

Harmonisation Through Hydrogen?

With the New Energy Carrier Towards a New Harmonised Energy Transition Policy in the Baltic Sea Region

Introduction: The Role of Hydrogen in the Baltic Sea Region's Energy Transition

Hydrogen has increasingly been recognised as a crucial pillar of Europe's energy transition (COM (2016) 860), particularly in enabling sector coupling and advancing decarbonisation efforts (COM (2020) 301). In response, the European Union and numerous member states have outlined national strategies and roadmaps to accelerate the development of a hydrogen economy.² Within this broader framework, the Baltic Sea region has emerged as a focal point, hosting both major hydrogen producers and consumers in the evolving European energy landscape.³

Beyond its environmental benefits, hydrogen has gained new strategic significance in light of the geopolitical shifts following Russia's invasion of Ukraine (COM (2022) 230).⁴ As European energy policies increasingly reflect

1 This chapter is based on previous research by the author, Kalis, Michael (ed.): *The Energy Trilemma in the Baltic Sea Region—Security, Equity and the Environment*, London 2024. The research cited above was updated for this chapter and re-evaluated in the context of the research question at hand.

2 Cheng, Wenting/Lee, Sora: *How Green Are the National Hydrogen Strategies?*, in: *Sustainability* 14 (2022), No. 3, 1930, <https://doi.org/10.3390/su14031930>; Koneczna, Renata/Cader, Justyna: *Hydrogen in the Strategies of the European Union Member States*, in: *Mineral Resources Management* 37 (2021), No. 3, pp. 53–74, DEHEMA Acatech (ed.): *Comparative Analysis of International Hydrogen Strategies, Country Analysis 2023*, www.wasserstoff-komp.ass.de/fileadmin/user_upload/img/news-und-media/dokumente/2023_e_H2_Laenderanalyse.pdf (24.05.2024).

3 Cf. DEHEMA: *Comparative Analysis of International Hydrogen Strategies*; Ludwig Bölkow Systemtechnik (LBST)/World Energy Council: *International Hydrogen Strategies*, 2020, www.weltenergieerat.de/wp-content/uploads/2020/10/WEC_H2_Strategies_finalreport.pdf (24.05.2024); IEA: *Global Hydrogen Review 2023*, 2023, iea.blob.core.windows.net/assets/ecdfc3bb-d212-4a4c-9ff7-6ce5b1e19cef/GlobalHydrogenReview2023.pdf (24.05.2024); Koneczna/Cader: *Hydrogen in the Strategies of the European Union Member States*.

4 See also IRENA: *Geopolitics of the Energy Transformation—The Hydrogen Factor*, 2022, www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jan/IRENA_Geopolitics_Hydrogen_2022.pdf (24.05.2024); Carlson, Ewa Lazarczyk/Pickford, Kit/Nyga-Łukaszewska, Honorata: *Green Hydrogen and an Evolving Concept of Energy Security—Challenges and*

concerns over security and diversification,⁵ hydrogen is now viewed as both a climate solution and a tool for reducing reliance on fossil fuel imports. This shift is evident in the EU's REPowerEU plan (COM (2022) 230), which explicitly integrates hydrogen into both its decarbonisation and energy security agendas.

As momentum builds behind hydrogen initiatives, the Baltic Sea region is witnessing an expansion of transnational projects aimed at strengthening regional hydrogen infrastructure.⁶ Key developments include hydrogen clusters and valleys in Finland and Estonia, partnerships between Denmark's Bornholm Energy Island and Germany's Lubmin port, and large-scale infrastructure initiatives such as the Baltic Sea Corridor and the Nordic Hydrogen Corridor. These projects align with broader European efforts, including the European Hydrogen Backbone, to create an interconnected hydrogen economy. Given its strategic location and growing hydrogen-related activities, the Baltic Sea region has the potential to emerge as a key driver of Europe's hydrogen future.

While these initiatives reflect progress toward a hydrogen-based energy system, they also raise questions about policy coherence and integration across national borders. With European and regional hydrogen policies advancing at different paces, the extent to which these efforts contribute to a harmonised energy transition remains an open question. Looking at the fragment of the emerging hydrogen economy in the Baltic Sea region, using the Hydrogen Trilemma⁷ and thus applying the concept of the Energy Trilemma, the following article examines different perspectives and policies in the Baltic Sea region on the way to a joint and harmonised regional hydrogen economy.

Comparisons, in: *Renewable Energy* 219 (2023), No. 1, <https://doi.org/10.1016/j.renene.2023.119410>.

- 5 World Energy Council: *Evolving with Resilience and Justice—World Energy Trilemma 2024*, www.worldenergy.org/assets/downloads/World_Energy_Trilemma_2024_Full_Report.pdf?v=1713253987 (24.05.2024); Surwillo, Izabela/Slakaityte, Veronika: *Energy Crisis at the Baltic Sea—Divergent National Paths Toward a Common Green Future*, in: Pundziute-Gallois, Emilija/Serry, Arnaud (eds.): *Permacrisis & Logistics—From Assessment to Foresight*, Caen 2023; Slakaityte, Veronika/Surwillo, Izabella/Berling, Trine V.: *Energy Security in the Baltic Sea Region—Transition within Geopolitical Constraints—Danish Institute for International Studies Report*, pure.diiis.dk/ws/files/10998512/Energy_security_in_the_Baltic_Sea_Region_DIIS_Report_2022_08.pdf (24.05.2024).

- 6 Cf. Kalis, Michael: *Clean, Green, Sustainable? Hydrogen and the Energy Trilemma in the Baltic Sea Region*, in: id. (ed.): *The Energy Trilemma in the Baltic Sea Region—Security, Equity and the Environment*, London 2024, <https://doi.org/10.4324/9781003479178>.

- 7 *ibid.*

Hydrogen is increasingly seen as a fundamental element for advancing the European energy transition (COM (2016), 860). Its significance lies not only in its function within sector coupling (the integration and coordination of different energy sources and sectors), which facilitates the integration of electrified and molecular energy supply (COM (2020), 301, 1), but also in its potential as a transportable and storable energy carrier that can support the use of renewable energy sources, which are often volatile (COM (2020), 301, 1; COM (2019), 640). As a chemical energy carrier, hydrogen serves as the foundation for producing synthetic hydrocarbons or can be utilised directly as an energy source in various sectors (COM (2020), 301; COM (2019), 640). It is also considered crucial for achieving climate neutrality within the EU (COM (2020), 301, 1). Furthermore, hydrogen holds a prominent place in the realisation of the European Green Deal (COM (2019), 640), the Commission's primary strategic document driving the EU's transition to a climate-neutral and green economy. To further this vision, many EU member states and the EU itself have developed national strategies or roadmaps aimed at building a hydrogen economy.⁸ Such strategies are also being pursued worldwide,⁹ contributing to the anticipated emergence of a global hydrogen economy.¹⁰ Despite variations in the specifics of these strategies,¹¹ the overarching objective remains the same: the establishment and scaling up of hydrogen production at the European or national level.¹²

However, hydrogen and the emerging hydrogen economy are not only seen as vital components for a future energy system based on renewable sources

8 Cheng/Lee: How Green Are the National Hydrogen Strategies?; Koneczna/Cader: Hydrogen in the Strategies of the European Union Member States; DECHEMA: Comparative Analysis of International Hydrogen Strategies.

9 DECHEMA: Comparative Analysis of International Hydrogen Strategies; LBST/World Energy Council: International Hydrogen Strategies; IEA: Global Hydrogen Review 2023.

10 IEA: Global Hydrogen Review 2023; Nallapaneni, Anuraag/Kshirsagar, Soham: Global Hydrogen Economy and Hydrogen Strategy Overview, in: Jaiswal-Nagar, Deepshikha/Dixit, Viney/Devasahayam, Sheila (eds.): Towards Hydrogen Infrastructure, Oxford 2024, pp. 59–74; Ball, Michael/Wietschel, Martin: The Hydrogen Economy—Opportunities and Challenges, Cambridge 2009.

11 DECHEMA: Comparative Analysis of International Hydrogen Strategies; LBST/World Energy Council: International Hydrogen Strategies; IEA: Global Hydrogen Review 2023; Cheng/Lee: How Green Are the National Hydrogen Strategies?; Koneczna/Cader: Hydrogen in the Strategies of the European Union Member States.

12 DECHEMA: Comparative Analysis of International Hydrogen Strategies; LBST/World Energy Council: International Hydrogen Strategies; IEA: Global Hydrogen Review 2023; Cheng/Lee: How Green Are the National Hydrogen Strategies?; Koneczna/Cader: Hydrogen in the Strategies of the European Union Member States.

(COM (2020), 301; COM (2020), 299). The role of hydrogen is also frequently highlighted in discussions about energy security, diversification, and the reliable supply of fuels and energy (COM (2022), 230).¹³ In particular, following the Russian invasion of Ukraine, the hydrogen economy has been emphasised as crucial, not only in Europe but also in the Baltic Sea region (COM (2022), 230).

Given hydrogen's key role in the energy landscape, some describe it as the »new oil«,¹⁴ while others consider it the »holy grail« of the energy transition.¹⁵ While there is ongoing debate regarding hydrogen demand,¹⁶ its source—often referred to as the »hydrogen rainbow«¹⁷—and the design of an appropriate regulatory framework,¹⁸ a general consensus exists: hydrogen is integral

13 See also IRENA: Geopolitics of the Energy Transformation; Carlson/ Pickford/Nyga-Lukaszewska: Green Hydrogen and an Evolving Concept of Energy Security.

14 Van de Graaf, Thijs/Overland, Indra/Scholten, Daniel/Westphal, Kirsten: The New Oil? The Geopolitics and International Governance of Hydrogen, in: Energy Research & Social Science 70 (2020), <https://doi.org/10.1016/j.erss.2020.101667>.

15 Winebrake, James: Hype or Holy Grail? The Future of Hydrogen in Transportation, in: Strategic Planning for Energy and the Environment 22 (2002), No. 2, pp. 20–34, <https://doi.org/10.1080/10485230209509610>; Scita, Rossana/Raimondi, Pier Paolo/Noussan, Michel: Green Hydrogen—The Holy Grail of Decarbonisation? An Analysis of the Technical and Geopolitical Implications of the Future Hydrogen Economy, FEEM Working Paper No. 13.2020, <http://dx.doi.org/10.2139/ssrn.3709789>.

16 Riemer, Matia/Zheng, Lin/Eckstein, Johannes/Wietschel Martin/ Pieton, Natalia/Kunze, Robert: Future Hydrogen Demand: A Cross-Sectoral, Global Meta-Analysis, HYPAT Working Paper 04/2022, www.hypat.de/hypat-wAssets/docs/new/publications/HYPAT_Working_Paper_04_2022_Future_hydrogen_demand.pdf (24.05.2024); Merten, Frank/Scholz, Alexander: Meta-Analysis of the Costs of and Demand for Hydrogen in the Transformation to a Carbon-Neutral Economy, Wuppertal 2023, epub.wupperinst.org/frontdoor/deliver/index/docId/8417/file/8417_Hydrogen.pdf (24.05.2024).

17 Arcos, Jose M. Marin/Santos, Diogo M.F.: The Hydrogen Color Spectrum—Techno-Economic Analysis of the Available Technologies for Hydrogen Production, in: Gases 3 (2023), No. 1, pp. 25–46, <https://doi.org/10.3390/gases3010002>; Nationaler Wasserstoffrat (NWR): Classification of Different Paths to Hydrogen Production (»Hydrogen Rainbow«), www.wasserstoffrat.de/fileadmin/wasserstoffrat/media/Dokumente/EN/2022-04-01_NWR-Information_Paper_Hydrogen_Rainbow.pdf (24.05.2024).

18 HydrogenEurope: Hydrogen Europe Position Paper A Regulatory Framework Fit for a European Hydrogen Market, 2022, hydrogeneurope.eu/wp-content/uploads/2022/06/220609-A-regulatory-framework-fit-for-a-European-h2-market-Final-2.pdf (24.05.2024); Ringsgwandl, Lena Maria/Schaffert, Johannes/Brücken, Nils/Albus, Rolf/Görner, Klaus: Current Legislative Framework for Green Hydrogen Production by Electrolysis Plants in Germany, in: Energies 15 (2022), No. 5, <https://doi.org/10.3390/en15051786>; Dolci, Francesco/Thomas, Denis/Hilliard, Samantha/Fúnez Guerra, Carlos/Hancke, Ragnhild/Ito, Hiroshi/Jegoux, Mathilde/ Kreeft, Gijs/Leaver, Jonathan/Newborough, Marcus/Proost, Joris: Incentives and Legal Barriers for Power-to-Hydrogen Pathways—An International Snapshot, in: International Journal of Hydrogen Energy 44 (2019), No. 23, pp. 11394–11401; Fleming, Ruven:

to the development of the EU's future integrated energy systems, making it a crucial element for the success of the European energy transition.

Hydrogen in the Baltic Sea Region—Yet Another Fragment of a Fragmented Energy Transformation?

And yet, considering the national hydrogen strategies, which diverge at least in their specifics and details, and taking into account the different energy transition policies within the European member states, the question arises as to whether and how hydrogen fits into this picture of targeted, harmonised yet fragmented energy transition policies. Following this, one might ask whether hydrogen will be yet another fragment of an already fragmented energy transformation.

Hydrogen in National Strategies Among the Baltic Sea Region—Multi-Speed and Multi-Pathways of Energy Transformation

The Baltic Sea region's energy transition is marked by a diverse range of national policies, reflecting different speeds and pathways toward hydrogen adoption. While a common understanding exists regarding hydrogen's role as an energy carrier and a key driver of decarbonisation, distinct national strategies reveal variations in both implementation timelines and technological approaches.

By 2023, almost all countries in the Baltic Sea region had introduced a hydrogen strategy or an equivalent policy framework.¹⁹ Despite significant

Clean or Renewable—Hydrogen and Power-to-Gas in EU Energy Law, in: Journal of Energy & Natural Resources Law 39 (2019), No. 1, pp. 43–63, <https://doi.org/10.1080/02646811.2020.17953829>.

- 19 BMWi: Die Nationale Wasserstoffstrategie, 2020, www.bmbf.de/SharedDocs/Downloads/files/die-nationale-wasserstoffstrategie.pdf?__blob=publicationFile&v=2 (24.05.2024); BMWK: Fortschreibung der Nationalen Wasserstoffstrategie, 2023, www.bmbf.de/SharedDocs/Downloads/de/2023/230726-fortschreibung-nws.pdf?__blob=publicationFile&v=1 (24.05.2024); Poland: Polish Hydrogen Strategy Until 2030 with an Outlook Until 2040—Summary, 2021, www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKewil_NPfnZSGAxUyQvEDHZVeCf0QFnoECA4QAQ&url=https%3A%2F%2Fwww.gov.pl%2Fattachement%2F06213bb3-64d3-4ca8-afbe-2e50dadfa2dc&u sg=AOvVaw3-5frKu0DKcDVmQ-UiVmtx&opi=89978449 (24.05.2024); Estonia: Estonian Hydrogen Roadmap, 2023, kliimaministeerium.ee/sites/default/files/documents/2023-07/Estonian%20hydrogen%20roadmap%20ENG.pdf (24.05.2024); Norway: The Norwegian

differences in their energy mixes and broader transition policies, these nations broadly recognise hydrogen's strategic importance for their national energy futures and the region as a whole.²⁰

Germany considers hydrogen integral to sector coupling and essential for completing its energy transition.²¹ Finland and Denmark, meanwhile, aim to establish themselves as frontrunners in hydrogen production and exports within both the European Union and the Baltic Sea region.²² Sweden, lacking an extensive gas network, is prioritising the development of a national hydrogen infrastructure and focusing on its application in achieving a fossil-free industrial sector.²³ Norway links hydrogen development to its existing gas infrastructure and CO₂ storage capabilities, envisioning itself as a key player in low-carbon hydrogen production through carbon capture and storage.²⁴ Poland similarly emphasises industrial hydrogen use, incorporating carbon capture technologies into its strategy.²⁵ In contrast, Estonia, Lithuania, and Latvia, though lacking substantial hydrogen production or demand at present, are laying the groundwork for a future hydrogen economy.²⁶

Regional cooperation plays a pivotal role in shaping the hydrogen economy across the Baltic Sea. This is evident in efforts to establish priority corridors²⁷

Government's Hydrogen Strategy—Towards a Low Emission Society, 2020, www.regjerin.gen.no/contentassets/40026db2148e41eda8e3792d259efb6b/y-0127e.pdf (24.05.2024); Denmark: The Government's Strategy for Power-to-X, 2021, www.en.kefm.dk/Media/637788859015138974/PtX%20strategi_ENG3.pdf (24.05.2024); Finland: National Hydrogen Roadmap for Finland, 2020, www.businessfinland.fi/4abb35/globalassets/finnish-customers/02-build-your-network/bioeconomy-cleantech/alykas-energia/bf_national_hydrogen_roadmap_2020.pdf (24.05.2024); Sweden: Strategy for Fossil Free Competitiveness—Hydrogen, 2020, fossilfritt.se/wp-content/uploads/2021/01/Hydrogen_strategy_for-_fossil_free_competitiveness_ENG.pdf (24.05.2024).

20 BMWi: Die Nationale Wasserstoffstrategie; BMWK: Fortschreibung der Nationalen Wasserstoffstrategie; Poland: Polish Hydrogen Strategy Until 2030; Estonia: Estonian Hydrogen Roadmap; Norway: The Norwegian Government's Hydrogen Strategy; Denmark: The Government's Strategy for Power-to-X; Finland: National Hydrogen Roadmap; Sweden: Strategy for Fossil Free Competitiveness.

21 BMWi: Die Nationale Wasserstoffstrategie, p. 4.

22 Finland: Government Resolution on Hydrogen, 2023, julkaisut.valtioneuvosto.fi/bitstream/handle/10024/164746/VN_2023_19.pdf?sequence=1&isAllowed=y (24.05.2024), p. 11; Denmark: The Government's Strategy for Power-to-X, p. 52.

23 Sweden: Strategy for Fossil Free Competitiveness, p. 7.

24 Norway: The Norwegian Government's Hydrogen Strategy, p. 48.

25 Poland: Polish Hydrogen Strategy Until 2030, p. 2.

26 Estonia: Estonian Hydrogen Roadmap, p. 7.

27 BMWK: Fortschreibung der Nationalen Wasserstoffstrategie, p. 17.

and expand gas infrastructure²⁸. Norway's engagement in regional hydrogen initiatives further underscores the collaborative approach being taken.²⁹

These varying national strategies highlight the Baltic Sea region's energy transition as a multi-speed, multi-pathway process, where different countries pursue hydrogen adoption at their own pace and according to their distinct energy landscapes.

The Hydrogen Trilemma in the Baltic Sea Region

The categorisation of hydrogen as a key element of the energy transition, even as a »holy grail«,³⁰ is also an expression of its importance for the energy trilemma. It seems that hydrogen is expected to make a significant contribution on the path to an integrated energy system and the necessary balance among energy equity, environmental sustainability, and energy security. Hydrogen is not only seen in connection with the decarbonisation of the energy system.³¹ Rather, the energy policies in the EU and the member states following the Russian war of aggression in Ukraine and the energy crisis have shown that hydrogen is in the portfolio of energy security policies in the context of diversification and domestic, resilient energy supply.³² Some even go beyond this and speak of hydrogen as the decisive tool for untying the Gordian knot of the energy trilemma.³³ Following these assumptions and expectations, hydrogen would not only be a mere fragment of the energy transformation but a key or tool respectively to resolve existing conflicts in the ongoing transformation. If these expectations proved right, hydrogen would very well encompass the potential to harmonise the diverging energy transition policies among the EU and the Baltic Sea region.

28 Finland: Government Resolution on Hydrogen, p. 8; Sweden: Strategy for Fossil Free Competitiveness, p. 7; Denmark: The Government's Strategy for Power-to-X, p. 52.

29 Norway: The Norwegian Government's Hydrogen Strategy, p. 50; Estonia: Estonian Hydrogen Roadmap, p. 14.

30 Cf. Winebrake: Hype or Holy Grail?; Scita/Raimondi/Noussan: Green Hydrogen.

31 Cf. Cheng/Lee: How Green Are the National Hydrogen Strategies?; Carlson/Pickford/Nyga-Lukaszewska: Green Hydrogen and an Evolving Concept of Energy Security.

32 Carlson/Pickford/Nyga-Lukaszewska: Green Hydrogen and an Evolving Concept of Energy Security.

33 IEA: The Future of Hydrogen—Seizing Today's Opportunities, 2019, [iea.blob.core.windows.net/assets/9e3a3493-b9a6-4b7d-b499-7ca48e357561/The_Future_of_Hydrogen.pdf](https://www.iea.blob.core.windows.net/assets/9e3a3493-b9a6-4b7d-b499-7ca48e357561/The_Future_of_Hydrogen.pdf) (24.05.2024).

However, it should not be underestimated that hydrogen itself can be part of the energy trilemma.³⁴ Irrespective of the instrumental importance of hydrogen in the energy policies of the EU and the Baltic Sea region and thus in overcoming the energy trilemma, hydrogen itself is subject to the challenges of balancing security, sustainability, and justice.³⁵ In fact, hydrogen finds itself in a duplex situation within the concept of the energy trilemma. On the one hand, hydrogen policies and hydrogen law must be analysed as a component of energy policies under the concept of the energy trilemma and considering the question of resolving the dilemma situation. On the other hand, however, individual elements of the hydrogen policy itself must be examined in light of the requirements of the energy trilemma. This creates a situation that can be aptly described as the »hydrogen trilemma«.³⁶ The hydrogen trilemma describes the challenge for policy and lawmakers to balance seemingly contradictory interests of energy security, energy justice and environmental sustainability on the path to a sustainable hydrogen economy. It is precisely under this framework of the hydrogen trilemma that hydrogen's participation in the sometimes-erratic pathways of the ongoing energy transformation becomes evident. In other words, changes in the overall energy transformation, reorientation of priorities, external and internal impacts or shocks will affect energy transition policies and hydrogen policies likewise. Following this it is not hydrogen per se, which is leading to harmonising energy transition policies, and yet hydrogen may very well be an indicator of or key component

34 Cf. Hong, Sanghyun/Kim, Eunsung/Jeong, Saerok: Evaluating the Sustainability of the Hydrogen Economy Using Multi-Criteria Decision-Making Analysis in Korea, in: *Renewable Energy* 204 (2023), p. 485–492, <https://doi.org/10.1016/j.renene.2023.01.037>.

35 Chew, Yick Eu/Cheng, Xin Hui/Minh Loy, Adrian Chun/Shen How, Bing/Andiappan, Viknesh: Beyond the Colours of Hydrogen: Opportunities for Process Systems Engineering in Hydrogen Economy, in: *Process Integration and Optimization for Sustainability* 7 (2023), p. 941–950; Cheng/Lee: How Green Are the National Hydrogen Strategies?; Cailard, Amandine/Yeganyan, Rudolf/Cannone, Carla/Plazas-Niño, Fernando/Howells, Mark: A Critical Analysis of Morocco's Green Hydrogen Roadmap—A Modelling Approach to Assess Country Readiness from the Energy Trilemma Perspective, in: *Climate* 11 (2023), <https://doi.org/10.33774/coe-2024-5srcs>; Carlson/Pickford/Nyga-Łukaszewska: Green Hydrogen and an Evolving Concept of Energy Security; Piria, Raffaele/Honnen, Jens/Pfluger, Benjamin/Ueckerdt, Falko/Odenweller, Adrian: Ariadne-Analysis—Securing Hydrogen Imports for Germany: Import Needs, Risks and Strategies on the Way to Climate Neutrality, 2022, ariadneprojekt.de/media/2022/03/Ariadne-Analysis_Securing-hydrogen-imports_February2022.pdf (24.05.2024); cf. Ansari, Dawud/Maria Pepe, Jacopo: Toward a Hydrogen Import Strategy for Germany and the EU, in: *SWP Working Paper—Research Division Global Issues* (2023), No. 1, www.swp-berlin.org/publications/products/arbeitspapiere/Ansari_Pepe_2023_Hydrogen_Import_Strategy_WP.pdf (24.05.2024).

36 Cf. Kalis: Clean, Green, Sustainable?.

in such a process of harmonisation. This becomes particularly evident when looking at the increasing securitisation within the EU and the Baltic Sea region, which not only but also affects the energy transition policies.

New Momentum Towards Hydrogen?—Transnational Cooperation and Energy Security

In February 2022, Russia launched its ongoing attack on Ukraine in violation of international law. The Russian aggression and subsequent sanctions as well as unilateral measures, particularly by states in the Baltic Sea region, led to further geopolitical tensions. Based on the role of Russia in European imports of fossil fuels and existing dependencies in the Baltic Sea region on Russian oil and gas, the conflict began to spread from the mere catchment area of the region to the energy policies of its littoral states. While some states initially maintained energy relations with Russia,³⁷ Russia faced accusations of energy weaponisation,³⁸ leading some states to restrict or even break off energy relations with Russia.³⁹

On August 5, 2022, the EU adopted the regulation known as the Gas Emergency Plan to coordinate measures to reduce gas demand within the EU and to ensure the Union's security of gas supply, Regulation (EU) 2022/1369. The EU was preparing for the gas and energy crisis with the voluntary reduction in demand by the member states, Art. 3 Regulation (EU) 2022/1369, and the option of mandatory demand reduction, Art. 5 (1) Regulation (EU) 2022/1369, in the event of a so-called Union alert by the council.

In addition to these urgent emergency measures to reduce demand by the EU and its member states to avert an energy crisis, a forward-looking picture of increasing energy resilience emerged (COM (2022), 230). Emphasising the need for energy security while continuing the energy transition, the commission published its REPowerEU plan, which places energy supply,

37 Slakaityte/Surwillo/Berling: Energy Security in the Baltic Sea Region.

38 Cf. LaBelle, Michael: Energy as a Weapon of War—Lessons from 50 Years of Energy Interdependence, in: *Global Policy* 14 (2023), No. 3, pp. 531–547; Hartvig, Áron Dénes/Kiss-Dobronyi, Bence/Kotek, Péter/Takácsné Tóth, Borbála/Gutzianas, Ioannis/Zsombor Zareczky, András: The Economic and Energy Security Implications of the Russian Energy Weapon, in: *Energy* 294 (2024), <https://doi.org/10.1016/j.energy.2024.130972>; Mikulska, Anna/Finley, Mark: Asymmetric Interdependence and Wielding the Energy Weapon: Russia and the EU Post Russian Invasion of Ukraine, in: *Current Sustainable Renewable Energy Reports* 11 (2024), pp. 39–44, <https://doi.org/10.1007/s40518-024-00234-9>.

39 Slakaityte/ Surwillo/Berling: Energy Security in the Baltic Sea Region.

diversification, energy savings, and the accelerated expansion of renewable energies at the centre of its further energy security and energy transition policy (COM (2022), 230). Hydrogen plays a multiple role in the REPowerEU plan, both in the development of a secure energy supply through renewable energies in Europe and in the secure import of renewable energy sources from other EU countries (COM (2022), 230). In addition to the buzzword of diversification, the focus is on accelerating the development of a European hydrogen economy (SWD (2022), 230).

Indeed, following the Russian aggression and the energy crisis one can observe an ongoing securitisation of energy policies, including hydrogen. This securitisation that applies to energy policy as a whole and thus a shift of narrative from primary sustainability towards energy security⁴⁰ might prove to create a new momentum towards hydrogen within the Baltic Sea region.

In fact, these recent developments in the European, regional, and national hydrogen economies indicating a shift in focus are already visible within hydrogen strategies. Initially, the movement was centred on producing greenhouse gas-free hydrogen; however, there is now an increasing emphasis on scaling up hydrogen production and meeting economic requirements. This evolving approach has been described as a »scale-first, green-later« strategy,⁴¹ especially in the Baltic Sea region. National hydrogen strategies also reflect this trend.⁴²

This shift prioritises energy security over sustainability. The »scale-first, green-later« approach reveals a potential distortion of the energy trilemma or hydrogen trilemma introduced above, where energy security is emphasised at the expense of sustainability and energy justice. In the Baltic Sea region and the broader EU, the ramp-up of hydrogen infrastructure and the prioritisation of energy security raise critical questions about the sustainability of the hydrogen economy and whether it can achieve its long-term objectives. However, this phenomenon of securitisation in combination with ongoing hydrogen efforts may very well lead to a harmonisation on energy transition and hydrogen policies.

40 Cf. Loewe, Martha/Quittkat, Christine/Knodt, Michèle/Ott, Ingrid: The Impact of the Russian War Against Ukraine on the German Hydrogen Discourse, in: Sustainability 16 (2024), No. 2, <https://doi.org/10.3390/su16020773>.

41 Cheng/Lee: How Green Are the National Hydrogen Strategies?.

42 *ibid.*

Hydrogen—Diversifying and Securing Energy Transformation in the Baltic Sea Region

Not only is hydrogen part of the European RePowerEU plan as both, a diversifying and decarbonising energy carrier, but hydrogen also takes on a key role in multilateral and unilateral measures taken by states in the Baltic Sea region. The Marienborg Declaration places hydrogen and the green energy transition in the Baltic Sea region in the context of energy security and diversification.⁴³ With the Baltic Energy Security Summit and the Berlin Declaration on Baltic Offshore Wind by the Council of the Baltic Sea States, the national states within the Baltic Sea region emphasised their joint ambition towards national and European independence from Russian energy while boosting the green energy transition through cooperation within the region. The EU and individual member states and neighbours of the Baltic Sea region have also increased their hydrogen ambitions following the Russian war of aggression.⁴⁴ Germany, for example, adapted its existing national hydrogen strategy from 2020⁴⁵ and in 2023 doubled its national hydrogen ambitions from 5 GW of domestic electrolysis capacity to 10 GW.⁴⁶ Estonia's hydrogen roadmap also recognises a need for accelerated implementation of mature energy projects, speaking of a limited time frame to maximum transition from imported fossil natural gas to local renewable energy, explicitly including the introduction of a hydrogen market in Estonia and the region.⁴⁷ In its government resolution following the already existing hydrogen roadmap,⁴⁸ Finland also considers the recent crisis to be an indicator of the need for a stronger self-sufficient energy supply, including hydrogen.⁴⁹ These and other observations indicate a new momentum for hydrogen since the energy crisis and the Russian war of aggression. At the same time, there is a securitisation that applies to energy policy as a whole and thus a shift of narrative from primary sustainability towards energy security.⁵⁰

43 The Baltic Sea Energy Security Summit: Marienborg Declaration, 2022, www.regeringen.dk/media/11544/the-marienborg-declaration-_300822.pdf (24.05.2024).

44 IEA: Northwest European Hydrogen Monitor, 2024, iea.blob.core.windows.net/assets/b8ba8ad3-fl35-4002-9e21-b8cbd213fb36/NorthwestEuropeanHydrogenMonitor2024.pdf (24.05.2024).

45 BMWi: Die Nationale Wasserstoffstrategie.

46 BMWK: Fortschreibung der Nationalen Wasserstoffstrategie.

47 Estonia: Estonian Hydrogen Roadmap, p. 8.

48 Finland: National Hydrogen Roadmap.

49 Finland: Government Resolution on Hydrogen, p. 8.

50 Cf. Loewe/Quittkat/Knodt/Ott: The Impact of the Russian War Against Ukraine.

Hydrogen in Transnational Cooperation—Joint Declarations and Visions Towards the Hydrogen Economy in the Baltic Sea Region

In addition to these efforts towards energy security on national and transnational level we can observe several significant projects of transnational cooperation within the Baltic Sea. Looking at these projects from a regional perspective one might speak of the vision of a regional and harmonised hydrogen economy.

Next to individual projects of varying scale and scope, the Baltic Sea Hydrogen Collector stands out. It aims to create an offshore hydrogen pipeline infrastructure in the Baltic Sea region to secure energy supply for the Baltic Sea region and Europe. The large-scale project operated by the Finnish and Swedish gas network operators *Gasgrid* and *Nordion* with other partners is now part of the European Projects of Common Interests (C (2023) 7930). Back in 2013, the EU introduced the so-called Union's list of projects of common interest with the Regulation (EU) 347/2013 on guidelines for trans-European energy infrastructure. These are significant European infrastructure projects that are intended to help the Union achieve its energy and climate targets. One year after the revision of the regulation (cf. Regulation (EU) 2022/869), the Baltic Sea Hydrogen Collector was added to the list of projects of common interest alongside the Nordic-Baltic Hydrogen Corridor and other projects.

The Baltic Sea Hydrogen Collector project also joins one of two flagship projects under REPowerEU and the Clean Hydrogen Partnership. The Clean Hydrogen Partnership is investing 105.4 million euros in nine hydrogen valleys across Europe, including the Baltic Sea H2 in Finland and Estonia, which is outstanding in terms of funding and scale.⁵¹ The largest European Hydrogen Valley adds to other infrastructure projects under the Baltic Energy Market Interconnection Plan Hydrogen (BEMIP Hydrogen). The BEMIP Hydrogen initiatives focus on promoting hydrogen interconnectivity in the Baltic Sea region, linking Sweden, Finland, Estonia, Latvia, Lithuania, Poland, and Germany. One of the most important projects within this framework is the Nordic Hydrogen Route—Bothnian Bay. The Nordic-Baltic Hydrogen Corridor initiative takes a broad approach and will connect Finland, Estonia,

51 Cf. Clean Hydrogen Partnership: REPowering the EU with Hydrogen Valleys: Clean Hydrogen Partnerships invests EUR 105.4 million for funding 9 Hydrogen Valleys across Europe, 31.01.2023, www.clean-hydrogen.europa.eu/media/news/repowering-eu-hydrogen-valleys-clean-hydrogen-partnership-invests-eur-1054-million-funding-9-2023-01-31_en (24.05.2024).

Latvia, Lithuania, Poland, and Germany, creating a comprehensive hydrogen network in the Baltic Sea region. This far-reaching project will enable the efficient transport of hydrogen across national borders, promote regional cooperation, and support the widespread introduction of this clean energy source.

Together, these BEMIP Hydrogen initiatives, transnational cooperation, and projects as well as the national hydrogen strategies add up to a picture that shows the special role of hydrogen in the Baltic Sea region and the region's energy transition. Although a comparable document to the Esbjerg Declaration (2022), which declares the North Sea to be the future »powerhouse« for wind energy and hydrogen in the EU, is missing for the Baltic Sea region, even this brief insight reveals an agenda of no less significance that spans the entire region of the Baltic Sea and its littoral states. Although a joint vision for hydrogen within the Baltic Sea region has not yet been officially formalised in a single document, these fragments of hydrogen policies, projects and collaborations before and after the Russian aggression at least testify to the development of a joint and harmonised future hydrogen economy in the region.

Harmonisation Through Hydrogen?

The various efforts and national strategies surrounding hydrogen development in the Baltic Sea region not only highlight the region's commitment to the energy transition and energy security, but they also raise the question of whether hydrogen can indeed foster harmonisation of energy policy across the region. The diversity of national interests, technological maturity levels, and historical dependencies presents a challenge. In particular, the different political objectives related to hydrogen—ranging from decarbonising industry to promoting hydrogen as an export commodity—could make achieving regional consensus more difficult.

Nevertheless, the growing transnational cooperation seen in projects such as the Baltic Sea Hydrogen Collector and the Nordic-Baltic Hydrogen Corridor indicates that hydrogen could indeed serve as a catalyst for regional cooperation and harmonisation. If national strategies can be integrated and cross-border infrastructure developed, hydrogen could become a cornerstone of energy policy in the Baltic Sea region.

The increasing importance of hydrogen for energy security—especially following the geopolitical tensions caused by the Russian war—amplifies the need for a coordinated regional response. Hydrogen could help reduce

dependence on fossil fuels and diversify the region's energy supply. However, to achieve this, regulatory, financial, and technical standards need to be harmonised across national borders.

In conclusion, hydrogen is undoubtedly a key player in the energy transition within the Baltic Sea region. Whether it can also contribute to the harmonisation of energy policy depends on the willingness of states to reconcile their national interests in favour of a shared, common regional goal and policy.

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