

Shipping the sunshine? A critical research agenda on the global hydrogen transition

Large amounts of low-carbon hydrogen imports from the Global South are needed for the hydrogen transition in Germany and the EU. In an unequal global system, it is far from certain that the promised financial, technological and socio-economic benefits will materialise and outweigh the costs for the Global South countries who supply the precious energy resource to northern economies. To strengthen social science perspectives in hydrogen research, we sketch the contours of a critical research agenda on the global hydrogen transition.

Tobias Kalt , Johanna Tunn 

Shipping the sunshine? A critical research agenda on the global hydrogen transition | GAIA 31/2 (2022): 72–76

Keywords: critical social sciences, decarbonisation, energy justice, global justice, green hydrogen, hydrogen governance, hydrogen transition

Hydrogen has taken the centre stage of the European energy transition debate. Sometimes called the “new oil”, low-carbon hydrogen¹ ought to contribute at once to decarbonisation, economic growth and socio-economic development in producing countries, while making European energy supply less dependent on natural gas from Russia. Notably, the hydrogen transition is fundamentally a global transition as northern industrial economies intend to meet most of their hydrogen demand through imports from the Global South (figure 1, p. 74). However, current overly optimistic win-win narratives should be taken with caution. Taking place under asymmetric global power relations, the global hydrogen transition risks transferring energy resources to the Global North while leaving socio-ecological harms behind in the Global South. In this context, it is somewhat surprising that hydrogen research, as Hanusch and Schad (2021) point out, lacks diverse perspectives from the social sciences and humanities and instead focuses narrowly on technical feasibility studies, economic cost analyses and acceptability studies. Hanusch and Schad (2021) argue that more diverse hydrogen research on path dependencies, social inequalities and energy cultures would contribute to avoiding a technocratic hydrogen transition. We agree and would like to extend their call in outlining a research agenda for critical hydrogen studies that is rooted in critical social theory and focuses on the global dimension of the hydrogen transition. We draw on insights, concepts and methodologies from political ecology, political economy, postcolonial

studies and science and technology studies to suggest seven research avenues. We start with a focus on the global political economy and global governance of hydrogen transitions, then zoom in to the local conflicts and justice implications surrounding hydrogen projects, followed by a shift to the epistemic and discursive dimension of hydrogen transitions. We end by suggesting to not only focus on the critique of existing hydrogen projects but to also explore the emancipatory potentials of hydrogen futures.

The global hydrogen market and ecologically unequal exchange

The emerging global hydrogen market ought to benefit both producing and consuming countries. The common narrative sees countries in the Global South supplying green hydrogen to the Global North and expecting investments, jobs and technologies in return (BMBF 2021). The concept of ecologically unequal exchange helps to critically scrutinise these win-win narratives. Ecologically uneven exchange takes place when there is a net flow of materials, energy and labour embodied in internationally traded commodities from one place to another (Hornborg 1998). Studies show that imperialist exploitation leads to a huge drain of resources from the Global South that is not accounted for in conventional trade statistics. A recent analysis by Hickel et al. (2022) calculates that the net appropriation of raw materials from the Global South amounts to 43% of the North’s material consumption. An analysis of the material footprint of global hydrogen value chains would reveal how much embodied energy, water, land

Tobias Kalt, MA | tobias.kalt@uni-hamburg.de

Johanna Tunn, MSc | johanna.tunn@uni-hamburg.de

both: Universität Hamburg | Faculty of Business, Economics and Social Sciences | Social Sciences | Allende-Platz 1 | 20146 Hamburg | Germany

© 2022 by the authors; licensee oekom. This Open Access article is licensed under a Creative Commons Attribution 4.0 International License (CC BY).
<https://doi.org/10.14512/gaia.31.2.2>

Received March 25, 2022; revised version accepted May 24, 2022 (double-blind peer review).

¹ Low-carbon hydrogen includes *green* hydrogen from renewable energy, *blue* hydrogen from natural gas with carbon dioxide capture and storage (CCS), *turquoise* hydrogen from natural gas through methane pyrolysis and *pink* hydrogen from nuclear power. However, whether other types than green hydrogen are actually low-carbon is contested (Howarth and Jacobsen 2021).

and labour travels from producing to consuming countries and thus contributes to the North's ecological debt (Hornborg and Martínez Alier 2016). A related assessment of the distribution of economic value along global hydrogen value chains could investigate how much value is created in producing countries and how much is captured by importing countries. Research should also deal with power struggles between various state, corporate and civil society actors in global hydrogen production networks seeking to influence the terms on which energy resources are appropriated (Dorn and Huber 2020).

Global hydrogen governance

To govern the global hydrogen market, an increasing number of hydrogen-dedicated institutions, projects and initiatives is emerging worldwide. Bilateral energy partnerships build the grounds for pilot projects in Global South countries, new funding instruments such as the German government's *H2Global* foundation de-risk hydrogen investments, whilst established institutions such as the International Renewable Energy Agency (IRENA), the International Energy Agency (IEA) and the German Corporation for International Cooperation (GIZ) support the development of hydrogen strategies in countries of the Global South. From a governance perspective, key questions are: whose terms determine hydrogen diplomacy (Griffiths 2019)? Do these institutions enable mutually beneficial or asymmetrical hydrogen futures and governance processes (Müller 2017)? These questions are all the more crucial since energy partnerships and hydrogen diplomacy might legitimise and obscure conflicts, exploitation, human rights abuses and (neo-)colonial occupation. A recent study by Allan et al. (2021) raises concerns about renewable energy production in Moroccan-occupied Western Sahara that secures and greenwashes the colonial occupation. Similarly, if green hydrogen imports were to come from Western Sahara, European dependency on hydrogen produced in occupied and disputed territories would create a diplomatic incentive to recognise the occupation of Western Sahara. By linking governance and postcolonial literature, studies should therefore focus on the racialised governance of energy systems (Newell 2021), analyse which subjects are privileged or excluded in hydrogen governance, and whether hydrogen governance enables or suppresses social justice (Teo and Wynne-Hughes 2020). Research should further investigate to what extent applied hydrogen sustainability criteria are helpful to prevent negative socio-ecological effects. For example, the EU's pilot certification scheme *CertifHy* classifies hydrogen as "low-carbon" or "clean" (Cheng and Lee 2022); however, carbon certification alone will not be sufficient to address conflicts around water and energy justice (see *Hydrogen injustices*). Research could further be devoted to the governance aspects of hydrogen mapping and (econo)metrics. For example, the German government-funded *H2Atlas-Africa*² maps hydrogen potentials in West Africa, classifying land according to technical and "objective" categories of hydrogen potentials. As critical geographers

have shown, such simplified mappings obfuscate and depoliticise underlying structural dimensions of inequality and do not consider local socio-economic and environmental conditions (Du Toit 2005). Their results thus should by no means be considered as sufficient criteria for site selection. Drawing from cartographic theory (Kitchin et al. 2013), studies should investigate dominant knowledges and processes of knowledge generation around these metrics and examine their power effects.

Expanding the hydrogen frontier through green extractivism

Zooming in on the local impacts of hydrogen transitions in producing countries, green extractivism (Voskoboynik and Andreucci 2021) and green grabbing (Fairhead et al. 2012) are helpful concepts that describe the large-scale private appropriation of resources and land for environmental or climate ends. Examples are large wind parks in Oaxaca, Mexico or the solar power project in Ouarzazate, Morocco that transfer control over energy resources to private investors and are criticised for intensifying social inequalities, local environmental degradation and social conflicts (Hamouchene 2016, Siamanta and Dunlap 2019). Green extractivism accompanies the expansion of the hydrogen commodity frontier, a process that appropriates increasing amounts of renewable energy, land and water resources for hydrogen production. A first research direction should explore the global drivers of green hydrogen extractivism, for example, capitalist expansion, green financialisation and energy colonialism. These are strategies that respond to climate, energy, economic and geopolitical crises by deepening the appropriation of nature and dispossession of people of their lands and resources (Harvey 2003). A second focus could be on the actor constellations around green hydrogen projects including energy corporations, investors, governments, international organisations, donors, green and developmental NGOs and local communities, asking questions such as: what kind of new hydrogen alliances are emerging "from above"? Which strategies do they pursue to gain control over energy resources and to externalise socio-ecological costs? Which conflict lines become visible? A third research avenue could analyse the discourses that turn green hydrogen into a sustainable low-carbon solution, and examine legitimisation narratives about climate mitigation, developmental benefits and higher productivity of seemingly empty, degraded or underutilised lands (see *[Post]colonial discourses*). Lastly, research should pay attention to political reactions "from below" (Hall et al. 2015).³

>

² *H2Atlas-Africa* is a project under the cooperation of the German Federal Ministry of Education and Research (BMBF) and African partners which aims at identifying the potentials for green hydrogen production in Southern and West Africa: www.h2atlas.de/en.

³ These range from the acquiescence or incorporation of local communities to open resistance, as in the case of Bedouin opposition to the Saudi Arabian *NEOM* green hydrogen project that led to the extrajudicial killing of the environmental justice activist Abdel Rahim Al-Huwaïti.

Hydrogen injustices

Political ecology analyses of green extractivism and green grabbing for hydrogen projects can be complemented by drawing on environmental, energy and climate justice literature to explore the justice implications in conflicts over energy, water and land (Müller et al. forthcoming). Environmental justice focuses on the uneven distribution of environmental benefits and costs (Pellow 2018), energy justice deals with questions of energy access, distribution and decision-making (Jenkins et al. 2016), and climate justice focuses on the uneven global responsibilities, vulnerabilities and adaptive capacities in the climate crisis (Sultana 2022). Conflicts may emerge, for example, in energy-poor countries between the use of renewable energy for green hydrogen production or for defossilising the domestic energy mix and meeting domestic energy needs. Similarly, the land needed for large renewable energy plants may restrict other types of land-use. Water justice may be an issue in arid regions if scarce water resources are earmarked for hydrogen production rather than serving local water needs. Desalination plants aim to circumvent water shortages but also impact marine ecosystems and local fisheries. In some countries like Chile and South Africa, socio-ecologically harmful mining activities are greenwashed as green hydrogen ought to “green” mining sectors. Through a climate justice lens, research should inquire about who gets the benefits and who bears the costs for climate mitigation through green hydrogen and challenge ecomodernist “decoupling through green growth” narratives in green hydrogen transitions. Importantly, an intersectional lens helps to examine how energy, environmental and climate injustices manifest along overlapping lines of margin-

alisation and discrimination (Malin and Ryder 2018). For example, those women in low-income households in the Global South who take on roles of water purveyors may be hit hardest if hydrogen projects restrict community access to water and lead to rising water tariffs.

Uneven epistemic geographies

Apart from material inequalities, the hydrogen transition is based on and sustains epistemic injustices. Basic scientific research as well as policy-relevant research on climate and energy is both shaped by an under-representation of the social sciences (Overland and Sovacool 2020) and dominant practices of knowledge generation in exclusive spaces primarily framed by epistemic communities in the global North (Mahony and Hulme 2018). These uneven epistemic geographies result in a lack of diversity (Tandon 2021). They exclude perspectives from female, queer and Global South scholars as well as diverse cultures of knowledge-making (e.g., indigenous knowledges), thus “perpetuat[ing] the colonial practices of discounting of knowledge, lived experiences and wisdom from many global-south contexts” (Sultana, cited from Tandon 2021). We suggest paying more attention to the geographies of hydrogen knowledge and the representation of diverse disciplines and perspectives in hydrogen research. Studies could investigate the allocation of patents and research funding as well as the diversity of research networks and authorship. With emerging funding under *HORIZON Europe* and international hydrogen research clusters (e.g., between the West African Science Service Centre on Climate Change and Adapted

FIGURE 1: Green hydrogen produced in countries of the Global South, such as Namibia and Chile, is planned to be shipped to Europe primarily by sea. However, technical feasibility challenges and high economic costs may create problems for the future of the global hydrogen trade.



Land Use [WASCAL], the Southern African Science Service Centre for Climate Change and Adaptive Land Management [SASS-CAL] and the German Federal Ministry of Education and Research [BMBF]) which envisage research cooperation on equal terms, accompanying research could examine project logics, the discursive and material constraints as well as patterns and inequalities in resource allocation. The concept of co-production of knowledge (Jasanoff 2004) could help to understand how scientific and policy-relevant hydrogen knowledge is generated by interactions between technology and society, and thus enable reflection on the underlying spatialities (cf. Hazlett et al. 2020 for methods). Applying the lens of epistemic violence (Brunner 2021) could shed light on how hydrogen knowledges emerge among an entanglement of dominant energy knowledges and the exclusion of marginalised perspectives amidst colonial modernity and capitalism.

(Post)colonial discourses, narratives and imaginaries

The Global South is presented as a beacon of hope for the European hydrogen strategy. Yet, hydrogen policies and projects risk perpetuating colonial, racist and developmental misrepresentations. Among these, images of empty, sun-drenched steppes (e.g., found in the *H₂Atlas-Africa*) and narratives of sparsely populated areas accompanying hydrogen-site selections reproduce *terra nullius* fictions that are inaccurate and have historically been instrumentalised for colonial invasion, exploitation and mass violence (Keenan 2020). Moreover, Eurocentric development discourses guide joint hydrogen initiatives such as the BMBF initiative *Go Green Go Africa*. Germany's self-representation as an indispensable pioneer of hydrogen knowledge and technology to enable the African hydrogen transition is anchored in Western narratives of progress: it erroneously suggests that "good" development needs the help of Europe and that African energy transitions should follow European models. Discourse analysis (e.g., Ahmed 2021) could investigate the ideas and concepts reproduced through hydrogen policies and projects, examine how producer countries are represented and objectified, and interrogate contingencies of whiteness that are inscribed in these representations (Baldwin 2012). Research should also explore how racist discourses legitimise hydrogen strategies, as exemplified by the former Africa Commissioner of the German government: he framed hydrogen as a means to preserve the "Fortress Europe" (Leithäuser 2021).

Emancipatory hydrogen futures

While the research directions suggested above focus on the risks of reproducing systemic injustices through the hydrogen transition, we may also imagine more emancipatory hydrogen futures. This requires that hydrogen transitions do not perpetuate colo-

onial, class and gender injustices but highlight the struggle of frontline communities against climate change, extractivism and social inequalities. Transformative research could explore the conditions and challenges for just hydrogen transitions. This includes asking about macro level conditions, such as inclusive global governance, strong sustainability investment criteria, equitable trade agreements and fair knowledge and technology transfers. Research on producing countries should focus on how principles of energy democracy can be strengthened in hydrogen strategies (Szulecki 2018). Hydrogen democracy would emphasise issues of democratic control in the hydrogen economy, as well as the decentralisation of hydrogen production and its re-orientation to meet social needs. Research also needs to shift focus to necessary changes in consuming countries, such as privileging electrification over hydrogen use wherever feasible and shrinking the industrial metabolism to reduce hydrogen demand. More fundamental transformations need to take place in terms of decolonising ideas of progress, overcoming society-nature dualisms and moving beyond the capitalist growth economy (Albert 2021). Research on hydrogen partnerships may look at how those can be designed to bring local ownership, participation and justice principles to the fore. On a micro level, case studies should investigate how the planning and implementation of hydrogen projects can be aligned with principles of energy and environmental justice. Feminist, decolonial, degrowth and ecosocialist perspectives are helpful to identify cornerstones for building inclusive, democratic and just hydrogen futures beyond neo-colonial, capitalist and patriarchal hydrogen techno-utopias (Bell et al. 2020, Lennon 2017).

Towards a critical hydrogen research agenda

Even if the hydrogen transition is still in its infancy, the course for hydrogen futures is already being set today. As this article has shown, the high hopes of a hydrogen transition should be approached with caution. This does not mean that green hydrogen should not be part of the solution, as it would be equally misguided to write off green hydrogen as part of a low-carbon transition. However, if countries of the Global South are to become the main producers of hydrogen for the European energy transition, the hydrogen transition cannot be viewed in isolation from global inequalities, colonial histories of oppression and hierarchies of knowledge – fields of work that scholars of the social sciences and humanities attend to. Critical research on the global hydrogen transition is crucial to prevent the (re)production of global inequalities and power imbalances, to anticipate and circumvent problems and conflicts in its implementation, and to set the course towards a globally just and socially accepted hydrogen transition.

Acknowledgement: We thank two anonymous reviewers for helpful comments.

Funding: Funding has been provided by the German Federal Ministry of Education and Research (BMBF) (grant number: 161TA201A/B).

Competing interests: The authors declare no competing interests.



References

- Ahmed, Y. 2021. Political discourse analysis: a decolonial approach. *Critical Discourse Studies* 18/1: 139–155. <https://doi.org/10.1080/17405904.2020.1755707>.
- Albert, M. 2021. The climate crisis, renewable energy, and the changing landscape of global energy politics. *Alternatives: Global, Local, Political* 46/3: 89–98. <https://doi.org/10.1177%2F03043754211040698>.
- Allan, J., H. Lakkhal, M. Lemaadel. 2021. *An unjust transition: Energy, colonialism and extractivism in occupied Western Sahara*. <https://longreads.tni.org/an-unjust-transition> (accessed March 23, 2022).
- Baldwin, A. 2012. Whiteness and futurity: Towards a research agenda. *Progress in Human Geography* 36/2: 172–187. <https://doi.org/10.1177/0309132511414603>.
- Bell, S. E., C. Daggett, C. Labuski. 2020. Toward feminist energy systems: Why adding women and solar panels is not enough. *Energy Research and Social Science* 68: 101557. <https://doi.org/10.1016/j.erss.2020.101557>.
- BMBF (Bundesministerium für Bildung und Forschung). 2021. *West Africa can become the climate-friendly energy powerhouse of the world*. www.bmbf.de/bmbf/en/home/_documents/west-africa-can-become-the-eli-energy-powerhouse-of-the-world.html (accessed May 23, 2022).
- Brunner, C. 2021. Conceptualizing epistemic violence: an interdisciplinary assemblage for IR. *International Politics Reviews* 9/1: 193–212. <https://doi.org/10.1057/s41312-021-00086-1>.
- Cheng, W., S. Lee. 2022. How green are the national hydrogen strategies? *Sustainability* 14/3: 1930. <https://doi.org/10.3390/su14031930>.
- Dorn, F. M., C. Huber. 2020. Global production networks and natural resource extraction: Adding a political ecology perspective. *Geographica Helvetica* 75: 183–193. <https://doi.org/10.5194/gh-75-183-2020>.
- Du Toit, A. 2005. *Poverty measurement blues: Some reflections on the space for understanding “chronic” and structural poverty in South Africa*. <http://dx.doi.org/10.2139/ssrn.1753682>.
- Fairhead, J., M. Leach, I. Scoones. 2012. Green grabbing: A new appropriation of nature? *Journal of Peasant Studies* 39/2: 237–261. <https://doi.org/10.1080/03066150.2012.671770>.
- Griffiths, S. 2019. Energy diplomacy in a time of energy transition. *Energy Strategy Reviews* 26: 100386. <https://doi.org/10.1016/j.esr.2019.100386>.
- Hall, R., M. Edelmann, S. M. Borrás, I. Scoones, B. White, W. Wolford. 2015. Resistance, acquiescence or incorporation? An introduction to land grabbing and political reactions “from below”. *Journal of Peasant Studies* 42/3–4: 467–488. <https://doi.org/10.1080/03066150.2015.1036746>.
- Hamouchene, H. 2016. *The Ouarzazate solar plant in Morocco: Triumphant “green” capitalism and the privatization of nature*. <https://portsite.org/node/11225/printable/print> (accessed March 1, 2022).
- Hanusch, F., M. Schäd. 2021. Hydrogen research: technology first, society second? *GAIA* 30/2: 82–86. <https://doi.org/10.14512/gaia.30.2.5>.
- Harvey, D. 2003. *The new imperialism*. Oxford, UK: Oxford University Press.
- Hazlett, M., K. Henderson, I. Zeitzer, J. Drew. 2020. The geography of publishing in the Anthropocene. *Conservation Science and Practice* 2:e270. <https://doi.org/10.1111/csp2.270>.
- Hickel, J., C. Dorninger, H. Wieland, I. Suwandi. 2022. Imperialist appropriation in the world economy: Drain from the global South through unequal exchange, 1990–2015. *Global Environmental Change* 73: 102467. <https://doi.org/10.1016/j.gloenvcha.2022.102467>.
- Hornborg, A. 1998. Towards an ecological theory of unequal exchange: Articulating world system theory and ecological economics. *Ecological Economics* 25/1: 127–136. [https://doi.org/10.1016/S0921-8009\(97\)00100-6](https://doi.org/10.1016/S0921-8009(97)00100-6).
- Hornborg, A., J. Martínez-Alier. 2016. Ecologically unequal exchange and ecological debt. *Journal of Political Ecology* 23: 328–333. <https://doi.org/10.2458/v23i1.20220>.
- Howarth, R. W., M. Z. Jacobsen. 2021. How green is blue hydrogen? *Energy Science and Engineering* 9/10: 1676–1687. <https://doi.org/10.1002/ese3.956>.
- Jasanoff, S. 2004. *States of knowledge: The co-production of science and the social order*. London: Routledge.
- Jenkins, K., D. McCauley, R. Heffron, H. Stephan, R. Rehner. 2016. Energy justice: A conceptual review. *Energy Research and Social Science* 11: 174–182. <https://doi.org/10.1016/j.erss.2015.10.004>.
- Keenan, S. 2020. Expanding terra nullius. *Contemporary Pacific* 32/2: 449–460. <https://doi.org/10.1353/cp.2020.0037>.
- Kitchin, R., J. Gleeson, M. Dodge. 2013. Unfolding mapping practices: A new epistemology for cartography. *Transactions of the Institute of British Geographers* 38: 480–496. <https://doi.org/10.1111/j.1475-5661.2012.00540.x>.
- Leithäuser, J. 2021. Es geht um die Industrialisierung Afrikas. *Frankfurter Allgemeine Zeitung*, August 26, 2021. https://nooke.de/wp-content/uploads/2021/08/210826_FAZ-GN-fordert-mehr-Engagement-fuer-Afrikal.pdf (accessed June 9, 2021).
- Lennon, M. 2017. Decolonizing energy: Black Lives Matter and technoscientific expertise amid solar transitions. *Energy Research and Social Science* 30: 18–27. <https://doi.org/10.1016/j.erss.2017.06.002>.
- Mahony, M., M. Hulme. 2018. Epistemic geographies of climate change: Science, space and politics. *Progress in Human Geography* 42/3: 395–424. <https://doi.org/10.1177%2F0309132516681485>.
- Malin, S. A., S. S. Ryder. 2018. Developing deeply intersectional environmental justice scholarship. *Environmental Sociology* 4/1: 1–7. <https://doi.org/10.1080/23251042.2018.1446711>.
- Müller, F. 2017. IRENA as a global actor: Pathways towards energy governmentality. *Innovation: European Journal of Social Science Research* 30/3: 306–322. <https://doi.org/10.1080/13511610.2017.1279538>.
- Müller, F., J. Tunn, T. Kalt. Forthcoming. Hydrogen justice. *Environmental Research Letters*.
- Newell, P. 2021. Race and the politics of energy transitions. *Energy Research and Social Science* 71. <https://doi.org/10.1016/j.erss.2020.101839>.
- Overland, I., B. Sovacool. 2020. The misallocation of climate research funding. *Energy Research and Social Science* 62. <https://doi.org/10.1016/j.erss.2019.101349>.
- Pellow, D. 2018. *What is critical environmental justice?* Cambridge, UK: Polity.
- Siamanta, Z. C., A. Dunlap. 2019. “Accumulation by wind energy”: Wind energy development as a capitalist Trojan horse in Crete, Greece and Oaxaca, Mexico. *ACME: International Journal for Critical Geographies* 18/4: 925–955.
- Sultana, F. 2022. Critical climate justice. *Geographical Journal* 188: 118–124. <https://doi.org/10.1111/geoj.12417>.
- Szulecki, K. 2018. Conceptualizing energy democracy. *Environmental Politics* 27/1: 21–41. <https://doi.org/10.1080/09644016.2017.1387294>.
- Tandon, A. 2021. Analysis: The lack of diversity in climate-science research. *Carbon Brief*. www.carbonbrief.org/analysis-the-lack-of-diversity-in-climate-science-research (accessed March 23, 2022).
- Teo, T. A., E. Wynne-Hughes. 2020. *Postcolonial governmentalities. Rationalities, Violences and Contestations*. Lanham, MD: Rowman & Littlefield.
- Voskoboinik, D., D. Andreucci. 2021. Greening extractivism: Environmental discourses and resource governance in the “Lithium Triangle”. *Environment and Planning E: Nature and Space* 0: 1–23. <https://doi.org/10.1177%2F25148486211006345>.



Tobias Kalt

Studies in political science. Since 2020 research associate at the department of Global Climate Governance, Universität Hamburg, Germany. Research associate in the research projects *Building just hydrogen partnerships with the Global South (H2POLITICS)* and *Funds, tools and networks for an African energy transition (GLOCALPOWER)*. Research interests: energy and climate justice, socio-ecological transformation, social movements and trade unions.



Johanna Tunn

Studies in international development. Since 2021 research associate at the department of Global Climate Governance, Universität Hamburg, Germany, in the research project *Building just hydrogen partnerships with the Global South (H2POLITICS)*. Previously research associate at the Department of Energy Systems, TU Berlin, Germany. Research interests: energy and climate justice, current focus on epistemic violence in the Anthropocene.