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Hydrogen: Legal and regulatory
challenges for Switzerland in a
global context

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A. Introduction

Hydrogen (“H₂”) as an energy carrier, but also as a key feedstock to produce renewable fuels (e.g. synthetic methane and methanol) and platform chemicals (e.g. ammonia) is set to play a major role in decarbonization efforts worldwide.

The European Union (“EU”) is one of the main drivers of the green hydrogen economy. Once more, Switzerland is operating in a regulatory environment in which developments are already taking place and therefore certain normative facts have already been created, as shown in the first part of this article.

Switzerland can no longer postpone dealing with the opportunities and risks entailed by these developments. Defining a clear strategy is essential to plan the political and regulatory steps which are necessary to preserve its options for championing the green hydrogen market. Only first steps in this direction have been taken so far, as presented in the second part of this article. Further steps will have to follow.

B. The global context

Green hydrogen (i.e. hydrogen produced from renewable energy sources) and its derivatives carry a huge potential for decarbonization and have therefore gained much prominence in net-zero strategies, policies and regulations in an increasing number of jurisdictions.¹ Much of these developments aim at creating an enabling and supportive framework for expanding the production and use of green hydrogen via mandatory targets, investment incentives and funding mechanisms meant to generate a sufficiently strong “demand-pull” for a market to develop.² Green hydrogen is in fact much more expensive

¹ Green hydrogen has the potential to fulfill 12% of the final energy demand under the 1.5°C Scenario of the International Renewable Energy Organization (IRENA): IRENA, World Energy Transitions Outlook 2022 (March 2022) <<https://www.irena.org/Publications/2022/Mar/World-Energy-Transitions-Outlook-2022>> accessed 27 September 2024.

² In the U.S., the Inflation Reduction Act is designed to boost the green hydrogen industry by offering production tax credits for ten years, investment tax credits for energy storage, clean vehicle credits for hydrogen fuel cell vehicles, and alternative fuel credits in the form of property tax credits for hydrogen refueling stations: White House, Inflation Reduction Act Guidebook (2022) <<https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/>> accessed 27 September 2024. Meanwhile, the EU has established funding initiatives through programs like Important Projects of Common European Interest (IPCEI) and the European Hydrogen Bank, which organizes auctions where green hydrogen producers can compete for financial support via a fixed premium per kilogram of hydrogen produced. The EU is expected to allocate USD 4.56 billion annually to hydrogen projects from 2021 to 2030. In addition, the European Clean Hydrogen Alliance was created to

than higher in carbon solutions due to the high costs of electrolysis, storage and transportation, in addition to the investment required in setting up the necessary infrastructure for those (e.g. pipelines, compression units and hydrogen refueling stations).³

The expansion of the green hydrogen economy can largely benefit from trade, as some countries can exploit their renewable energy endowments to produce green hydrogen at competitive prices.⁴ Many countries, including Switzerland⁵, expect to import a significant share of their hydrogen needs and in some cases, such as in the case of the EU, imports of green hydrogen are a key component to meeting the Hydrogen Accelerator targets set along the EU Commission's REPowerEU plan (10 million tons of green hydrogen produced domestically and other 10 million tons imported from third countries by 2030).⁶ For trade flows to materialize in alignment with existing targets, however, issues surrounding (A) diversity of definitions, standards and certification schemes for green hydrogen and (B) infrastructural challenges need to be addressed on a priority basis.

I. A fragmented landscape

Different national programs are in place to differentiate green hydrogen from other types of hydrogen, but they rely on varying definitions and criteria for what qualifies as green hydrogen. In the case of the EU, for instance, two delegated acts (the so-called RFNBO Delegated Act and the GHG Methodology Delegated Act) to the Renewable Energy Directive (RED) III⁷ establish detailed

foster investment and the large-scale deployment of clean hydrogen projects across the region. European Commission, European Clean Hydrogen Alliance (2024) <https://single-market-economy.ec.europa.eu/industry/strategy/industrial-alliances/european-clean-hydrogen-alliance_en> accessed 27 September 2024.

³ Not surprisingly, the share of green hydrogen is only around 4% of all hydrogen produced in the world: IRENA, Hydrogen <<https://www.irena.org/Energy-Transition/Technology/Hydrogen>> accessed 27 September 2024.

⁴ Alejandro Nuñez-Jimenez and Nicola De Blasio, 'Competitive and Secure Renewable Hydrogen Markets: Three Strategic Scenarios for the European Union' (2022) *International Journal of Hydrogen Energy* <<https://www.sciencedirect.com/science/article/pii/S0360319922037715>> accessed 27 September 2024.

⁵ Cf. [section C.I](#) and [III](#) below.

⁶ European Commission, REPowerEU: Affordable, Secure and Sustainable Energy for Europe <https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en> accessed 27 September 2024.

⁷ Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as

rules on the EU definition of green hydrogen ensuring that hydrogen, irrespective of whether it is produced domestically or imported from third countries, is made from renewable electricity and achieves 70% emissions savings.

As to the first condition, the RFNBO Delegated Act establishes stringent criteria that must be met for hydrogen to be classified as a renewable fuel of non-biological origin (RFNBOs).⁸ These conditions essentially aim at ensuring that, on the one hand, the hydrogen produced is genuinely “green” by linking its production to renewable energy sources (i.e. temporal correlation and geographical correlation criteria) and, on the other hand, that the increased demand for green electricity drives the development of new generation capacity rather than diverting existing renewable energy away from other uses (such as powering homes or businesses), which could lead to increased reliance on fossil fuels elsewhere (i.e. additionality criterion). As to the second condition, the GHG Methodology Delegated Act provides a framework for calculating whether hydrogen and other RFNBOs comply with the requirement to achieve a 70% reduction in greenhouse gas (GHG) emissions.⁹ The methodology takes into account the entire life-cycle, from upstream emissions from the production of renewable electricity (e.g., solar or wind) through process emissions during the electrolysis, to transportation, distribution and end use emissions when hydrogen is consumed.

Importantly, compliance with the requirements set in the delegated acts is not a prerequisite for importing or placing hydrogen on the EU market (although public support may be conditional on meeting the criteria) but only determines whether the products are eligible to be counted towards the EU targets. *It is clear, however, that the regime de facto amounts to a market access barrier to the extent that it generates demand for green hydrogen to the*

regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652 [2023] OJ L 2413.

⁸ Commission Delegated Regulation (EU) 2023/1184 of 10 February 2023 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a Union methodology setting out detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin. [2023] OJ L 157/11.

⁹ Commission Delegated Regulation (EU) 2023/1185 of 10 February 2023 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a minimum threshold for greenhouse gas emissions savings of recycled carbon fuels and by specifying a methodology for assessing greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and from recycled carbon fuels. [2023] OJ L 157/20.

detriment of other types of hydrogen.¹⁰ The implementation of the delegated acts will depend on certification by third-party schemes. The European Commission has the authority to officially recognize these schemes for certifying green hydrogen.¹¹ At the time of writing, ISCC applied for recognition of its RFNBO certification by the European Commission but it is yet received formal acceptance.¹²

The EU approach has been criticized by many as either excessively stringent, complex or burdensome for operators;¹³ others have argued that it will ultimately prove almost impossible to comply with for third-countries, leaving the EU unable to comply with its import targets.¹⁴ At the moment, it is unclear whether other countries, including Switzerland, may decide to align to the EU regime given the uncertainty that still surrounds technical feasibility and implementation costs. While other advanced economies seeking to play a central role in the green hydrogen economy, such as the US, seems to have opted for a lighter approach when it comes to determining eligibility for tax credits available to “clean” hydrogen production under the Inflation Reduction Act (IRA),¹⁵ the proliferation of different national approaches to classification and certification of hydrogen may hamper trade opportunities, increase compliance costs and ultimately delay the expansion of the sector. Accord-

¹⁰ T. Payosova and K. Holzer, New EU Requirements for Green Hydrogen and Their WTO Compatibility, SELA Annual Meeting, 20 September 2024.

¹¹ Article 30(4) of the Directive (EU) 2018/2001.

¹² ISCC, *Certification Approach for Renewable Fuels of Non-Biological Origin* (January 2024) <https://www.iscc-system.org/wp-content/uploads/2024/01/1_TCRFNBOs160124_Updates-Certification-Approach_ISCC_JulianePohl.pdf> accessed 27 September 2024.

¹³ S. Porciello, 'EU Green Hydrogen Rules Too Strict, Transition Phase Should Be Extended, German Minister Says (Update)' (2024) <<https://mlexmarketinsight.com/news/insight/eu-green-hydrogen-rules-too-strict-transition-phase-should-be-extended-german-minister-says-update>> accessed 27 September 2024.

¹⁴ K. Talus, F. Gallagos and J. Pinto, 'Importing US-Produced Hydrogen and Its Derivatives into the EU – Examples of Unnecessary Complications, Barriers and Distinctions' (2024) *Journal of Energy and Natural Resources Law* <<https://www.tandfonline.com/doi/epdf/10.1080/02646811.2024.2341544?needAccess=true>> accessed 27 September 2024.

¹⁵ The Inflation Reduction Act (IRA) introduces four technology-neutral credit tiers based on the life-cycle emissions rate of a hydrogen production process. To be eligible for the tax credit, the life-cycle GHG emissions rate must not exceed 4 kg of CO₂e per kilogram of hydrogen at the point of production. For hydrogen produced via electrolysis, emissions are calculated based on the emission rate of the regional electricity grid. However, producers also have the option to attribute their emissions to a specific electricity generation facility. U.S. Department of the Treasury, *IRS Release Guidance on Hydrogen Production Credit to Drive American Innovation and Strengthen Energy Security*, Press Release (22 December 2023).

ingly, many have called for a unified methodology for calculating the carbon footprint of hydrogen and the use of a common terminology and harmonized standards for determining “green” hydrogen with a view to facilitate mutual recognition of national certification schemes.¹⁶ However, it is important to acknowledge that international standardization efforts for hydrogen are still in the early stages. The first hydrogen-specific international standard was published by ISO in 2023. The standard, ISO/TS 19870:2023, is a technical specification outlining methodologies for calculating the GHG emissions associated with the production, conditioning, and transport of hydrogen.¹⁷ The standard importantly offers a comprehensive framework for determining the carbon footprint of different hydrogen technologies using a life-cycle approach. However, it is important to note that the standard does not define itself what qualifies as “green”, “sustainable”, or “clean” hydrogen.

Against this backdrop, the EU approach – which combines criteria based on the actual life-cycle carbon footprint of hydrogen and criteria setting the conditions for selected technological pathways to grant the qualification of “green hydrogen” – has arguably the potential to shape the green hydrogen market, even beyond the Union. As a standard-setter and a rule-maker, the EU has long influenced the trajectory of policies, regulations and standards in the climate and energy domains in other countries due to the so-called “Brussels effect”.¹⁸ Early signs of voluntary alignment to the EU regulatory framework on hydrogen can already be detected if one looks at the Memoranda of Understanding (“MoUs”) that the EU has been concluding in the latest years to kick start strategic partnerships in critical raw materials and green hydrogen with exporting countries such as Namibia. Importantly, such MoUs also include a “regulatory alignment” pillar.¹⁹ For Switzerland, which itself has followed a policy of so-called “autonomous adaptation” of Swiss law to EU

¹⁶ I. Espa, K. Holzer and T. Payosova, *Fostering Hydrogen Trade through Harmonization of Standards*, *Oil, Gas and Energy Review* (2024) forthcoming.

¹⁷ ISO, *ISO/TS 19870:2023, Hydrogen Technologies: Methodology for Determining the Greenhouse Gas Emissions Associated with the Production, Conditioning and Transport of Hydrogen to Consumption Gate* (ISO, 2023) <<https://www.iso.org/standard/83132.html>> accessed 27 September 2024. ISO/TS 19870:2023 will be replaced by ISO/AWI 19870-1, which is currently under development <<https://www.iso.org/standard/85045.html>> accessed 27 September 2024.

¹⁸ A. Bradford, *The Brussels Effect: How the European Union Rules the World*, OUP 2020.

¹⁹ I. Espa, *The impact of Energy Transition-related Policies in EU, US and China on the Economic Diversification of Developing Countries Dependent on Critical Minerals*, UNCTAD Background Paper, forthcoming.

law,²⁰ alignment to the EU requirements may represent in principle a safer (and easier) regulatory choice, especially considering the expected intensification of hydrogen flows with the EU market, but it would arguably render imports of green hydrogen from third-countries more difficult.

II. Infrastructural challenges

The expansion of the green hydrogen sector and the intensification of trade flows in hydrogen and derivatives will inevitably pose a number of infrastructural challenges due to the need to secure storage and transportation options that imply repurposing existing infrastructure (e.g. natural gas pipelines) and/or investing in new dedicated infrastructure (e.g. new pipelines, port terminals, compression units). Not surprisingly, large infrastructural projects aimed at creating interregional hydrogen corridors have not yet ramped up due to the magnitude of costs involved vis-à-vis high uncertainty concerning the return on investment given that the market remains quite small – despite recent estimates showing that cross-border trade of hydrogen and its derivatives could save USD 3.7 trillion in investment costs by 2050.²¹

Infrastructural projects and collaboration are however under way in Europe. The European Hydrogen Backbone (“EHB”) is an initiative undertaken by thirty-three energy infrastructure operators, which aims at developing a pan-European hydrogen infrastructure by repurposing and expanding the existing natural gas pipelines.²² The goal is to create a dedicated hydrogen network that connects hydrogen production and consumption centers across Europe. These pipelines will enable green hydrogen supplies from North Africa to Germany via Italy and Austria, among others. The network will initially consist for the most part of repurposed natural gas pipelines, with the rest being new hydrogen pipelines. By 2030, around 11,600 km of pipelines could already

²⁰ M. Oesch and M. Brugger, *The Policy of Autonomous Adaptation of Swiss Law to EU Law, in Switzerland and the EU: A Challenging Relationship*, M. Maresceau and C. Tobler, Editors. 2023, Brill: Leiden. pp. 35–67.

²¹ Hydrogen Council, *Emerging Trade Corridors for Hydrogen and its Derivatives* (Hydrogen Council, May 2024) <<https://hydrogencouncil.com/wp-content/uploads/2024/05/Emerging-trade-corridors-for-hydrogen-and-its-derivatives.pdf>> accessed 27 September 2024. See also WTO-IRENA, *International Trade and Green Hydrogen: Supporting the Global Transition to a Low-Carbon Economy* (WTO-IRENA, December 2023) <<https://www.irena.org/Publications/2023/Dec/International-trade-and-green-hydrogen-Supporting-the-global-transition-to-a-low-carbon-economy>> accessed 27 September 2024

²² European Hydrogen Backbone (EHB), *European Hydrogen Backbone* <<https://ehb.eu>> accessed 27 September 2024

be operational, whereas the EHB envisions creating a 53,000 km hydrogen pipeline network by 2040 across 28 European countries.²³

As part of the European Hydrogen Backbone (EHB), in May 2023 Italy, Germany and Austria have signed an agreement to cooperate on the development of a network to transport hydrogen from the southern Mediterranean to northern Europe called the SouthH2 Corridor.²⁴ Stretching over 3,300 km, this corridor has been granted by the European Commission the status of Projects of Common Interest (PCI), which ensures fast-track permitting and access to European funding from the so-called Connecting Europe Facility.²⁵

Although Switzerland is involved in the European Hydrogen Backbone,²⁶ there is currently no concrete plan to integrate the country into the European Hydrogen Backbone (EHB). The lack of a Swiss hydrogen strategy has arguably contributed isolating Switzerland from cooperation opportunities in hydrogen transport infrastructure. The potential for exclusion from the EU hydrogen market is adding further uncertainty to Swiss-EU economic cooperation prospects, which are already strained from the stalemate in the negotiations on an EU-Switzerland institutional framework agreement²⁷ and the failed EU-Switzerland electricity agreement to date, which has already effectively excluded Switzerland from the EU internal energy market.²⁸

Reforms in the Swiss regulatory framework are essential to support the growth of a green hydrogen economy. The forthcoming national hydrogen strategy will be a crucial foundation for this framework, providing much-

²³ European Hydrogen Backbone (EHB), 'European Hydrogen Backbone Grows to Meet REPowerEU's 2030 Hydrogen Targets' (EHB, 2023) <[https://ehb.eu/newsitem/european-hydrogen-backbone-grows-to-meet-repower-eu-s-2030-hydrogen-targets#:~:text=The group proposes a hydrogen,set of hydrogen import opportunities](https://ehb.eu/newsitem/european-hydrogen-backbone-grows-to-meet-repower-eu-s-2030-hydrogen-targets#:~:text=The+group+proposes+a+hydrogen,set+of+hydrogen+import+opportunities)> accessed 27 September 2024.

²⁴ Reuters, 'Italy, Germany, Austria Sign Cooperation Deal on Southern Hydrogen Link' (Reuters, 30 May 2024) <<https://www.reuters.com/sustainability/climate-energy/italy-germany-austria-sign-cooperation-deal-southern-hydrogen-link-2024-05-30/>> accessed 27 September 2024.

²⁵ Reuters, 'Projects Sponsored by Snam, Eni, Terna Get Priority Status from EU' (Reuters, 28 November 2023) <<https://www.reuters.com/business/energy/projects-sponsored-by-snam-eni-terna-get-priority-status-eu-2023-11-28/>> accessed 27 September 2024.

²⁶ Since the announcement of the EHB initiative's work programme in January 2022, FluxSwiss (i.e. the Belgian-Swiss system operator of the TransitGas pipeline) has joined the initiative.

²⁷ The Federal Council, Switzerland and the EU: cooperation and negotiation <<https://www.admin.ch/gov/en/start/documentation/swisseurelations.html>> accessed 27 September 2024.

²⁸ Cf. B. Kratz and C. Tobler, *EU-Swiss legal relations: Might we get an Electricity Agreement after all ?*, Chapter X in: EELR XV, forthcoming.

needed certainty for investors and energy companies. Additionally, it will be important to secure Switzerland's integration into the planned European hydrogen transportation network to enable the import of hydrogen from third countries.²⁹

C. Legal and Regulatory Challenges for Switzerland

I. Starting position in a global context

In Switzerland, hydrogen has so far only played a role as an industrial raw material, which was produced almost exclusively using fossil fuels, in some cases on-site.

However, the regulation of hydrogen should not be viewed in an exclusively national context but in the evolving European and global legal and regulatory context, as shown in the first part of this article.

What is Switzerland's starting position in this context?

(1) With its traditionally high share of hydropower generation (60 percent) and an increasing share of other renewable electricity production³⁰, Switzerland could produce green hydrogen, at least with its surplus electricity production during the summer. However, in order to be able to massively expand the production of climate-neutral hydrogen instead of the hydrogen that has so far been produced mainly using fossil fuels, a lot of *cheap* renewable electricity is needed, which Switzerland does not have to the same extent as sun-rich countries that can generate larger surpluses throughout the year.

(2) The EU is focusing on electrification *and* hydrogen for its decarbonization policy and has pledged to increase the share of (green) hydrogen from zero to twenty percent by 2050.³¹ The EU is promoting and funding hydrogen projects along the entire value chain from production capacities to storage solutions and pipeline infrastructure. The aim is to create a European Hydrogen Backbone, which includes the creation of an infrastructure that will at the same time help to create a European hydrogen market.³²

²⁹ VSE, Avenir énergétique 2050 <<https://www.strom.ch/fr/avenir-energetique-2050/resultats#etude>> accessed 27 September 2024.

³⁰ For the Swiss energy statistics cf. the website of the Swiss Federal Office for Energy SFOE, <<https://www.bfe.admin.ch/bfe/de/home/versorgung/statistik-und-geodaten/energiestatistiken/gesamtenergiestatistik.html>> accessed 28 September 2024.

³¹ See [section B](#) above.

³² See [section B.II](#) above.

*From a Swiss perspective, a connection to the European Hydrogen Backbone therefore appears to be crucial in order to have all options available. In this respect too, Switzerland already has a basic infrastructure prerequisite in the form of the existing transit gas pipeline. However, a use for the transport of hydrogen would of course require a partial conversion of existing parallel infrastructures and/or a partial new construction.*³³

(3) As regards hydrogen projects for future imports in an extended, global context, Switzerland also has a good starting point with its global CO₂ compensation system based on bilateral intergovernmental agreements.³⁴

An analysis of the regulatory status quo and further need for action can be structured according to the topics as follows.³⁵

- Technical rules
- Permitting procedures
- Certificates of origin
- Grid and market regulations
- Decarbonization measures
- Promotion and subsidies

The following analysis starts with the responsibilities and the lack of a hydrogen strategy so far, and then highlights the regulations that have been set in place since 2023. The focus is on the 2023 so-called Umbrella decree, which is to be enacted on 1 January 2025. Other topics related to current regulations will also be listed before the remaining need for action is addressed.

³³ Cf. Art. 24^{bis} para. 1 of the Federal Spatial Planning Act of June 22, 1979 (SR 700) on the bundling requirement for infrastructure facilities.

³⁴ Cf. art. 6 Federal Act on the Reduction of CO₂ Emissions (CO₂ Act) of 23 December 2011 (SR 641.71). It is the KliK Foundation, as per the delegation of this task based on art. 39 para. 2 CO₂ Act, which has since 2022 been supporting climate protection activities in countries that have signed a bilateral climate agreement with Switzerland under Article 6.2 of the Paris Agreement. Reference can also be made to the SWEET-reFuel.ch research project, see <<https://www.zhaw.ch/de/forschung/forschungsdatenbank/projektdetail/projektid/7214/>> accessed 28 September 2024, which, among other things, examines the opportunities that arise for Switzerland's international hydrogen projects.

³⁵ See the final report of phase 1 dated 14 September 2023 of a study by Polynomics, E-Bridge and EPFL, *Rahmenbedingungen für Wasserstoff in der Schweiz*, as published by the Association of Swiss Electricity Companies VSE on its website, <<https://www.strom.ch/de/nachrichten/zukunft-wasserstoff-neue-studie-zeigt-politischen-und-regulatorischen-handlungsbedarf>> accessed 28 September 2024, p. 30 ss.

II. Responsibilities according to the Energy Act

According to Art. 6 para. 2 of the Energy Act³⁶, energy supply is in principle a matter for the energy industry. “The Confederation and the cantons shall provide the framework conditions necessary to enable the energy industry to fulfill this task in the best interests of all”.

III. The Missing Swiss Hydrogen Strategy

Hydrogen is regarded as an important element in the decarbonization process by both the Swiss gas industry³⁷ and electricity industry^{38, 39}, as well as by the umbrella business association *economiesuisse*⁴⁰, which have all been pushing hydrogen as a topic of strategic importance. However, at the time of writing this article (end of September 2024) Switzerland still lacks an official hydrogen policy strategy. Therefore, it is still not clear which priority hydrogen will be attributed in the context of the Swiss decarbonization policy⁴¹ and how important legal and regulatory framework conditions will look like. This will not solely be important in a national perspective but also, for the reasons stated above, for Switzerland’s positioning within the nascent global market for green hydrogen.

Since 2020, there have been a number of postulates, interpellations and motions from members or commissions of the Swiss federal parliament in this respect.⁴² With motion no. 22.3376 dated 1st April 2022⁴³, the Swiss Federal

³⁶ Federal Energy Act (EnG) of 30 September 2016 (SR 730.0).

³⁷ See the website of the Swiss Gas Industry Association VSG, <<https://gazenergie.ch/de/energiezukunft/wasserstoff/>> accessed 28 September 2024, which publishes a barometer of renewable gases every six months.

³⁸ Cf. the website of the Association of Swiss Electricity Companies VSE, <<https://www.strom.ch/de/nachrichten/vse-positionspapier-so-hat-wasserstoff-eine-zukunft-der-schweiz>> accessed 28 September 2024, with further links on the subject of hydrogen.

³⁹ It was these two associations, by the way, that had commissioned the Polynomics / E-Bridge / EPFL study (Fn 35).

⁴⁰ Cf. the *economiesuisse* website, <<https://www.economiesuisse.ch/de/dossier-politik/wasserstoff-und-erneuerbare-gase-der-energetraeger-der-zukunft>> accessed 28 September 2024.

⁴¹ Some reference points can be derived from the Energy Perspectives 2050+, published by the SFOE, <<https://www.bfe.admin.ch/bfe/en/home/policy/energy-perspectives-2050-plus.html/>> accessed 28 September 2024.

⁴² An overview, as of November 2023, can be found at the end of the Federal Council’s November 2023 report at <<https://www.parlament.ch/de/ratsbetrieb/suche-curia-vista/geschaef?AffairId=20223376>> accessed 28 September 2024.

⁴³ Cf. <<https://www.parlament.ch/de/ratsbetrieb/suche-curia-vista/geschaef?AffairId=20223376>> accessed 28 September 2024.

Council was asked to propose measures to promote the development and secure the supply of hydrogen in Switzerland. Such measures could, in the view of the respective parliamentary commission, take the form of financial contributions or non-financial measures to promote the production, import, storage or distribution of hydrogen from CO₂-neutral production processes.

On 15 November 2023, answering to an earlier postulate no. 20.4406 made at the end of 2020, the Swiss Federal Council delivered a first report on “Hydrogen. Analysis of the situation and options for Switzerland”.⁴⁴ This report provides us with first indications of what the Swiss Federal Council’s hydrogen strategy, as promised to be delivered by the end of 2024, might look like. In summary:

- Decarbonization is to take place primarily through electrification.
- Hydrogen is to be used where electricity cannot be used directly or is less suitable. According to the federal government’s Energy Perspectives 2050+, hydrogen is expected to account for only around three percent of total energy consumption in 2050.⁴⁵
- However, until a European hydrogen network will be established and until production will ramped up worldwide, the demand for hydrogen in Switzerland will mainly have to be met by an increasingly green domestic production. Hydrogen production should primarily take place at electricity generation plants or directly on large consumer sites, which could then become hydrogen hubs in industrial areas⁴⁶.
- If not used directly at the production site, transportation should take place in converted or newly built gas pipelines or by road.
- From 2035 onwards, imports are expected to become increasingly cheaper via the European hydrogen network. The Swiss transit gas pipeline is important in this context.
- In the Federal Council’s understanding, the industry should be responsible for the construction of hydrogen pipelines and the conversion of the gas network infrastructure. The task of the federal government as well as the Cantons and municipalities is to set the framework conditions⁴⁷ “so

⁴⁴ The Federal Council’s November 2023 report can be downloaded at <https://www.parlament.ch/de/ratsbetrieb/suche-curia-vista/geschaefft?AffairId=20223376> accessed 28 September 2024.

⁴⁵ Cf. Fn 30.

⁴⁶ An example is the Multi Energy Hub Zug on the site of the Tech Cluster Zug (V-Zug); see their website <https://mezag.ch/> accessed 28 September 2024.

⁴⁷ Cf. art. 6 para. 2 of the Energy Act and [section II](#) above.

that a market ramp-up is made possible and safety for the population and the environment remains guaranteed”. Safety is perceived as an important political issue, as there is still great skepticism about hydrogen among the Swiss population.

- Hydrogen is primarily considered as seasonal storage medium. Due to its very low efficiency, reconversion into electricity appears to be inefficient and expensive and is therefore only an option as a reserve. Due to the lack of storage options for gas in Switzerland, hydrogen must be converted into liquid synthetic energy sources for these purposes.
- Pages 5 and 6 of the Report show a timeline for establishing a hydrogen economy in Switzerland with a tabular list of the relevant political and regulatory steps.
- A schematic representation of the Power-to-X paths taken into consideration concludes the report.

In 2023, first regulatory steps regarding hydrogen and Power-to-gas (“PtG”) have been taken with the new Electricity Act (the so-called “Umbrella Decree”) dated 29 September 2023, which is to enter into force on 1st January 2025. These provisions will be summarized under [section IV](#).

However, as explained, it still remains to be seen which priority the Federal Council will give to a Swiss hydrogen economy and what measures, if any, it intends to take to further incentivize its development.

IV. Hydrogen Production and Power-to-Gas as addressed in the 2023 Electricity Act

The 2023 Electricity Act⁴⁸, the so-called Umbrella Decree, for the first time, addresses hydrogen and PtG in terms of energy market regulation. An overview of the provisions that directly address the production of hydrogen and other renewable gases can be found in a forthcoming article by Markus Schreiber⁴⁹, to be published in the focus issue on energy law of Weblaw Jusletter by the end of October 2024⁵⁰.

⁴⁸ Federal Act on a Secure Electricity Supply with Renewable Energies (Amendment to the Energy Act and the Electricity Supply Act) of 29 September 2023, BBl 2023 2301, adopted in the referendum of 9 June 2024.

⁴⁹ M. Schreiber, *Wasserstoff und andere erneuerbare Gase im “Mantelerlass”*, forthcoming.

⁵⁰ See <<https://jusletter.weblaw.ch/juslissues/2024/1211.html>> accessed 28 September 2024.

The thrust of these new regulations is, on the one hand, to *remove existing obstacles to the construction of hydrogen production plants.*

The construction of electrolyzers and methanation plants will in the future be of “national interest”. This is stated in the revised art. 12 para. 2 of the Energy Act.⁵¹ This means that the interest in the construction of such plants should from now on be given the same weighting as the (otherwise overruling) interests of national nature and landscape conservation (see art. 6 para. 2 of the Nature and Cultural Heritage Protection Act⁵²). The draft of the associated ordinance⁵³, art. 9a Energy Ordinance⁵⁴, does not even require a threshold value for electrolyzers and methanation plants.

For obvious reasons⁵⁵, it makes sense to install such plants at power generation facilities. However, as the run-of-river power plants that are particularly suitable for the production of green hydrogen are usually located outside of the building zone, the approval of electrolyser plants by the communal and cantonal authorities was in the past sometimes difficult.⁵⁶ This is also where the Umbrella Decree comes in with a new art. 24^{ter} Spatial Planning Act, which provides for the licensing of biomass and other plants for the conversion of renewable energy into hydrogen, methane and other synthetic hydrocarbons outside the building zone, provided this is deemed appropriate for a secure supply of renewable energy. The precise criteria for eligibility for approval are to be defined at ordinance level, with proximity to the production of renewable energy and the possibility of transportation playing a particular role.⁵⁷

⁵¹ As to the functionality of art. 12 EnG cf. UVEK, *Explanatory Report dated 21 February 2024*, p. 1 s. and also M. Bickel, in Kratz et al (eds.), *Kommentar zum Energierecht*, Volume III, Berne 2016; Th. Largey, *L'intérêt national à l'utilisation des énergies renouvelables*, in: Jusletter 28 novembre 2022.

⁵² Federal Act on the Protection of Nature and Cultural Heritage of 1 July 1966 (SR 451).

⁵³ The provisions of the ordinances accompanying the Umbrella Decree were submitted for consultation in spring 2024 and should be available in definitive form by the end of 2024. The corresponding references are therefore still to be regarded as provisional.

⁵⁴ Federal Energy Ordinance (EnO) of 1 November 2017 (SR 730.01).

⁵⁵ In addition to the technical connection of such locations, this also includes the advantage of exemption from grid fees within the framework of a so-called self-consumption arrangement.

⁵⁶ In 2022, for example, the Zurich Building Appeals Court had to decide on the approval of a hydrogen production plant and denied that the plant had the necessary site-specificity required for an exemption permit under Art. 24 of the Spatial Planning Act. See Schreiber (fn 49), section 3 for more details.

⁵⁷ Cf. Art. 32f Spatial Planning Ordinance in accordance with the consultation draft of 19 June 2024, at <https://www.fedlex.admin.ch/de/consultation-procedures/ongoing#https://fedlex.data.admin.ch/eli/dl/proj/2024/54/cons_1> accessed 28 September 2024.

With these regulations, some of the existing obstacles to the construction of electrolyzers and other PtX plants will therefore be removed. Further procedural simplifications will result from the so-called Acceleration Decree, which is of a general nature and at the end of September 2024 still being debated in the Swiss Parliament.⁵⁸ However, the question remains as to whether the construction of hydrogen production plants should be specifically incentivized or promoted beyond this, as is the case with funding in the EU,⁵⁹ with Germany as an example.⁶⁰

In recent years, the *exemption from grid fees* resulting from the self-production of electricity privilege (see art. 16 para. 1 of the Energy Act⁶¹) has provided an incentive for the construction of hydrogen production facilities at electricity generation plants. Other producers of hydrogen through electrolysis were however at a clear disadvantage as a result of this privilege. In the Umbrella decree, the Parliament addressed this issue by retaining this incentive with the new regulations, but also by making it available to others, namely industrial producers. The aim of these provisions was therefore, on the other hand, to create a *level playing field for the operating costs of hydrogen producers* and at the same time keep these costs low.

The newly inserted art. 14a of the Electricity Supply Act⁶² exempts all storage facilities without end electricity consumption from grid fees in a technology-neutral manner (para. 1 lit. b).

In future, conversion plants that convert electricity into hydrogen, gas or synthetic fuels will benefit from a grid fee reimbursement option to the extent of the electricity fed back into the grid (art. 14a para. 4 lit. b Electricity Supply Act).

Conversion plants that convert hydrogen, gas or synthetic fuels with electricity into storable chemical substrates are also to benefit to the extent of the electricity is drawn from the grid. However, this grid fee exemption option

⁵⁸ Cf. the Parliament's website, <<https://www.parlament.ch/de/ratsbetrieb/suche-curia-vista/geschaeft?AffairId=20230051>> accessed 28 September 2024.

⁵⁹ See [section B](#) above.

⁶⁰ As part of a third (!) hydrogen wave of the IPCEI (Important Projects of Common European Interest) Hydrogen in July 2024, the German Federal Ministry of Economics issued a series of funding decisions totaling EUR 4.6 billion for projects covering the entire hydrogen value chain; see for example energate Messenger, www.energate-messenger.de, of July 15, 2024, "Bund schiebt Wasserstoff-Welle mit 4.6 Milliarden an", with further links.

⁶¹ Cf. S. Rechsteiner and M. Waldner, in: Kratz et al. (eds.), *Kommentar zum Energierecht, Volume III*, Berne 2020.

⁶² Federal Electricity Supply Act (StromVG) of 23 March 2007 (SR 734.7).

is limited to pilot and demonstration plants that are operated with electricity from renewable energies until a total capacity of 200 MW is reached (art. 14a para. 4 lit. c Electricity Supply Act).

The new art.18a Electricity Supply Ordinance⁶³ (in the version of the consultation draft) further specifies that the plant must be in operation by 31 December 2034, be operated with renewable sources of energy, be recognized by the federal government as a P&D plant and not lead to the 200 MW being exceeded (para. 2). According to para. 3, recognition as a P&D plant should require “novel technical or operational characteristics”. This in turn makes it doubtful whether a hydrogen producer, that has been granted an exemption from grid fees⁶⁴ for the first plant, may expect a grid fee refund for further similar plants.

With this regulation, the most relevant PtX systems in Switzerland will only be able to benefit to a limited extent from an exemption from grid fees. The exemption in neighboring Germany and Austria will still be more extensive.⁶⁵

If the creation of a level playing field between power plant and grid operators as hydrogen producers, on the one hand, and industrial producers, on the other hand, is to be further intensified, *unbundling* would also have to be addressed. Without unbundling provisions, the power plant and grid operators will continue to have advantages that they can exploit in an evolving new market.⁶⁶ However, this is not an issue likely to be addressed in the context of further incentivizing green hydrogen production in Switzerland. It remains to be seen whether the Swiss electricity market regulatory authority ElCom will address unbundling issues instead of the legislator, as ElCom has in an earlier communication regarding electricity storage made it clear that it considers storage to be a competition area⁶⁷.

⁶³ Federal Electricity Supply Ordinance (StromVV) of 14 March 2008 (SR 734.71).

⁶⁴ Cf. also art. 23a Electricity Supply Act, so-called “Regulatory Sandbox” provision regarding pilot projects.

⁶⁵ Cf. Schreiber (fn 49), section III/2.

⁶⁶ See Schreiber (fn 49), section III/3 with further reference; B. Kratz, *Speicher als Schlüsselkomponente der Energiewende*, Zurich/St. Gallen 2018, p. 85 et seq. and on the subject of unbundling in infrastructure-based sectors in general, most recently also Josianne Magnin, *Wettbewerbsrecht und Entflechtung im Infrastrukturbereich*, Habil. Lucerne, Zurich/Geneva 2024.

⁶⁷ See ElCom, Questions and answers on the Energy Strategy 2050 of April 3, 2018, last updated on November 14, 2023, to be found on www.elcom.admin.ch > Documentation > Communications.

As long as there are no unbundling requirements, integrated energy companies can also use the storage options of hydrogen and PtG as flexibilities in the sense of the new Art. 17c Electricity Supply Act to make grid operation more efficient and have these remunerated.

Further, in the context of the Umbrella Decree, hydrogen is also being addressed as a *trade-related issue*: green hydrogen and synthetic fuels from Switzerland need to be backed by certificates, with a view to comply with the quota for renewables, reduction of GHG emissions as well as to achieving the climate targets set out in the Climate Protection Act. Draft art. 4a ss. of the Energy Ordinance, based on art. 9 para. 5 of the Energy Act, propose a certificate system designed for a transition period, which is therefore not yet in all respects compliant with the EU system.⁶⁸

V. Other relevant regulations

As regards *specific decarbonization measures*, biogenic and synthetic fuels have been exempted from mineral oil tax and from the performance-related heavy vehicle charge for electrically powered vehicles.⁶⁹ This also aims at creating demand side incentives.

The revised CO₂ Act entering into force on 1 January 2025 provides in art. 28f for blending quotas for renewable aviation fuels.

As to recent climate protection legislation, the Climate and Innovation Protection Decree⁷⁰ has created a *subsidy* from which technologies that are part of the value chain of the hydrogen home market can benefit.

As far as the *pipeline-based transportation of hydrogen* is concerned, the scope of the Pipeline Ordinance⁷¹ was extended to hydrogen in 2023 as a first step.⁷²

In 2024, another revision of the Pipeline Ordinance has been submitted for consultation, with the aim to address technical criteria and safety regulations for the transportation of hydrogen at ordinance level for the time being.⁷³

⁶⁸ Cf. UVEK, Explanatory Report dated 21 February 2024, p. 10 s.

⁶⁹ Cf. Polynomics analysis (fn 35), p. 49 and 2024 amendments to CO₂ Act, BBl 2024 686.

⁷⁰ Federal Act on Targets in Climate Protection, Innovation and Energy Security (KIG) of 30 September 2022; BBl 2022 2403.

⁷¹ Federal Pipeline Ordinance (RLV) of 26 June 2019 (SR 746.11).

⁷² This regulation has been criticized as excessive; see Polynomics analysis (fn 35), p. 32.

⁷³ Cf. the SFOE Website, <<https://www.bfe.admin.ch/bfe/de/home/news-und-medien/medienmitteilungen/mm-test.msg-id-102488.html>> accessed 28 September 2024, with further links to the respective documents.

VI. Coming to an Agreement with the European Union?

As regards energy, many good reasons exist for Switzerland to come to a sectoral agreement with the EU. This also applies with regard to hydrogen: If Switzerland wants to be fully integrated into the European Hydrogen Backbone for future imports and transports of hydrogen, it must work towards the inclusion of the transit gas pipeline, whether in a trilateral framework with its neighboring countries Germany and Italy or in relation to the EU. As of the end of September 2024, there is no official information regarding the ongoing negotiations with the EU that also include energy related matters.

D. Conclusions

From our point of view, it seems imperative that Switzerland does not miss the integration into European Hydrogen Backbone, which would allow it to keep all its options available with regard to its future hydrogen strategy and any adaptations thereof.

With regard to future trade in green hydrogen, it seems important that Switzerland aligns with international standards and complies with recognized certification schemes in order to be integrated in the green hydrogen market. In this context, alignment with European standards may represent an obvious option for Switzerland, but they remain burdensome and may render imports excessively difficult. A Swiss “way” matched with arrangements for mutual recognition may represent an alternative option.

Also with a view to further broadening the base of its energy security, it would appear to be the right course for Switzerland to further incentivize the development of domestic production of green hydrogen up to a certain production capacity. In the interests of a level playing field, it is important that the formation of industrial hubs, which are also major consumers of industrial fuels to be decarbonized, is equally incentivized.

In order to incentivize private investments in hydrogen, long-term purchase agreements should be admitted. Funding would certainly further incentivize such investments.

As for the regulation of hydrogen and PtX as a cross-sectoral matter, it is in the nature of things that this has so far been done selectively within the framework of various decrees and sector specific contexts. It can be expected that hydrogen will also be addressed in the future Gas Supply Act as renewable

gas and also in terms of transportation pipelines. In this context, the question will again be raised as to whether a specific hydrogen regulation in a separate decree would not be more appropriate to deal with the specifics of the matter.

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