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# Brazil Energy Journal

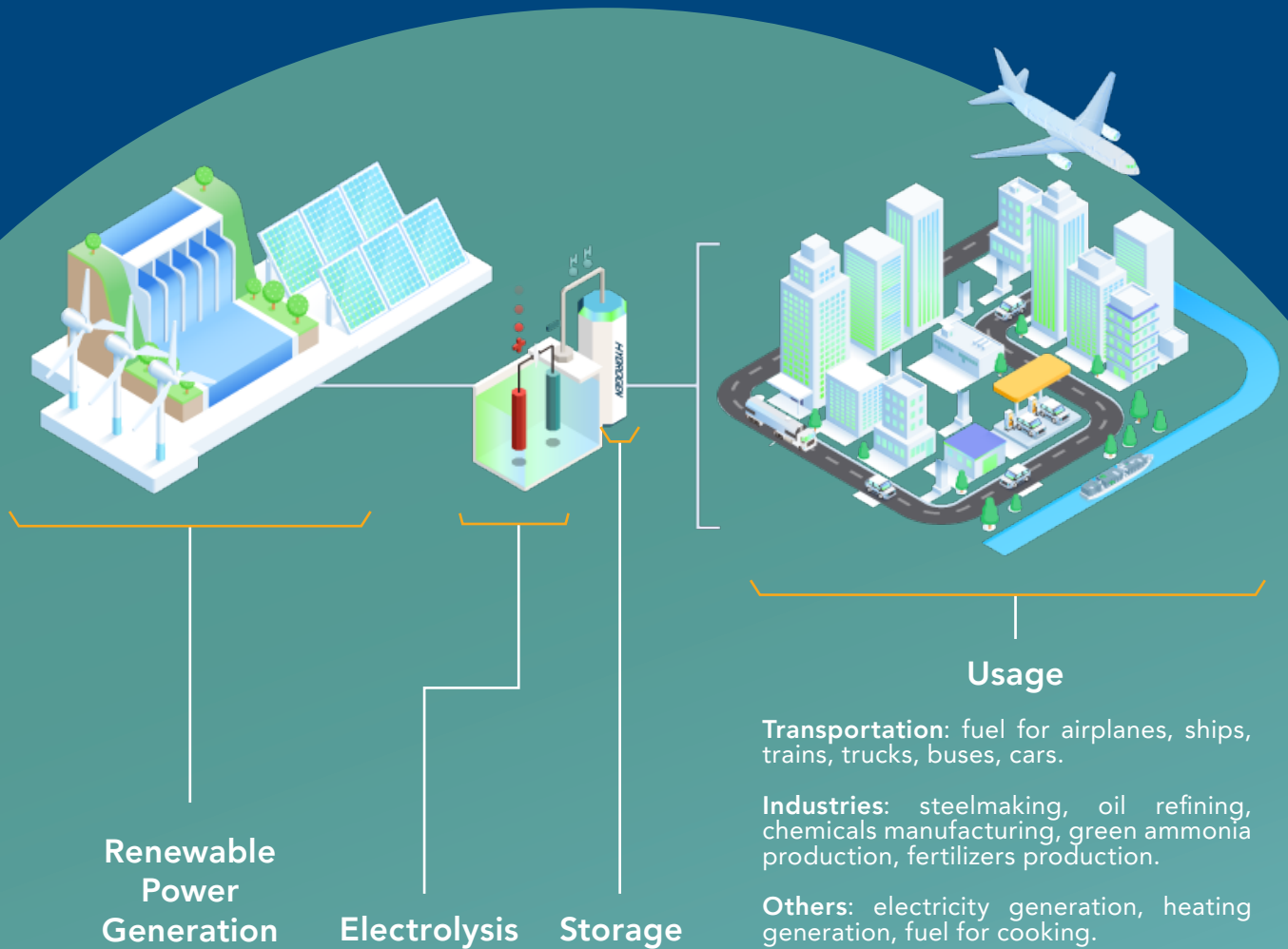
GREEN HYDROGEN

# Overview

Hydrogen can be characterized as a non-metal natural resource capable of carrying energy or to serve as feedstock in a series of industrial procedures. The only distinction between Green Hydrogen and the other colors of hydrogen classification derives from its manufacturing method: Green Hydrogen is produced without carbon emissions through a process of water electrolysis, which is powered by renewable energy sources.

Color	Classification	Description
	Black Hydrogen	Produced by gasification of coal (anthracite), without CCUS.
	Brown Hydrogen	Produced by gasification of coal (coal), without CCUS.
	Gray Hydrogen	Produced by steam reform of natural gas, without CCUS.
	Blue Hydrogen	Produced by steam reform of natural gas (possibly also from other fossil fuels), with CCUS.
	Green Hydrogen	Produced by electrolysis of water with energy from renewable sources (particularly wind and solar energy).
	White Hydrogen	Produced by natural Hydrogen extraction or geological.
	Turquoise Hydrogen	Produced by thermal cracking of methane, without generating CO <sup>2</sup> .
	Moss Hydrogen	Produced by catalytic reforms, gasification of plastics at end-of-life to syngas, anaerobic biodigestion of biomass or biofuels, with or without CCUS.
	Pink Hydrogen	Produced by nuclear power source.

This Brazil Energy Journal will focus specifically on Green Hydrogen. For further information on Blue Hydrogen, access our previous journal [here](#).



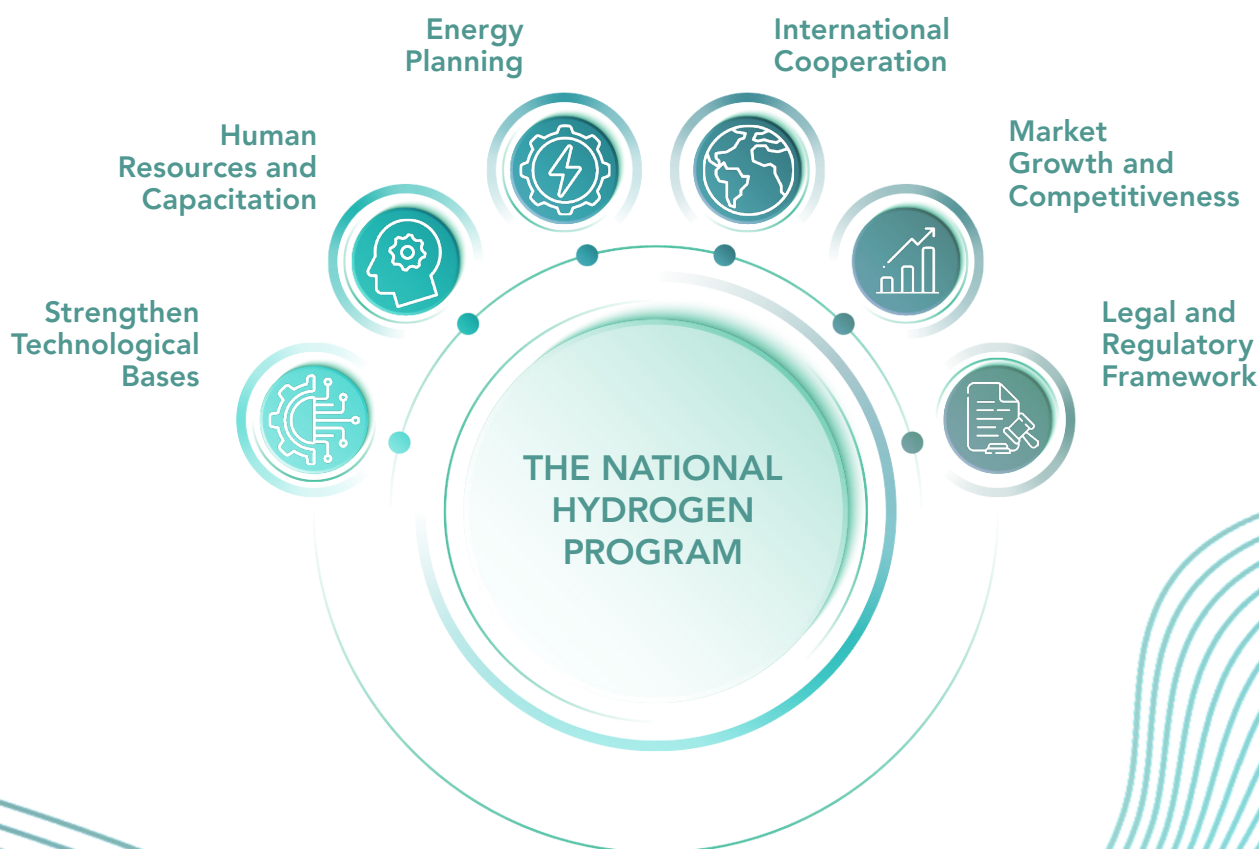
The renewable nature of Green Hydrogen and the fact that it can feasibly replace the use of fossil fuels is leading to a series of investments and projects seeking to achieve the Member States' goals of reducing carbon emissions in light of the Paris Agreement. Green Hydrogen may replace fossil fuels and it also plays a key role in certain industrial processes, including in the fertilizer industry as a component in the production of green ammonia (NH<sub>3</sub>). In the form of green ammonia, Green Hydrogen can be exported and transported for long distances in a cheaper and more efficient manner, facilitating its usage on a global scale.

The abundance of renewable energy sources combined with a strategic location for exports to demanding markets favors Brazil as a potential global hub for Green Hydrogen. The development of offshore power generation in Brazil will also contribute with the implementation of Green Hydrogen projects that will target exports.

# The National Hydrogen Program - PNH2

Following international initiatives, the first step to encourage the development of a local hydrogen industry was the creation of the Brazilian National Hydrogen Program – PNH2. The guidelines for the PNH2 were first stipulated in 2021 by the National Energy Policy Council (CNPE) through its guidelines introduced by Resolution No. 06/2021. Earlier in 2021, the issuance of CNPE Resolution No. 02/2021 allocated research and development resources managed by the regulatory energy agencies (ANEEL and ANP) in hydrogen projects.

The guidelines established in CNPE Resolution No. 06/2021 were reaffirmed this year in CNPE Resolution No. 06/2022, which formally established the PNH2. Brazil's main principles and targets were summarized in that instrument, as follows:





## 7 PNH2 PRINCIPLES

I. Promotion of the national potential of energy resources

II. Recognition of the diversity of energy sources and technological alternatives

III. Decarbonization

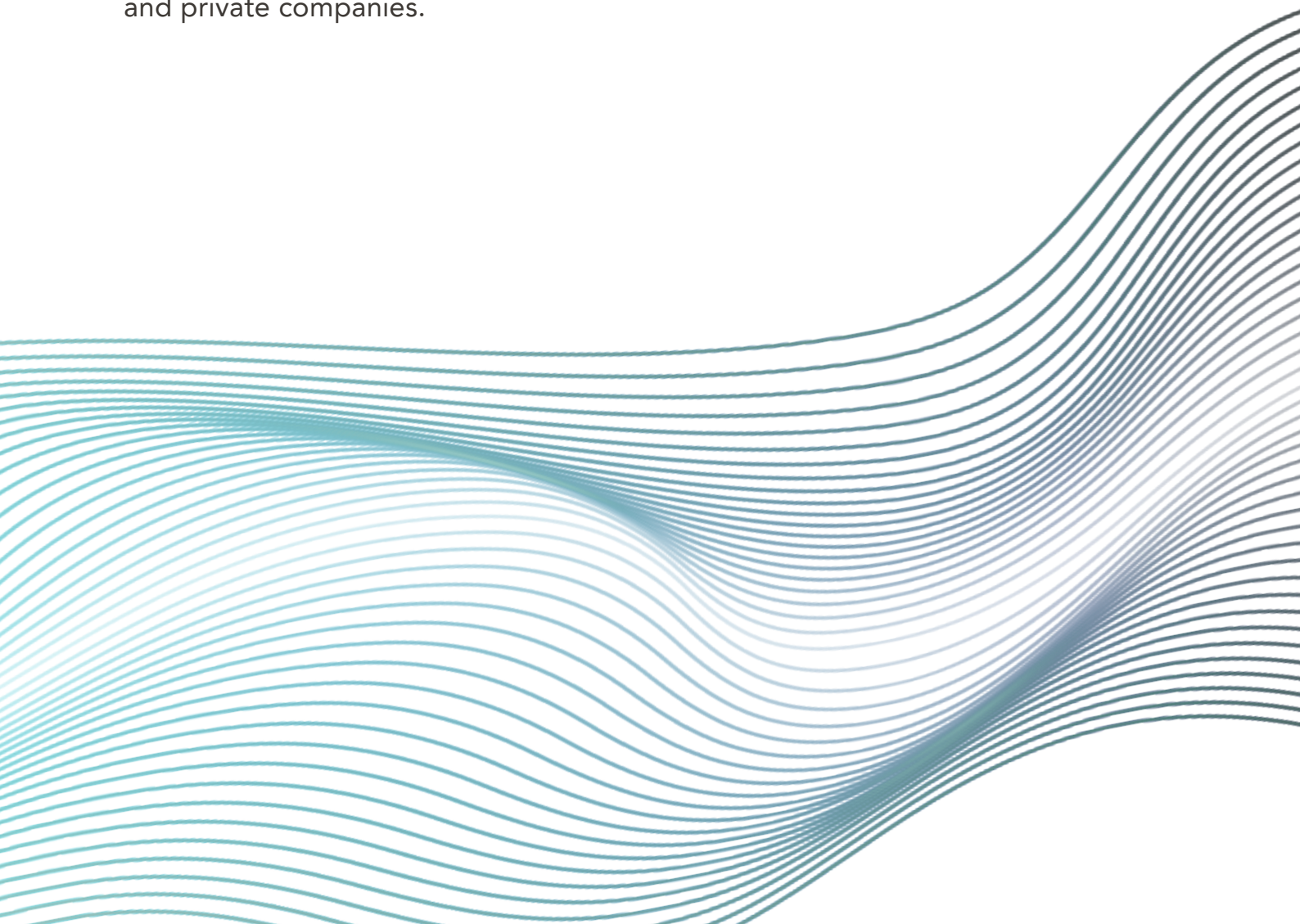
IV. Promotion and incentive to the national technological development

V. Development of a competitive market

VI. Search for synergies and partnerships with other countries

VII. Recognition of the national industry's contribution

The main innovation of CNPE Resolution No. 06/2022 was the creation of the Management Committee of PNH2 – Coges-PNH2, which is responsible for the coordination and implementation of the program with the support of thematic groups in connection with the guidelines and principles of PNH2, including specialists and representatives from governmental bodies, associations and public and private companies.



Below are the authorities which make up Coges–PNH2 and the respective thematic chambers:

<b>MINISTRY OF MINES AND ENERGY (COORDINATION)</b>
MINISTRY OF ECONOMY
CIVIL HOUSE OF THE PRESIDENCY
MINISTRY OF THE ENVIRONMENT
MINISTRY OF FOREIGN AFFAIRS
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATIONS
MINISTRY OF REGIONAL DEVELOPMENT
MINISTRY OF EDUCATION
MINISTRY OF AGRICULTURE, LIVESTOCK AND FOOD SUPPLY
SPECIAL SECRETARY OF STRATEGIC AFFAIRS
ENERGY RESEARCH COMPANY (EPE)
NATIONAL ELECTRIC POWER AGENCY (ANEEL)
NATIONAL AGENCY OF PETROLEUM, NATURAL GAS AND BIOFUELS (ANP)

The following **5 Thematic Committees review** specific issues within their competence, develop studies, analyses and technical reports to support Coges-PNH2:

- I – Scientific-Technological Strengthening;
- II – Human Resources Training;
- III – Energy Planning;
- IV - Legal and Regulatory Framework; and
- V – Market Opening, Growth and Competitiveness.

### **Public Consultation No. 147/2022**

The groups have prepared a 3-year plan to be approved in December’s ordinary meeting of Coges–PNH2, which has been published under **Public Consultation No. 147/2022** promoted by the Ministry of Mines and Energy ("MME").

Under a legal and regulatory perspective, the main goal is to avoid regulatory barriers that could hinder investments in Green Hydrogen, considering, among others, the following aspects: (i) alignment of national and international standards; (ii) interrelationships between different economic sectors; (iii) harmonization and cooperation between governmental agencies; and (iv) standards related to safety and use of new technologies.

# Regulated Aspects

Certain activities in the Green Hydrogen supply chain are already subject to existing regulations. The use of water resources is regulated by the National Water and Basic Sanitation Agency (ANA), as well as by the state agencies pursuant to federal, state and local laws. Electricity generation, on the other hand, is regulated by the National Electric Energy Agency (ANEEL) pursuant to federal laws. Although market players have been structuring Green Hydrogen projects in Brazil, the lack of specific regulations on hydrogen increase the regulatory risk assessment by investors. Thus, we expect more regulations to be issued in order to fill all the regulatory gaps in the hydrogen chain, as well as to create tax and other incentives, boosting the development of this market in Brazil.

## Proposed Bill of Law

There are 2 Bills of Law in progress that intend to regulate hydrogen in the Brazilian energy matrix: (i) Bill of Law No. 725/2022, known as the "Hydrogen Bill", proposed by Senator Jean Paul Prates; and (ii) Bill of Law No. 1,878/2022, known as the "Green Hydrogen Bill", proposed by the Senate Environment Committee.

Both Bills of Law mirror the regulatory framework proposed in Europe to the extent that they allocate the regulatory competence on hydrogen to the regulatory gasbodies based on these industries' similarities.

### (i) Bill of Law No. 725/2022

Bill of Law No. 725/2022 has the purpose of establishing mechanisms for the insertion of hydrogen in the national energy sector. It also sets parameters to encourage the use of sustainable hydrogen, which is defined as the hydrogen produced solely from solar, wind, biomass, biogas or hydraulic sources.

Bill of Law No. 725/2022 amends Law No. 9,478/1997, known as the Petroleum Law, and provides that the National Agency for Petroleum, Natural Gas and Biofuels – ANP would be competent to regulate, authorize and supervise all activities in the hydrogen chain.

Finally, Bill of Law No. 725/2022 establishes a mandatory blending of hydrogen in natural gas transportation pipelines at the following minimum percentages by volume and in the following progression: (i) 5%, as of January 1, 2032; and (ii) 10%, as of January 1, 2050. These volume percentages shall contain a mandatory proportion of sustainable hydrogen of at least 60% in 2032 and 80% in 2050.

## (ii) Bill of Law No. 1,878/2022

Bill of Law No. 1,878/2022 provides guidelines for the production and use of Green Hydrogen for energy purposes with the objective of promoting the development of this energy vector. Bill of Law No. 1,878/2022 limits its scope of application solely to Green Hydrogen.

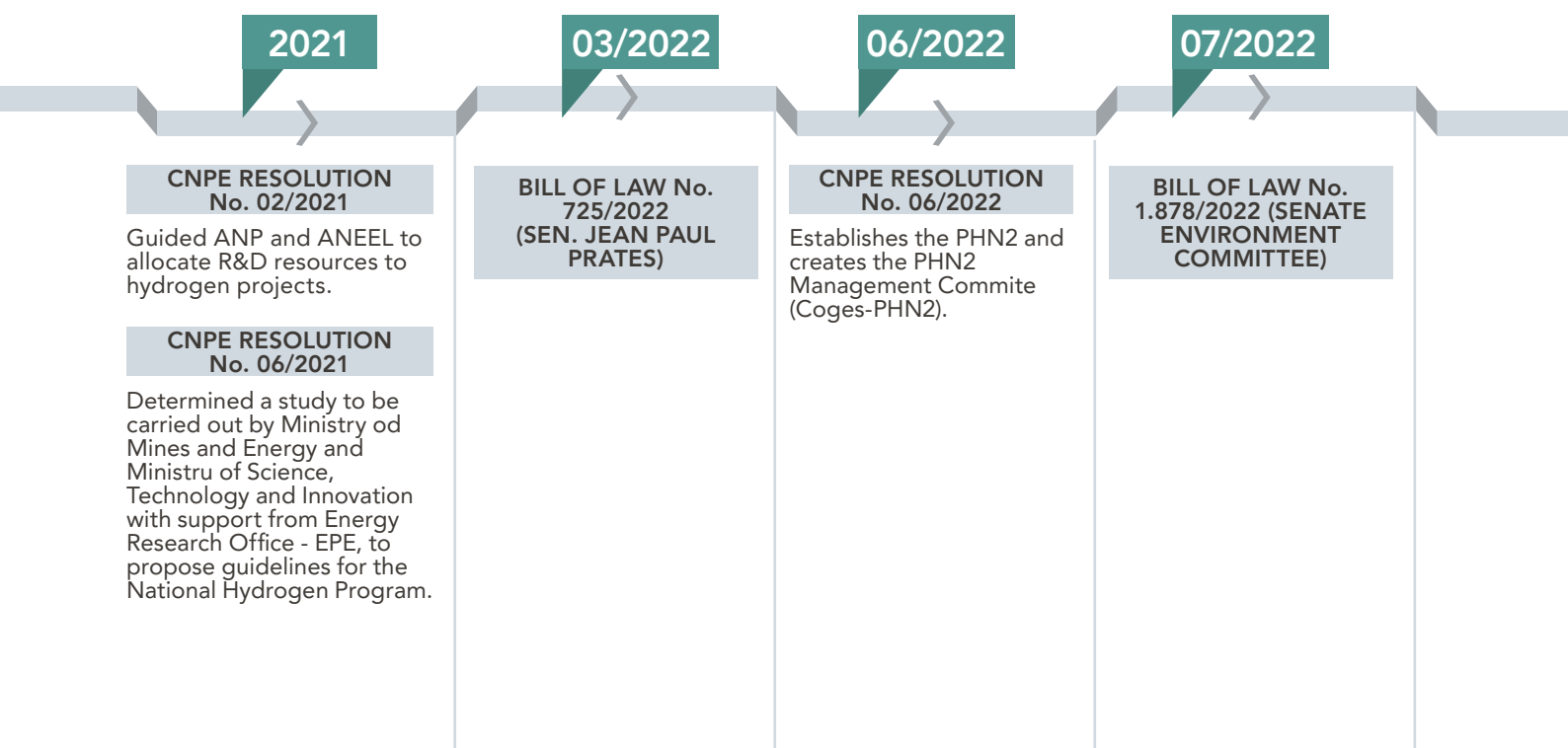
Similarly to Bill of Law No. 725/2022, Bill of Law No. 1,878/2022 also amends provisions of the Petroleum Law to include hydrogen under the jurisdiction of ANP. Thus, ANP would regulate, authorize and supervise the activity of the Green Hydrogen chain and have its name altered to "National Agency of Petroleum, Natural Gas, Biofuels and Green Hydrogen".

Pursuant to Bill of Law No. 1,878/2022, ANP would be responsible to issue a license for Green Hydrogen production following certain legal, financial and technical requirements.

The Bill of Law also provides for the issuance of a Prior Interference Declaration – DIP from the Brazilian Institute of the Environment – IBAMA as part of the environmental licensing proceeding. The Bill of Law also brings provisions related to the use of water regulated by ANA to ensure the rational use of water resources, the safety of people and facilities, and the protection of the environment.

The Bill of Law provides that the government will provide credit lines for research and development of the Green Hydrogen industry.

Finally, the Bill of Law creates certain standards for the decommissioning of Green Hydrogen facilities.





# Next Steps

Brazil is emerging as one of the main countries with the potential to supply the global Green Hydrogen economy. Besides fulfilling several criteria to become a key exporter, the country also has a relevant market to be supplied internally. In addition to the creation of a legal and regulatory framework for the hydrogen industry, other ongoing important steps to achieve such goals are:

## Certification Standards

Brazil is actively contributing with the international community in creating the certification standards for Green Hydrogen. The Brazilian Chamber of Electric Energy Commercialization (CCEE) is already working towards the establishment of certification procedures in Brazil in accordance with international standards.

## Financing

The Brazilian Development Bank (BNDES) announced BRL300 million credit lines to finance Green Hydrogen. The initial target is to support pilot projects powered with renewable energy sources to encourage the production and storage of the zero-carbon fuel in the country. On June, 2022, BNDES published its **Accreditation Policy for Stationary Energy Storage Systems, Batteries and Electrolysers**, which defines the equipment in hydrogen facilities that may be financed by BNDES.

Green Hydrogen projects could also be qualified to issue infrastructure debentures, which has been an effective mechanism to privately finance infrastructure projects in Brazil.

## Export Infrastructure

There are few possible hubs in the Brazilian coast to support Green Hydrogen export activities and even the existing ones demand further investments. Public and private entities have already been discussing port infrastructure investments in the states of Ceará, Rio Grande do Norte and Rio de Janeiro.

## Tax Incentives

In order to promote investments, Green Hydrogen could benefit from federal and state tax incentives, such as the one under the Regime of Fiscal Incentive for Infrastructure Investments – REIDI.

Some states have created ICMS exemptions for power purchase transactions destined for the production of Green Hydrogen.

## PNH2 3-year plan

The PNH2 is addressing other relevant challenges, such as technological and human resources constraints and the strategy to boost the internal demand for Green Hydrogen. As mentioned above, the PNH2 3-year plan is currently subject to contributions from interested parties in the context of the MME's public consultation.

## Contact Us

We will continue to monitor all initiatives related to the development of the Green Hydrogen industry and keep you informed.



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