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Hydrogen Regulations by Jurisdiction and Changing Transmission Systems—Part I

By Simone Goligorsky, Simon Grieser, Colette D. Honorable, Eric Lin, Adela Mues, Debra A. Palmer, Hagen Rooke, Nicolas Walker, Karim Alhassan, Albertine Aquenin, Nicole Cheung, Tufayel Hussain and Zahir Sabur*

In this two-part article, the authors examine the hydrogen regulations in some of the key jurisdictions globally, including: the European Union, France, Germany, the United Kingdom, China, Singapore, the United Arab Emirates, and the United States. This first part of the article discusses the hydrogen regulatory regimes in the European Union, France, and Germany. The second part of the article, which will appear in an upcoming issue of Pratt's Energy Law Report*, will focus on hydrogen regulation in the United Kingdom, China, Singapore, the United Arab Emirates, and the United States.*

In the last two years, legislators have stepped up their efforts by launching hydrogen strategies.

The climate crisis has become a central policy driver in many jurisdictions, with regulators coming to the view that clean hydrogen may provide the necessary solution to reach the targeted levels of decarbonization, as set out in international treaties such as the Paris Agreement, and as discussed at COP26. Consequently, stakeholders, including industry players, investors, supranational organizations, and governments, have begun harnessing the potential of hydrogen to drive the global green energy transition, creating a hydrogen policy momentum.

Ahead of the development and implementation of product-specific legislation, regulators in many of these jurisdictions have brought hydrogen within the scope of existing laws (for example, those applicable to natural gas). Alongside the use of existing laws, regulators are drafting a comprehensive regulatory framework that will govern the production, storage, transportation, distribution, and associated infrastructure of hydrogen. The forthcoming regulations also will set out rules pertaining to the use, sale, and purchase of low-carbon hydrogen.

The regulators' overarching objective is to facilitate the development and functioning of the domestic hydrogen market, as well as cross-border trade. To

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this end, some regulators hope to implement public support mechanisms and incentives, and to develop a workable definition of clean hydrogen, which is necessary for the establishment of a licensing regime. Some jurisdictions also are considering the launch of certification tools that provide guarantees of origin and trace the types of hydrogen produced. However, it is worth noting at the outset that, despite certain similarities, hydrogen policy strategies will differ from jurisdiction to jurisdiction. This article provides an overview of the legislation that is currently in place, and provides a summary of forthcoming proposals, in certain key jurisdictions.

EUROPEAN UNION

Pressure to Create a Hydrogen-Only Distribution System

At the EU level, the main rules regulating the gas market are Directive 2009/73/EC of the European Parliament and of the Council of July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC (*Gasbinnenmarktrichtlinie*—GasRL) and the Regulation of the European Parliament and of the Council on the internal markets for renewable and natural gases and for hydrogen (*Fernleitungszugangsverordnung*—ErdgasZVO).

The currently applicable versions of the GasRL and ErdgasZVO are designed to regulate the transmission, distribution, supply, and storage of natural gas.

Pending Legislation

On December 15, 2021, the EU Commission published proposals for the regulation of the natural gas and hydrogen market. This would involve amending the GasRL and ErdgasZVO.

Like Germany's recently amended Energy Industry Act (*Energiewirtschaftsgesetz*—EnWG), both drafts make a clear distinction between the regulation of natural gas networks and that of hydrogen networks. However, unlike the EnWG, the EU regulatory requirements for hydrogen would apply to all hydrogen network operators: There is no opt-in option.

Combined Gas and Hydrogen Operations

There are high hurdles for the combined operation of gas and hydrogen networks.

Operating gas and hydrogen networks in combination, as many transmission and distribution system operators would like to do, would be virtually impossible with the implementation of the regulations.

Definition of "Gas" Under GasRL and ErdgasZVO

Natural gas is referred to when the gas consists mainly of methane or can be fed into the natural gas grid and transported in a technically safe manner.

Hydrogen, on the other hand, is not defined in more detail, but this is also due to the fact that the EU follows a more technology-open approach; i.e., all production paths for hydrogen generation (electrolysis, steam reforming, methane pyrolysis, etc.) are covered.

Upcoming European Parliament and Council Rules for Internal Market in Natural Gas

Definition

Under the present drafts, "gas" means not only natural gas, but also hydrogen.

The Article 2 of the GasRL treats gases together and does not make an overall distinction between hydrogen and other gases, thereby defining "gases" as "hydrogen and gas."

Strengthening Consumer and End-User Markets

Article 10 I ensures that all end customers have the right to be supplied with gases, including hydrogen, by a supplier. This applies regardless of the member state in which the supplier is registered.

Article 10 I further stipulates that in the supply contract end customers are entitled to an overview of the services to be provided, and the various quality levels and maintenance services offered.

Article 11 gives the customer the right to change hydrogen supplier. In this context, it is stipulated that the switching fees incurred in the event of a switch must be reasonable.

Duties of Hydrogen Network Operators, Hydrogen Storage Facilities and Hydrogen Terminals

Article 46 regulates the various duties of hydrogen network operators, hydrogen storage facilities and hydrogen terminals. Among other things, under Article 46 I a), a safe and reliable infrastructure for the transportation and storage of hydrogen must be operated, maintained, and further developed.

It further provides that environmental protection must be considered and close cooperation must be established with associated and neighbouring hydrogen network operators.

In addition, under Article 46 I b), operators must ensure that the hydrogen system can meet a realistic demand for the transportation and storage of hydrogen.

Also, under Article 46 I f), operators must provide network users with the information they need for timely access to the infrastructure.

Article 52 I obliges operators of hydrogen networks to send the regulatory authorities, at regular intervals, details of the hydrogen infrastructure that they plan to build.

It should be noted that, as an EU directive, these regulations do not enter into force immediately upon their adoption, but must first be transposed by member states into national law.

Overview of the European Parliament and ErdgasZVO Rules

Third Party Access

Under Article 6 I of the ErdgasZVO, hydrogen network operators must offer their services to all network users on a non-discriminatory basis. If the same service is offered to different customers, equivalent contractual conditions apply. Hydrogen network operators must also publish on their website the contract terms and conditions, the tariffs charged for network access and, where applicable, the balancing charges.

Distribution of Capacity Rights

Capacity rights for hydrogen storage and distribution should be freely tradable. To this end, Article 11 requires each transmission system operator, storage system operator, liquefied natural gas (LNG) system operator, and hydrogen system operator to take appropriate measures to ensure that capacity rights can be traded freely, transparently, and in a non-discriminatory manner.

Obligation of Hydrogen Plant Operators

In accordance with Article 31 I, hydrogen storage operators must publish details of all services they offer, including the relevant terms and conditions, and the technical information required by hydrogen storage users. Regulatory authorities may require operators to publish additional information for network users.

Article 40 I requires hydrogen network operators to cooperate at the EU level within the framework of the European Network of Hydrogen Network Operators in order to promote the functioning and development of the internal hydrogen market and cross-border trade. This is to ensure optimal management, coordinated operation, and proper technical development of the European hydrogen network.

The annex to the Natural Gas Regulation also contains significant proposals for supplementing the Security of Gas Supply Regulation (EU SOS GasVO), which are of particular importance given the current turbulence in prices and low storage levels. This implementation of the third energy package for gas markets is a further concretization of the European Green Deal.

Effective Dates

The Commission's drafts will be discussed in the European Parliament and the Council this year. Adoption was not expected before the end of 2022, and more than likely not until 2023.

While the changes to the ErdgasZVO will have immediate legal effect upon adoption and publication, the GasRL, as a directive, must then be transposed into national law.

FRANCE

Regulators Define Three Types of Hydrogen by Production Type

Under Article L. 811-1 of the French Energy Code, Hydrogen is defined as a gas containing various concentrations of dihydrogen molecules obtained after application of an industrial process.

According to Article L. 811-1, three types of hydrogen are defined:

- *Renewable hydrogen*, which is produced either by electrolysis using electricity from renewable energy sources, or by means of any other technology that uses exclusively one or more of these same renewable energy sources and does not conflict with other uses allowing their direct recovery. In all cases, its production process emits, per kilogram of hydrogen produced, a quantity of carbon dioxide equal to no more than a given threshold.
- *Low-carbon hydrogen*, where the production process generates no more emissions than the threshold set for renewable hydrogen, but the hydrogen does not meet the other criteria necessary to be designated as renewable hydrogen.
- *Carbonaceous hydrogen*, which is neither low-carbon, nor renewable.

The threshold and proportions necessary to classify hydrogen according to the above definitions have not yet been established.

Pursuant to Article L. 821-2, the renewable or low-carbon characteristics of hydrogen can be proven by traceability warranties based on a model similar to the one used to guarantee origin for renewable electricity.

Public Support

In accordance with Article L. 812-1 et seq., a system of grants was introduced in the Energy Code to support hydrogen production.

Production

Hydrogen production is subject to the "classified facilities for protection of the environment" regulation (*installations classées pour la protection de*

l'environnement—ICPE), which imposes specific requirements and enhanced state scrutiny on facilities and activities that may harm the environment. The facilities and activities in scope are divided into sections.

Under Section 3420 of the ICPE, the production of inorganic chemicals such as hydrogen in industrial quantities by chemical or biological transformation is subject to state authorization regardless of the quantities produced.

This authorization covers: (i) programs to mitigate risks to the environment; (ii) programs to prevent pollution of, and protect, water; and (iii) limits on greenhouse gas emissions.

Storage

Hydrogen storage is regulated. The relevant rules depend on the quantities of hydrogen being stored.

Under Section 4715 of the ICPE, storage is subject to:

- State authorization when the quantity of hydrogen likely to be present in the facility is equal to or greater than 1 tonne.
- Notification to the regulatory authorities when the quantity of hydrogen is greater than or equal to 100 kg, but less than 1 tonne.

Under these thresholds, no permit is required.

The Mining Code covers the possibility of storing hydrogen underground.

Underground hydrogen storage is regulated by concession contracts. In principle, any concession must be subject to a public inquiry and open to competing bids. The concession contract determines the scope of the underground facility and the geological formations concerned. The duration of the concession is also determined by the contract and cannot exceed 50 years.

Transportation

Transportation is subject to different regulatory frameworks depending on whether hydrogen is transported via the pipelines of a dedicated transportation network or through the existing natural gas transportation network:

- If the pipeline is part of a transportation network dedicated solely to hydrogen, the regulatory framework has yet to be defined by the government.
- If the pipeline is part of the existing natural gas transportation network (this applies only to renewable hydrogen), the hydrogen is subject to the same regulatory framework as natural gas, namely:
    - The right of access to natural gas transportation facilities must be guaranteed by operators under the terms of the contract.

- Charges for using transportation networks must be determined in a transparent and non-discriminatory manner.

Distribution

Distribution will be subject to different regulatory frameworks depending on whether hydrogen is distributed by pipelines that are part of a dedicated distribution network or the existing natural gas distribution network:

- If the pipeline is part of a distribution network dedicated solely to hydrogen (unlike the regulatory framework for transportation, this applies only to renewable energy), the regulatory framework has yet to be defined by the government.
- If the pipeline is part of the natural gas distribution network (this applies only to renewable hydrogen), the hydrogen is subject to the same regulatory framework as the distribution of natural gas:
  - A right of access to natural gas distribution facilities must be guaranteed by operators under the terms of the contract.
  - Charges for using natural gas distribution networks must be determined in a transparent and non-discriminatory manner.
  - In municipalities that are already served by a natural gas network, state owned gas distribution system operators are required to connect customers who so request to the existing state-owned distribution networks.

Sales

The production of renewable hydrogen and its sale to end users take place in competitive markets that are not regulated by the Energy Code.

The sale of renewable gas injected into the natural gas network is not subject to supply authorization, provided that this gas is sold by the producer to a natural gas supplier.

Pending Legislation

On September 8, 2020, the French government announced a National Strategy for the Development of Decarbonized Hydrogen, which will provide €7 billion in public support by 2030, including €2 billion by 2022 under France's Recovery and Investments for the Future (*France Relance et du Programme d'Investissements d'avenir*) plans.

Following the adoption of Law No. 2019-1147 of November 8, 2019, on energy and climate, Article L. 100-4 of the Energy Code on national energy policy was amended to include the objective of "developing low-carbon and

renewable hydrogen and its industrial, energy and mobility uses." The Law also empowers the government to take any measure by ordinance that would "define a support and traceability framework for renewable and low-carbon hydrogen." This is the purpose of Ordinance No. 2021-167 of February 17, 2021, on hydrogen.

The Ordinance creates a new Book VIII in the Energy Code and defines three types of hydrogen according to their production methods. It also sets up a public support mechanism for hydrogen production and creates a mechanism for guarantees of origin and traceability to certify the type of hydrogen produced. Finally, a new regime for self-consumption of hydrogen has been introduced.

The Ordinance will be supplemented by three decrees and two application orders, which have yet to be enacted.

GERMANY

Hydrogen and Natural Gas Networks Will Be Subject to Separate Rules

Until now, only a few pipelines have been used exclusively for hydrogen. The pipelines used so far for hydrogen are mainly used for industrial purposes. These pipelines are classified as so-called "closed distribution networks" under Section 110 of the Energy Industry Act (EnWG). Therefore, these pipelines are subject to only partial regulation and are exempt from incentive regulation in particular due to their use for industrial purposes. In fact, there has so far been no independent regulation of the hydrogen market in Germany. However, with the amendments to the Energy Industry Act of July 26, 2021, (*Energiewirtschaftsgesetz*—EnWG), new regulations on the use of hydrogen networks have come into force.

Pending Legislation

According to the legal explanatory memorandum, the purpose of the amendments to the EnWG is the gradual development of hydrogen infrastructure in Germany. The regulations are intended as a transitional solution until European requirements are in place.

In the memorandum, the Federal Ministry of Economics (BMWi) also presented key considerations for the transitional regulation of hydrogen networks. According to these, the definition of gas should not be extended to hydrogen. Instead, hydrogen should be regulated separately, independently of the previous regulations regarding gas, under the EnWG.

The German government has stated that separate regulation of hydrogen and natural gas networks is imperative under the current EU legal framework. The EU Commission submitted proposals on this subject at the end of 2021. Transposition into German law is expected from 2025 onwards.

In light of evolving EU law, Section 112b EnWG seeks to adapt the regulatory framework for the joint regulation and financing of gas and hydrogen networks.

The amendments to the EnWG add new or revise existing definitions under Section 3 and include new provisions on the regulation of hydrogen networks under Sections 28j-q, and on transitional regulation under Sections 133a-c EnWG.

Separate Definition of "Hydrogen"

In the definition of "energy" in Section 3 No. 14 EnWG, the words "and gas" are replaced by the words "gas and hydrogen." This basically places hydrogen alongside gas as a separate energy carrier. However, this should only apply to pure hydrogen pipelines. For the process of blending hydrogen into the natural gas grid, the existing legal framework remains in place. This is also illustrated by the unchanged wording of Section 3 No. 19a EnWG, pursuant to which hydrogen produced by water electrolysis also falls under the gas definition.

Under the new definition, hydrogen is only considered "energy" within the meaning of the EnWG if it is used for grid-based energy supply, but not if used for non-performance-related supply.

Separate Definition of "Hydrogen Network"

"Hydrogen network" is now defined independently in the EnWG and classified as a general supply network. Therefore, industrial pipelines that connect a generation plant only with specific consumption points and therefore are not general supply pipelines, are not covered by the EnWG under the term "hydrogen network."

Definitions of "Gas" and "Biogas"

The existing definitions of "gas" and "biogas" will be amended to distinguish clearly between the two substances. As a result, the existing definition of "gas" in the EnWG will be cleansed of its "hydrogen components."

Distinction Between "Hydrogen Network Operators" and "Hydrogen Plant Operators"

A distinction is made between "hydrogen network operators" and "hydrogen plant operators" based on the new unbundling rules. Pursuant to Section 28m EnWG, operators of hydrogen networks are not allowed to build, operate or own facilities for the production, storage, and distribution of hydrogen. The intention of this provision is to prevent cross-subsidization and discrimination.

Opt-In Clause Until the New Provisions Under the EnWG Come Into Effect

In the transitional phase, until new regulations are implemented in the EnWG as a result of new EU provisions, hydrogen pipeline operators are free

to decide whether they wish to be subject to the hydrogen network regulation under the EnWG (via an opt-in clause). Operators of hydrogen storage facilities are therefore able to declare that access to their facilities should be in accordance with the regulations of the EnWG. Submission can be made by issuing an "opt-in declaration." If the pipeline operators, however, refuse to be subject to the EnWG, the few existing industrial hydrogen networks are not subject to the EnWG network regulation, until new EnWG regulations come into force.

If operators choose to opt-in under the regulations of the EnWG in the transitional phase, the regulations of the EnWG apply holistically, and not only to individual pipeline sections but to all the operators' sections. Those who choose not to be regulated are not covered by the requirements regarding network access, tariff setting and unbundling. However, it is expected that this decision will only be of a temporary nature, because the German legislature (*Deutscher Bundestag*) anticipates that, in the medium term, it will be necessary to introduce comprehensive and mandatory regulations, without an opt-in clause, that apply for all hydrogen networks.

Infrastructure

Section 113a of the EnWG governs the transfer and continued validity of rights of way and land easements for gas pipelines. The provisions also apply to the operation of these pipelines if transporting hydrogen. This is intended to facilitate the conversion of gas pipelines into hydrogen pipelines.

Under Section 113b EnWG, transmission system operators can identify pipelines that could be converted into hydrogen pipelines as part of the gas network development plan. They must ensure that the remaining network can meet capacity requirements.

Finance

As mentioned, the definition of "gas" in the EnWG will not be extended to hydrogen. Hydrogen will be regulated separately in the EnWG. This also means that there is no provision for interlinked financing via natural gas network fees.

On the question of financing, the BMWi holds the opinion that joint financing via joint network tariffs, to be paid by natural gas and hydrogen customers, is not permissible under EU law. According to the BMWi, financing should therefore be provided solely by hydrogen grid users, although public funding is likely to be required to avoid prohibitively high grid-usage tariffs from preventing the market from ramping up.

Section 28o of the EnWG provides for a cost-based tariff largely in line with Section 21 of the EnWG.

The terms and conditions, and tariffs must be reasonable, non-discriminatory, and transparent, and must not be less favorable than those

applied by network operators in comparable cases for services within their company or to affiliated or associated companies.

Operators of hydrogen networks have the option of receiving a monetary subsidy if they submit to an assessment by the German Federal Network Agency (BNetzA) of the adequacy of the respective hydrogen network infrastructure in terms of secure and economical supply. The prerequisites for such an assessment of the need for individual hydrogen network infrastructures are regulated under Section 28p of the EnWG. If the assessment is successful in respect of the operator´s hydrogen network, the Federal Network Agency (BNetzA) approves the costs determined. However, the charges are not approved in accordance with Section 23a of the EnWG.

Finally, there is a provision in the EnWG, authorizing ordinances to establish the terms and conditions for the determination of costs.

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