

Principles of Green Hydrogen Geopolitics

Figures Sources

The content presented here refers to the figure “Principles of Green Hydrogen Geopolitics”, commissioned by Global Hydrogen Diplomacy on behalf of the German Federal Foreign Office. All sources are summarized in this document.

Sources and further reading	
Energy Sovereignty	IRENA. (2022). Geopolitics of the energy transformation: The hydrogen factor. International Renewable Energy Agency.
Supply & Value Chains	Rodrigue, J.-P. (2022). The vulnerability and resilience of the global container shipping industry. <i>Current History</i> , 121(831), 17-23.
Energy Transition as Power Transition	Energy Institute. (2025). Oil proved reserves [Dataset]. Our World in Data. https://archive.ourworldindata.org/20260518-083815/grapher/oil-proved-reserves.html; Energy Institute. (2025). Gas proved reserves [Dataset]. Our World in Data. https://archive.ourworldindata.org/20260518-083815/grapher/natural-gas-proved-reserves.html; Energy Institute. (2025). Coal proved reserves [Dataset]. Our World in Data. https://archive.ourworldindata.org/20260518-083815/grapher/coal-proved-reserves.html. Energy Sector Management Assistance Program (ESMAP). (2020). Global photovoltaic power potential by country. World Bank. Lu, X., & McElroy, M. B. (2023). Global potential for wind-generated electricity. In <i>Wind Energy Engineering</i> (pp. 47-61). Academic Press. <i>See the ANNEX for detailed calculations.</i>
Sustainable Governance	IRENA. (2022). Geopolitics of the energy transformation: The hydrogen factor. International Renewable Energy Agency.

ANNEX

Top Ten Countries by Proven Oil, Natural Gas, and/or Coal Reserves in 2020, Including Global Reserve Shares (in %) and World Ranks.

Country	Oil Share	Oil Rank	Gas Share	Gas Rank	Coal Share	Coal Rank
Australia					14,04	3
Canada	9,7	3				
China			4,47	6	13,38	4
Germany					3,36	6
India					10,38	5
Indonesia					3,26	7
Iran	9,11	4	17,07	2		
Iraq	8,37	5				
Kazakhstan					2,39	10
Kuwait	5,86	7				
Libya	2,79	10				
Nigeria			2,91	10		
Poland					2,65	9
Qatar			13,12	3		
Russia	6,22	6	19,88	1	15,16	2
Saudi Arabia	17,17	2	3,2	8		
Turkmenistan			7,23	4		
Ukraine					3,21	8
United Arab Emirates	5,65	8	3,16	9		
United States	3,97	9	6,71	5	23,27	1
Venezuela	17,54	1	3,33	7		

Note: Blank cells indicate that the country's share is below 1% of global proven reserves for the respective resource.

Sources: Energy Institute. (2025). *Oil proved reserves* [Dataset]. Our World in Data. <https://archive.ourworldindata.org/20260518-083815/grapher/oil-proved-reserves.html>;

Energy Institute. (2025). *Gas proved reserves* [Dataset]. Our World in Data. <https://archive.ourworldindata.org/20260518-083815/grapher/natural-gas-proved-reserves.html>;

Energy Institute. (2025). *Coal proved reserves* [Dataset]. Our World in Data. <https://archive.ourworldindata.org/20260518-083815/grapher/coal-proved-reserves.html>.

Top Ten Countries by Average Practical Photovoltaic Power Potential (PVOUT).

Rank	Country	PVOUT (kWh/kWp/day)
1	Namibia	5,3791
2	Chile	5,3647
3	Jordan	5,315
4	Egypt	5,2467
5	Yemen	5,2137
6	Oman	5,1683
7	Saudi Arabia	5,1588
8	Lesotho	5,1349
9	Libya	5,1243
10	Botswana	5,1069

Note: Countries with excellent solar PV conditions are defined here as the top 10 countries by average practical photovoltaic power potential (PVOUT), all exceeding 5.1 kWh/kWp/day and thus above the ESMAP threshold of 4.5 kWh/kWp/day.

Source: Energy Sector Management Assistance Program (ESMAP). (2020). Global photovoltaic power potential by country. World Bank.

Top Ten Countries by Annual Wind Energy Generation Potential.

Rank	Country	Onshore (PWh)	Offshore (PWh)	Total (PWh)
1	Russia	116	23	139
2	Australia	86	13	99
2	Canada	78	21	99
3	United States	74	14	88
4	Argentina	42	5	47
5	China	39	5	44
6	Kazakhstan	41	0,03	41,03
7	Mongolia	17	0,03	17,03
8	Somalia	14	1	15
9	Sudan	15	0,03	15,03
10	Brazil	8	3	11
10	Mauritania	10	1	11

Note: Countries with high wind energy potential are defined here as the top 10 countries by estimated total annual wind electricity generation potential, considering both onshore and offshore resources and restricted to technically suitable installation sites.

Source: Lu, X., & McElroy, M. B. (2023). *Global potential for wind-generated electricity*. In *Wind Energy Engineering* (pp. 47–61). Academic Press.