifting away from macro-economic dependence on hydrocarbon revenues and ensuring sustainable revenue streams. This is especially true for petrostates that are more dependent on oil revenues. Thus, diversification toward non-oil sectors and strengthening institutional quality will play a central role in the energy transition more broadly and

in the just transition in particular to avoid inequalities toward broader society and disadvantaged groups inside petrostates. Other states can also assist petrostates through technical support and capacity building to achieve better outcomes of collective climate goals and just transition.

Future research can elaborate on other areas of just transition in the oil sector and petrostates. For example, while oil is more capital-intensive than fossil fuels like coal, a transition away from hydrocarbons will still impact a large number of workers in the oil and gas sector. Future research is needed on the challenges that will be faced by oil and gas workers, how they differ from those of coal workers, and how to mitigate them. Further work is likewise needed to understand the conditions under which petrostates can diversify their economies and perhaps link with the growing research on the energy transition and a social contract [105] and also what is a just energy investment [139].

CRediT authorship contribution statement

Qaraman Hasan: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Raphael J. Heffron:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Formal analysis, Conceptualization. **Soran Mohtadi:** Writing – review & editing, Writing – original draft, Validation, Formal analysis, Data curation, Conceptualization. **Brian D. Blankenship:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Indra Overland:** Writing – review & editing, Validation, Supervision, Formal analysis, Conceptualization. **Johannes Urpelainen:** Writing – original draft, Validation, Supervision, Formal analysis, Conceptualization.

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

Data will be made available on request.

Appendix 1. Petrostates by oil rent as a percentage of GDP (more than 10% between 2000 and 2020)

No	Countries	Average oil rents (%GDP)
1	Iraq	47.47
2	Libya	45.99
3	Kuwait	45.71
4	Congo, Rep.	38.38
5	Saudi Arabia	37.40
6	Oman	34.13
7	Angola	32.43
8	Equatorial Guinea	32.31
9	Gabon	26.01
10	Azerbaijan	25.60
11	Qatar	25.18
12	Yemen, Rep.	23.07
13	Iran, Islamic Rep.	22.90
14	Algeria	20.69
15	Venezuela, RB	19.84
16	United Arab Emirates	19.82
17	Norway	18.57
18	Brunei Darussalam	17.23
19	Kazakhstan	16.11
20	Bahrain	15.73

(continued on next page)

(continued)

No	Countries	Average oil rents (%GDP)
21	Turkmenistan	15.72
22	Nigeria	11.35
23	Ecuador	10.93

Appendix 2. International Country Risk Guide (ICRG) components and points

POLITICAL RISK COMPONENTS		
Sequence	Component	Points (max.)
A*	Government Stability	12
B*	Socioeconomic Conditions	12
C*	Investment Profile	12
D*	Internal Conflict	12
E*	External Conflict	12
F	Corruption	6
G	Military in Politics	6
H	Religious Tensions	6
I	Law and Order	6
J	Ethnic Tensions	6
K	Democratic Accountability	6
L	Bureaucracy Quality	4
Total		100

References

[1] P. Newell, D. Mulvaney, The political economy of the 'just transition', *Geogr. J.* 179 (2) (2013) 132–140.

[2] J. Abraham, Just transitions for the miners: labor environmentalism in the Ruhr and Appalachian coalfields, *New Polit. Sci.* 39 (2) (2017) 218–240.

[4] Declaration of the United Nations Conference on Human Environment. <https://legal.un.org/avl/ha/dunche/dunche.html>, 1972 (Available at, last accessed 7 December 2023).

[6] COP 16, C. o. t. P, Sixteenth Session of the Conference of the Parties (COP 16), November 2010. https://unfccc.int/event/cop-16#decisions_reports, 2010.

[7] S. Droubi, R.J. Heffron, D. McCauley, A critical review of energy democracy: a failure to deliver justice? *Energy Res. Soc. Sci.* 86 (2022) 102444.

[8] R.J. Heffron, D. McCauley, What is the 'just transition'? *Geoforum* 88 (2018) 74–77.

[9] S.M. Gardiner, Climate justice, in: *The Oxford Handbook of Climate Change and Society*, 2011, pp. 309–322.

[10] J. Lee, J. Byrne, Expanding the conceptual and analytical basis of energy justice: beyond the three-tenet framework, *Front. Energy Res.* 7 (2019) 99.

[11] D. McCauley, Just Transition: Integrating climate, energy and environmental justice, *Energy Policy* 119 (2018) 1–7.

[12] B. Blankenship, M. Aklin, J. Urpelainen, V. Nandan, Jobs for a just transition: evidence on coal job preferences from India, *Energy Policy* 165 (2022) 112910.

[13] S. Pai, K. Harrison, H. Zerriffi, A Systematic Review of the Key Elements of a Just Transition for Fossil Fuel Workers, Smart Prosperity Institute Ottawa, ON, Canada, 2020.

[14] M.L. Ross, The oil curse, in: *The Oil Curse*, Princeton University Press, 2012.

[16] K.E. Jenkins, Oil and Gas Just Transitions: An Introduction to the Special Issue Vol. 23, Taylor & Francis, 2023, pp. 1079–1086.

[17] M. Korsnes, B. Loewen, R.F. Dale, M. Steen, T.M. Skjølsvold, Paradoxes of Norway's energy transition: controversies and justice, *Clim. Pol.* (2023) 1–19.

[18] E. Hughes, A. Zabala, Net zero by choice? Oil and gas industry motivations for the energy transition and public policy in Scotland, *Clim. Pol.* (2023) 1–17.

[19] L.M. Fitzgerald, Tracing the development of anti-fossil fuel norms: insights from the Republic of Ireland, *Clim. Pol.* (2023) 1–14.

[20] R.J. Heffron, Repurposing for the just transition: energy companies need to future-proof their structure and strategy, *J. World Energy Law Bus.* 16 (3) (2023) 302–307.

[21] H. Mahdavy, The patterns and problems of economic development in rentier states: the case of Iran, in: *Studies in the Economic History of the Middle East* 67, 1970, p. 428.

[22] T. Economist, Dutch disease, *Econ. Mag.* (1977) 82–83.

[23] R. Auty, *Sustaining Development in Mineral Economies: The Resource Curse Thesis*, Routledge, 2002.

[24] J.D. Colgan, Oil, domestic politics, and international conflict, *Energy Res. Soc. Sci.* 1 (2014) 198–205.

[25] R.J. Heffron, *Achieving a Just Transition to a Low-Carbon Economy*, Springer, 2021.

[26] P. García-García, Ó. Carpintero, L. Buendía, Just energy transitions to low carbon economies: a review of the concept and its effects on labour and income, *Energy Res. Soc. Sci.* 70 (2020) 101664.

[27] H.-O. Pörtner, D.C. Roberts, H. Adams, C. Adler, P. Aldunce, E. Ali, R.A. Begum, R. Betts, R.B. Kerr, R. Biesbroek, *Climate Change 2022: Impacts, Adaptation and Vulnerability, IPCC Sixth Assessment Report*, 2022.

[28] J. Rawls, *A theory of justice*, in: *Ethics*, Routledge, 2004, pp. 229–234.

[29] S. Abram, E. Atkins, A. Dietzel, K. Jenkins, L. Kiamba, J. Kirshner, J. Kreienkamp, K. Parkhill, T. Pegram, L.M. Santos Ayllón, Just transition: a whole-systems approach to decarbonisation, *Clim. Pol.* 22 (8) (2022) 1033–1049.

[30] X. Wang, K. Lo, Just transition: a conceptual review, *Energy Res. Soc. Sci.* 82 (2021) 102291.

[33] S. Carley, D.M. Konisky, The justice and equity implications of the clean energy transition, *Nat. Energy* 5 (8) (2020) 569–577.

[34] L. Chancel, T. Piketty, Carbon and Inequality: From Kyoto to Paris Trends in the Global Inequality of Carbon Emissions (1998–2013) & Prospects for an Equitable Adaptation Fund World Inequality Lab, 2015.

[37] R. Bullard, Environmental justice in the 21st century, *Debating Earth* (2005) 3222–3356.

[38] L. Urkidi, M. Walter, Dimensions of environmental justice in anti-gold mining movements in Latin America, *Geoforum* 42 (6) (2011) 683–695.

[39] R. White, Resource extraction leaves something behind: environmental justice and mining, *Int. J. Crime Justice Soc. Democr.* 2 (1) (2013) 50–64.

[40] S.E. Bell, Y.A. Braun, Coal, identity, and the gendering of environmental justice activism in central Appalachia, *Gend. Soc.* 24 (6) (2010) 794–813.

[41] B. Bustos, M. Folchi, M. Fragkou, Coal mining on pastureland in Southern Chile: challenging recognition and participation as guarantees for environmental justice, *Geoforum* 84 (2017) 292–304.

- [42] J. Kopas, E. York, X. Jin, S. Harish, R. Kennedy, S.V. Shen, J. Urpelainen, Environmental justice in India: incidence of air pollution from coal-fired power plants, *Ecol. Econ.* 176 (2020) 106711.
- [43] C.O. Ikporkupo, Petroleum, fiscal federalism and environmental justice in Nigeria, *Space Policy* 8 (3) (2004) 321–354.
- [44] D. O'Rourke, S. Connolly, Just oil? The distribution of environmental and social impacts of oil production and consumption, *Annu. Rev. Env. Resour.* 28 (2003) 587–617.
- [45] M.C. LaBelle, In pursuit of energy justice, *Energy Policy* 107 (2017) 615–620.
- [46] H. Svarstad, T.A. Benjaminsen, Reading radical environmental justice through a political ecology lens, *Geoforum* 108 (2020) 1–11.
- [47] L. Álvarez, B. Coolsaet, Decolonizing environmental justice studies: a Latin American perspective, *Capital. Nat. Social.* 31 (2) (2020) 50–69.
- [48] P. Mohai, D. Pellow, J.T. Roberts, Environmental justice, *Annu. Rev. Env. Resour.* 34 (2009) 405–430.
- [49] R.J. Heffron, D. McCauley, G.Z. de Rubens, Balancing the energy trilemma through the energy justice metric, *Appl. Energy* 229 (2018) 1191–1201.
- [51] B.K. Sovacool, M.H. Dworkin, *Global Energy Justice*, Cambridge University Press, 2014.
- [52] K. Jenkins, D. McCauley, R. Heffron, H. Stephan, R. Rehner, Energy justice: a conceptual review, *Energy Res. Soc. Sci.* 11 (2016) 174–182.
- [53] G. Pellegrini-Masini, A. Pirni, S. Maran, Energy justice revisited: a critical review on the philosophical and political origins of equality, *Energy Res. Soc. Sci.* 59 (2020) 101310.
- [54] E.D. Rasch, M. Köhne, Practices and imaginations of energy justice in transition. A case study of the Noordoostpolder, the Netherlands, *Energy Policy* 107 (2017) 607–614.
- [55] B.K. Sovacool, M.H. Dworkin, Energy justice: conceptual insights and practical applications, *Appl. Energy* 142 (2015) 435–444.
- [57] F. Sultana, Critical climate justice, *Geogr. J.* 188 (1) (2022) 118–124.
- [58] T. Kortetmäki, Reframing climate justice: a three-dimensional view on just climate negotiations, *Ethics Policy Environ.* 19 (3) (2016) 320–334.
- [59] A. Mihr, Climate justice, migration and human rights, in: *Climate Change, Migration and Human Rights*, Routledge, 2017, pp. 43–67.
- [62] R.J. Heffron, D. McCauley, The 'just transition' threat to our Energy and Climate 2030 targets, *Energy Policy* (2022) 112949.
- [65] J.D. Colgan, Oil and revolutionary governments: fuel for international conflict, *Int. Organ.* 64 (4) (2010) 661–694.
- [66] P. Collier, A. Hoeffler, Testing the neocon agenda: democracy in resource-rich societies, *Eur. Econ. Rev.* 53 (3) (2009) 293–308.
- [67] M.L. Ross, *The Oil Curse: How Petroleum Wealth Shapes the Development of Nations*, Princeton University Press, 2012.
- [68] M.L. Ross, What do we know about export diversification in oil-producing countries? *Extr. Ind. Soc.* 6 (3) (2019) 792–806.
- [69] World Bank, D, Access to electricity, Retrieved 25 January 2023 from, <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?view=chart>, 2023.
- [70] L.J. Kemp, S.R. Madsen, J. Davis, Women in business leadership: a comparative study of countries in the Gulf Arab states, *Int. J. Cross-cult. Manag.* 15 (2) (2015) 215–233.
- [71] F.E. Mundial, *Global Gender Gap Report*, WEF, 2021.
- [73] A. Barnes, M. Alexander, M. Jo Buchanan, O. Ahmed, M. Zhavoronkova, E. Hoffman, C. Chung, H. Argento-McCurdy, D. Madson, Uplifting women in the clean energy economy, Retrieved 24 January 2023 from, <https://www.americanprogress.org/article/uplifting-women-in-the-clean-energy-economy/>, 2022.
- [74] A. Paris, Paris Agreement to the United Nations Framework Convention on Climate Change, Adopted Dec. 12, 2015; Entered Into Force Nov. 4, 2016, 2015 (In).
- [75] H. Mahdavy, The patterns and problems of economic development in rentier states: the case of Iran, in: *Studies in the Economic History of the Middle East* 428, 1970, p. 67.
- [76] R. Cherif, F. Hasanov, M. Zhu, Breaking the Oil Spell: The Gulf falcons' Path to Diversification, *International Monetary Fund*, 2016.
- [78] C.S. Hendrix, Kicking a crude habit: diversifying away from oil and gas in the twenty-first century, *Int. Rev. Appl. Econ.* 33 (2) (2019) 188–208.
- [79] A.A. Lashitew, M.L. Ross, E. Werker, What drives successful economic diversification in resource-rich countries? *World Bank Res. Obs.* 36 (2) (2021) 164–196.
- [81] B. Fattouh, A. Sen, Economic diversification in Arab oil-exporting countries in the context of peak oil and the energy transition, in: *When Can Oil Economies Be Deemed Sustainable?*, Palgrave Macmillan, Singapore, 2021, pp. 73–97.
- [82] M. Hvidt, Economic Diversification in GCC Countries: Past Record and Future Trends, 2013.
- [83] G. Peszko, D. Van Der Mensbrugge, A. Golub, J. Ward, C. Marijs, A. Schopp, J. Rogers, A. Midgley, *Diversification and Cooperation in a Decarbonizing World: Climate Strategies for Fossil Fuel-dependent Countries*, World Bank Publications, 2020.
- [84] O.J. Ebohon, A.J. Ikeme, Decomposition analysis of CO2 emission intensity between oil-producing and non-oil-producing sub-Saharan African countries, *Energy Policy* 34 (18) (2006) 3599–3611.
- [86] W. McDonough, Carbon is not the enemy, *Nature* 539 (7629) (2016) 349–351.
- [87] IEA, M, *Transforming Industry Through CCUS*, International Energy Agency Paris, France, 2019.
- [88] T.A. Shehri, J.F. Braun, N. Howarth, A. Lanza, M. Luomi, Saudi Arabia's climate change policy and the circular carbon economy approach, *Clim. Pol.* (2022) 1–17.
- [90] F. Ploeg, v. d., Natural resources: curse or blessing? *J. Econ. Lit.* 49 (2) (2011) 366–420.
- [91] A. Tornell, P.R. Lane, The voracity effect, *Am. Econ. Rev.* 89 (1) (1999) 22–46.
- [92] T.L. Karl, *The Paradox of Plenty: Oil Booms and Petro-States* Vol. 26, Univ of California Press, 1997.
- [93] S. Matallah, Rampant corruption: the dilemma facing economic diversification in oil-abundant MENA countries, *Resour. Policy* 75 (2022) 102541.
- [94] H. Mehlum, K. Moene, R. Torvik, Institutions and the resource curse, *Econ. J.* 116 (508) (2006) 1–20.
- [95] J. Urpelainen, *Global Environmental Politics: The Transformative Role of Emerging Economies*, Columbia University Press, 2022.
- [96] A. Elwerfelli, J. Benhin, *Oil a Blessing or Curse: A Comparative Assessment of Nigeria, Norway and the United Arab Emirates*, 2018.
- [98] B.A. Albassam, Economic diversification in Saudi Arabia: myth or reality? *Resour. Policy* 44 (2015) 112–117.
- [100] J.A. Robinson, R. Torvik, T. Verdier, Political foundations of the resource curse, *J. Dev. Econ.* 79 (2) (2006) 447–468.
- [102] P. Stevens, *The Geopolitical Implications of Future Oil Demand*, London, UK, Chatham House, 2019.
- [103] B. Smith, Oil wealth and regime survival in the developing world, 1960–1999, *Am. J. Polit. Sci.* 48 (2) (2004) 232–246.
- [104] T. Besley, T. Persson, State capacity, conflict, and development, *Econometrica* 78 (1) (2010) 1–34.
- [105] R.J. Heffron, L. De Fontenelle, Implementing energy justice through a new social contract, *J. Energy Nat. Resour. Law* 41 (2) (2023) 141–155.
- [106] Q.M. Hasan, I.M. Khudir, D.S. San Olawuyi, Regulating corporate social responsibility in energy and extractive industries: the case of international oil companies in a developing country, *Resour. Policy* 83 (2023) 103607.
- [107] B.K. Sovacool, S.E. Bell, C. Daggett, C. Labuski, M. Lennon, L. Naylor, J. Klinger, K. Leonard, J. Firestone, Pluralizing energy justice: incorporating feminist, anti-racist, indigenous, and postcolonial perspectives, *Energy Res. Soc. Sci.* 97 (2023) 102996.
- [108] C. Schelly, D. Bessette, K. Brosemer, V. Gagnon, K.L. Arola, A. Fiss, J.M. Pearce, K.E. Halvorsen, Energy policy for energy sovereignty: can policy tools enhance energy sovereignty? *Sol. Energy* 205 (2020) 109–112.
- [109] IEA, *Gender diversity in energy: what we know and what we don't know*, IEA, 2020. <https://www.iea.org/commentaries/gender-diversity-in-energy-what-we-know-and-what-we-dont-know> (Available at, last accessed 7 December 2023).
- [111] B. Hussein, *Energy sector diversification: meeting demographic challenges in the MENA region*, The Atlantic Council, 2020. <https://www.atlanticcouncil.org/in-depth-research-reports/report/energy-sector-diversification-meeting-demographic-challenges-in-the-mena-region/>.
- [112] M. Swilling, I. Nygaard, W. Kruger, H. Wlokas, T. Jhetam, M. Davies, M. Jacob, M. Morris, G. Robbins, M. Funder, Linking the energy transition and economic development: a framework for analysis of energy transitions in the global South, *Energy Res. Soc. Sci.* 90 (2022) 102567.
- [113] G. Terry, No climate justice without gender justice: an overview of the issues, *Gen. Dev.* 17 (1) (2009) 5–18.
- [115] J.I. Uduji, N.E.N. Okolo-Obasi, Gender sensitive responses to climate change in Nigeria: the role of multinationals' corporate social responsibility in oil host communities, *J. Glob. Responsib.* 14 (1) (2023) 89–110.
- [116] N. Alsharif, S. Bhattacharyya, M. Intartaglia, Economic diversification in resource rich countries: history, state of knowledge and research agenda, *Resour. Policy* 52 (2017) 154–164.
- [118] M. Warren, Thousands of scientists are backing the kids striking for climate change, *Nature* 567 (7748) (2019) 291–293.
- [119] K. Lee, N. Gjerose, S. O'Neill, J. Barnett, Youth perceptions of climate change: a narrative synthesis, *Wiley Interdiscip. Rev. Clim. Chang.* 11 (3) (2020) e641.
- [120] R.S. Abate, *Climate Change and the Voiceless: Protecting Future Generations, Wildlife, and Natural Resources*, Cambridge University Press, 2019.
- [121] B.K. Sovacool, Who are the victims of low-carbon transitions? Towards a political ecology of climate change mitigation, *Energy Res. Soc. Sci.* 73 (2021) 101916.
- [123] S. Tagliapietra, The impact of the global energy transition on MENA oil and gas producers, *Energy. Strat. Rev.* 26 (2019) 100397.
- [124] N. Healy, J. Barry, Politicizing energy justice and energy system transitions: fossil fuel divestment and a "just transition", *Energy Policy* 108 (2017) 451–459.
- [126] R.S. Abate, E.A. Kronk, Commonality among unique indigenous communities: an introduction to climate change and its impacts on indigenous peoples, in: *Climate Change and Indigenous Peoples*, Edward Elgar Publishing, 2013.
- [127] D.R. Wildcat, *Red Alert!: Saving the Planet With Indigenous Knowledge*, ReadHowYouWant.com, 2010.
- [130] S. Normann, "Time is our worst enemy:" lived experiences and intercultural relations in the making of green aluminum, *J. Soc. Issues* 78 (1) (2022) 163–182.
- [131] L. Etchart, The role of indigenous peoples in combating climate change, *Palgrave Commun.* 3 (1) (2017) 1–4.
- [133] D.S. Olawuyi, *Climate Change Law and Policy in the Middle East and North Africa Region*, Routledge, 2021.
- [134] Institute, G. R, *Climate change laws of the world*, Retrieved 9 September 2023 from, <https://climate-laws.org/#map-section>, 2023.
- [136] SGI, S. G. I, *Paving the way to net zero emissions by 2060*. <https://www.greeninitiatives.gov.sa/about-sgi/sgi-targets/reducing-emissions/reduce-carbon-emission-s/#:~:text=Saudi%20Arabia%20is%20taking%20a,initiatives%20that%20will%20reduce%20emissions,2022>.

- [137] Dubai, G. o, Mohammed bin Rashid Al Maktoum Solar Park. <https://www.dewa.gov.ae/en/about-us/strategic-initiatives/mbr-solar-park>, 2023.
- [138] O. Aigbovo, E. Ogboka, Electric power sector reform act 2005 and the development of renewable energy in Nigeria, *Renew. Energy Law Policy Rev.* 7 (1) (2016) 20–29.
- [139] R.J. Heffron, M. Merdekawati, B. Suryadi, Z. Yurnaidi, Defining a 'just energy investment' for the ASEAN just transition, *Environ. Sustainability Indic.* 22 (2024) 100367.