FEMISE CONFERENCE PAPER N. 7

EU HYDROGEN POLICY:
What Path for a Just Energy Transition in North Africa?

Ayoub Menzli and Gianmarco Riva

FEMISE
ECONOMIC RESEARCH FORUM منتدى البحوث الاقتصادية
IEMed. European Institute of the Mediterranean

FEMISE CONFERENCE **PAPER**

SHIFTING PARADIGMS:
Opportunities for a Deeper EU-Mediterranean Integration in a Changing World
EU HYDROGEN POLICY: WHAT PATH FOR A JUST ENERGY TRANSITION IN NORTH AFRICA?

Authors:
Ayoub Menzli, Ph.D Candidate, Department of Political Science, Roma Tre University

Gianmarco Riva, College of Europe

Editing: FEMISE
Peer Reviewer: Anonymous
Design Layout: Núria Esparza
Layout: Núria Esparza

September 2024
Published by FEMISE and IEMed

This paper was submitted and accepted for presentation at the FEMISE 2023 Annual Conference, "Shifting Paradigms: Opportunities for a Deeper EU-Mediterranean Integration in a Changing World," Barcelona, Spain, 27-29 September 2023 under the theme: Economics of the Euro-Mediterranean Green Transition

The paper was evaluated and peer reviewed by experts, whose contributions are greatly appreciated. The revised version was accepted for publication under the FEMISE Conference Paper series.

The opinions and content of this document are the sole responsibility of the authors and can under no circumstances be regarded as reflecting the position of the FEMISE, the IEMed or the AECID.

FEMISE, **Forum Euroméditerranéen des Instituts de Sciences Économiques** (the Euro-Mediterranean Forum of Institutes of Economic Sciences), is a Euromed network established in Marseille, France in June 2005 as an NGO (under the French Law of 1901), following 8 years of activities. The network gathers more than 100 members of economic research institutes from the North and South of the Mediterranean, representing the 37 partners of the Barcelona Process and the European Neighbourhood Policy (ENP).

FEMISE is coordinated by the Economic Research Forum (ERF), Egypt.

The **Economic Research Forum** (ERF) is a regional network dedicated to promoting high quality economic research to contribute to sustainable development in the Arab countries, Iran and Turkey. ERF operates from two offices in the region, in Cairo, Egypt and in Dubai, United Arab Emirates. ERF's main office is located in Cairo, Egypt.

Established in 1993, ERF's core objectives are to build strong research capacity in the ERF region; to lead and support the production of independent, high quality economic research; and to disseminate research output to a wide and diverse audience.

The **European Institute of the Mediterranean** (IEMed), founded in 1989, is a think and do tank specialised in Euro-Mediterranean relations. It provides policy-oriented and evidence-based research underpinned by a genuine Euromed multidimensional and inclusive approach.

The IEMed is a consortium comprising the Catalan Government, the Spanish Ministry of Foreign Affairs, European Union and Cooperation, and the Barcelona City Council.

EU HYDROGEN POLICY:
What Path for a Just Energy Transition in North Africa?

CONTENTS

ABSTRACT

With the European Green Deal, the EU has embarked on an journey to become climate-neutral by 2050. As a pivotal component of this strategy, green hydrogen is set to reach 10 million tonnes of production-import by 2030: an ambitious target that is difficult to achieve without contributions from third countries. To this end, the EU has increasingly engaged with its North African partners, which represent a great potential for cooperation opportunities thanks to their abundance in renewable energy resources, notably solar and wind. The convergence with the EU's demand for clean energy thus offers a compelling backdrop for bilateral collaboration, positioning North African as a major hydrogen partner. Despite many positives that a hydrogen market in North Africa can have, its development process is not risk-free. Challenges range from energy poverty, water scarcity, and land-use conflicts to socio-political factors, such as poor governance structures, insufficient stakeholder engagement, and the absence of clear policy frameworks. These limitations suggest that further research is needed in the study of EU hydrogen policy in North Africa. It is against this backdrop that our work wants to offer a critical inquiry on the matter, highlighting its multiple facets and interdisciplinary dimension. By exploring the concept of energy justice as an analytical perspective, we evaluate EU hydrogen policy in Algeria, Morocco, Egypt, and Tunisia. The intent is to shed a light on its opportunities and risks, expose instances of energy injustices, and put forth suggestions to alleviate them. Hopefully, this would enhance the effectiveness of EU hydrogen policy in fostering a more equitable and just energy transition in these regions.

LA POLITIQUE DE L'HYDROGÈNE DE L'UE :
Quelle voie pour une transition énergétique juste en Afrique du Nord ?

RÉSUMÉ

Avec le "Green Deal" européen, l'UE s'est lancée dans une aventure visant à atteindre la neutralité climatique d'ici à 2050. L'hydrogène vert, élément central de cette stratégie, devrait atteindre 10 millions de tonnes de production-importation d'ici à 2030 : un objectif ambitieux difficile à atteindre sans la contribution de pays tiers. À cette fin, l'UE s'est de plus en plus engagée auprès de ses partenaires d'Afrique du Nord, qui représentent un grand potentiel d'opportunités de coopération grâce à leur abondance en ressources énergétiques renouvelables, notamment solaires et éoliennes. La convergence avec la demande d'énergie propre de l'UE offre donc une toile de fond convaincante pour la collaboration bilatérale, positionnant l'Afrique du Nord comme un partenaire majeur dans le domaine de l'hydrogène. Malgré les nombreux aspects positifs d'un marché de l'hydrogène en Afrique du Nord, son processus de développement n'est pas sans risque. Les défis vont de la pauvreté énergétique, de la pénurie d'eau et des conflits d'utilisation des terres à des

facteurs sociopolitiques, tels que des structures de gouvernance médiocres, un engagement insuffisant des parties prenantes et l'absence de cadres politiques clairs. Ces limites suggèrent que l'étude de la politique de l'hydrogène de l'UE en Afrique du Nord doit faire l'objet de recherches plus approfondies. C'est dans ce contexte que notre travail veut offrir une enquête critique sur la question, en soulignant ses multiples facettes et sa dimension interdisciplinaire. En explorant le concept de justice énergétique comme perspective analytique, nous évaluons la politique de l'hydrogène de l'UE en Algérie, au Maroc, en Égypte et en Tunisie. L'objectif est de mettre en lumière ses opportunités et ses risques, d'exposer des exemples d'injustices énergétiques et de formuler des suggestions pour les atténuer. Nous espérons ainsi améliorer l'efficacité de la politique européenne de l'hydrogène en favorisant une transition énergétique plus équitable et plus juste dans ces régions.

سياسة الاتحاد الأوروبي بشأن الهيدروجين: أي مسار لتحقيق انتقال عادل للطاقة في شمال أفريقيا؟

ملخص

من خلال **الصفقة الأوروبية الخضراء**، انخرط الاتحاد الأوروبي ضمن خطة تهدف إلى أن يصبح محايدًا مناخيًا بحلول عام 2050. وكعنصر محوري في هذه الاستراتيجية، من المقرر أن يصل إنتاج الهيدروجين الأخضر إلى 10 ملايين طن من الهيدروجين الأخضر بحلول عام 2030: وهو هدف طموح يصعب تحقيقه دون مساهمات من دول ثالثة خارج الاتحاد الأوروبي. ولتحقيق هذه الغاية، انخرط الإتحاد بشكل متزايد مع شركائه في شمال أفريقيا، التي تمثل مجالًا كبيرًا لفرص التعاون بفضل وفرة موارد الطاقة المتجددة لديها، لا سيما الطاقة الشمسية وطاقة الرياح. وبالتالي، فإن التقارب مع طلب الاتحاد الأوروبي على الطاقة النظيفة يوفر خلفية جاذبة للتعاون الثنائي، مما يجعل شمال أفريقيا شريكاً رئيسياً في مجال الهيدروجين. وعلى الرغم من الإيجابيات العديدة التي يمكن أن تتسم بها سوق الهيدروجين في شمال أفريقيا، إلا أن عملية تطويرها ليست خالية من المخاطر. وتتراوح التحديات من فقر الطاقة وندرة المياه والنزاعات على استخدام الأراضي، إلى العوامل الاجتماعية والسياسية، مثل ضعف هياكل الحوكمة، وغياب المشاركة الكافية للأطراف المعنية، وغياب أطر سياسات واضحة. تشير هذه القيود إلى أن هناك حاجة إلى مزيد من البحث في دراسة سياسة الاتحاد الأوروبي الخاصة بالهيدروجين في شمال أفريقيا. وفي ظل هذه الخلفية، تسعى هذه الدراسة إلى تقديم استقصاء نقدي حول هذه المسألة، مع تسليط الضوء على جوانبها المتعددة وأبعادها متعددة المجالات. من خلال استعراض مفهوم العدالة في مجال الطاقة كمنظور تحليلي، نقوم بتقييم سياسة الاتحاد الأوروبي في مجال الهيدروجين في الجزائر والمغرب ومصر وتونس. والقصد من ذلك هو تسليط الضوء على فرصها ومخاطرها، وكشف حالات الظلم في مجال الطاقة، وتقديم اقتراحات للتخفيف من حدتها. ونأمل أن يؤدي ذلك إلى تعزيز فعالية سياسة الاتحاد الأوروبي في مجال الهيدروجين في تعزيز انتقال أكثر إنصافًا وعدالة في مجال الطاقة في هذه المناطق.

INTRODUCTION

The European Union (EU) aims to become climate neutral by 2050. To achieve this target, significant reductions in greenhouse gas (GHG) emissions have been put in place. Among efforts to decarbonize the European economy, 'low-carbon' hydrogen (H2) has been playing an increasingly key role. This was evident not only in the 2020 EU H2 strategy[1], but also in the launch of RePowerEU in 2022, through which the European Commission (EC) further increased its ambition for green (renewable) H2, setting a 10 million tonnes (MT) production and 10 MT import target by 2030[2]. In this regard, a new European Hydrogen Bank[3] was recently proposed to support H2 investments and market uptakes, both concerning domestic industry and third-country imports. The need to import H2 from third countries is a result of the fact that EU domestic production alone is not enough to meet the demand required by the Union's decarbonization efforts. Within this context, the constrained H2 export abilities of Ukraine due to the ongoing conflict have translated into bigger expectations from the EU Southern Neighborhood, notably North Africa (NA).

PROBLEMATIZATION

Despite the announced positive aspects of a hydrogen (H2) market in North Africa (NA) by the EU and some North African governments, its development is not risk-free. Challenges include potential energy poverty if centralized export-oriented projects are prioritized without addressing local energy needs, leading to unequal benefits favoring the EU and its member states. Water scarcity is another issue that could be exacerbated in one of the world's most water stressed regions, possibly causing displacement and forced migration. While desalination is often described as a way around the water issue, its environmental impacts are highly contested. Additionally, land conflicts might intensify from land acquisitions for green H2 plants, affecting ecosystems and local communities. Weak governance, regulations, and transparency could lead to corruption, exclusion of stakeholders, and investment risks, undermining the attractiveness of renewable H2 development.

PREVIOUS WORKS AND RESEARCH GAPS

While the potential of EU H2 diplomacy has garnered increased attention, significant constraints persist in our understanding of the subject, particularly within the context of North Africa. These limitations

[1] 'Hydrogen', European Commission, accessed 31 March 2023, https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen_en#:~:text=The%20ambition%20is%20to%20produce,in%20energy%2d Intensive%20 industrial%20 processes.

[2] Ibid.

[3] 'Commission Outlines European Hydrogen Bank to Boost Renewable Hydrogen', on, March 2023, https://energy.ec.europa.eu/news/commission-outlines-european-hydrogen-bank-boost-renewable-hydrogen-2023-03-16_en.

encompass insufficient stakeholder engagement, exemplified by the divide between advocated policy engagement and the limited consultations between decision-makers and stakeholders, largely due to restricted freedom of dissent and human rights challenges. Furthermore, an absence of a clear policy framework detailing the EU's approach to supporting just energy transition via H2 diplomacy can result in uncertain and inconsistent policy decisions particularly when EU strategic interests are at play. This gap is to an extent influenced by inadequacies in addressing socio-economic aspects within EU H2 policy documents and memoranda with North African partners.

THE NEED FOR A CRITICAL INQUIRY

These limitations suggest that further research is needed, particularly on the socio-political implications of the expanding role of H2[4], to ensure that the development and implementation of EU H2 diplomacy in NA results in an equitable, sustainable, and socially just process. To this end, the realization of a just hydrogen diplomacy in NA requires effective collaboration and coordination between the EU and its North African partners during all stages of its implementation and development. Principles of fairness, inclusivity, and sustainability shall guide this process.

OBJECT OF SCRUTINY, AIMS, AND TASKS

It is against this backdrop that our work intends to offer a critical inquiry on EU H2 policy that could highlight its multiple facets and multidisciplinary validity by taking into account relevant socio-political aspects. Starting from the analysis of the definition of energy justice, we then utilize the energy justice conceptual framework as a lens through which to assess EU H2 diplomacy in NA. The aim is to identify, and expose, existing cases of energy injustices, as well as to advance propositions on how to mitigate them in order to make EU H2 diplomacy better, contributing to a "more" just energy transition.

RATIONALE OF THE STUDY

The rationale behind the present study lies in its authors' belief that, by exposing thought-provoking reflections on H2 energy injustices in North Africa, it could encourage academic and policy discussion about possibilities for the EU and North African governments to adopt a more comprehensive and fair approach to its H2 policies. These policies could bring energy justice principles to its core by taking into account the possible drawbacks that an H2 economy's expansion may have on the region, while prioritizing the social and environmental aspects of the energy transition.

[4] Kirsten E. H. Jenkins et al., 'The Methodologies, Geographies, and Technologies of Energy Justice: A Systematic and Comprehensive Review', Environmental Research Letters 16, no. 4 (March 2021).

RESEARCH DESIGN

METHODOLOGY

A comparative case study methodology is a research approach that involves analyzing and comparing two or more cases to identify similarities and differences between them. In this case, Algeria, Morocco, Egypt, and Tunisia (four North African countries that are significant in terms of their potential for hydrogen development and renewable energy resources) will be selected with a focus on key elements that are relevant to the research question: energy poverty, water scarcity, land-use conflicts, renewable energy resources, and socio-economic conditions. The methodology involves a comprehensive analysis of existing official documents, academic literature, policy reports, NGO publications, and investigative journalism pieces related to the EU's hydrogen policy, renewable energy development, and energy justice in North Africa. Incorporating secondary sources from gray literature, such as NGO reporting, addresses the limitations of relying solely on official authorities and mainstream academic sources. By including underrepresented perspectives, this research seeks to provide a more inclusive and socially conscious analysis of the challenges and opportunities for achieving a just hydrogen transition in North Africa. The comparative case study approach allows for a more encompassing examination of the multidimensional aspects of energy justice and potential implications thereof for the EU's hydrogen policy in North Africa. Additionally, this methodology highlights the importance of considering multiple voices and perspectives in policymaking and energy transition planning to ensure a more equitable and sustainable approach to renewable hydrogen development in the region.

ANALYTICAL CONTEXT

POTENTIALS AND OPPORTUNITIES FOR RENEWABLE HYDROGEN IN NORTH AFRICA

Recognizing the potential of North Africa's abundant renewable energy resources, the EU has increasingly engaged with the region to develop hydrogen policies that foster sustainable energy transition and cooperation. The convergence of North Africa's solar and wind capacities with the EU's demand for clean energy offers a compelling backdrop for collaboration, positioning the region as a potential hydrogen supplier to Europe.

The declared socio-economic benefits for the H2 market in NA are indeed manifold: new jobs creation and reskilling opportunities for local communities through the transfer of technologies and know-how, decarbonization of hard-to-abate sectors via accelerated access to modern energy, the creation of new and transparent institutions and governance structures, the development of green infrastructures and of the region's green and blue economy, direct and indirect revenues from H2 exports. Overall, the production of clean H2 is expected to help the economic resilience of African partners in key vulnerable sectors such as water and agriculture, as well as to increase their climate ambition in line with respective nationally determined contributions (NDCs) under the Paris Agreement[5].

STATE OF PLAY: EU HYDROGEN POLICIES IN ALGERIA, MOROCCO, EGYPT AND TUNISIA

Favourable investment opportunities for the EU green H2 market in North Africa are guaranteed by the region's abundance in renewable energy (RE) resources, as well as its proximity to Europe. Over the recent years, this has been confirmed by major EU policy steps undertaken across the Southern Neighbourhood, such as the Africa-EU Energy Partnership[6] and the Commission's New Agenda for the Mediterranean[7]. Numerous initiatives and projects have consequently been launched by the EU and North Africa to promote Hydrogen policies, within whose evolving landscape, Algeria, Morocco, Egypt, and Tunisia stand out as key players.

Algeria's extensive natural gas reserves make it a significant contributor, not only in green, but also in blue hydrogen production. To leverage its expertise as a natural gas producer, the EU has in fact shown

[5] Ivi., European Commission, February 2021

[6] Swetha RaviKumar Bhagwat and Maria Olczak, 'Green Hydrogen: Bridging the Energy Transition in Africa and Europe' (Florence School of Regulation, 2020).

[7] 'Renewed Partnership with the Southern Neighbourhood A New Agenda for the Mediterranean', JOINT COMMUNICATION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS (European Commission, February 2021).

interest in collaborating with Algeria, where from the SoutH2 Corridor project[8] will originate, connecting the country to Europe through a new hydrogen backbone.

Morocco's commitment to renewable energy and its favourable geographic location for solar and wind projects have also caught the EU's attention. A case in point is the 2022 EU-Morocco Green Partnership[9], which underscore their mutual interest in hydrogen development, aiming at boosting cooperation opportunities on innovation, research, and clean energy investment solutions, including green H2.

Egypt, with its growing interest in green hydrogen and its role as a regional energy hub, has caught the EU's eye as a potential partner in hydrogen production, storage, and transportation. Collectively, the collaborative engagement between the EU and Egypt in harnessing renewable resources and H2 production is underscored by a number of initiatives. Worth mentioning is the first integrated green hydrogen facility[10] in the country, being developed in the Suez Canal Economic Zone with the support of the European Bank for Reconstruction and Development (EBRD).

In a recent announcement, Tunisia's Ministry of Electricity and Energy Transition unveiled its ambitious plan to export 6 million tonnes of green hydrogen to Europe by the year 2050[11]. This export target is in alignment with Europe's projected demand for 11 million tonnes of green hydrogen imports from the region. Tunisia's Ministry of Electricity and Energy Transition emphasized that Tunisia possesses the necessary resources to produce green hydrogen cost-effectively in the short and medium term, positioning itself as a potential supplier to Europe. To realize this goal, Tunisia is actively developing a national roadmap for green hydrogen, outlining its strategic objectives in this field. Collaborating with the German Federal Ministry for Economic Cooperation and Development (BMZ), Tunisia launched the H2Vert.TUN[12] project to enhance the framework for a renewable energy-based green hydrogen value chain. Furthermore, the country is planning to establish a network for transporting green hydrogen from Gabès and Tataouine to the Cap-Bon region, with infrastructure designed to facilitate exports to Europe[13]. To address the water shortage issue, a critical component of green hydrogen production, Tunisia intends to establish desalination plants in the south and midland regions, particularly in Mahdia and Gabès[14]. Also, feasibility studies to explore the potential for green H2 production in NA are being undertaken, such as the EU-funded HyDeal Ambition project[15], which

[8] 'SoutH2 - The Initiative', accessed 15 August 2023, https://www.south2corridor.net/south2.

[9] 'The EU and Morocco Launch the First Green Partnership on Energy, Climate and the Environment Ahead of COP 27', European Commission, October 2022, https://neighbourhood-enlargement.ec.europa.eu/news/eu-and-morocco-launch-first-green-partnership-energy-climate-and-environment-ahead-cop-27-2022-10-18_en.

[10] 'Egypt Green Hydrogen S.A.E', accessed 15 August 2023, https://www.ebrd.com/work-with-us/projects/psd/53558.html.

[11] "Tunisia to export 6mln tonnes of green hydrogen to Europe by 2050", Renew Africa, 2023. https://renewafrica.biz/news/rest-of-africa/tunisia-to-export-6mln-tonnes-of-green-hydrogen-to-europe-by-2050/

[12] "Promoting a green hydrogen economy in Tunisia", Deutsche Gesellschaft für Internationale Zusammenarbeit, 2023. https://www.giz.de/en/worldwide/109262.html

[13] Renew Africa, Op. cit.

[14] Anel Dokso, "Tunisia's Quest to Become Europe's Green Hydrogen Supplier", Energy News 2023.https://energynews.biz/ tunisias-quest-to-become-europes-green-hydrogen-supplier/

[15] 'Mass-Scale Green Hydrogen Hubs', HyDeal Ambition, accessed 31 March 2023, https://www.hydeal.com/hydeal-ambition.

aims to develop an integrated renewable H2 supply chain between Europe and third countries, *North Africa in primis,* by 2030.

CHALLENGES AND RISKS OF H2 MARKET DEVELOPMENT

Notwithstanding the positive aspects of the H2 market for NA, which are acknowledged by both civil society[16] and the international community[17], its development is far from being a free-risk process. On the contrary, it faces potential challenges of different natures:

- Green H2 production risks cement **energy poverty** in North Africa should renewable energy capacities of decentralized export-oriented projects not be adopted to satisfy the energy needs of local economies[18]. Leaving the benefits of the EU H2 import value chain concentrating in the Global North would mean diverting natural resources from North Africa's electrification and decarbonization efforts[19], leading to an unequal ecological exchange[20].

- **Water shortages** in semi-arid areas with increasingly scarce resource endowments due to rising temperatures (e.g., Algeria, Egypt) can be aggravated by the desalination processes required for green H2 production[21]. This can lead to forced displacement of populations, whose survival and socioeconomic development depend on such resources, with destabilizing effects on regional migration fluxes[22].

- **Land-use conflicts** may be exacerbated by land acquisitions and intensive soil exploitation[23] owed to the development of green H2 production plants. Major portions of lands would de facto be expropriated[24] and allocated to new large-scale infrastructures. Not only can this have negative spillovers onto the environment[25], such as degradation of ecosystems and biodiversity loss[26], but also restrict the habitats of local communities[27].

---

[16] Mohamed Adow et al., 'Civil Society Perspectives on Green Hydrogen Production and Power-to-X Products in Africa', Position paper (German Watch, January 2022).

[17] 'Hydrogen: A Renewable Energy Perspective' (IRENA, 2019).

[18] Ivi., Mohamed Adow et al., 2022; Franziska Müller, Johanna Tunn, and Tobias Kalt, 'Hydrogen Justice', *Environmental Research Letters* 17, no. 11 (November 2022).

[19] Hamza Hamouchene, 'Green Hydrogen: The New Scramble for North Africa', Aljazeera, November 2021, https://www.aljazeera.com/opinions/2021/11/20/green-hydrogen-the-new-scramble-for-north-africa.

[20] Ivi., Franziska Müller et al., 2022; Jason Hickel et al., 'Imperialist Appropriation in the World Economy: Drain from the Global South through Unequal Exchange, 1990–2015', *Global Environmental Change* 73 (1 March 2022).

[21] J. Jaime Sadhwani, Jose M. Veza, and Carmelo Santana, 'Case Studies on Environmental Impact of Seawater Desalination', *Desalination,* Desalination and the Environment, 185, no. 1 (1 November 2005): 1–8; H. Munia et al., 'Water Stress in Global Transboundary River Basins: Significance of Upstream Water Use on Downstream Stress', *Environmental Research Letters* 11, no. 1 (January 2016).

[22] Susanne Schmeier et al., 'Water Scarcity and Conflict: Not Such a Straightforward Link', ECDPM, October 2019.

[23] 'The Illusion of Green Hydrogen', ReCommon (blog), 8 November 2022.

[24] 'Kenya's Ambitious Wind Turbines Battle Community Land Crosswinds', ISS Africa, 16 March 2020, https://issafrica.org/iss-today/kenyas-ambitious-wind-turbines-battle-community-land-crosswinds.

[25] Raymond E. Millemann et al., 'Enhanced Oil Recovery: Environmental Issues and State Regulatory Programs', Environment International 7, no. 3 (1 January 1982): 165–77.

[26] Ivi., Mohamed Adow et al, 2022.

[27] Ivi., Franziska Müller et al., 2022.

- The **lack of good governance and transparency** allows for corruption to influence large-scale renewable energy projects[28]. This often translates into the exclusion of relevant stakeholders from policy- and decision-making processes, leading to more political and regulatory instability and, by consequence, higher investment risks[29]. As a result, conditions for renewable H2 development become less attractive.

CONSTRAINTS UNDERLYING EU H2 DIPLOMACY IN NORTH AFRICA

While the potential of the EU H2 diplomacy has been the subject of increasing attention over the last few years, several constraints to our current knowledge and understanding of the topic remain, particularly within the geographical context of NA. These include:

- **Limited dialogue with stakeholders:** despite policy engagement with relevant stakeholders being advocated as the cornerstone of the cooperation between the EU and its Southern Neighbourhood, as shown by the 2021 New Agenda for the Mediterranean[30], this seems to prove valid only on paper. De facto, consultations between decision-makers and stakeholders (including civil society, non-governmental organizations (NGO), and local communities) on the potential impacts of EU H2 projects in NA have so far been limited, like in the case of Morocco[31]. This is mainly due to poor freedom of dissent and constraints to human rights activism in the area[32]. Moreover, inconsistencies on stakeholders' engagement persist between institutional declarations and real facts, notably with respect to African partners. For instance, while the European Clean Hydrogen Alliance[33] promotes a forum for the coordination and maximization of the impact of joint actions and projects by engaging all stakeholders in the H2 value chain, African countries remain excluded from the Alliance's membership criteria[34]. Paradoxically, this is in contradiction with the stated objectives of European Commission's 2020 comprehensive Strategy with Africa[35], according to which political support and policy dialogue shall be conducted through mobilization of expertise, knowledge-sharing, and the creation of accessible knowledge platforms.

[28] Ivi., Mohamed Adow et al, 2022.

[29] James Kneebone and Andris Piebalgs, 'Redrawing the EU's Energy Relations: Getting It Right with African Renewable Hydrogen',(Florence School of Regulation, EUI, September 2022).

[30] Ivi., European Commission, 2021.

[31] https://www.jadaliyya.com/Details/33115

[32] Omar Aziki, 'ATTAC CADTM Morocco: 20 Years of Struggle for Another Possible Morocco – One of Social and Environmental Justice, of Dignity and Freedom', CADTM, 31 March 2023.

[33] European Commission, 'Declaration of the European Clean Hydrogen Alliance', n/a, https://ec.europa.eu/docsroom/documents/43526.

[34] 'Criteria for Membership in the European Clean Hydrogen Alliance', n.d., file:///Users/gmriva/Downloads/Clean%20Hydrogen%20Alliance%20-%20Criteria%20for%20selection%20of%20members%20-%20PV.pdffile:///Users/gmriva/Downloads/Clean%20Hydrogen%20Alliance%20-%20Criteria%20for%20selection%20of%20members%20-%20PV.pdf.

[35] 'JOINT COMMUNICATION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL Towards a Comprehensive Strategy with Africa' (European Commission, 2020), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020JC0004.

- **Absence of a clear policy framework:** no clear policy framework delineating how the EU will engage with North African countries to support a just energy transition in the context of its H2 diplomacy is present, which may lead to uncertain and inconsistent policy decisions. This can be justified by insufficiencies regarding socio-economic considerations within EU public documents addressing H2 policy, as well as the respective memoranda and partnership signed between the EU and Morocco, Egypt, and Algeria. In particular, the *New Agenda for the Mediterranean*[36], the reference document delineating the EU's policy approach to its Southern Neighbourhood, acknowledges the socio-economic aspects of the energy transition, as well as their related challenges. However, it falls short of specific considerations thereof in the context of planned EU hydrogen policies in North Africa, as well as of how these will support a just energy transition in the region. Another reference document, the *Africa-EU energy partnership report 2020*[37], while presenting the main benefits of H2 market development in NA, does not include any consideration regarding the socio-political and economic challenges derived therefrom. This is also the case for the EC Joint communication *Towards a Comprehensive Strategy for Africa*[38], where H2-related considerations are nearly non-existent (the word 'hydrogen' is mentioned once only). Risks and challenges associated with H2 market development in NA seem, to the author's best knowledge, to remain insufficiently explored also in technical studies, such as the one conducted by the European Investment Bank (EIB) on Africa's green H2 potential[39].

- **Lack of comprehensiveness:** despite the rising interest in EU H2 diplomacy in NA, comprehensive studies that examine its political and social implications are still limited. On the whole, available literature on H2 falls short of perspectives for social sciences and humanities, often leaving the subject to technical studies[40].

[36] Ivi., European Commission, 2021.

[37] Ivi., Swetha RaviKumar Bhagwat and Maria Olczak, 2020.

[38] Ivi., European Commission., 2020.

[39] 'New Study Confirms €1 Trillion Africa's Extraordinary Green Hydrogen Potential', European Investment Bank, accessed 15 August 2023, https://www.eib.org/en/press/all/2022-574-new-study-confirms-eur-1-trillion-africa-s-extraordinary-green-hydrogen-potential.

[40] Frederic Hanusch and Miriam Schad, 'Hydrogen Research: Technology First, Society Second?', *GAIA - Ecological Perspectives for Science and Society 30*, no. 2 (15 July 2021): 82–86; Clark A. Miller, Jennifer Richter, and Jason O'Leary, 'Socio-Energy Systems Design: A Policy Framework for Energy Transitions', *Energy Research & Social Science* 6 (1 March 2015): 29–40; Benjamin K. Sovacool, 'The Political Economy of Energy Poverty: A Review of Key Challenges', *Energy for Sustainable Development* 16, no. 3 (1 September 2012): 272–82.

CONCEPTUAL FRAMEWORK: DEFINING ENERGY JUSTICE

The concept of energy justice identifies instances of injustice that can occur as a result of the energy transition, as well as vulnerable groups that may be impacted by them[41]. In particular, it highlights how energy transition policies may often cause inequalities by placing an undue burden on societies through negative externalities (e.g., pollution, displacement, and high energy prices)[42].

In the literature, energy justice is operationalized through a conceptual framework aimed to categorize the different types of (in)justices occurring within energy systems[43]. These are recognitional, distributive, and procedural justice, on top of which recent contributions from post-colonial and decolonial studies have added relational justice, focusing on human-nature relations[44]. For the sake of consistency with the problematics identified in our analysis, we selected distributive, procedural and relational justice.

- **Distributive justice:** it investigates the distributional effects of the energy transition process, i.e., how costs and benefits are distributed along the H2 value chain[45], as well as how resources are allocated across the society[46].

- **Relational justice:** it inquires how resource-intensive H2 production processes interfere with human-nature relations.

- **Procedural justice:** it focuses on political participation by assessing the inclusivity, fairness, and representativeness of decision-making structures of H2 governance. The accent is placed on the importance of openness and objectivity.

[41] Kirsten Jenkins, Darren McCauley, and Alister Forman, 'Energy Justice: A Policy Approach', *Energy Policy* 105 (1 June 2017): 631–34.

[42] Robert Lindner, 'Green Hydrogen Partnerships with the Global South. Advancing an Energy Justice Perspective on "Tomorrow's Oil"', *Sustainable Development* n/a, no. n/a, accessed 31 March 2023.

[43] Kirsten Jenkins et al., 'Energy Justice: A Conceptual Review', *Energy Research & Social Science* 11 (1 January 2016): 174–82. Darren McCauley et al., 'Energy Justice in the Transition to Low Carbon Energy Systems: Exploring Key Themes in Interdisciplinary Research', Applied Energy 233–234 (1 January 2019); Benjamin K. Sovacool et al., 'New Frontiers and Conceptual Frameworks for Energy Justice', Energy Policy 105 (1 June 2017): 677–91.

[44] Jamie Linton and Jessica Budds, 'The Hydrosocial Cycle: Defining and Mobilizing a Relational-Dialectical Approach to Water', Geoforum 57 (1 November 2014): 170–80; Zoe Todd, 'Fish Pluralities: Human-Animal Relations and Sites of Engagement in Paulatuuq, Arctic Canada', *Érudit* 38, no. 1–2 (2014): 217–38.

[45] Ivi., Franziska Müller et al., 2022.

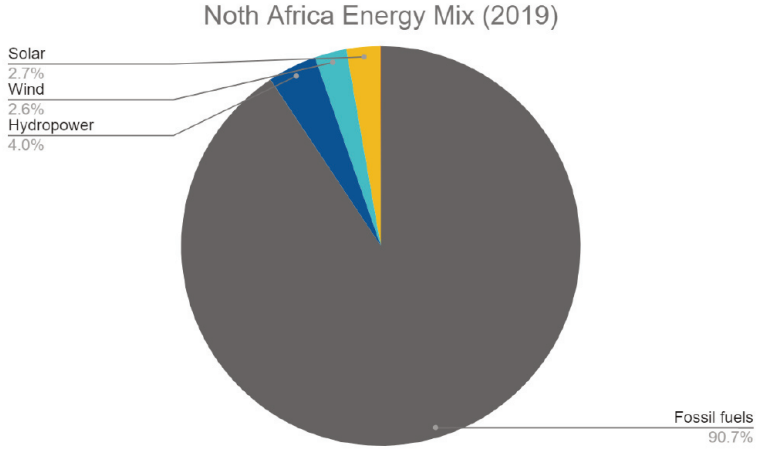
[46] John E. Roemer, *Theories of Distributive Justice:* (Cambridge, MA: Harvard University Press, 1998).

EMPIRICAL ANALYSIS

EXISTING ENERGY (IN)JUSTICES IN EU H2 DIPLOMACY IN NA

Distributive (in)justice

A key element of distributive justice is the distribution of benefits and costs of the energy transition. In this respect, a key concept to be considered when developing energy transition (and green H2 production policies) is the renewable energy additionality principle. This states that 'if there are other productive uses for the electricity being generated from renewable sources, that electricity should not be diverted from those uses to produce green hydrogen'[47]. In North Africa, the share of renewables in the final energy mix is still very low[48].



Source: Africa Energy Portal

What this entails is that not only will green H2 be produced using renewables that would be better spent decarbonizing North African electricity generation, but also that the produced H2 will be exported to Europe at the detriment of local needs. Taking Egypt as an example, it would require a total of 36 gigawatts (GW) of dedicated renewable power capacity (over 60% of Egypt's current total electricity generation capacity) to replace the existing grey H2 production and consumption with green H2[49].

[47] 'Green Hydrogen: A Guide to Policy Making' (Abu Dhabi: IRENA, 2020).

[48] 'North Africa | Africa Energy Portal', accessed 31 March 2023.

[49] Ali Habib and Mostefa Ouki, 'Egypt's Low Carbon Hydrogen Development Prospects' (The Oxford Institute for Energy Studies, November 2021).

Relational (in)justice

Green H2 projects are being developed in places with the finest solar PV and wind resources. The problem is that brighter areas are also the driest. More than 70% of the electrolyzer projects planned will be in water-stressed areas[50] and considering that producing H2 through electrolysis requires 9 liters (L) of water per kilogram (kg) of H2, this puts extra pressure on the water resources of North African countries. In southern Tunisia, two public solar plants were installed in Tozeur, each with an output of 10 MW. Since the installation of the plants, some of the water has been diverted to run the solar farm, leaving local farmers without possibility to enjoy the benefits of the electricity generated for their ground-water pumps[51].

Procedural (in)justice

The development of Morocco's H2 economy has been primarily driven by the government, private energy companies, and European development banks and institutions, with limited community consultations and restricted spaces for human rights activists. This raises concerns that civil participation is excluded, if not suppressed, and that the transition is led more by market forces than by public interest. One renewable energy project that caused disputes with nearby villages is the Noor Ouarzazate solar plant.[52] The project took place on 3000 hectares (ha) of land that was communally owned by a Berber clan and used for pastoralism. However, the administration of the solar project restricted the herders' access to the land and replaced local bodies, which governed the land as commons, with state and market institutions that commodified the land and its resources. Despite opposition from local communities and civil society groups, the herders were unsuccessful in demanding a fair share of the project's benefits[53].

Similarly in Tunisia, there have been several instances of contested renewable energy projects due to lack of community consultation and local development. For example, in the governorate of Bizerte, wind farms faced opposition from locals who were not consulted and felt excluded from the project's benefits. This led to attacks on the facilities and disrupted production for over a period of six months[54]. In the same vein, the Borj Essalhi wind turbines were built on collective lands without proper compensation or consultation with locals. Villagers claim they were "dispossessed by force" under the Ben Ali regime, and have since protested by refusing to pay their electricity bills, resulting in continuous blackouts[55].

[50] 'Geopolitics of the Energy Transformation: The Hydrogen Factor', IRENA, 15 January 2022.

[51] Isabelle Gerretsen, 'Debt-Stricken Tunisian Farmers "ignored" as Government Rolls out Solar Megaproject', Climate Home News, 11 February 2022, https://www.climatechangenews.com/2022/02/11/debt-stricken-tunisian-farmers-ignored-government-rolls-solar-megaproject/.

[52] Sarah Ryser, 'The Anti-Politics Machine of Green Energy Development: The Moroccan Solar Project in Ouarzazate and Its Impact on Gendered Local Communities', *Land 8,* no. 6 (June 2019).

[53] Ivi., Franziska Müller et al., 2022.

[54] Yasmina El Amine, 'Tunisia's Energy Sector: A Just Transition Analysis', *Arab Reform Initiative,* 2 March 2023.

[55] Aida Delpuech and Arianna Poletti, 'Borj Essalhi: The High Costs of Wind Turbines', ikyfada, April 2021, https://inkyfada.com/en/2021/04/20/wind-turbines-cap-bon-tunisia/.

CONCLUSIONS AND POLICY RECOMMENDATIONS

What emerges from adopting an energy justice perspective towards EU H2 diplomacy in NA is that the currently neo-colonial model of green H2 production and import policies may risk exacerbating existing inequities and creating environmental and social tensions, let alone structural costs and technical challenges. For this to be prevented and to promote a more just energy transition, the EU should adopt a more comprehensive approach to its H2 diplomacy. This shall bring energy justices principles to its core by taking into account the possible drawbacks that an H2 economy's expansion may have in the region, while prioritizing the social and environmental aspects of the energy transition. Notably:

- **The EU shall promote its H2 policy in NA based on the principle of distributive justice, which ensures that the costs and benefits of the energy transition are not concentrated in specific industries or regions, but rather fairly distributed across all stakeholders.** This means:

  - **avoiding mere resource extractivism, that is encouraging renewable H2 projects also for local use in NA instead of prioritizing green H2 for exports.** By focusing on local use of renewable energy projects, the EU can better contribute to a more sustainable and equitable energy transition in NA. Not only would this benefit local communities, but also foster intra- and inter- regional collaboration while reducing negative externalities associated with exploitation of traditional energy sources. To this end, the EU could implement:

    Benefit Sharing Mechanisms: they would ensure that the positive outcomes of hydrogen projects are shared equitably with local communities. This could involve revenue sharing, community development funds, or other forms of compensation to enhance the well-being of affected communities.

  - **prioritizing diversification of high value-added segments of supply chains and making them accessible to local communities.** For example, the EU could:

    diversify the supply chain of renewable energy technologies (e.g., solar panels, wind turbines) by encouraging the establishment of manufacturing facilities across various regions in North Africa. By providing incentives for local companies to set up production plants in economically depressed areas, this would create job opportunities for the local workforce;

  - **promoting Public-Private Partnerships (PPPs) that prioritize local engagement and involvement.** To this end, when designing and developing large-scale H2 projects, the EU could require project developers to collaborate with local communities through joint ventures or profit-sharing agreements. This approach would empower local communities, giving them a better say

in decision-making processes and ensuring they benefit directly from the economic opportunities generated by the projects.

- **reducing exposure of North African countries to price volatility through the build-up of resilient economic apparatuses.** To this end, financial and technical support shall be granted to local communities to ensure that they can benefit from the hydrogen economy. This support should be targeted at social and economic development programs that improve living standards and promote local entrepreneurship. Existing EU financial and technical support instruments that are consistent with the EU hydrogen policy's objectives are manifold:

  European Investment Bank (EIB) Financing. With a track record of funding projects that contribute to climate action and environmental sustainability, the EIB's financing is well-aligned with EU's goals of supporting green hydrogen initiatives in North Africa.

  European Bank for Reconstruction and Development (EBRD) Support. It focuses on financing projects in countries transitioning to market-oriented economies. Supporting hydrogen projects in NA through the EBRD, as is currently the case in Egypt[56], could help strengthen energy security while promoting sustainable infrastructure development.

  Green Climate Fund (GCF). Its mission to support climate-related projects in developing countries makes it highly consistent with the EU's hydrogen policy. As green hydrogen is an essential element of the global effort to combat climate change, accessing funding through the GCF can advance the development of green hydrogen in North Africa.

  Horizon Europe Program. Projects related to green hydrogen research, technology development, and innovation fall directly within the scope of the EU hydrogen policy and can receive support through this program.

  Partnership for Research and Innovation in the Mediterranean Area (PRIMA). PRIMA's focus on addressing water scarcity and promoting sustainable agriculture is relevant to the EU hydrogen policy in North Africa, as water is a critical resource in hydrogen production. Supporting projects that have positive impacts on water use and sustainability aligns with the EU's commitment to environmental responsibility.

As the EU hydrogen comprehensive and multifaceted policy is focusing on sustainable development, climate action, and energy transition, a combination of these instruments, tailored to specific projects and needs, would be most effective in realizing the EU's hydrogen policy objectives in North Africa.

[56] 'The EBRD in Egypt', EBRD, accessed 15 August 2023, https://www.ebrd.com/egypt.html.

- **The EU shall promote its H2 policy based on the principle of relational justice, which requires that attention is devoted to mitigating the negative interferences that resource-intensive H2 production processes may have with human-nature relations.** This means:

  - **prioritizing the protection of vulnerable ecosystems, and ensuring that the H2 production processes are as sustainable and low-impact as possible.** This could be done through different means, such as:

    Life Cycle Assessments: the EU can require life cycle assessments for H2 production methods, whereby the environmental impacts associated with each and every stage of the hydrogen production process would be evaluated. This would allow the EU to identify and address the most resource-intensive and environmentally harmful steps, and promote the adoption of more sustainable production methods.

    Renewable Energy Integration: prioritization of renewable energy sources for H2 production is of crucial importance. By relying on clean energy inputs, H2 production processes can minimize their carbon footprints, thus reducing negative impacts on the ecosystems.

    Green Hydrogen Certification: a certification system for green H2 production would ensure that only H2 produced using low-impact and sustainable methods is recognised and supported. This could work as an incentive for H2 producers to adopt environmentally responsible practices.

  - **Granting communities in water-stressed areas the possibility to access fresh water.** To this end, possible solutions can be:

    Water-Efficient Technologies: the EU could encourage the implementation of water-efficient technologies in H2 production processes. Technologies such as closed-loop systems, water recycling, and water-saving equipment could reduce freshwater consumption, notably in regions affected by water scarcity;

    Water Stewardship Plans: companies involved in H2 production shall be required to develop and implement water stewardship plans. These would outline possible strategies to mitigate water-related risks, assess water availability in the areas, and detail action to provide water access to local communities.

    Community Engagement: the EU shall prioritize community engagement and involve local stakeholders in decision-making processes related to water usage in H2-production projects. This would be essential in designing sustainable and equitable water management practices.

    Water Offset Initiatives: H2 producers operating in water-stressed areas could be required to support water offset initiatives. These would involve investing in local water conservation projects or restoration efforts in nearby ecosystems to offset the water footprint from H2 production activities.

- **Respecting indigenous rights and land use**. Notably, when developing and implementing H2 production projects, especially in regions inhabited by indigenous communities, the EU should:

  Ensure that the principle of Free, Prior, and Informed Consent (FPIC)[57] is respected. FPIC empowers indigenous communities to participate in decision-making processes and protects their rights and relationship with their ancestral lands. Local communities shall thus benefit from the right to give or withhold their consent for projects that may affect their traditional lands and resources. This means:

  Avoiding Land Grabs and Social Conflicts: the EU should ensure that the development of hydrogen projects does not lead to land grabs or social conflicts. Land acquisitions for large-scale projects should be conducted with respect for existing land rights, and communities affected by the projects should be consulted and compensated fairly for any land use changes.

  Support Land Use Planning and Biodiversity Protection: land use planning identifies areas of high biodiversity value and cultural significance. By avoiding sensitive areas for hydrogen production, such as protected habitats or sacred sites, the negative impact on ecosystems and the cultural heritage of indigenous communities can be minimized.

- **Adopting responsible resource planning** via, inter alia, a better **supply chain transparency.** In this regard, the EU can implement requirements for transparency and traceability in the H2 production supply chain. This includes tracking the origin of raw materials used in hydrogen production, such as metals for electrolyzers, to ensure they are sourced responsibly and ethically. Avoiding materials obtained through environmentally destructive practices or human rights violations would be essential in promoting relational justice.

By integrating these policy recommendations into its H2 strategy, the EU can work towards a more inclusive and environmentally responsible approach, ensuring that hydrogen production respects human-nature relations and contributes to sustainable development while minimizing negative impacts on ecosystems and water-stressed regions.

- **The EU shall promote its H2 policy in NA based on the principle of procedural justice, which requires that decision-making structures of H2 governance are inclusive, fair, and representative.** This means:

  - involving all stakeholders, including local communities, civil society organizations, and labor unions, during all phases of the development and implementation of its H2 projects. Engaging civil society and local stakeholders would guarantee buy-ins, thereby preventing development

[57] 'Free, Prior and Informed Consent | Indigenous Peoples | Food and Agriculture Organization of the United Nations', FAO, 2023, https://www.fao.org/indigenous-peoples/our-pillars/fpic/en/.

from being held back by outsiders' interests. This can ensure that H2 policy is fairly aligned with needs of local communities and that the benefits of the H2 economy are equitably shared. For instance, the EU could:

promote public participation in the Environmental Impact Assessment process of H2 projects. This engagement would encourage input from local communities and stakeholders, allowing affected communities to voice their concern, advance alternatives, and influence decision-making to safeguard their environment and well-being.

Use the Union for the Mediterranean (UfM) Platform as a solution to deepen dialogue coordination on H2 policies with NA partners. In 2022, the first UfM Ministerial Conference on Research and Innovation (R&I) put forward a declaration aimed to foster R&I potential to increase the resilience of the Euro-Med region. Among other things, commitments were made in the area of climate change and renewable energy, including green H2 production. In this regard, a new UfM ministerial conference on R&I with a specific focus on H2 can be proposed. This can be an effective way to promote dialogue, as well as to pave the way for further collaboration, fostering connections and supporting joint actions on H2 policies in the region.

Promote a more inclusive Clean Hydrogen Alliance by expanding its membership also to countries from the Southern Neighbourhood. This would guarantee North African partners to have a seat at the negotiating and policy-discussing table. This would allow for a more inclusive stakeholder engagement and, consequently, a more participatory representative decision-making on H2 governance.

- participatory policymaking can be promoted only if the right conditions subsist. To this end, the EU should encourage capacity building programs and institutional strengthening, as well as policy frameworks where citizens can actively engage. A focus shall be placed on socio-economic development to ensure that local workers are equipped with the right competencies to take on new roles in the newly created H2 economy. Notably:

  Investments in vocational training and skills development. Collaborating with educational institutions in the region to provide local communities with specialized training will allow the local workforce to acquire the skills needed in the renewable energy sector, thus enhancing accessibility to employment opportunities and reducing social inequalities.

  Investments in governance and institutional strengthening. In this respect, the EU Twinning Instrument (an essential component of the EU's Enlargement and Neighborhood Policy) can be a useful tool to foster the transfer of knowledge, expertise, and best practices in Morocco, Egypt and Algeria. By doing so, it can help these countries develop their administrative capacities, enhance their governance structures, and align their institutional framework with EU standards.

In summary, adopting an energy justice perspective in the EU's hydrogen diplomacy in North Africa is crucial to ensure a just and equitable energy transition. The current centralized model of green hydrogen production and import policies may exacerbate inequities and environmental tensions. To address this, the EU should take a comprehensive approach, prioritizing distributive justice by encouraging renewable hydrogen projects for local use and benefiting communities. Resilient economic apparatuses and financial support should be granted to reduce price volatility and aid local development. Relational justice should focus on sustainable and low-impact hydrogen production methods and water access for water-stressed areas while respecting indigenous rights and land use. Procedural justice demands inclusive decision-making involving all stakeholders and capacity building for participatory policymaking. By fostering transparency and inclusivity, the EU can ensure a just hydrogen transition that respects human-nature relations and fosters socio-economic development in North Africa.

BIBLIOGRAPHY

Adow, Mohamed, Amos Wemanya, Kerstin Opfer, Chigozie Nweke-Exe, Augustine B. Njamnshi, Jamie Fernandez, and Stephan Singer. 'Civil Society Perspectives on Green Hydrogen Production and Power-to-X Products in Africa'. Position paper. German Watch, 2022.

Africa Energy Portal. North Africa. Accessed 31 March 2023. https://africa-energy-portal.org/region/north-africa.

Aziki, Omar. 'ATTAC CADTM Morocco: 20 Years of Struggle for Another Possible Morocco – One of Social and Environmental Justice, of Dignity and Freedom'. CADTM, 2023.

Bhagwat, Swetha RaviKumar, and Maria Olczak. 'Green Hydrogen: Bridging the Energy Transition in Africa and Europe'. Florence School of Regulation, 2020.

Criteria for Membership in the European Clean Hydrogen Alliance, n.d.

Declaration of the European Clean Hydrogen Alliance. European Commission, n/a.

Delpuech, Aida, and Arianna Poletti. 'Borj Essalhi: The High Costs of Wind Turbines'. ikyfada, April 2021.

EBRD. The EBRD in Egypt. Accessed 15 August 2023. https://www.ebrd.com/egypt.html.

Egypt Green Hydrogen S.A.E. Accessed 15 August 2023. https://www.ebrd.com/work-with-us/projects/psd/53558.html.

El Amine, Yasmina. Tunisia's Energy Sector: A Just Transition Analysis. Arab Reform Initiative, 2 March 2023.

European Commission. Joint Communication to the Parliament and the Council - Towards a Comprehensive Strategy with Africa. European Commission, 2020.

European Commission. Renewed Partnership with the Southern Neighbourhood: A New Agenda for the Mediterranean. Joint Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 2021.

European Commission. The EU and Morocco Launch the First Green Partnership on Energy, Climate and the Environment Ahead of COP 27, 2022.

European Commission. Commission Outlines European Hydrogen Bank to Boost Renewable Hydrogen. DG ENER, 2023. https://energy.ec.europa.eu/news/commission-outlines-european-hydrogen-bank-boost-renewable-hydrogen-2023-03-16_en

European Commission. Hydrogen. Accessed 31 March 2023. https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen_en.

European Investment Bank. New Study Confirms €1 Trillion Africa's Extraordinary Green Hydrogen Potential. Accessed 15 August 2023. https://www.eib.org/en/press/all/2022-574-new-study-confirms-eur-1-trillion-africa-s-extraordinary-green-hydrogen-potential.

Food and Agriculture Organization of the United Nations. Free, Prior and Informed Consent | Indigenous Peoples | Food and Agriculture Organization of the United Nations. Accessed 15 August 2023. https://www.fao.org/indigenous-peoples/our-pillars/fpic/en/.

Gerretsen, Isabelle. 'Debt-Stricken Tunisian Farmers "ignored" as Government Rolls out Solar Megaproject'. Climate Home News, 2022.

Habib, Ali, and Mostefa Ouki. 'Egypt's Low Carbon Hydrogen Development Prospects'. The Oxford Institute for Energy Studies, 2021.

Hamouchene, Hamza. 'Green Hydrogen: The New Scramble for North Africa'. Aljazeera, 2021.

Hanusch, Frederic, and Miriam Schad. 'Hydrogen Research: Technology First, Society Second?' *GAIA - Ecological Perspectives for Science and Society 30,* no. 2 (2021): 82–86.

Hickel, Jason, Christian Dorninger, Hanspeter Wieland, and Intan Suwandi. 'Imperialist Appropriation in the World Economy: Drain from the Global South through Unequal Exchange, 1990–2015'. *Global Environmental Change* 73 (2022).

HyDeal Ambition. 'Mass-Scale Green Hydrogen Hubs'. Accessed 31 March 2023. https://www.hydeal.com/hydeal-ambition.

IRENA. Hydrogen: A Renewable Energy Perspective. IRENA, 2019.

IRENA. Green Hydrogen: A Guide to Policy Making. Abu Dhabi: IRENA, 2020

IRENA. 'Geopolitics of the Energy Transformation: The Hydrogen Factor', 2022.

ISS Africa. 'Kenya's Ambitious Wind Turbines Battle Community Land Crosswinds', 2020.

Jenkins, Kirsten E. H., Benjamin K. Sovacool, Niek Mouter, Nick Hacking, Mary-Kate Burns, and Darren McCauley. 'The Methodologies, Geographies, and Technologies of Energy Justice: A Systematic and Comprehensive Review'. *Environmental Research Letters* 16, no. 4 (2021).

Jenkins, Kirsten, Darren McCauley, and Alister Forman. 'Energy Justice: A Policy Approach'. *Energy Policy* 105 (2017): 631–34.

Jenkins, Kirsten, Darren McCauley, Raphael Heffron, Hannes Stephan, and Robert Rehner. 'Energy Justice: A Conceptual Review'. *Energy Research & Social Science* 11 (2016): 174–82.

Kneebone, James, and Andris Piebalgs. 'Redrawing the EU's Energy Relations: Getting It Right with African Renewable Hydrogen'. Florence School of Regulation, EUI, 2022.

Lindner, Robert. 'Green Hydrogen Partnerships with the Global South. Advancing an Energy Justice Perspective on "Tomorrow's Oil"'. *Sustainable Development* n/a, no. n/a.

Linton, Jamie, and Jessica Budds. 'The Hydrosocial Cycle: Defining and Mobilizing a Relational-Dialectical Approach to Water'. *Geoforum* 57 (2014): 170–80.

McCauley, Darren, Vasna Ramasar, Raphael J. Heffron, Benjamin K. Sovacool, Desta Mebratu, and Luis Mundaca. 'Energy Justice in the Transition to Low Carbon Energy Systems: Exploring Key Themes in Interdisciplinary Research'. *Applied Energy* 233–234 (2019).

Millemann, Raymond E., Ronnie J. Haynes, Theodore A. Boggs, and Stephen G. Hildebrand. 'Enhanced Oil Recovery: Environmental Issues and State Regulatory Programs'. *Environment International* 7, no. 3 (1982): 165–77.

Miller, Clark A., Jennifer Richter, and Jason O'Leary. 'Socio-Energy Systems Design: A Policy Framework for Energy Transitions'. *Energy Research & Social Science* 6 (2015): 29–40.

Müller, Franziska, Johanna Tunn, and Tobias Kalt. 'Hydrogen Justice'. *Environmental Research Letters* 17, no. 11 (2022).

Munia, H., J. H. A. Guillaume, N. Mirumachi, M. Porkka, Y. Wada, and M. Kummu. 'Water Stress in Global Transboundary River Basins: Significance of Upstream Water Use on Downstream Stress'. *Environmental Research Letters* 11, no. 1 (2016).

ReCommon. 'The Illusion of Green Hydrogen', 2022.

Roemer, John E. *Theories of Distributive Justice:* Cambridge, MA: Harvard University Press, 1998.

Ryser, Sarah. 'The Anti-Politics Machine of Green Energy Development: The Moroccan Solar Project in Ouarzazate and Its Impact on Gendered Local Communities'. *Land* 8, no. 6 (2019).

Sadhwani, J. Jaime, Jose M. Veza, and Carmelo Santana. 'Case Studies on Environmental Impact of Seawater Desalination'. *Desalination,* Desalination and the Environment, 185, no. 1 (2005): 1–8.

Schmeier, Susanne, Jessica Hartog, Joyce Kortlandt, Karen Meijer, Emma Meurs, Rolien Sasse, and Rozemarijn ter Horst. 'Water Scarcity and Conflict: Not Such a Straightforward Link'. ECDPM, 2019.

SoutH2 - The Initiative. Accessed 15 August 2023. https://www.south2corridor.net/south2.

Sovacool, Benjamin K. 'The Political Economy of Energy Poverty: A Review of Key Challenges'. *Energy for Sustainable Development* 16, no. 3 (2012): 272–82.

Sovacool, Benjamin K., Matthew Burke, Lucy Baker, Chaitanya Kumar Kotikalapudi, and Holle Wlokas. 'New Frontiers and Conceptual Frameworks for Energy Justice'. *Energy Policy* 105 (2017): 677–91.

Todd, Zoe. 'Fish Pluralities: Human-Animal Relations and Sites of Engagement in Paulatuuq, Arctic Canada'. *Érudit* 38, no. 1–2 (2014): 217–38.

FEMISE

CMCI · 2 rue Henri Barbusse · F-13 241 Marseille cedex 01 · France
+ 33 (0) 4 91 31 51 95 · www.femise.org

ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية

21 Al-Sad Al-Aaly Street, Dokki, Giza, Egypt · PO Box: 12311
+202 333 18 600 · https://erf.org.eg/

IEMed.
European Institute of the Mediterranean

Carrer Girona, 20 · 08010 Barcelona · Spain
+34 93 244 98 50 · https://www.iemed.org/

With the financial support of

Ministerio de Asuntos Exteriores, Unión Europea y Cooperación · aecid · Cooperación Española