

## The National Hydrogen Program and the Regulation (or Not) of Hydrogen in Brazil

By Paulo Rage

The global energy landscape and climate change have put new pressure on the economy to decarbonize. Thus, renewable energy sources and inputs have been sought for a wide variety of industries and consumer markets. In this scenario of energy transition, hydrogen has been gaining importance as a potential new key element. Hydrogen has the physico-chemical characteristics that allow it to become both an energy source and a renewable and non-polluting input with many practical purposes. It can be used directly as an energy source in the automotive, aerospace, and power generation industries. It can also be used as an input in several industrial segments—steel, food, chemical, mineral, cement, petrochemical, fertilizer, technological, among others.

Number 1 on the periodic table, hydrogen (H) is the most abundant chemical element in nature, constituting approximately 75% of the elemental mass of the universe,<sup>1</sup> and can be obtained in a variety of ways. Depending on how hydrogen is obtained (and its polluting degree), it can be classified by colors, the main ones being gray, white, blue or green. Green hydrogen, in particular, has received a lot of attention and

investment from the market, as it is a renewable energy source that can be used in the whole production chain, from the initial generation of renewable electric energy to the water electrolysis process that leads to hydrogen production. However, green hydrogen's cost is still very high when compared to its non-renewable alternatives, whether as an input for other industries or as an energy source. Therefore, it is crucial that the entire hydrogen industry be open to investment in research and development. It is also fundamental that its market be open to free competition, which would spur innovation in the market to provide the economy of scale and technological evolution needed to increase its productivity and, consequently, decrease its cost.

In this setting, the National Hydrogen Program (PNH)<sup>2</sup> was published by the Ministry of Mines and Energy (MME) in July 2021. Its purpose is to “develop and consolidate the hydrogen market in Brazil, as well as promote the international introduction of the Country on an economically competitive basis.” Among its objectives, the PNH lists these related to a “Legal and Regulatory-Normative Framework”:

“Analyze the existing national laws and regulations to subsidize the

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*inclusion of Hydrogen as an energy vector and fuel in the Brazilian energy matrix. Promote the regulation, through governmental agencies, of the production, transport, quality, storage and use of hydrogen and its technologies by:*

- a. Analyzing the existing authorities of regulatory agencies, competent bodies or entities, as well as new needs;
- b. Assessing the need for proposing regulations on new technologies at the three levels (federal, state and municipal);
- c. Observing that regulation should remain open to market conditions and avoid barriers and technological lock-in;
- d. Evaluating interrelations between sectors and proposing harmonization;
- e. Seeking to develop and establish codes, norms and standards issued by national institutions in line with international rules;
- f. Promoting cooperation among governmental agencies for the regulation of hydrogen, considering its multiple sources and uses, seeking regulatory harmonization, citing as an example the transportation of hydrogen mixed with natural gas;
- g. Evaluating the need to propose additional standards related to safety for the production, transportation and use of hydrogen; and
- h. Assessing the need to develop hydrogen certification mechanisms, for production and consumption.”

Given the context of the hydrogen global market and the huge potential for Brazilian participation, a very common question soon arises for a country such as Brazil, used to a strongly regulated economy (where there is not exactly a “free enterprise” regime but a regime of “regulated enterprise”): how is or how should hydrogen be regulated in the country? From a political-economic vision of strong state control of economic activity, a market for a product/element of such economic relevance that is not duly controlled, regulated and administered by the state would be inconceivable. The question is not directly answered in current legi-

slation, however. This is because a large part of the hydrogen chain is already under general norms or under specific industries’ regulatory norms; in addition, certain aspects could still fall in a “competence vacuum” between the existing legislations and regulatory agencies.

On the other hand, from a pro-market and pro-free enterprise view, which formed the basis of the recent Economic Freedom Law, it can be argued that existing regulation already regulates the activities of the hydrogen chain and does not require additional regulation. In this sense, economic freedom (which includes freedom of initiative) should be the rule, and regulation should only be exceptional,<sup>3</sup> only when eminently necessary and only to the extent necessary to guarantee people’s basic first generation human rights (life, liberty and property).<sup>4</sup>

So do we need additional regulation for hydrogen in Brazil? Let’s see.

Firstly, for the upstream part of the hydrogen chain, the legislation regarding its initial acquisition already exists and depends on mode. Different publications often use certain colors to designate hydrogen obtained by different processes.<sup>5</sup> Of the main colors, we highlight gray, white, blue or green. In most cases, such acquisition is already subject to its own regulation, depending on the modality, and, consequently, its method of production. Gray hydrogen is obtained from natural gas or coal, and the exploration and production of both is already duly regulated by the Brazilian oil and gas and mining legislations, respectively. The same goes for blue hydrogen, which derives from the same sources but differs from gray hydrogen by the fact that CO<sub>2</sub> can be separated and captured in its production process. Regarding green hydrogen, obtained through the electrolysis of water and from the generation of renewable electric energy (especially solar, wind or hydro), both the source and use of its water input, as well as the generation of its other (renewable) energy input, are already regulated by the National Water and Basic Sanitation Agency (ANA) and the National Electric Energy Agency (ANEEL), respectively. This leaves white hydrogen as a special situation, which we analyze below.

Once the inputs for the industrial/artificial production of hydrogen are obtained (i.e., through physicochemical or biochemical processes), the next activity in the chain—purchasing such inputs for industrial/artificial production—would not need additional state regulation. This activity is already subject to existing legislation for the protection of people, goods, and the environment, such as through environmental and technical safety regulations. An industrial hydrogen production activity would be equivalent to several other industrial activities that use chemical elements as inputs (or as a final product). Normally, they do not require concession, authorization or additional specific regulatory licensing. And this does not mean that they are “unregulated” or “unlawful” since the company that practices such industrial activities must already follow and respect all the general Brazilian legislation (which is considerable and complex when compared to that of other countries). This compliance with the general Brazilian law includes the need to obtain the environmental license applicable to the industrial activity in question and given the product’s perilous characteristics. Also, this means respecting the technical and safety rules in dealing with the material (for example, for its flammable characteristics), which is already the object of analyses and regulations by ABNT (e.g., by ABNT/CEE-067) and by INMETRO (e.g., by UTILH2). Additionally, such a company must already pay the taxes levied on its revenues and profits as well as observe all other Brazilian legislation, such as that regarding labor, civil, business, competition and exchange rate. The same reasoning applies to the company that engages in the activity of storing this industrially produced hydrogen.

Finally, on the final consumption end of hydrogen, the same legal-normative reasoning would apply to the other industries. The industrial activities mentioned above, such as the production of steel, fertilizer, food and petrochemicals, use hydrogen as their input, just as they use inputs such as water, plastics and energy. Therefore, they do not need a concession, authorization, or additional specific regulatory licensing. Such industries also already follow the existing environmental and technical

safety rules. As for hydrogen-based power generation, the same rules are followed as mentioned above for green hydrogen.

A special consideration exists for white hydrogen, the natural or geological hydrogen extracted directly from the subsoil. Although there is already important scientific literature on the subject, little is known or has been discussed about this option’s economic use in the market.<sup>6</sup> In this case, a legal discussion would arise as to whether white hydrogen would be a resource eventually owned by the federal government, by force of a constitutional command (CF arts. 20 and 176), since it doesn’t fit the definition of a ‘mineral’.

On the one hand, it can be argued that this resource produced in an isolated way (or together with helium) would not be property of the federal government, since this rule only applies to mineral resources (which is not the case of hydrogen). Thus, there is no room for any debate on “participation in the results of the exploration” or “financial compensation for this exploration” (CF art. 20, §1<sup>st</sup>) because it is not a property of the federal government. Not being property of the federal government, hydrogen can be explored and produced by the owner of the surface soil.

In case white hydrogen is considered as property of the federal government, either (i) by an understanding contrary to the above; (ii) when the reservoir involves hydrocarbons or other minerals; (iii) (onshore) in cases where the state is the owner of the land with the white hydrogen reserve; or (iv) (offshore) by the exception of this natural resource being located on the continental shelf, in the exclusive economic zone and marine land; the need for some legal instrument is raised, by means of which the exploration and production of such a resource can be granted to third parties (whether public or private, national or foreign). In this particular case, discussions about a possible expansion of the current competence of the National Agency of Petroleum, Natural Gas and Biofuels (ANP) and the oil and gas legislation itself, which today only covers hydrocarbons, would be appropriate. Therefore, a regime similar to the one that currently exists for hydrocarbons should be used.

In this case, the concession regime would possibly be applicable since we are not dealing with pre-salt polygon areas or, as a general rule, areas that are considered strategic (so far). However, the current government participation as a whole in the oil and gas regimes (including the concession regime) would probably not be commensurate with hydrogen's current market monetization potential nor with the incentive (or, from an Economic Freedom Law perspective, the absence of "state disincentive") that hydrogen needs for its development.

Hydrogen really has the potential to be one of the big players in the energy transition to a low carbon economy. For this purpose, it is fundamental not to create legal insecurity (through unnecessary additional rules and regulations) or bureaucratic procedures (such as those related to concessions and authorizations) that could discourage or even make its development impossible. It is paramount that any regulatory attempt respects Objective C in section 5.4 of the PNH: "*See that regulation remains open to market conditions and avoids technological barriers and lock-in*". Parodying the words of the PNH, we must prevent the "Legal and

Regulatory-Normative Framework" ("Arcabouço") from becoming a Legal and Regulatory-Normative "Calaboose" ("Calabouço") by imposing "barriers and lock-ins" to innovation in the hydrogen sector. Outside of the exception for the particular case of white hydrogen, as described above, for hydrogen's other industrial uses (as in the case of gray, blue and green hydrogen), the Brazilian legislation does not need additional regulation in the sense of requiring concession, authorization or specific regulatory licensing. As it is, Brazilian law is fully compatible with the development of hydrogen-related activities. Therefore, it is possible to immediately start industrial production, storage, transport and hydrogen consumption activities in Brazil based on the current legal and regulatory framework. Along these lines, and following the vision of classical economics, on which the Economic Freedom Law is based, many times the best way for the state to facilitate the development of an incipient and innovative industry such as hydrogen, which is proving to be crucial for the planet's sustainable development, is to prevent the creation of regulatory barriers, that is, "not to get in the way."

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## Endnotes

- <sup>1</sup> PALMER, David. *Hydrogen in the Universe*. NASA: 1997.
- <sup>2</sup> MINISTRY OF MINES AND ENERGY. *Programa Nacional do Hidrogênio*. Available at: <<https://www.gov.br/mme/pt-br/assuntos/noticias/mme-apresenta-ao-cnpe-proposta-de-diretrizes-para-o-programa-nacional-do-hidrogenio-pnh2/HidrogenioRelatriodiretrizes.pdf>> Access on August 07, 2021.
- <sup>3</sup> BASTIAT, Frédéric. *A Lei*. São Paulo: Instituto Ludwig von Mises Brasil, 2010.
- <sup>4</sup> VASAK, Karel. *A 30-year Struggle: The sustained efforts to give force of law to the Universal Declaration of Human Rights*. Paris: The Unesco, 1977. Available at: <<http://unesdoc.unesco.org/images/0007/000748/074816eo.pdf#nameddest=48063>> Access on August 07, 2021. *Apud* MINISTÉRIO PÚBLICO FEDERAL. *Direitos humanos fundamentais : 70 anos da Declaração Universal dos Direitos Humanos e 20 anos do reconhecimento da jurisdição da Corte Interamericana de Direitos Humanos e as mudanças na aplicação do direito no Brasil*. Brasília: MPF, 2019. Also available at: <[http://www.mpf.mp.br/pgf/documentos/coletanea\\_direitos\\_humanos\\_fundamentais.pdf](http://www.mpf.mp.br/pgf/documentos/coletanea_direitos_humanos_fundamentais.pdf)> Accessed on August 07, 2021.
- <sup>5</sup> MINISTRY OF MINES AND ENERGY. *Bases para a Consolidação da Estratégia Brasileira do Hidrogênio*. Available at: <[https://www.epe.gov.br/sites/pt/publicacoes/dadosabertos/publicacoes/PublicacoesArquivos/publicacao569/Hidrogeno%CC%82nio\\_23Fev2021NT%20\(2\).pdf](https://www.epe.gov.br/sites/pt/publicacoes/dadosabertos/publicacoes/PublicacoesArquivos/publicacao569/Hidrogeno%CC%82nio_23Fev2021NT%20(2).pdf)> Accessed on August 07, 2021.
- <sup>6</sup> *Ibid*, p. 7.

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