GERMANWATCH G7 BRIEFING SERIES

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POLICY BRIEF

G7 in 2022: Towards a Green G7 Hydrogen Action Pact

Green hydrogen and its derivatives are key elements to achieve full industry transition and climate neutrality. According to the International Energy Agency's (IEA) Net Zero Emissions Scenario, globally, 520 million tonnes (Mt) hydrogen will be needed by 2050.[1] As of 2021, global hydrogen demand was around 90 Mt, being almost completely fossil-based.[2] The Russian war against Ukraine provides even more pressure to substitute fossil fuels as soon as possible.

Hence, accelerating the development of a global market for green hydrogen is urgently needed. The Group of Seven (G7) countries are well placed to play a major facilitating role and pull factor in that regard. By 2025, G7 countries' hydrogen and ammonia generation in the electricity sector alone needs to reach nearly 200 TWh.[3]

However, to mitigate that global competition for green hydrogen will disadvantage the Global South as well as be counteractive to climate protection, an alliance of front runners who jointly work on a minimum set of sustainability standards and clearly emphasise green hydrogen will be necessary.

A stronger alignment among the G7 countries in that sense can create a substantial market pull for green hydrogen and trigger the acceleration of the market ramp-up. By announcing a joint G7 Hydrogen Action Pact (G7-HAP) in May 2022, the G7 ministers made important progress; however, besides staying rather vague, the ministers left important questions on sustainability standards open and put too much attention on low-carbon hydrogen.

[1] IEA (2021). Net Zero by 2050: A Roadmap for the Global Energy Sector. https://iea.blob.core.windows.net/assets/7ebafc81-74ed-412b-9c60-5cc32c8396e4/NetZeroby2050-ARoadmapfortheGlobalEnergySector-SummaryforPolicyMakers_CORR.pdf
[2] IEA (2021). Global Hydrogen Review. https://iea.blob.core.windows.net/assets/5bd46d7b-906a-4429-abda-e9c507a62341/GlobalHydrogenReview2021.pdf
[3] IEA (2021). Achieving Net Zero Electricity Sectors in G7 Members. https://www.iea.org/reports/achieving-net-zero-electricity-sectors-in-g7-members

1 Announcement of the G7 Hydrogen Action Pact

In May 2022, G7 ministers announced the launch of the G7-HAP. This Pact sketches out six action points on how to ramp up low-carbon and renewable hydrogen and power-to-X production, trade, transport, and use domestically and at a global scale. The action points cover commitments to rapidly establish the regulatory frameworks and joint standards needed, via reaffirmation of strong financial commitments, to expressing willingness to identify knowledge gaps, exchange on best practices (particularly with regard to sustainability criteria), and organise dialogue on geopolitical implications of a global hydrogen market.

G7-HAP – Commitments by the G7

1. "We will accelerate the development of low-carbon and renewable hydrogen, and other power-to-X value chains, domestically and at a global scale, notably in hard-to-abate sectors.
2. We will speed up the shaping of regulatory frameworks and common standards that facilitate the production, trade, transport, and use of low-carbon and renewable hydrogen and derived products.
3. We confirm our strong financial commitments for the market ramp-up of low-carbon and renewable hydrogen and its derivatives, thereby signalling an irreversible shift towards a world economy based on low-carbon and renewable energy sources.
4. We will identify and close existing gaps for the ramp-up of low-carbon and renewable hydrogen value chains, reaching also beyond G7 countries.
5. We will exchange best practices on low-carbon and renewable hydrogen production based on sustainability criteria and facilitate dialogue on the geopolitical implications of an emerging global hydrogen market.
6. We support the role of low-carbon and renewable hydrogen and its derivatives in the decarbonisation of natural gas infrastructure and for zero-emission thermal power generation."

2 Our recommendations

To build on and specify the G7-HAP, we expect the German G7 presidency to continue its work on the action plan in the second half of the presidency in the following ways:

2.1 Specify goals, functions, and timeline of the G7-HAP

As of today, there is a lack of clarity on concrete quantifiable goals, functions, and the timeline of the G7-HAP. The above-mentioned actions need to be translated into concrete milestones and worked on in a process that is inclusive to relevant stakeholders from academia, private sector, and civil society, from the G7 countries and beyond.

2.2 Increase added value compared with other multilateral hydrogen programmes

The G7-HAP is an addition to a number of existing multilateral initiatives on hydrogen. These include the 2021 Glasgow Breakthrough Agenda, the Clean Energy Ministerial, Mission Innovation, the International Partnership for Hydrogen and Fuel Cells in the Economy, the International Renewable Energy Agency (IRENA), the IEA Technology Collaboration Programmes, and the Hydrogen Energy Ministerial (see Table 1 in the annex). This risks creating ambiguity, duplication, and overlapping functions and responsibilities. More clarity is required on the ways that the G7-HAP will go beyond these initiatives or complement them. From the German G7 presidency we particularly expect to ensure that the next steps of the G7-HAP are in line with the Hydrogen Accelerator Plans of the European Commission as sketched out in the REPowerEU Plan.

2.3 Put clear emphasis on green hydrogen

Both the G7 Climate, Energy and Environment Ministers communiqué and the Conclusions of the Industrial Decarbonization Agenda look at low-carbon and renewable hydrogen as a twin priority. The continued emphasis on low-carbon hydrogen, implies a continued fossil fuels production and business as usual. This is a worrying development, considering the urgent need to rapidly reduce the dependence on fossil fuels in the wake of Russia's war against Ukraine and misses providing the urgently needed new global push for renewables. The G7 needs to agree a joint definition of green hydrogen, clearly prioritise green hydrogen over other production pathways, and align their regulatory frameworks and financing schemes accordingly.

Seven reasons why the G7 should clearly emphasise green over low-carbon hydrogen

- Blue hydrogen is fossil-based, and therefore comes with significant greenhouse gas (GHG) emissions from 3.91 to 8.2 kg CO_{2eq}/kg H_2.[4] Its unlimited use can jeopardise reaching climate neutrality and the goals of the Paris Agreement.
- It furthermore creates the risk of either locking in the G7 countries and their partner countries further into fossil fuel dependence or generates substantial stranded assets.[5] This seems particularly problematic given the current geopolitical and economic crisis caused by the Russian attack on Ukraine.
- Nuclear-based hydrogen, albeit being less GHG-intensive, comes with other unsolved and severe environmental and safety risks that cannot be washed away.[6]
- Promoting low-carbon hydrogen (blue or pink) at a G7 level risks being an expensive mistake. Blue hydrogen relies on expensive and energy-intensive carbon capture and storage technology as well as subsequent infrastructure for CO_2 transportation and long-term storage.[7] Nuclear energy is currently the most expensive form of energy[8] and the realisation of new nuclear plants takes at least 7 years.[9]
- Green hydrogen, on the other hand, is a zero-emission pathway that, if done right, has the potential to speed up renewable expansion and industrial decarbonisation globally.
- There are two trends that make green hydrogen a very promising avenue: 1) electrolysers are getting cheaper;[10] and 2) prices of renewables continue to go down,[11] whereas the price for fossil gas is currently at a high.[12] BloombergNEF predicts that green hydrogen will economically outcompete blue hydrogen by around 2030.[13]
- The next 5 to 10 years are crucial for the development of green hydrogen. This is a fairly short amount of time compared with the huge innovation and development task ahead. To reach the desired global hydrogen market quickly, we need to concentrate our regulatory and financial efforts on fostering green hydrogen.

[4] Oni et al. (2022). Comparative assessment of blue hydrogen from steam methane reforming, autothermal reforming, and natural gas decomposition technologies for natural gas-producing regions. https://www.sciencedirect.com/science/article/pii/S0196890422000413
[5] IRENA (2022). Geopolitics of the Energy Transformation: The Hydrogen Factor, International Renewable Energy Agency, Abu Dhabi. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jan/IRENA_Geopolitics_Hydrogen_2022.pdf
[6] Jacobson (2021). The 7 reasons why nuclear energy is not the answer to solve climate change. https://eu.boell.org/en/2021/04/26/7-reasons-why-nuclear-energy-not-answer-solve-climate-change
[7] IPCC (2022). Climate Change 2022. Mitigation of Climate Change. Summary for Policy-Makers. https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf
[8] Schneider (2021). The World Nuclear Industry Status Report 2021. https://www.worldnuclearreport.org/IMG/pdf/wnisr2021-lr.pdf
[9] Statista (2022). Median Construction Time Required for Nuclear Reactors Worldwide from 1981 to 2020 (in months). https://www.statista.com/statistics/712841/median-construction-time-for-reactors-since-1981/
[10] BNEF (2022). Hydrogen – 10 Predictions for 2022. https://about.bnef.com/blog/hydrogen-10-predictions-for-2022/
[11] IPCC (2022). Climate Change 2022. Mitigation of Climate Change. Summary for Policy-Makers. https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf
[12] IEA (2022). Natural Gas Prices in Europe, Asia and the United States, Jan 2020-February 2022. https://www.iea.org/data-and-statistics/charts/natural-gas-prices-in-europe-asia-and-the-united-states-jan-2020-february-2022
[13] BNEF (2022). Hydrogen – 10 Predictions for 2022. https://about.bnef.com/blog/hydrogen-10-predictions-for-2022/

2.4 Go beyond a mere exchange of best practices on sustainable hydrogen production and develop a proper set of sustainability standards

As part of the G7-HAP, exchange of best practices on sustainability criteria (and advancement of a dialogue on geopolitical consequences of a global hydrogen market) has been foreseen; however, in that regard, actions need to go beyond mere exchange. To mitigate possible negative effects of hydrogen production in partner countries and to enable hydrogen partnerships that support local just transitions, it is crucial to identify and agree on concrete and ambitious sustainability criteria. These should be worked out in a process that is inclusive to countries of the G20 and the Global South and, again, need to be translated into regulatory frameworks as well as reflected in public funding programmes.

Sustainability standards are key to:

- mitigate potential socioecological risks associated with producing hydrogen and synthetic fuels (such as negative climate impacts, water stress, land grabbing, and human rights violation);[14]
- enable producer countries, and particularly countries of the Global South, to benefit from producing these new green energy carriers (such as by enabling knowledge transfer, job and value creation, and democratisation of energy economies), and therefore potentially leaving fossil alternatives behind or even allowing for leap frogging;[15]
- create investment security for the development of a robust and societally backed green hydrogen market;[16] and
- enable the marketing of subsequent products such as green steel, green flights, and green shipping.[17]

[14] Heinemann, C. & Mendelevitch, R. (2021). Working Paper. Sustainability Dimensions of Imported Hydrogen. https://www.oeko.de/fileadmin/oekodoc/WP-imported-hydrogen.pdf;
Nationaler Wasserstoffrat (2021). Nachhaltigkeitskriterien für Importprojekte von erneuerbarem Wasserstoff und PtX-Produkten. https://www.wasserstoffrat.de/fileadmin/wasserstoffrat/media/Dokumente/NWR_Positionspapier_Nachhaltigkeitskriterien.pdf;
Powershift Africa et al. (2022). Civil Society Perspectives on Green Hydrogen PRODUCTion and Power-to-X Products in Africa. https://www.germanwatch.org/sites/default/files/positionpaper_greenhydrogenproductionandpower-to-x_productsinafrica_250122.pdf;
Thomann, J. et al. (2022) Hintergrundpapier zu Nachhaltigem Grünen Wasserstoff und Syntheseprodukten. https://www.isi.fraunhofer.de/content/dam/isi/dokumente/cce/2022/HYPAT_Working_Paper_01-2022_Hintergrundpapier_zu_nachhaltigem_gruenen_Wasserstoff_und_Syntheseprodukten.pdf

[15] ibid.

[16] Heinemann, C. & Mendelevitch, R. (2021). Sustainability dimensions of imported hydrogen. https://www.oeko.de/publikationen/p-details/sustainability-dimensions-of-imported-hydrogen, and Agora Energy (2021) Climate Neutral Industry in Europe. https://static.agora-energiewende.de/fileadmin/Success_Stories/PW/PW_EU_Climate-neutral-industry/A-E_242_Succ_Stor_Pathways_IND_EU_Climate-neutrality_WEB.pdf
Piria, R. et al. (2021). Analyse: Wasserstoffimportsicherheit für Deutschland – Zeitliche Entwicklung, Risiken und Strategien auf dem Weg zur Klimaneutralität. https://ariadneprojekt.de/publikation/analyse-wasserstoffimportsicherheit-fuer-deutschland-zeitliche-entwicklung-risiken-und-strategien-auf-dem-weg-zur-klimaneutralitaet/

[17] Heinemann, C. & Mendelevitch, R. (2021). Sustainability dimensions of imported hydrogen. https://www.oeko.de/publikationen/p-details/sustainability-dimensions-of-imported-hydrogen, and Agora Energy(2021). Climate Neutral Industry in Europe. https://static.agora-energiewende.de/fileadmin/Success_Stories/PW/PW_EU_Climate-neutral-industry/A-E_242_Succ_Stor_Pathways_IND_EU_Climate-neutrality_WEB.pdf

Sustainability dimensions in areas such as energy and water supply, land use, socioeconomic impacts, human rights, and GHG emissions should be assessed on a project level and others on a country level, for example when implementing hydrogen partnerships. For more details on sustainability dimensions for hydrogen and derivatives, see the **letter of German civil society organisations** to the G7 presidency.

2.5 Develop a joint vision on a credible monitoring and certification system

The previous G7 texts leaves out the topic of monitoring and certification of hydrogen and its derivatives. This question is a prerequisite for making green hydrogen internationally tradable and creating transparent and reliable hydrogen partnerships as well as a global market. It is furthermore a precondition for industry and transport to market their derived goods as green. We envision a jointly prepared accreditation of an independent and credible certification and monitoring body, on a level similar to the International Trade Centre, the Organisation for Economic Co-operation and Development, or IRENA that verifies the compliance of hydrogen products, projects, and partnerships with the agreed definition of green hydrogen. It shall, thereby, be elaborated whether and how this certification scheme can look beyond the "greenness" of hydrogen and examine the compliance with further sustainability standards.

Table 1: Overview of international developments and initiatives on hydrogen

	Membership	**Goals**	**Institutionalisation**
EU Hydrogen Accelerator (2022)	EU	Scale up the deployment of renewable hydrogen, The REPowerEU Plan's ambition is to produce 10 million tonnes and import 10 million tonnes of renewable hydrogen in the EU by 2030 (a substantial increase from the 5.6 million tonnes foreseen within the revised Renewable Energy Directive, published in July 2021).	Part of the EU Commission's REPowerEU Plan
Glasgow Breakthrough Agenda (2021)	Launched by the UK, a coalition of 42 world leaders (their countries	The Glasgow Breakthroughs are the first set of global leader-led common targets under The Breakthrough Agenda.	Leaders are committing to measure global progress and to review and strengthen their international actions

	represent 70% of global GDP).	The commitments set ambitious goals for 2030 to dramatically accelerate the innovation and deployment of clean technologies in five key sectors of the economy: power, road, transport, steel, **hydrogen**, and agriculture. The goal for hydrogen is to achieve affordable renewable and low-carbon hydrogen that is globally available by 2030.	every year. The UK COP Presidency will take this forward in 2022 by establishing an ongoing annual **Global Checkpoint Process.**
Clean Energy Ministerial (CEM) - Hydrogen Initiative (2019)	Canada, the USA, Japan, the Netherlands, and the European Commission with participation of several other CEM member countries.	The new **Hydrogen Initiative** will drive international collaboration on policies, programmes, and projects to accelerate the commercial deployment of hydrogen and fuel cell technologies across all sectors of the economy and focus on how hydrogen can contribute to cleaner energy systems, while promoting sustainability, resiliency, and energy security. Initial work focuses on three key areas: 1. Helping to ensure successful deployment of hydrogen within current industrial applications. 2. Enabling deployment of hydrogen technologies in transport (e.g. freight, mass transit, light-rail, and marine). 3. Exploring the role of hydrogen in meeting the energy needs of communities.	The IEA coordinates efforts under this initiative.
Mission Innovation - Clean Hydrogen Mission (June 2021)	Chile, the European Commission, and ministers from Australia, Austria,	The goal of the Clean Hydrogen Mission is to reduce the costs of clean hydrogen to the end user to 2 dollars per kg by 2030 and to deliver at least 100 large-scale integrated hydrogen valleys worldwide.	Launched for an initial period of 5 years, and depending on progress achieved, may be extended for a further 5 years to support the

	Canada, Chile, China, Germany, India, Italy, Morocco, Norway, Saudi Arabia, the Republic of Korea, the UK, and the US.		delivery of its key objectives by 2030. Each member state has to annually produce accessible summaries of their respective clean hydrogen research, development, and demonstration efforts.
International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) (2003)	Australia, Chile, **France**, **Italy**, Norway, UAE, Austria, China, **Germany**, **Japan**, Russia, the **UK**, Brazil, Costa Rica, Iceland, Korea, South Africa, **US, Canada**, **EC**, India, the Netherlands, and Switzerland.	IPHE **informs** broad stakeholder groups, including policymakers and the public, on the benefits and challenges to establishing widespread commercial hydrogen and fuel cell technologies in the economy. There are currently two Working Groups: 1) Regulations, Codes, Standards & Safety; 2) Education & Outreach. IRENA and IPHE agreed in October 2021 to closely work on the rapid growth in hydrogen deployment and use globally.	
IEA Technology Collaboration Programmes (TCP)	These collaborations involve over 6,000 experts worldwide who represent nearly 300 public and private organisations located in 55 countries.	This supports the work of independent, international groups of experts that enable governments and industries from around the world to lead programmes and projects on a wide range of energy technologies and related issues.	Annual reports for hydrogen: Accelerate hydrogen implementation and widespread utilisation to optimise environmental protection, improve energy security, and promote economic development internationally. Positions the Hydrogen TCP as a premier global resource for expertise in hydrogen.

Hydrogen Energy Ministerial (October 2021)	30+ global leaders and ministers talked about their perspective toward a hydrogen-based economy.		

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