



# GreenPaths

EUROPEAN KNOWLEDGE HUB ON  
JUST TRANSITION PATHWAYS

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# Introduction

## Abstract

This case study investigates the social impacts of the EU green hydrogen economy. It takes an energy justice perspective to enrich social impact analysis of hydrogen economies in two particular localities: Groningen in the north of the Netherlands and the Western Sahara a region recognized in international law as a non-self-governing territory, to which Morocco has territorial pretensions. Social impact assessments on (renewable) energy projects and systems, such as the EU-endorsed SLC-A, currently do not (sufficiently) assess the justice of green transitions (Fortier et al., 2019). This study builds on energy justice approaches to integrate additional indicators towards understanding the social impacts of green hydrogen and applies the resulting assessment framework to green hydrogen projects in Groningen and Western Sahara. This study shows how the introduction of green technologies and energy systems risks exacerbating distributional, procedural and recognition injustices where these concerns are not properly addressed in EU and national law and policy frameworks.

## Keywords

Hydrogen; transition fuels; technology; social impact; just transition.

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# 1 Overview

Hydrogen has been hailed, particularly by the EU, as one of the key energy carriers for the green transition (European Commission, 2021). The fact that hydrogen does not release CO<sub>2</sub> when burned, and its possible utilisation as a fuel in hard-to-abate sectors, has made it popular among EU policymakers. The transition to a renewable hydrogen economy, however, is not without its issues. While it is true that hydrogen can be created in a 'renewable' manner through electrolysis - using renewable electricity to split water into hydrogen and oxygen -, this technology is not yet widely used. As a matter of fact, 95% of hydrogen in the EU is created from fossil fuels, either by using coal, fossil gas or as a byproduct of producing plastics (Deasy-Millar et al., 2025). Whereas hydrogen that is produced with electrolysis that uses green electricity is called 'green hydrogen', fossil-based hydrogen is called either 'brown' or 'black' (depending on the type of coal) or 'grey' (gas), and the latter is the most common form of hydrogen (Deasy-Millar et al., 2025). There is one more - contentious - category of hydrogen: 'blue' hydrogen. Blue hydrogen is fossil-based hydrogen that has had the carbon generated captured during the generating process with carbon capture and storage (CCS). Blue hydrogen is contentious because it is unclear how 'clean' blue hydrogen is, with some authors suggesting that emissions from blue hydrogen could even exceed the emissions of grey hydrogen (Howarth & Jacobson, 2021;). The two main problems for blue hydrogen are methane leaks (which cause more warming than CO<sub>2</sub>) and the need for fully functional CCS (Bauer et al, 2022). Doubts have been raised about the extent to which these two problems can be avoided at scale (Howarth & Jacobson 2021; Mohideen et al 2023). The EU, however, has still decided that blue hydrogen is part of the transition to a green hydrogen economy and termed it low-carbon hydrogen in the delegated act on low-carbon hydrogen (European Commission, 2025).

In any event, only 1.1 percent of all hydrogen production capacity is currently either 'green' or 'blue' (Deasy-Millar et al., 2025). With only 571 MW of electrolyser capacity installed in Europe, less than a tenth of the EU hydrogen strategy goal of 6GW production capacity by 2025 has been realized (Deasy-Millar et al., 2025). This is somewhat surprising considering the large-scale investments that have been put into green hydrogen production. The Commission has allowed nearly 20 billion Euros in state aid under its Important Projects of Common European Interest (IPCEI) programme since 2022, however only 21% of these projects have reached a final investment decision (FID) (Collins, 2025). Moreover, hydrogen overall has seen a 15% fall in demand in 2024 compared to 2020 (Deasy-Millar et al., 2025). These data show that the economic promises of green hydrogen have not yet come to fruition and green hydrogen production (in Europe) may still be too costly. What is more, even 'green' hydrogen is not without its environmental trade-offs because its production requires a large deployment of renewable energy, large amounts of water, land, and critical materials (Terlouw et al., 2025). Considering the Commission's focus on importing hydrogen from regions which are currently experiencing water shortages such as Morocco and Egypt, hydrogen production may have severe environmental consequences as well (Müller et al., 2022).

This paper studies the social impacts of the EU green hydrogen economy policy. It takes an energy justice perspective to understand the social impact of green hydrogen

production in two particular localities which have been singled out as sites of large-scale projects: Groningen in the north of the Netherlands and the Western Sahara, a region recognized in international law as a non-self-governing territory, to which Morocco has territorial pretensions. Social impact assessments on (renewable) energy projects and systems, such as the EU-endorsed SLC-A, currently do not (sufficiently) assess the justice of green transitions (Fortier et al., 2019). This study builds on existing energy justice approaches to formulate an energy justice approach towards understanding the social impacts of green hydrogen and applies the resulting assessment framework to green hydrogen projects in Groningen and Western Sahara.

## 2 Research questions

Building on the existing knowledge and in line with the broader goal of the GreenPaths project this study seeks in particular to understand how European policies for the transition to a green hydrogen economy impact energy justice. To gain a detailed perspective of these impacts, it focusses on two regions that have invested heavily in the hydrogen economy and feature centrally in the policy approach: Groningen in the Netherlands and the Western Sahara and Morocco. Groningen has one of the first hydrogen valleys and is an important part of the ‘backbone infrastructure’ of the EU (the grid of pipelines which will carry hydrogen throughout Europe), Morocco on the other hand is one of the ‘neighbouring’ countries that is investing heavily in hydrogen production for the European market, among others in the occupied Western Sahara region. The study thus asks the following question:

*How does the European policy framework on green hydrogen production impact energy justice in Groningen, Morocco, and the Western Sahara?*

To answer this question the study uses the following sub-questions:

- How can energy justice be operationalised in the green hydrogen transition?
- What is the European policy approach to green hydrogen production in Europe and its neighbouring regions?
- How does EU green hydrogen policy impact energy justice in Groningen?
- How does EU green hydrogen policy impact energy justice in Morocco and the Western Sahara?

This case study seeks to zoom into the energy justice dimension of the green transition to the European hydrogen economy. Energy justice is an emerging concept that has developed from work on environmental justice as a distinct approach to the inequalities that may accompany the introduction of new energy projects and energy systems (Jenkins et al. 2016, Sovacool & Dworkin 2015). Environmental justice frameworks often take multiple dimensions of justice to be part of their concept of justice (Schlosberg,

2004). In the case of energy justice, the three central justice tenets that were introduced by McCauley et al. (2013) have remained central to its conceptualization: distributive justice, recognition justice and procedural justice. These concepts of justice interact to understand the full process of *in*justice:

“Energy justice, our focus throughout, evaluates (a) where injustices emerge, (b) which affected sections of society are ignored, (c) which processes exist for their remediation in order to (i) reveal, and (ii) reduce such injustices” (Jenkins et al. 2016, p 175).

These dimensions always include distributive justice, procedural justice and recognition justice, but have been extended with other dimensions such as restorative justice, cosmopolitan justice and epistemic justice (Sovacool & Dworkin, 2015; Jenkins et al., 2016; Müller et al., 2022). The concept of energy justice has been used in particular to understand the effects of energy policy on the justice of contemporary energy systems (McCauley et al., 2013). In this paper we will work with the three central dimensions of energy justice which require some elaboration.

### Distributive justice

Within energy justice, distributive justice asks how the benefits and ills of energy production and consumption are distributed in society (McCauley et al., 2013). It recognizes the unequal distribution of both the physical allocation of benefits and ills and their associated responsibilities (Walker, 2009; Jenkins et al., 2016). Distributive justice is concerned both with the siting of energy infrastructure and the access to energy services (Jenkins et al., 2016). It ‘represents a call for the distribution of benefits and detriments across all members of society regardless of income, race, etc.’ (Heffron et al., 2015, p. 169). Within the field of hydrogen, distribution questions have centred around ‘the potential benefits the hydrogen could produce as well as how costs and the externalities may be distributed’ (Dillman & Heinonen, 2022).

### Recognition justice

Recognition justice asks whether individuals are fairly represented, free from physical harm and offered complete and equal rights (McCauley et al., 2013). It is in this way different from procedural justice aspects, instead looking at “the process of disrespect, insult and degradation that devalue some people and some places’ identities in comparison to others” (Walker, 2009: 615; Heffron et al., 2015). Nancy Fraser identifies three types of misrecognition that take place: cultural domination, non-recognition, and disrespect (Fraser, 2008). By identifying what groups may face discrimination or disproportionate effects, recognition justice seeks to identify vulnerabilities (Dillman & Heinonen, 2022).

## Procedural justice

Procedural justice asks whether there are equitable decision-making procedures that make sure all groups are able to participate in a non-discriminatory way and that their decisions are taken seriously throughout (McCauley et al 2013). It concerns fair and equal access to legal procedures, policymaking and transparency of information from the relevant institutions (Jenkins et al. 2016). In the words of Heffron et al. (2015, p. 917): 'It unites distributional and recognition-based justice through a combined demand for both formal and informal forms of involvement in decision-making'.

The concept of energy justice is increasingly applied to the (green) hydrogen economy. Geographically most of these authors have focused on the justice implications and risks of the green hydrogen economy for the global south (Patonia, 2025; Müller et al. 2022; Kalt et al., 2023; Tunn et al., 2024). Energy justice perspectives give a more comprehensive and interconnected framework of understanding the social impacts of large-scale energy transitions. In this way the energy justice approach helps to develop a systemic, in-depth and innovative understanding of green transition policies and approaches and their social impacts and trade-offs, which is the primary objective of the GreenPaths case studies. An energy justice perspective thus not only asks what impacts take place, but also who gets disproportionately impacted and whether these impacts can be addressed through formal and informal procedures.

The case study utilizes the GreenPaths Methodological Matrix. Our case study is particularly interested in the cross-sectoral and holistic social impact process of injustice and inequalities. To do so **we investigate the concepts of sustainable growth and decarbonization at the project level as policy surrounding the EU green hydrogen is firmly embedded in narratives of (sustainable) growth and decarbonisation.** Within these concepts it works within the sectoral concepts of **renewables and fossil fuel phase out**. The EU hydrogen economy is explicitly meant to be a technology to phase out fossil fuels and replace them with hydrogen as a renewable alternative. At the level of the case study the concepts **hydrogen, new extractivism and green/ land grabbing** have been utilized, as these concepts are used generally within energy justice frameworks and can help give an understanding to the social impacts. Zooming into these topics as part of our assessment framework we were able to link these processes of social impact to the specific case of the hydrogen economy and the framework of energy justice.

## 3 Methods

The case studies employed mixed methods relying both on (pre-existing) quantitative indicators and desk study of legal and policy documents and secondary reporting. First, a legal doctrinal study and literature study were done to outline the relevant EU policy in the field of hydrogen, with a particular focus on the policies that are most relevant for the geographical regions that we are interested in: Groningen, Morocco and the Western Sahara. After setting out the policy framework, a selection was made of the key policies to be considered in this study, the policy framework on (green) hydrogen is

very extensive and as such five European policies that focus on green hydrogen production were expressly selected to study in the case study: the European Hydrogen Strategy, the REPowerEU plan, the Renewable Energy Directive III, and the Decarbonised Gas Market Package.

The assessment framework for the case study was the result of a literature review into energy justice and social impact assessment of green hydrogen projects and systems (Jenkins et al., 2017; Zamagni et al. 2025; Tunn et al., 2024; Dillman & Heinonen, 2022; Patonia, 2025). The operationalisation of energy justice in the literature is rather diverse, with the dimensions or types of justice ranging from 3 to 7 different categories of justice. Measuring energy justice has been the source of much debate. The literature proposes a wide range of metrics that may be relevant in understanding the justice dimensions of energy systems. Many of these general frameworks for measuring energy justice focus on energy accessibility, energy affordability, environmental and health metrics, economic participation and ownership and, procedural justice and democracy (Baker et al., 2023; Lanckton & DeVar, 2021; Apergi et al. 2024). Because the hydrogen economy is in many ways indeterminate (Dillman & Heinonen, 2022), the analysis has sought to analyse not only current social impacts, but also the risks of future social impacts.

The study does not use a Social Life Cycle Analysis (SLCA) methodology because it does not focus on specific technologies of hydrogen production and aims to understand what social impacts take place at the site of hydrogen production and use. It should be borne in mind, however, that the social impacts of hydrogen production span much further than the site of production. Risks of exploitative and adverse labour conditions (child labour, forced labour, accidents and bargaining rights) and risks to local communities (water use and migration) have been shown to be prevalent in the hydrogen supply chain (dos Reis et al., 2024, Martin-Gamboa et al., 2025; Akhtar et al., 2023, Werker et al., 2019). The insights of these analysis have been incorporated where applicable.

To do so it considers indicators and research along different elements of energy justice. For distributive justice it looks at indicators on **energy access and affordability, wealth and ownership distribution and environmental impacts**. Recognition justice looks at indicators centred around **recognition, misrecognition and indigenous rights**. Procedural justice looks at indicators on **public participation, transparency and due process**. In selecting the indicators to be used, we used the GreenPaths Methodological Matrix data set and identified additional indicators and topics from the literature review. These topics and indicators were paired with specific (public) data sources from renowned institutions such as the World Bank, EUROSTAT, IRENA, IEA, World Economic Forum and from policy documents of the EU, the Dutch government and the Moroccan government among others.

## 4 Findings and results

### EU Hydrogen Policy

The EU has put considerable effort into making hydrogen the fuel of the future. In its hydrogen strategy the EU Commission sums up the main reasons why:

‘Hydrogen can be used as a feedstock, a fuel or an energy carrier and storage, and has many possible applications across industry, transport, power and buildings sectors. Most importantly, it does not emit CO<sub>2</sub> and almost no air pollution when used. It thus offers a solution to decarbonise industrial processes and economic sectors where reducing carbon emissions is both urgent and hard to achieve. All this makes hydrogen essential to support the EU’s commitment to reach carbon neutrality by 2050 and for the global effort to implement the Paris Agreement while working towards zero pollution.’ (Commission, 2020, p. 1)

The Commission, thus, sees a great future for hydrogen in meeting the global climate commitments. The EU strategy on hydrogen seeks to materialize this reality through a three ‘phase’ approach. In the first phase, which ran from 2020 to 2024 and has just ended, the objective was to install at least 6 GW of renewable hydrogen electrolyzers in the EU and produce up to 1 million tonnes of renewable hydrogen (European Commission, 2020). The focus in this first phase would be on setting up smaller hydrogen production sites that would give local supply of green or blue hydrogen to existing users of hydrogen. Existing hydrogen production was to be retrofitted with carbon-capture technologies and future medium-range and ‘backbone’ infrastructure would be planned. This initial phase would mainly be concerned with setting up a regulatory framework for a hydrogen market and enabling supply and demand. The regulatory framework came in the form of the Hydrogen and the Decarbonised Gas Market Package which sets out rules among others on tariffs, third party access to infrastructure and transparency requirements in Regulation 2024/1789 and market rules on competition and consumer protection in Directive 2024/1788. To enable supply, investment was encouraged among others through the Green Hydrogen Alliance, a platform that brings together industry stakeholders and ‘bridging the cost gap between conventional solutions and renewable and low-carbon hydrogen and through appropriate State aid rules’ (European Commission, 2020, p. 6)

The second phase, from 2025-2030, sees hydrogen become ‘an intrinsic part’ of the energy system with the objective to install 40 GW of renewable hydrogen electrolyzers and the production of 10 million tonnes of renewable hydrogen (European Commission, 2020, 7). This is the time when demand is geared up for industry and transport. The Commission has done so through uptake requirements of green hydrogen for industry that were introduced in the revision of the Renewable Energy Directive (REDIII) (Directive 2023/2413). These uptake requirements for green hydrogen (or ‘renewable fuels of non-biological origin (RFNBOs)’) ask for an uptake of green hydrogen by 2030 of

'1% of total energy supplied to the transport sector, and at least 42% of all hydrogen used in industry, increasing to 60% in 2035' (European Commission n.d.). To prevent this hydrogen production from harming the green transition in other areas two criteria for RFNBOs were introduced: additionality and temporal and geographic correlation. Additionality requires green hydrogen production to come from new and unsupported renewable energy generation (European Commission, n.d.). Temporal and geographic correlation meanwhile requires that green hydrogen is made only when and where it is available to prevent further fossil use (European Commission n.d.). In the second phase hydrogen 'valleys' will be developed in remote areas, islands and regional systems: these are places where hydrogen production and demand are clustered and situated closer together to cover the entire value chain from production to consumption (European Commission, 2020, p. 7). The second phase also seeks to introduce large scale transport of hydrogen, with a pan-European transport infrastructure and hydrogen trade, in particular with the EU's neighbouring countries. In terms of policy, the EU hopes to scale up through 'gearing up EU's support and stimulate investments to build a fully-fledged hydrogen ecosystem' (European Commission, 2020, p. 7), with the final aim of 'an open and competitive EU hydrogen market, with unhindered cross-border trade and efficient allocation of hydrogen supply among sectors' (European Commission, 2020, p. 7).

The third phase, from 2030 onwards and towards 2050, would see renewable hydrogen technologies reach maturity and be deployed at large scale to reach all hard-to-decarbonise sectors (European Commission, 2020, p. 7). The Commission adds that this requires a massive scale up in renewable energy production as 'about a quarter of renewable electricity might be used for renewable hydrogen production by 2050' (European Commission, 2020, p. 7).

The goals set out in the EU hydrogen strategy were further raised in the Commissions REPowerEU plans (European Commission, 2022). The Commission plan was set up in response to the energy market disruptions caused by the Russian invasion of Ukraine with the aim to reduce the EU's dependence on Russian fossil fuels. Hydrogen is identified in the REPowerEU as one of the six ways to increase the resilience, security, and sustainability of the EU's energy system. On hydrogen, the Commission set the key indicative target of 10 million tonnes of domestic hydrogen production and 10 million tonnes of imported renewable hydrogen by 2030 (European Commission, 2022).

### Case 1: Groningen, The Netherlands

Within the EU, a select group of countries have invested heavily in (renewable) hydrogen. The Netherlands is one of them. The Netherlands has a historically large fossil industry, in no small part because of the discovery in the late 1950's of the 'Groningen gas field', one of the largest fields in Europe. Exploitation started in 1963 through the public-private partnership 'Gasunie' and the gas field remained a massive boon to the Dutch treasury (and the state's fossil partners Shell and ExxonMobil) until its closure in 2022 (Tweede Kamer, 2023). Its closure was due to public pressure in response to land subsidence and earthquakes that were the result of the exploitation of the field (Tweede Kamer, 2023).

The closure of the field meant a recognition for the local population, with the main conclusion of the Dutch parliamentary inquiry into the closure of the fields being: ‘as far as gas extraction is concerned, the interests of the people of Groningen were ignored on a structural basis’ (Tweede Kamer, 2023, p 7.). The closure of the field, however, would also have social impacts, with a Commission JRC report discussing the risk of stranded assets and jobs along the gas value chain reporting risks for thousands of jobs and billions in stranded assets (Spisto et al., 2020). However, the report also already identifies mitigating pathways, among others in the form of hydrogen. Hydrogen would allow much of the infrastructure to be repurposed and many of the skilled workers to remain in the region (Spisto et al., 2020). This is part of why the Northern Netherlands has decided to invest heavily in Hydrogen and to set up the first EU hydrogen valley. Most of the activities of this valley are concentrated in Groningen. The national and local policy framework surrounding the production of Hydrogen in Groningen consist particularly of the Dutch climate agreement (Klimaatpakket, 2019), the National hydrogen programme (Nationaal Waterstof Programma) and its Routekaart Waterstof (Hydrogen Roadmap, 2022), and the National Energy Programma (NPE, 2023). These national policies have set out a goal for 600 MW of hydrogen production in 2025 and 6-8 GW of production by 2030 (Nationaal Waterstof Programma, 2022).

## Case 2: Morocco and the Western Sahara

Morocco plans to develop green hydrogen production to satisfy its own needs for sustainable ammonia and fuels, and also to become a significant exporter (Green Hydrogen Organisation, n.d.). To produce green hydrogen, Morocco needs electricity from renewable sources. The share of renewables in its electricity generation in 2022 was around 17% (IEA, 2022). In its 2021 roadmap on green hydrogen, Morocco set out an ambitious roadmap for green hydrogen production, estimating a total (international) demand for hydrogen equivalent to 8 GW of production capacity in 2030, going to 37 GW in 2040 and 87 GW in 2050 (Kingdom of Morocco, 2021).

To reach its goals, Morocco launched the Moroccan Offer (MASEN, 2025), a call for direct foreign investment in integrated renewable energy and green hydrogen projects, promising various incentives and favourable conditions for investment. Projects under construction are praised by officials as creating jobs, busting the economy and contributing to sustainable development (see e.g. Toutate, 2025). Many of these projects are, however, planned in the Western Sahara. The Western Sahara was a Spanish colony until 1975, when it was annexed by Morocco. Since then, it has been the site of a territorial dispute between Morocco and its indigenous Saharawi population under the Sahrawi Arab Democratic Republic (SADR), led by the Polisario Front (BBC, 2024). Neighbouring Mauritania also has claims on the Western Sahara; the International Court of Justice found in its 1975 advisory opinion that, although both Morocco and Mauritania had legal ties with the Western Sahara, these were not legal ties of sovereignty meaning that the Saharawi people have a right of self-determination. The fighting lasted until 1991, when a UN brokered peace deal was struck and a referendum on independence was announced. The referendum was never organised, however, and Western Sahara remains designated as a non-self-governing territory (UN, n.d.). The dispute has since mainly played out at the UN centring around Algeria,

which houses the leadership of the Polisario front and up to 200.000 Sahrawi refugees, and Morocco (Associated Press, 2025). At the UN, Morocco has sought support for a proposal to keep the Western Sahara as an autonomous region in the Kingdom of Morocco, with increasing success in recent years, in particular with backing from the UN security council in Resolution 2797 (Associated Press, 2025; Faouzi, 2025).

## Distributive justice

### Access to affordable and reliable energy

The first topic that is considered here is the access to affordable and reliable energy. Because the Netherlands is a very wealthy country, many of the metrics for **energy accessibility** indicate full access to electricity for citizens and a supply of 121.157 GWh of which 48.315 (40%) came from renewable sources (IRENA, 2022). The overall share of renewables in total energy usage is low, with only 11% of energy coming from renewable sources (IRENA, 2022). There are two important justice concerns in the area of access to energy: first, whereas all current housing is supplied with electricity, the Dutch energy infrastructure is extremely overburdened with 14.044 businesses waiting for a heavy electricity connection and 8.539 businesses waiting for a feed in connection to deliver electricity to the grid. These requests add up to a staggering 9.131 MW capacity on the waiting list and 4.591 MW waiting for a feed in (Netbeheer Nederland, 2025). This pressure on the grid also affects housing development with a number of housing developments being delayed over a lack of connection to the grid (Netbeheer Nederland, 2025). This comes at a precarious time when most of the Netherlands faces a housing crisis, with a shortage of 396.000 houses in 2025 (Ministerie van Volkshuisvesting en Ruimtelijke Ordening, 2025). Future and existing hydrogen projects require a connection with the grid (ter Berke et al., n.d.) and although the possibility of hydrogen as a means to 'balance the grid' is mentioned, this relies on large scale hydrogen storage (Ter Berke et al., n.d.). Energy infrastructure will likely further be strained when hydrogen projects are added to the grid. Not only the access but also the affordability of renewable energy is strained by the introduction of largescale electrolyzers (Bindi et al. 2025). This problem is exacerbated by the difficulties of the Netherlands to tender offshore wind production at scale which has also been signalled by the responsible ministry (Hermans, 2025). From the perspective of **affordability** another issue is that the Groningen region has one of the highest rates of energy poverty in the Netherlands, at 8.6% in the Province of Groningen and 9% in the Eemsdelta region of Groningen where most of the Hydrogen production takes place (Mulder et al., 2023). Meanwhile the country is struggling with high (renewable) energy prices since the war in Ukraine started, leading to windfall profits for energy companies and extremely high energy costs for consumers (Nicolay et al., 2023). Energy prices have cooled somewhat in the meantime with the average cost of energy being 1.628 Euro per cubic meter of gas and 0.233 Euro per kWh of electricity for households over 2024 (CBS, 2025). At the same time industry prices are substantially lower with 0.487 per cubic meter of gas and 0.132 Euro for a kWh of electricity for large industrial energy users over 2024 (CBS, 2025). The price of energy in the Netherlands is higher than the EU average, both for households and industrial electricity use (which is the highest in Europe according to the Commission

(2025)). The rationale behind substantially lower prices for industry and high subsidies for renewable energy projects is that Dutch industry cannot compete internationally without these subsidies (Anderson et al., 2023). Research however also suggests (renewable) energy subsidies have led to windfall profits in the past (Hulshof & Mulder, 2022).

In Morocco, access to energy is also reported at 100 percent; in 2023 total electricity production was 41.503 GWh with 7.237 GWh (17%) coming from renewable sources (IRENA, 2022). Morocco is heavily dependent on imports, with roughly 90 percent of energy being imported (IRENA, 2022). One of the key reasons for Morocco to focus on green energy is to create energy independence, however, the focus on green hydrogen production for export seems to undercut this energy independence (Tunn et al., 2022; Müller et al., 2020). In terms of affordability, 14 percent of Morocco experiences energy poverty (Kettani & Sanin, 2024). The Western Sahara region meanwhile sees a large amount of power cuts that are likely related with political reasons (figuring frequently on Sahawari National days and during demonstrations) (Allan et al., 2022). Energy poverty also features heavily in the Western Sahara region, with reports of people paying large shares of their income on energy bills, energy 'poaching' through clandestine connections and some people not having a connection at all (Allan et al., 2022). Allan et al. (2022) thus deem electricity an 'exclusive' resource in the Western Sahara, with energy access and affordability utilised in colonial oppression. Unfortunately, there is no data available on the extent of power cuts, energy poverty and access to energy in the Western Sahara. There is a clear risk, however, of further amplifying these inequities when companies establish large scale infrastructure in the Western Sahara region.

### **Wealth, financing and ownership**

Turning to the distribution of wealth and ownership, there is a clear indication that the risks are socialized whereas the benefits are privatised. Outside of the infrastructure, there is no public ownership in the hydrogen economy and there are no community benefit agreements. What is more, fossil majors are currently benefiting the most from subsidies to produce green hydrogen. High energy prices further exacerbate the already strained financial picture for green hydrogen production in the Netherlands. Research concludes that under market circumstances in 2021: "an investment in a 100 MW electrolyser plant needs almost all its investment costs subsidized in order to become break even" (Veenstra & Mulder, 2024, p. 11). This was attributable to the fact that fossil gas-based power plants were the 'price setting' plants and the lack of available green energy. The research concludes that "to make an investment in electrolysis profitable with lower subsidy requirement, the amount of renewable electricity generation needs to grow significantly, or the carbon prices need to be much higher" (Veenstra & Mulder, 2024, p. 11-12). Other research comparing the market conditions between low-carbon hydrogen production at a favourable location with the most efficient transport method and low-carbon hydrogen production in Northwest Europe found that the production of low carbon hydrogen (blue and green) has the lowest cost in Morocco compared to Northwest Europe (Perey & Mulder, 2023). With much of the public investments centring around subsidizing the 'business case' of fossil majors (Moerenhout et al., 2024). This is also true in the case of the Netherlands and Groningen where generous subsidy

schemes have been set up to finance green hydrogen projects. In the latest round of the financing scheme, hydrogen producers could gain up to 80 percent of the cost of setting up green hydrogen facilities and 4 euro per kgH<sub>2</sub>; in comparison, the levelized cost of 'grey' hydrogen is 0.262847965 €/KgH<sub>2</sub>. The difference is roughly 16 times the original price, most of which gets paid from subsidies by the government: according to Dutch government, 'It is assumed that the government covers 75-90 percent of the added costs of producing RFNBO's' (Hermans, 2025b, p. 3). This puts into question the efficiency of producing green hydrogen in the Netherlands in the first place, something that has also been signalled in the literature (Perey and Mulder, 2023; Van der Zwaan et al., 2021).

In terms of ownership, wealth and financing a number of problematic relationships arise in the context of hydrogen production in Morocco. First, the relationship between the EU (including its multinationals) and Morocco is considered problematic from a distributive perspective. Morocco is investing large amounts of public funds to attract Western multinationals that will produce hydrogen to export to the EU (Faouzi, 2025). The Moroccan plans clearly emphasise this perspective of a strong focus on exports of Green Hydrogen. Public ownership of energy production here is not present nor are there any community benefit agreements. Arguably the most problematic dimension, however, are risks of green grabbing: 'the appropriation of land and resources for purportedly environmental ends' (Hamouchene, 2023 p. 34) and 'green colonialism'. Previous projects within Morocco's territory raise such distributive concerns in terms of green grabbing. For example, Ouarzazate is said to be one of the largest solar power plants in the world (Aoulouhaj, 2025). It takes 3,000 ha of land previously owned in common by the local Amazigh population (Hamouchene, 2023). All this land is said to have been expropriated without proper consultation with the local population, not to mention their consent (Hamouchene, 2023; Haag, 2022). The land was grossly undervalued. What was usually sold for 10 to 12 Moroccan Dirhams per square meter was now estimated to 1 Moroccan Dirham per square meter (Haag, 2022). It is fair to assume that this was done to lower the amount of compensation due to expropriation. The local population did not effectively receive any fair share of the money paid through the compensation for the expropriation nor did they have any say on how this money, which was placed in a special fund, is to be spent (Haag, 2022).

A more egregious form of green grabbing happens in the Western Sahara, where Morocco is realising such renewable projects on occupied land. As a matter of fact, many of the projects meant for the attainment of Morocco's renewable energy goals (as much as 30 percent of its solar energy for example (Allan et al., 2022)) are or will be located in the Western Sahara without prior consent of the local population (Western Sahara Resource Watch, 2025a). EU energy Moreover, the so called 'Moroccan offer', which came into force in March of 2024 offers foreign investors huge swathes of land (between 10,000 and 30.000 hectares) and financial support to realise green hydrogen projects (Head of Government, 2025). The first round of investment under the Moroccan offer has led to a number of international investors: 'The investor consortium "ORNX" comprises the American company "Ortus," the Spanish company "Acciona," and the German company "Nordex," which will invest in ammonia production. Another consortium, consisting of the Emirati company "Taqa" and the Spanish company

"Cepsa," "ill focu" on ammonia and industrial fuel production' (Kingdom of Morocco, 2025). A large share of the land allocated for these projects, however, is located in the Western Sahara (Western Sahara Resource Watch, 2025a). This land (up to one million hectares) is considered 'public land' by the Moroccan state, which has been accrued as part of its illegal occupation of the Western Sahara and the displacement of the Saharawi population (Western Sahara Resource Watch, 2023). Importantly, it has been reported that the jobs created by these projects are not available to the local Saharawi population, but to Moroccan settlers (Müller et al., 2022).

### **Environmental effects**

From the perspective of environmental effects, there are a number of important factors at play in the production of green hydrogen. In the case of the Netherlands environmental effects from the production of green hydrogen are likely limited. The main risk seems to come from the use of blue hydrogen instead of green hydrogen to fuel the transition. Blue hydrogen's two main risks (methane leaks and faulty CCS systems) have not been properly addressed by the European Commission in its delegated regulation on hydrogen according to climate and industry groups (Bartlett, 2025; Todts et al. 2025). In particular, the default assumptions of emissions resulting from upstream processes such as methane leakage which have allegedly been lowered under pressure from the fossil gas industry (Todts et al. 2025). Moreover, the lack of scalability of CCS systems may mean that the expected lower emissions from blue hydrogen are a paper reality (Bartlett, 2025; Todts et al. 2025). If these problems are not resolved,

In Morocco meanwhile the most notable risk of the production of green hydrogen is that of exacerbating the current water shortage in the area (Wehrey & Bonney, 2025). Morocco is facing both a water shortage and water stress (World Bank Group, 2023). These problems are further exacerbated by green hydrogen production:

'The water intensity of green hydrogen stresses limited water resources, which already are being depleted by rising water demand and climate change. Further constriction of water availability would increase the vulnerabilities of local communities and compound the environmental and financial costs to address them' (Shehabi, 2024).

The main way in which these risks are said to be met is through desalination. Desalination, however, carries its own risks: first, desalination is expensive and requires a lot of energy, this means additional energy capacity and funding is necessary to realise desalination facilities (Shehabi, 2024). Second, there are large environmental consequences to desalination, particularly in the production of brine and other by-products of the process of desalination process (Shehabi, 2024). Moreover, desalination already further exacerbates the situation in the Western Sahara, where multiple desalination projects are set to use wind energy sourced in the Western Sahara and a desalination plant that is to be realised in occupied territory and (MacDonald, 2025; Western Sahara Resource Watch, 2025b). These plants further the dependency of Morocco on water and energy from the occupied territories and make green hydrogen production dependent on the colonial exploitation of resources.

## Recognition Justice

The recognition of vulnerable and particularly affected individuals is lacking in the EU framework of public participation. The Aarhus Convention identifies two groups of people that can take part in decision making processes, the 'public concerned' and 'the public', where the public is defined as 'all natural and legal persons together with their associations, organisations or groups' (Gómez and Rehage 2024). The public concerned is defined as those individuals whose interests may be affected. These definitions do not guarantee that vulnerable or marginalized groups of people are included in the participatory processes. Gómez and Rehage (2024) thus note a blindspot in the Convention where privileged and vulnerable or marginalized individuals are treated equally despite not being equal.

Rodhouse et al. (2024) studied the dimension of recognition justice in hydrogen production in Groningen by investigating who the 'imagined publics' are, i.e. who was recognized as a subject that would be impacted by the transition. Examples of the categories of imagined publics that they found were workers that could benefit from (re-)employment, uninformed general publics, critical publics with safety concerns and households that may benefit from blending gas and hydrogen (Rodhouse et al., 2024). Most of these perceived impacts are either positive or would be positive once these people are properly informed. They found that among policymakers there were a lot of 'deficit model assumptions' about publics – the public was seen as deficient in knowledge and understanding (Rodhouse et al., 2024). Other deficiencies of the public were considered in their direct use of hydrogen where people are 'seen as motivated primarily by comfort, convenience, habit, and economic incentives (...) unwilling to accept too much change or to experience too much (temporary) discomfort for the benefit of a sustainability-driven transition' (Rodhouse et al., 2024, p. 9). These assumptions about the public influence the engagement approaches, where the aim is to minimize the impact of transitions and where the scope of opportunities for participation by publics become limited (Rodhouse et al., 2024). This is a misrecognition where previous research has shown that such assumed deficiencies are stereotypical and incorrect and pervasive in energy governance (Rodhouse et al., 2024).

Non-recognition is present in many of the Dutch policy vision documents where publics were unable to take part in the imagination and formulation of desirable and just future hydrogen systems (Rodhouse et al., 2024). In many of the vision documents no citizens, future consumers or other publics were involved being unable to establish their own position, status and roles in the transition. Another recognition problem comes from the lack of recognition of 'institutionalised knowledge, values, roles, and relationships' where large investments of public money are mobilized to give industrial clusters access to large amounts of hydrogen (Rodhouse et al., 2024, p. 9). Such investment is justified by referencing 'cost effectiveness, availability of renewable alternatives in other sectors, and continued economic growth', without which the Netherlands will lose its energy-intensive petrochemical and steel industries (Rodhouse et al., 2024, p. 9). This ignores the fact that such prioritization of industry is deemed unfair by large groups in Dutch society and that there has been large public resistance against this protection of fossil industries that impact people's health, living environment and the climate. This is

apparent from the large-scale demonstrations against ‘fossil subsidies’ that have taken place over the past years (De Kleer et al., 2024) This may lead to further scrutiny from regional and local communities for example in subsurface activities around hydrogen storage. The lack of visioning surrounding (co-)ownership or (co-)production of hydrogen is another problematic feature of these visioning documents (Rodhouse et al., 2024). Moreover, the lack of involvement in vision formation may compound distributional justice concerns where the North Netherlands may again be responsible for the energy supply in the Netherlands without reaping concrete and positive benefits, contributing to the image of these regions as being exploited and used. These perspectives are further corroborated by research on the acceptability of hydrogen, where people mistrust the involvement of fossil companies and the use of blue over green hydrogen, further indicating their knowledge of hydrogen and its production (Palomo-Vélez et al. 2025)

When it comes to recognition justice in Morocco, the EU plans for a hydrogen economy have been weaponised in order to advance support for its proposal concerning incorporation of Western Sahara as an “autonomous” region. Close cooperation between Germany and Morocco on hydrogen was halted by Morocco to move Germany to support this proposal (Reyes, 2022). The German government did so in 2022, explicitly mentioning the importance of cooperation on green energy (Reyes, 2022). The findings related to distribution and recognition justice speak to the disregard of the interests of local communities, especially the Saharawi people of Western Sahara. The exploitation of the natural resources of WS and even Morocco seems to be done unilaterally, taking care of the interests of the investors only. The disregard for the Sahrawi interests was proved before the CJEU. The CJEU established that the Association Agreement between Morocco and the EU is in breach of international law as it does not provide either for explicit or implied consent of the Sahrawi people for the exploitation of Western Sahara natural resources (Judgments of the Court in Joined Cases C-778/21 P and C-798/21 P | Commission and Council v Front Polisario and in Joined Cases C-779/21 P and C-799/21 P | Commission and Council v Front Polisario ). The CJEU set the criteria for implied consent. It said:

‘First, the agreement in question must not give rise to an obligation for that people. Second, the agreement must provide that the people itself, which cannot be adequately represented by the population of the territory to which the right of that people to self-determination relates, receives a specific, tangible, substantial and verifiable benefit from the exploitation of that territory’s natural resources which is proportional to the degree of that exploitation. That benefit must be accompanied by guarantees that that exploitation will be carried out under conditions consistent with the principle of sustainable development so as to ensure that non-renewable natural resources remain abundantly available and that renewable natural resources, such as fish stocks, are continuously replenished. Lastly, the agreement in question must also provide for a regular control mechanism enabling it to be verified whether the benefit granted to the people in question under that agreement is in fact received by that people.’ (COMMISSION AND COUNCIL V FRONT POLISARIO, para 181).

As the production of green energy and green hydrogen means the use of land and water on a particular territory, it constitutes an exploitation of those natural resources. Therefore, if it is done on the territory of the Western Sahara, it has to be done with the

consent of the Saharawi people. Otherwise, it constitutes a breach of international law and EU law. It is important to stress that, in our view, it is not only the EU and the Member States that are bound by these judgments, but also the EU-based companies. This means that EU-based companies investing in projects in WS that are bound to exploit the natural resources of the Western Sahara violate EU law if they do not secure the explicit or implied consent of the people of the Western Sahara. The recent projects by European partners in the Western Sahara region thus run counter to this requirement and violates the principles of recognition justice for the Saharawi people.

## Procedural Justice

Procedural justice has a strong dimension in the EU legal framework among others in the Treaty on the European Union (article 11) and the Aarhus Convention. Squintani and Schouten (2022) specifically wrote about public participation in the EU hydrogen Economy with a focus on Groningen. Article 11(1) of the TEU states that EU institutions will 'give citizens and representative associations the opportunity to make known and publicly exchange their views in all areas of Union action'. Macro-level decisions in policies, plans and programmes often limit the space for micro-decisions (specific decisions on permits and projects) even though people are more inclined to participate at the micro-level (Perlaviciute & Squintani, 2023; Gómez & Rehage 2024).

These legal requirements for public participation, however, do not necessarily translate to effective participation at the level of energy policy. The 2020 EU Hydrogen Strategy for instance did have a public participation procedure, however, this was only open for ten business days, which falls short of the reasonable timeframe required by the Aarhus Convention (Gómez & Rehage (2024)). The consultation received 279 comments, of which only 35 came from citizens. Squintani and Schouten (2022) also found 'shortcomings in the drafting and implementation of the regulatory framework on public participation as regards the development of a hydrogen economy at all levels of governance, from the EU to the local level.' Most of the important policy decisions such as the investments in the hydrogen economy and the organisation of infrastructure and storage were made at a macro-level without participation (Squintani & Schouten, 2022). At the project level too procedural justice concerns arose. Squintani and Schouten mention a storage facility project where the participatory plan explicitly mentioned that the location of the hydrogen storage location was not part of the participatory procedure (Squintani & Schouten, 2022). This lack of adequate participation was also noted by Rodhouse et al. (2024).

There are risks for procedural justice in Morocco based on the indicators for different dimensions of procedural justice. For example, Morocco has a transparency index of 11/20 (Mungiu-Pippidi, 2022), the world Press Freedom Index gives it a score of 48.04/100 (Reporters Without Borders, 2025). Also in terms of due process and corruption Morocco scores poorly with an Index of Public Integrity (which looks at the opportunities and constraints for corruption) score of 5.34/10 (Mungiu-Pippidi, 2022), a Fragile State Index (measuring the risk of social, political and economic conflicts, with higher scores indicating greater fragility) of 68.8/120 (The Fund for Peace, 2025) and a Rule of Law Index (measuring a range of justice related indicators including government

constraints, corruption and fundamental rights) score of 0.48/10 (World Justice Project, 2025) leaving it below or just at the global average in many of these indexes. Besides the issues highlighted at the previous section, various sources point to the significant procedural justice problems in Western Sahara. In 2010, several thousand Saharawis established a Gdim Izik camp in the desert near El Aaiun to protest the social and economic exclusion (Western Sahara Resource Watch, 2017). The protest was violently dispersed by the Moroccan authorities, and the activists were illegally detained and sentenced to severe prison sentences, while many were tortured (United Nations Office of the High Commissioner for Human Rights, 2023). Another telling example of suppression of the freedom of expression is the illegal detention and harassment of Sultana Khaya, the president of an organization called “League for the Defense of Human Rights and Against the Plunder of Natural Resources” by the police (Amnesty International, 2021). Along with the exploitation of natural resources without their consent, these reports show that Saharawis’ voice is suppressed even when they try to protest their exclusion. Even within Morocco, some sources report that the inclusion of the local community in decision-making related to green energy projects is limited to awareness campaigns (Yahyaoui, 2024). Even if the local community members were invited to public meetings, they received information in a language they did not understand (Haag, 2022). Sometimes, they were told straightforwardly that they had no choice but to accept the project (Haag, 2022). Finally, some other sources express concerns that the public participation of local communities was suppressed (Müller et al. 2022).

## 5 Main results

The analysis shows that whereas there are potential environmental benefits to a transition to a green hydrogen economy, EU and national policies insufficiently address the (risk of) injustices that arise in the production of green hydrogen. Risks of distributive injustices, in terms of access to energy and its affordability, and where the benefits are not shared with (energy poor) local communities and will largely flow to European based fossil energy companies, are present in both Groningen and the Western Sahara. However, these risks materialised differently in both cases. In Groningen distributional concerns around the high cost of energy and the financial viability of green hydrogen production take centre stage. Meanwhile in Morocco distribution justice concerns surround the access to water and energy, resource extraction, the distribution of financial risks and in the Western Sahara particularly colonial dynamics of land grabbing and exploitation (Müller et al., 2022; Tunn et al., 2024).

In terms of recognition justice, again similar risks of underrepresentation and misrecognition were shared between both case studies. In the Groningen case study particularly through insufficient effective participation in hydrogen projects and a lack of recognition of past injustices incurred during the gas drilling in the region (Rodhouse et al., 2024). These risks appear insufficiently addressed in the overarching EU regulation and governance structures for green hydrogen projects, while in the concrete

projects under examination we find little evidence of acknowledgement and mitigation measures. Moreover, in terms of recognition justice we found that in particular in the Western Sahara, indigenous and land rights had not been recognized, and there seems to have been little to no recognition of the most vulnerable members of the community and plans were not properly including a breadth and diversity of voices.

In terms of procedural justice, public participation is ineffective in both the Netherlands and Morocco. In the Netherlands procedural risks centre around a lack of effective participation, with little room for participation by citizens. In Morocco, risks are present across all parts of procedure, from transparency and corruption to due process. These risks were further exacerbated due to poor indicators in terms of procedural justice with low scores and risks associated to little transparency, corruption, poor public participation and obstructed civil society. While Morocco scores poorly on many of the indicators for transparency and due process, the situation is particularly critical for the Western Sahara, where the protection of indigenous rights seem far from secured and democratic processes insufficiently give voice to these actors (Müller, 2022).

## 6 Discussion and conclusions

The findings show that there may be a blind spot in EU law and policy on the hydrogen transition regarding the justice consequences of such policies. Whereas the EU targets for renewable hydrogen uptake have pushed Member States towards supporting green hydrogen production and demand creation, EU policy has focused too much on the abstract and aggregate economic and CO<sub>2</sub>-related costs and benefits of this transition. The social (and in particular the justice) dimension of this transition has received little to no attention in EU policy. Significant additional concerns emerge once one integrates (energy) justice concerns along the lines of distributional justice, recognition justice and procedural justice in risk and impact assessments. Both in terms of the domestic effects of the policy proposals and in their international context, little attention is paid to the injustices that accompany the hydrogen transition. The review shows that these risks are substantial. In terms of distribution, established fossil corporations are gaining large public investments to realise the EU hydrogen economy in energy-poor regions. The benefits and costs of this transition are largely skewed in favour of business interests as opposed to public finances and local communities. This distributional issue is further exacerbated by the lack of public participation in both areas and the lack of recognition of local voices and indigenous rights. The EU's policy on achieving a green hydrogen economy has thus become part of colonial dynamics and land grabbing in Northern Africa. Taking a life cycle perspective, however, highlights further risks of negative environmental and social effects, particularly in respect of the critical raw materials required to build electrolyser facilities. Many of these materials and components are sourced in China, India and South Africa where the production causes a range of social and environmental harms (dos Reis et al., 2024; Werker et al., 2019). These impacts should not be left outside of the scope of EU action, as is currently often the case.

In terms of recognition justice, the case study has made clear that there is insufficient recognition of marginalised and vulnerable groups inside of the Union and outside. Within the Union we can see how higher-level policy approaches restrict and narrow participation by the public at the micro scale, often through inadequate response deadlines and based on a presumed lack of technological or scientific knowledge of sustainability transitions. These technocratic ways in which the transition is approached not only misrecognises public knowledge and views, but they also ignore relevant and legitimate concerns surrounding distributive and procedural justice. The lack of adequate attention to dimensions of representation and recognition further exacerbate this. Outside of the Union we see how Union policies carry on colonial legacies of exploitation, resource extraction and human rights violations. This is apparent in the case of the Western Sahara, where European companies extract natural resources on occupied territory, legitimising and entrenching colonial appropriation of the Western Sahara by Morocco.

There were several gaps in the data. First, there is almost no data on many of the indicators used for the Western Sahara, this means that it is hard to quantify the situation on the ground. Second, we lacked access to the specific agreements that are set up by private and government institutions to realise the green hydrogen economy. These contracts and agreements would allow for further scrutiny of the distributional consequences of hydrogen projects, in particular which parties carry the financial risks, and which parties stand to profit. Third, there is a lack of publicly available impact assessments of existing hydrogen production sites and infrastructure, access to such information would have made the existing analysis much more detailed. Future research should seek ways in which these justice dimensions can be integrated in EU and national policymaking, including ways in which the availability of relevant information can be secured. The literature on environmental justice in general and energy justice in particular can be a good starting point for such an anchoring.

## 7 Recommendations

In terms of recommendations that flow from the case study we will present these along the same three justice dimensions that were used in the case study:

In terms of distributive justice, what is clear from the two cases is that local communities and society more broadly do not benefit directly from projects in the green hydrogen economy. EU, national and local policies should seek to distribute the benefits from these transitions more broadly, allowing for (financial and ownership) participation in green hydrogen projects. This could be achieved either through public investment in green energy and hydrogen that allows for access to renewable energy and a reduction in energy poverty or through community benefit agreements that share the wealth created by large scale energy projects. Moreover, more action is needed to prevent human rights and environmental degradation along the value chain, with large risks of complicity of human rights abuses in Morocco and elsewhere.

In terms of recognition justice, EU procedures for participation and impact assessment should focus more on integrating perspectives of vulnerable groups and communities. More weight needs to be given to vulnerable groups that are especially affected by energy policies, possibly even within the framework of the Aarhus Convention (Squintani & Schouten, 2024). In its external policy, the EU misrecognises or even ignores the risks for indigenous rights of the Sahrawi people in Morocco. The recent trade agreement with Morocco further amplifies this picture, where the Commission has in secret negotiated a new FTA with Morocco with no influence from the Sahrawi peoples (Pelliconi & Von Massow, 2025). In terms of procedural justice, there are important concerns in cooperating with Morocco, especially in the Western Sahara. Future cooperations need strong rule of law integration and requires an increase in transparency. Moreover, formal consent from the Sahrawi people is necessary. As for the EU, in terms of public participation the literature has some clear suggestions for improvement:

‘It is important that the Aarhus Convention requirements on public participation are applied in full, at all levels of government, including in case of plans and programmes from semi-public bodies. Macro-level policy options can then be subject to public participation when they are drafted and thus easy to change, rather than when they are implemented at project level, often by different parties than those who can shape macro-level policy options. Finally, the visibility of the duty of public participation in the context of the development of the hydrogen economy would benefit from a clearer framework on public participation at EU level.’ (Squintani & Schouten, 2024, p. 170)

## 8 References

- Allan, J., Lemaadel, M., & Lakhal, H. (2022). Oppressive energopolitics in Africa's last colony: Energy, subjectivities, and resistance. *Antipode*, 54(1), 44-63.
- Akhtar, M. S., Khan, H., Liu, J. J., & Na, J. (2023). Green hydrogen and sustainable development—a social LCA perspective highlighting social hotspots and geopolitical implications of the future hydrogen economy. *Journal of Cleaner Production*, 395, 136438.
- Anderson, B., Cammeraat, E., Dechezleprêtre, A., Dressler, L., Gonne, N., Lalanne, G., Guilljoto, J. M. & Theodoropoulos, K. (2023). Designing policy packages for a climate-neutral industry: A case study from the Netherlands. *Ecological Economics*, 205, 107720.
- Amnesty International (2021, March 18). *Morocco/Western-Sahara: Sahrawi activist abused under house arrest: Sultana Khaya*. Amnesty International. <https://www.amnesty.org/en/documents/mde29/3815/2021/en/>
- Aoulouhaj, A. (2025, June 6). *The German Development Bank gives the Noor I power plant in Ouarzazate a resounding thumbs up*. Atalyar. <https://www.atalayar.com/en/articulo/economy-and-business/the-german-development-bank-gives-the-noor-i-power-plant-in-ouarzazate-resounding-thumbs-up/20250625100000216224.html>
- Apergi, M., Eicke, L., Goldthau, A., Hashem, M., Huneus, S., de Oliveira, R. L., ... & Veit, K. (2024). An energy justice index for the energy transition in the global South. *Renewable and Sustainable Energy Reviews*, 192, 114238.
- Associated Press. (2025, October 31). *UN approves resolution supporting Morocco's claim to Western Sahara*. The Guardian. <https://www.theguardian.com/world/2025/oct/31/un-approves-resolution-supporting-moroccos-claim-to-western-sahara>
- Azemzi, H. (2025). Governance and policy approaches for addressing water scarcity: insights from Morocco. *Euro-Mediterranean Journal for Environmental Integration*, 1-12.
- Bauer, C., Treyer, K., Antonini, C., Bergerson, J., Gazzani, M., Gencer, E., ... & Van der Spek, M. (2022). On the climate impacts of blue hydrogen production. *Sustainable Energy & Fuels*, 6(1), 66-75.
- Baker, E., Carley, S., Castellanos, S., Nock, D., Bozeman III, J. F., Konisky, D., ... & Sovacool, B. (2023). Metrics for decision-making in energy justice. *Annual Review of Environment and Resources*, 48(1), 737-760.
- Bindi, J., Bartolomei, F., Pellegrini-Masini, G., Agostini, A., & Padovan, D. (2025). Assessing social impacts and Energy Justice along green hydrogen supply chains: a capability-based framework. *Energy Research & Social Science*, 126, 104149.
- Centraal Bureau voor de Statistiek (CBS) (2025, September 30). *Eindverbruikersprijzen aardgas en elektriciteit*. CBS. <https://opendata.cbs.nl/#/CBS/nl/dataset/85666NED/table>

- European Commission and Council of the European Union v Front populaire pour la libération de la Saguia el-Hamra et du Rio de oro (Front Polisario). Judgment of the Court (Grand Chamber) of 4 October 2024. ECLI:EU:C:2024:835.
- Commission delegated regulation (EU) specifying a methodology for assessing greenhouse gas emissions savings from low- carbon fuels Brussels, (8.7.2025C(2025) 4674 final)
- Collins, L. (2025, April 25) *Billions of euros allocated, but only 21% of green hydrogen projects awarded IPCEI funding by EU have reached FID*. Hydrogen Insight. <https://www.hydrogeninsight.com/policy/billions-of-euros-allocated-but-only-21-of-green-hydrogen-projects-awarded-ipcei-funding-by-eu-have-reached-fid/2-1-1811477>
- Dillman, K. J., & Heinonen, J. (2022). A 'just'hydrogen economy: a normative energy justice assessment of the hydrogen economy. *Renewable and Sustainable Energy Reviews*, 167, 112648.
- Directive 2023/2413. *Directive (EU) No. 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources*. <http://data.europa.eu/eli/dir/2023/2413/oj>
- Directive 2024/1788. *Directive (EU) No 2024/1788 of the European Parliament and of the Council of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen*. <http://data.europa.eu/eli/dir/2024/1788/oj>
- dos Reis, R. A., Rangel, G. P., & Neto, B. (2024). Social life cycle assessment of green hydrogen production: Evaluating a projected Portuguese industrial production plant. *Renewable Energy*, 235, 121293.
- de Kleer, D., van Teutem, S., & De Vries, C. E. (2024). Public support for pro-climate and counter-climate protests. *Open Sci Framew*, 1-93.
- European Commission (2020, July 8). *Communication from the Commission to the European parliament, the Council, the European economic and social committee and the Committee of the regions: A hydrogen strategy for a climate-neutral Europe*. (Report: COM(2020) 301 final) <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52020DC0301>
- European Commission (2022, May 18). *Communication from the Commission to the European parliament, the Council, the European economic and social committee and the Committee of the regions: REPowerEU Plan* (Report COM/2022/230 final)
- European Commission (no date). *Renewable hydrogen*. European Commission, Directorate-General for Communication. [https://energy.ec.europa.eu/topics/eus-energy-system/hydrogen/renewable-hydrogen\\_en](https://energy.ec.europa.eu/topics/eus-energy-system/hydrogen/renewable-hydrogen_en)
- Faouzi, A. (2025, October 3). *Germany, Netherlands, Czech Republic Back Morocco's Green Hydrogen Push*. Morocco World News. <https://www.moroccoworldnews.com/2025/10/261769/germany-netherlands-czech-republic-back-moroccos-green-hydrogen-push/>

- Fladvad, B. (2023). Infrastructuring environmental (in) justice: green hydrogen, Indigenous sovereignty and the political geographies of energy technologies. *Geographica Helvetica*, 78(4), 493-505.
- Gómez, A. F., & Rehage, R. (2024). Is Public Participation in Hydrogen Matters (Un) just? Evaluating the Ex-/inclusion of the Vulnerable and Marginalised Individuals in the Hydrogen Decision-Chains of the EU, Spain and Germany. *Journal for European Environmental & Planning Law*, 21(3-4), 318-342.
- Fortier, M. O. P., Teron, L., Reames, T. G., Munardy, D. T., & Sullivan, B. M. (2019). Introduction to evaluating energy justice across the life cycle: A social life cycle assessment approach. *Applied energy*, 236, 211-219.
- Fraser, N. (2008). Social justice in the age of identity politics: Redistribution, recognition, and participation. In *Geographic thought* (pp. 72-89). Routledge.
- Green Hydrogen Organisation. (no date). *Morocco*. Gh2.org. <https://gh2.org/countries/morocco#:~:text=Green%20hydrogen%20vision,ammonia%20imports%20with%20local%20production>
- Haag, L. (2022). Environmental colonialism in the Maghreb? Harnessing green energy on indigenous peoples' land. *The Swedish Institute of International Affairs*.
- Hamouchene, H. (2023). *Dismantling Green Colonialism: Energy and Climate Justice in the Arab Regio*. Pluto Press.
- Head of Government (2024, March 11) *Implementation of the Morocco Offer for the development of the green hydrogen sector(s)*. Kingdom of Morocco. <https://www.masen.ma/en/green-hydrogen-moroccan-offer>
- Heffron, R. J., McCauley, D., & Sovacool, B. K. (2015). Resolving society's energy trilemma through the Energy Justice Metric. *Energy Policy*, 87, 168-176.
- Hermans, S.T.M. (2025a, February 18). *Kamerbrief met reactie op moties over de jaarverplichting RFNBO's in industrie* [Letter of Government] Ministerie van Klimaat en Groene Groei. <https://www.rijksoverheid.nl/documenten/kamerstukken/2025/02/18/kamerbrief-moties-van-de-leden-erkens-en-flach-inzake-de-jaarverplichting-rfnbo-s-in-industrie>
- Hermans, S.T.M. (2025b, September 16). *Aanbiedingsbrief bij Actieplan windenergie op zee*. [Letter of Government] Ministerie van Klimaat en Groene Groei. <https://www.rijksoverheid.nl/documenten/kamerstukken/2025/09/16/actieplan-windenergie-op-zee>
- Howarth, R. W., & Jacobson, M. Z. (2021). How green is blue hydrogen?. *Energy Science & Engineering*, 9(10), 1676-1687.
- Hulshof, D., & Mulder, M. (2022). Design of Renewable Support Schemes and Windfall Profits: A Monte Carlo Analysis for the Netherlands. *The Energy Journal*, 43(5), 181-204.
- Deasy-Millar, A., Fraile, D., Muron, M., Pawelec, G., Santos, S. & Olivia Staudenmayer, O. (2025). *Clean Hydrogen Monitor 2025*. Hydrogen Europe.

- International Energy Agency. *Energy and Carbon Tracker 2022*. International Energy Agency. <https://www.iea.org/data-and-statistics/data-product/iea-energy-and-carbon-tracker-2022>
- International Energy Agency. (no date) *Share of renewables in energy consumption in Morocco*. International Energy Agency. <https://www.iea.org/countries/morocco/renewables#what-is-the-role-of-renewables-in-electricity-generation-in-morocco>
- Jenkins, K., McCauley, D., Heffron, R., Stephan, H., & Rehner, R. (2016). Energy justice: A conceptual review. *Energy research & social science*, *11*, 174-182.
- Kalt, T., Simon, J., Tunn, J., & Hennig, J. (2023). Between green extractivism and energy justice: competing strategies in South Africa's hydrogen transition in the context of climate crisis. *Review of African Political Economy*, *50*(177-178), 302-321.
- Kettani, M., & Sanin, M. E. (2024). Energy consumption and energy poverty in Morocco. *Energy Policy*, *185*, 113948.
- Kingdom of Morocco (2025, March 7) *Five National, International Operators to Develop Six Green Hydrogen Projects in Southern Morocco, \$31 Million Investment*. Maroc.ma, Ministry of Youth, Culture and Communication. <https://www.maroc.ma/en/news/five-national-international-operators-develop-six-green-hydrogen-projects-southern-morocco-31>
- Kingdom of Morocco (2021) "Feuille de route de l'hydrogène vert: Vecteur de Transition Énergétique et de Croissance Durable,".
- Landkton, T., & DeVar, S. (2021). Justice in 100 metrics. *Initiative for Energy Justice*.
- Lindner, R. (2023). Green hydrogen partnerships with the Global South. Advancing an energy justice perspective on "tomorrow's oil". *Sustainable Development*, *31*(2), 1038-1053.
- MacDonald, A. (2025, November 6). *Fifty years of plunder: How Morocco and its allies profit from Western Sahara*. Middle East Eye. <https://www.middleeasteye.net/news/western-sahara-fifty-years-plunder-profit-morocco-allies>
- Martín-Gamboa, M., Mancini, L., Eynard, U., Arrigoni, A., Valente, A., Weidner, E., & Mathieux, F. (2025). Social life cycle hotspot analysis of future hydrogen use in the EU. *The International Journal of Life Cycle Assessment*, *30*(6), 1379-1396.
- Masen (n.d.) *Green Hydrogen Morocco Offer*. Moroccan Agency for Sustainable Energy. <https://www.masen.ma/en/green-hydrogen-moroccan-offer>
- McCauley, D. A., Heffron, R. J., Stephan, H., & Jenkins, K. (2013). Advancing energy justice: the triumvirate of tenets. *International Energy Law Review*, *32*(3), 107-110.
- Ministerie van Volkshuisvesting en Ruimtelijke Ordening (2025) Het statistisch woningtekort uitgelegd. Ministerie van Volkshuisvesting en Ruimtelijke Ordening. <https://www.volkshuisvestingnederland.nl/onderwerpen/aanpak-woningtekort/berekening-woningbouwopgave>
- Moerenhout, J., van Nuffel, L., de Haas, V. & Jagtenberg, H. (2024) *Onderzoek naar vraagstimulering voor groene waterstof in de Nederlandse industrie: Analyse van vijf*

*mogelijke*

*instrumenten.*

Trinomics.

<https://www.rijksoverheid.nl/documenten/rapporten/2025/07/14/onderzoek-naar-vraagstimulering-waterstofindustrie>

- Mohideen, M. M., Subramanian, B., Sun, J., Ge, J., Guo, H., Radhamani, A. V., ... & Liu, Y. (2023). Techno-economic analysis of different shades of renewable and non-renewable energy-based hydrogen for fuel cell electric vehicles. *Renewable and Sustainable Energy Reviews*, *174*, 113153.
- Moktadir, M. A., & Ren, J. (2025). An Innovative Social Life Cycle Decision-Making Model for Assessing Social Sustainability: A Case of Green Hydrogen Production. *Sustainable Development*.
- Müller, F., Tunn, J., & Kalt, T. (2022). Hydrogen justice. *Environmental Research Letters*, *17*(11), 115006.
- Mungiu-Pippidi, A. (2022) "Transparency and Corruption: Measuring real transparency by a new index" Regulation and Governance. DOI: 10.1111/rego.1250.
- Netbeheer Nederland (2025, October 6). *Stand van Uitvoering: De voortdurende beweging op het gebied van elektriciteit*. Netbeheer Nederland halfjaarpublicatie. <https://www.netbeheernederland.nl/publicatie/stand-van-de-uitvoering-halfjaarpublicatie-2025>
- Nicolay, K., Steinbrenner, D., Woelfing, N., & Spix, J. (2023). The effectiveness and distributional consequences of excess profit taxes or windfall taxes in light of the Commission's recommendation to Member States.
- Palomo-Vélez, G., Perlaviciute, G., Contzen, N., & Steg, L. (2025). How company history and hydrogen type shape public trust and acceptability: A reputation management perspective. *Energy Research & Social Science*, *127*, 104279.
- Patonia, A. (2025). Green hydrogen and its unspoken challenges for energy justice. *Applied Energy*, *377*, 124674.
- Pelliconi, A.M. & Von Massow, S. (2025 October 16). How Not to Trade with Occupying Powers: Western Sahara and the Amendment to the EU-Moroccan Association Agreements. *EJIL:TALK*. <https://www.ejiltalk.org/how-not-to-trade-with-occupying-powers-western-sahara-and-the-amendment-to-the-eu-moroccan-association-agreements/>
- Perey, P., & Mulder, M. (2023). International competitiveness of low-carbon hydrogen supply to the Northwest European market. *International Journal of Hydrogen Energy*, *48*(4), 1241-1254. <https://doi.org/10.1016/j.ijhydene.2022.10.011>
- Perlaviciute, G., & Squintani, L. (2023). Time to talk about values, time to say no: What drives public participation in decision-making on abstract versus concrete energy projects?. *PLOS Climate*, *2*(8), e0000228.
- Project, W. J. (2025). WJP Rule of Law Index 2025. <https://worldjusticeproject.org/rule-of-law-index/>
- Reporters Without Borders (2025). *Morocco/ Western Sahara*. Reporters Without Borders. <https://rsf.org/en/country/morocco-western-sahara>

- Regulation 2024/1789. *Regulation (EU) No 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen*. <http://data.europa.eu/eli/reg/2024/1789/oj>
- Reyes, E., 2022. *Morocco and Germany overcome diplomatic crisis and unblock investment in green hydrogen*. Universidad de Navarra. Available from: <https://en.unav.edu/web/global-affairs/marruecos-y-alemania-superan-la-crisis-diplomatica-y-desencallan-las-inversiones-para-el-hidrogeno-verde>
- Schlosberg, D. (2004). Reconceiving environmental justice: global movements and political theories. *Environmental politics*, 13(3), 517-540.
- Shenabi, M. (2024, May 30). *Just Energy Transitions? Lessons From Oman and Morocco*. Carnegie Endowment for International Peace. <https://carnegieendowment.org/research/2024/05/morocco-oman-energy-transition-oil-exporting-renewable?lang=en>
- Scott, M., & Powells, G. (2020). Towards a new social science research agenda for hydrogen transitions: Social practices, energy justice, and place attachment. *Energy Research & Social Science*, 61, 101346.
- Sovacool, B. K., & Dworkin, M. H. (2015). Energy justice: Conceptual insights and practical applications. *Applied energy*, 142, 435-444.
- Spisto, A., Gerbelova, H., Maserà, M. and Barboni, M., The socio-economic impacts of the closure of the Groningen gas field, EUR 30208 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-18607-6, doi:10.2760/039540, JRC120521.
- Squintani, L., & Schouten, S. (2024). Public Participation in the Hydrogen Economy: Lessons Learned from the Northern Netherland Hydrogen Valley from Part II-Regulating Hydrogen Markets. In *Cambridge Handbook of Hydrogen and the Law* (pp. 158-170). Cambridge University Press.
- ter Berke, S., Ursavas, E., & Zhu, S. Identifying the Technical, Regulatory, and Market Barriers Inhibiting the Commercialization of an Integrated Hydrogen Economy in the Northern Netherland.
- Terlouw, T., Rosa, L., Bauer, C., & McKenna, R. (2024). Future hydrogen economies imply environmental trade-offs and a supply-demand mismatch. *Nature communications*, 15(1), 7043.
- The Fund for Peace (2025). *Fragile States Index Global Data*. The Fund for Peace. <https://fragilestatesindex.org/global-data/>
- Todts, W. Spence Jackson, H. Müller-Kraenner, S. Vassalo, G. Martinelli, C. Assous, A. (2024, December 16). *More stringent rules for 'blue hydrogen' based on fossil gas in the low-carbon fuels delegated act are needed to ensure a level playing field for Renewable Fuels of Non-Biological Origin*. Environmental Defense Fund. <https://www.edf.europa.org/news/2024/16/12/more-stringent-rules-blue-hydrogen-based-fossil-gas-low-carbon-fuels-delegated-act>
- Toutate, I. (2025, May 3). Dakhla Seawater Desalination Plant Boosts Sustainable Agriculture and Economy. Morocco World News.

<https://www.moroccoworldnews.com/2025/05/196503/dakhla-seawater-desalination-plant-boosts-sustainable-agriculture-and-economy/>

Tweede Kamer. Rapport Parlementaire Enquêtecommissie Aardgaswinning Groningen. 2023. Available online: <https://www.tweedekamer.nl/Groningen/rapport> (accessed on 15 June 2025).

Treaty on European Union of 13 December 2007 OJ C 202.

United Nations (2024) *Non-Self-Governing Territories*. United Nations <https://www.un.org/dppa/decolonization/en/nsgt>

United Nations Office of the High Commissioner for Human Rights (2023), *Opinion no 23/2023, concernant Sidi Abdallah Abbahah, Mohamed El Bachir Boutangiza, Mohamed Bani, Abdel Jalil Laaroussi, Abdulahi Lakhfaoui, Ahmed Sbai, Sid'Ahmed Lemjaid, BrahimIsmaili, Mohammed Khouna Babait, Mohamed Embareh Lefkir, Ennaâma Asfari, Mohamed Bouryal, Mohamed Lamin Haddi, El Hasane Azaoui, Abdellah Toubali, El Bachir Khadda, El Hassan Eddah and Mohamed Tahlil (Morocco)*. Opinions adopted by the Working Group on Arbitrary Detention at its 96th session. Opinion 23/2023 (Morocco) A/HRC/WGAD/2023/23.

Van Der Zwaan, B., Lamboo, S., and Dalla Longa, F., 2021. Timmermans' dream: an electricity and hydrogen partnership between Europe and North Africa. *Energy Policy*, 159, 112613. doi:10.1016/j.enpol.2021.112613

Veenstra, A. T., & Mulder, M. (2024). Profitability of hydrogen production: Assessment of investments in electrolyzers under various market circumstances. *Applied Energy*, 375, 124111.

Walker, G. (2009). Beyond distribution and proximity: exploring the multiple spatialities of environmental justice. *Antipode*, 41(4), 614-636.

Wehrey, F. & Bonney, A. (2025, March 6). *Beyond the Green Transition: Governance and Climate Vulnerability in Morocco*. Carnegie Endowment for International Peace.

<https://carnegieendowment.org/research/2025/03/beyond-the-green-transition-governance-and-climate-vulnerability-in-morocco?lang=en>

Werker, J., Wulf, C., & Zapp, P. (2019). Working conditions in hydrogen production: A social life cycle assessment. *Journal of industrial ecology*, 23(5), 1052-1061.

Western Sahara Resource Watch. (2017, April 26). *Unemployed Saharawis set up protest camp in occupied Western Sahara*. Western Sahara Resource Watch. <https://wsrw.org/en/archive/3831>

Western Sahara Resource Watch. (2023, November 3) *Moroccan government reveals energy gigaplans in occupied territory*. Western Sahara Resource Watch. <https://wsrw.org/en/news/moroccan-gov-reveals-energy-gigaplans-in-ot>

Western Sahara Resource Watch. (2025a, August 11). *Morocco pushes enormous green hydrogen plans in occupied Western Sahara*. Western Sahara Resource Watch. <https://wsrw.org/en/news/morocco-pushes-enormous-green-hydrogen-plans-in-occupied-western-sahara>

Western Sahara Resource Watch. (2025b, September 18). *Morocco's thirst for water quenched by Western Sahara winds*. Western Sahara Resource Watch.

<https://wsrw.org/en/news/moroccos-thirst-for-water-quenched-by-western-sahara-winds>

World Bank (2023, May 22). *Morocco CCDR – Morocco – Country Climate and Development Report (CCDR) : Background Paper – Water Scarcity and Droughts*. World Bank Group (Report: 182262/1). <http://documents.worldbank.org/curated/en/099052223171017467>

Yahyaoui, A., Wang, I., Sammoud, K. & Nyberg, M. (2024) *Morocco's Just Energy Transition 2024*. Liberal International.

Zamagni, A., Mancini, L., Eynard, U., Arrigoni, A., & Mathieux, F. (2025). *A conceptual framework for assessing and monitoring social risks and impacts related to hydrogen technologies and their value chains*. Publications Office of the European Union (JRC138850).



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