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Fundación e Instituto Torcuato Di Tella – International PtX Hub

# Fiscal Federalism and Environmental Governance - Implications for the Development of Green Hydrogen in Argentina

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# 1 Executive Summary

Argentina stands at a pivotal point in its energy transition, with the development of green Hydrogen (GH<sub>2</sub>) and Power-to-X (PtX) technologies offering a sustainable path to foster economic growth and sustainable development, while contributing to an ambitious global response to climate change as is necessary. The country's rich endowment of natural resources, which are heterogeneously distributed across its vast territory, provides a strong foundation for the creation of a robust GH<sub>2</sub> and PtX economy, but beyond this worthy availability of resources, political will, key sound policies, adequate and consistent regulatory frameworks as well as the accord on high-level decisions need to be reached and adopted to make this happen.

This policy brief explores the implications of fiscal federalism and environmental governance as related to the context of Argentina's federal governance structure, and then outlines strategic recommendations to address existing challenges, emphasizing the need for an integrated and consistent approach that leverages inter-provincial synergies, streamlines and overhauls environmental regulations as forcefully as needed, and addresses the complexities of the existing fiscal framework to ensure equitable development across provinces, and the most effective arrangements to deploy a framework to enable the robust development of a strategic value chain of green hydrogen and its multiple products.

Argentina's role as a significant consumer and potential major producer in the Latin American H<sub>2</sub> and PtX market is highlighted here, with a focus on pivoting from traditional fossil-based hydrogen production to the renewable energy sources.

In doing that, this document acknowledges persistent economic fluctuations and recurrent macroeconomic crises as daunting challenges, alongside the need to enact State policies and long-term planning for improved public and private investment in infrastructure to support this critical and demanding transition.

To maximize the potential of GH<sub>2</sub> and PtX, this brief recommends fostering inter-provincial collaboration and seek policy consistency, investing in critical energy infrastructure, streamlining what are frequently overlapping environmental regulations, strengthening fiscal federalism mechanisms, to make them more effective and coherent, tailoring policies to regional development trends, and establishing strategic GH<sub>2</sub> and PtX hubs.



This array of actions is aimed not only at enhancing and modernizing Argentina's overall energy matrix, but also driving forward job creation and fostering regional economic development, reducing simultaneously local air pollution and improving national health conditions, as well as focusing on achieving appropriate inclusion in global value chains.

The transformative potential of GH2 and PtX presents Argentina with an opportunity to contribute to global decarbonization efforts and climate action at the global and regional scale, while promoting sustainable and inclusive economic growth -within its own borders- in line with anticipated long-term carbon neutral growth.

Strategic planning and the alignment of policies, regulations, and investments, at the national and sub-national levels, are essential for realizing the huge potential attainable and grasping the opportunity for positioning Argentina as a leader in the GH2 and PtX global industry on the basis of its own strengths and endowments.



## 2 Introduction

Argentina, characterized by profound contrasts and a vast productive potential, is endowed with an abundance of high-quality natural resources that span across its extensive territory. This variety presents both strengths and potential synergies that can be harnessed through the active collaboration of its provinces, by leveraging local value chains, and fostering joint developments in infrastructure and resource utilization. The pursuit of a GH2 economy stands then as a promising avenue to channel a portion of these resources into a sustainable and decarbonized future, provided that the specificity of each of this repository of resources and the unique economic landscape of each province are carefully considered.

The country's role in the global H2 market clearly needs not be insignificant; Argentina is one of the top six H2 consumers in Latin America, and its current fossil based H2, mostly for industrial applications, such as oil refining and ammonia production, lays the groundwork for the inception of a significant lever towards renewable hydrogen. This pivotal transition could position Argentina as a key player in contributing to the global decarbonization efforts.

Despite this potential, Argentina nevertheless faces daunting challenges related to the complexity of its federal system, including persistent economic fluctuations and a history of macroeconomic crises that have hindered growth, curtailed momentum towards development, and at times hampered productivity, as well as inducing discretionary and uneven resource allocation, through typically arbitrary transfers to provinces. The recurrent macroeconomic crises and the renewed inconsistent economic policies frequently adopted have led to a persistent decline in real capital stock, unsustainable or largely decayed development infrastructure, and increasing inequality. Investing in modern public infrastructure, particularly within the energy sector, emerges as a critical priority to make feasible the transition towards a low emissions economy.

In response to these challenges, Argentina has referred to a stance that includes a commitment to promoting renewable energy, backed by policy and regulatory mechanisms, which have increased renewable energy capacity and shifted the energy matrix towards a cleaner profile.

However, current macroeconomic conditions, compounded by insufficient or inadequate energy infrastructure, present bottlenecks that hinder the full utilization



of the country's energy resources, both renewable and fossil. These conditions call for a reevaluation of the streams of public investment and the present tax systems and the fostering of a stable environment that can attract necessary private investments to support the development and export of GH2 and PtX products to be complemented by public investment in critical areas.

The transformative potential of H2 in Argentina is substantial, but realizing this potential requires an integrated approach that is able to address legal and regulatory frameworks, fiscal federalism gaps, and enhancing regional development trends within the context of the nation's federalist architecture.





### 3 Context and Challenges

Argentina's energy sector, characterized by a widespread, but unevenly distributed array of natural resources, is a good reflection of the country's broader federal structure. The diversity of these resources, including substantial renewable energy potential across its provinces, creates a fertile ground for the development of a robust GH2 economy.

However, the same federalist principles that grant provinces significant autonomy, also contribute to a decentralized energy landscape, where horizontal and vertical coordination and integration of policies across various levels of government, present significant challenges.

The Argentine vast territory is characterized by an abundance of high-quality natural resources among provinces; those resources are heterogeneously distributed across its landscape. Such distribution highlights the strengths and potential synergies that could be realized by making adequate use of local value chains and joint developments across provinces. However, the path to harnessing this potential is somewhat encumbered by Argentina's federal system, which results in a complex interplay between provincial autonomy and the need for a well-coordinated national energy strategy.

Current macroeconomic conditions, coupled with insufficient energy infrastructure, impede the full utilization of Argentina's rich energy resources. The existing infrastructure is a bottleneck to the expansion of both renewable and non-renewable power generation, limiting the country's ability to scale up H2 production to meet both domestic demand and eventual export potential.

The following table summarizes the distribution of resources (biomass balance and biogas potential) as well as biofuels production, renewable power generation (wind, solar and hydro), hydrocarbon production and existing seaport infrastructure among Argentine provinces in 2022.


**Table 1: Distribution of resources and productions among Argentine provinces, 2022**

|               | Biomass balance | Biogas potential | Biodiesel prod. | Ethanol prod. | Wind power gen. | Solar power gen. | Hydro power gen. | Natural gas prod. | Oil prod. | Seacost Ports |
|---------------|-----------------|------------------|-----------------|---------------|-----------------|------------------|------------------|-------------------|-----------|---------------|
| Buenos Aires  | 1%              | 37%              | 13%             | 0%            | 37%             | 0%               | 0%               | 0%                | 0%        | 45%           |
| CABA          | 0%              | 10%              | 0%              | 0%            | 0%              | 0%               | 0%               | 0%                | 0%        | 0%            |
| Catamarca     | 1%              | 1%               | 0%              | 0%            | 0%              | 5%               | 0%               | 0%                | 0%        | 0%            |
| Chaco         | 11%             | 2%               | 0%              | 0%            | 0%              | 0%               | 0%               | 0%                | 0%        | 0%            |
| Chubut        | 1%              | 2%               | 0%              | 0%            | 38%             | 0%               | 8%               | 6%                | 24%       | 9%            |
| Córdoba       | 1%              | 7%               | 0%              | 46%           | 4%              | 0%               | 3%               | 0%                | 0%        | 0%            |
| Corrientes    | 9%              | 3%               | 0%              | 0%            | 0%              | 0%               | 45%              | 0%                | 0%        | 0%            |
| Entre Ríos    | 5%              | 4%               | 2%              | 0%            | 0%              | 0%               | 12%              | 0%                | 0%        | 0%            |
| Formosa       | 11%             | 1%               | 0%              | 0%            | 0%              | 0%               | 0%               | 0%                | 0%        | 0%            |
| Jujuy         | 1%              | 2%               | 0%              | 8%            | 0%              | 28%              | 0%               | 0%                | 0%        | 0%            |
| La Pampa      | 2%              | 1%               | 3%              | 0%            | 1%              | 0%               | 0%               | 1%                | 3%        | 0%            |
| La Rioja      | 1%              | 1%               | 0%              | 0%            | 3%              | 5%               | 0%               | 0%                | 0%        | 0%            |
| Mendoza       | 4%              | 5%               | 0%              | 0%            | 0%              | 1%               | 4%               | 1%                | 9%        | 0%            |
| Misiones      | 16%             | 2%               | 0%              | 0%            | 0%              | 0%               | 0%               | 0%                | 0%        | 5%            |
| Neuquén       | 1%              | 2%               | 0%              | 0%            | 3%              | 0%               | 24%              | 63%               | 46%       | 0%            |
| Río Negro     | 2%              | 2%               | 0%              | 0%            | 3%              | 0%               | 0%               | 3%                | 4%        | 9%            |
| Salta         | 12%             | 3%               | 0%              | 9%            | 0%              | 28%              | 1%               | 3%                | 1%        | 0%            |
| San Juan      | 1%              | 1%               | 0%              | 0%            | 0%              | 28%              | 1%               | 0%                | 0%        | 0%            |
| San Luis      | 2%              | 1%               | 2%              | 10%           | 0%              | 5%               | 0%               | 0%                | 0%        | 0%            |
| Santa Cruz    | 0%              | 1%               | 0%              | 0%            | 11%             | 0%               | 0%               | 7%                | 12%       | 23%           |
| Santa Fe      | 2%              | 7%               | 80%             | 5%            | 0%              | 0%               | 0%               | 0%                | 0%        | 0%            |
| S. del Estero | 10%             | 2%               | 0%              | 0%            | 0%              | 0%               | 0%               | 0%                | 0%        | 0%            |
| T. del Fuego  | 1%              | 0%               | 0%              | 0%            | 0%              | 0%               | 0%               | 6%                | 1%        | 9%            |
| Tucumán       | 4%              | 4%               | 0%              | 22%           | 0%              | 0%               | 0%               | 0%                | 0%        | 0%            |

Source: Own elaboration based on data from FAO, 2020; Secretariat of Energy, 2023 and CAMMESA, 2023



This diversity of resources across the entire territory translates inevitably into different sub regional strategies and diverse potential roles in the different value chains among provinces and, therefore, cooperation between provinces is to be crucial and should be adequately fostered.

As Argentina endeavors to position itself as a potential global producer of GH2, leveraging its abundant renewable energy resources to produce cheap electricity and transform it into renewable H2, becomes a strategic imperative.

The country's commitment to decarbonization, and to a neutral carbon economy by 2050, though crucial, faces hurdles in the form of current macroeconomic short-term conditions and an infrastructure that is insufficient to support the wide use of its energy resources, both fossil and renewable.

Compounded by a history of sizable economic fluctuations and, as mentioned, recurrent macroeconomic crises, Argentina's growth capacity, development momentum, and productivity progress have suffered. The fluctuating public policies, characterized by a bias towards unilateral open economy orientations that is enacted without adequate checks and balances, alternated with subsequent phases of stringent limitations to private investment and then back, have led to intensive and destructive deindustrialization processes, high unemployment, job destruction, significant inefficiencies, and considerable increases in poverty trends across decades.

This pattern of underperformance is exacerbated by public investment systems struggling with volatile macroeconomic conditions and complex federal fiscal arrangements, which have resulted in highly inefficient resource allocation processes across the entire geography.

Presently, given very high external indebtedness and of a short-term tenor, huge, and apparently intractable fiscal deficit, hence scarce or nil fiscal space, and extremely high and still increasing inflation rates, even bordering hyperinflation, a new policy orientation, most recently adopted, after the last general election in October 2023, aims to provide virtually no public funding for any plan aimed at expanding existing or creating new infrastructure, neither to finance the necessary infrastructural investments (in the overall economy) nor most significantly to fund any climate action, even if it may be critical, at least for the time being.



Thus, under this overall financial restriction, only those projects or programs that may be privately funded will be apparently undertaken. This creates a deliberate rigid constraint on any plans relying solely on public investments and interventions, and thus defines critically the level of ambition for these strategic plans when there is no political will to undertake the development of a value chain, particularly a global one, because it requires a high level of resources, huge investments and a certain involvement from a public policy perspective that still needs to be subordinated to addressing very short-term imbalances.

Notwithstanding that, it is worth mentioning that, at the global scale, the development of GH2 production projects is, overall very much based on the participation of private enterprise. The global adoption of GH2 faces immense financing needs, with an estimated requirement of \$700 billion by 2030 (UNIDO, 2023).

It is clear that governments are essential for providing initial financial assistance and, especially, establishing the specific regulatory framework; however private sector finance is to be indispensable in scaling up the sectoral investments.

Despite the availability of various financing instruments with a proven track record in renewable energy technology, innovative financing mechanisms are necessary to overcome some of the uncertainties surrounding GH2 demand.

It is estimated that by 2030, approximately \$240 billions is pledged for 534 hydrogen projects worldwide, resulting in an investment gap of approximately \$460 billion (Hydrogen Council, 2022). With only \$70 billions of public funding committed to date, private finance is expected to play a critical role in bridging that gap, and enabling the critical GH2 transition.<sup>1</sup>

Without deep diving into the analysis of financial opportunities in a complex financial landscape such as the present one, it is possible to mention at least those provided by the global bonds market, with a market value of \$100 trillion (twice the size of the \$50 trillion equity market), that presents significant potential for GH2 financing. Green bonds, designed specifically for environmentally sustainable projects like GH2 production, have kept increasing in volume and gained

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<sup>1</sup> Hydrogen Council (2022). Hydrogen Insights 2022 - An updated perspective on hydrogen market development and actions required to unlock hydrogen at scale.



prominence even in some of the last difficult years. Their issuance is forecasted to reach about \$5 trillion by 2025, making them an attractive option for H2 investments<sup>2</sup>. Joint ventures are also an appealing alternative to be considered, if the fundamentals are sound and the opportunities are there.

Hence, the current state of affairs underscores the urgent need for strategic, long-term planning for infrastructure development, including that which would support the H2 economy. Such planning must be cognizant of the strong shifts in policy agendas that have historically created significant challenges for infrastructure investment and planning, particularly with contentious views between political parties on the eventual role of the private sector in that development.

Previous Argentine government's initiatives, such as the construction of new pipelines to increase the transportation capacity of natural gas or exemplary mechanisms to catalyze renewable energy capacity (for example, through the RenovAR and MaTER programmes<sup>3</sup>) testify the country's ability to successfully perform under the appropriate conditions in those cases where alternating governments consistently focus on the development of infrastructure projects that are crucial to the energy transition.

However, the success of these projects and the overall development of a H2 economy are contingent upon a harmonized policy and regulatory framework that aligns with the environmental and economic objectives of both the federal and provincial governments.

Furthermore, the federal fiscal architecture of Argentina, marked by significant decentralization and a high degree of vertical fiscal imbalance, tends to affect public policies and resource allocation. The dynamics of fiscal federalism have led to a complex and often contentious relationship between the national and provincial

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<sup>2</sup> Mathews, J. (2022). A Solar-Hydrogen Economy: Driving the Green Hydrogen Industrial Revolution.

<sup>3</sup> As part of the Renewable Energy Supply Program (RenovAr) and the Renewable Energy Term Market (MaTER), the awarded companies signed 20-year purchase power agreements (PPA) with a committed and defined price in USD/MWh with the Compañía Administradora del Mercado Mayorista Eléctrico S.A. (CAMMESA) and an adhesion agreement to the "Fondo para el Desarrollo de Energías Renovables" (FODER) trust, a structure that provides payment guarantees to the generation plants.



governments, influencing the paths of the development of the energy sector and the distribution of investment.

Strategic long-term planning is a crucial component for the future of infrastructure development in Argentina. This is particularly pertinent for the H2 economy, which requires substantial investment, an appropriate structure of incentives, and a stable policy environment to attract private sector participation at scale.

The government's role in mitigating risks and providing a clear regulatory framework is essential to realize the full potential of H2 as a major decarbonization driver in the future global economy.

Despite these challenges, Argentina's renewable energy potential, particularly in wind and solar power, offers a pathway to develop a competitive GH2 industry and at the same time open an opportunity to create a robust and sustainable stream of foreign resources that are much needed.

The country must capitalize on international cooperation, leveraging support for infrastructure and industrial development, to bolster its position as a H2 producer on the global stage also by enhancing bilateral partnerships with suitable and sound partners.



## 4 The challenges resulting from fiscal federalism and environmental governance

In addition to considering in detail the specificities of energy resources and sustainable carbon sources, when examining the context, the strategy and the means to promote the development of GH2 production and its derivatives in Argentina, as well as when exploring the associated transformational impacts due to its future unfolding, we think it is convenient to look at three relevant issues that should be factored into the analysis of the opportunities, possibilities, and potential constraints for the development of GH2 and the momentum for deploying related value chains in its future expansion.

These issues are:

1. Legal and regulatory framework established on environmental issues in Argentina;
2. Fiscal federalism architecture and its influence on public policies and resource allocation, as well as the cooperation and the dynamics tensions associated with the existing structure of incentives, resource allocation, and natural resources use;
3. Regional development trends in a context of differential growth, resource endowment and market size and infrastructure coverage in each of the diverse jurisdiction.

These three dimensions are inherently complex and can only be referred to in a succinct review such as this one; however, we provide an initial approach to the relevant features related to the major pertinent matters.

### 4.1 Legal and regulatory framework on environment issues pertaining to developing new productive initiatives

Argentina has a long-standing tradition of environmental regulations established to protect its natural capital, a framework which has evolved steadily during almost a century and a half. However, given the federal organization of the country, the evolution of that constitutional and regulatory framework dealing with environmental matters, has also been made progressively more complex, both in



terms of the legal and the institutional architecture put in place regarding environmental as well as social protection schemes.

Relevant precedents in this realm include an array of national laws, Supreme Court rulings, regulations enacted by provinces and municipalities, as well as provisions in the national Criminal and Civil code, as part of a continuously growing Federal Legislation.

Moreover, the provinces enacted their own regulations for the protection of the environment and of their natural resources, in some cases even before the central government had started passing a comprehensive set of environmental regulations; most provinces having incorporated the principle of environmental protection in their own constitutions, while they further put in place general laws related to the quality of, inter alia, air, water, and soil.

Therefore, Argentina environmental regulation is quite challenging, even, in cases, rather somewhat cumbersome: there are federal, provincial and municipal laws and regulations in force, which sometimes overlap one another, and, in some instances, there is a degree of uncertainty when it is necessary to determine which regulation is applicable to a particular case, or whether it is pertinent under certain particular circumstances.

Further, the Constitutional Reform of 1994 introduces the concept of the environment into the fundamental law of Argentina. To that end, article 41 addresses the issue in a new chapter in the dogmatic part entitled "New rights and guarantees."

Thus, at the Constitutional level, the amendment to the constitution introduced in August 1994, specifically incorporated the following text:

- a. the right of all inhabitants to enjoy a healthy, balanced and suitable environment for human development;
- b. a provision on the duty to preserve such environment; and,
- c. the concept of sustainable development, stating that productive activities must satisfy current needs, without hindering the needs of future generations.

The National Constitution moreover introduces the duty to immediately restore any damage caused to the environment, to its prior condition, including the obligation to clean and remediate sites that have been contaminated.





Pursuant to the 1994 amendment, the provinces have the original and exclusive jurisdiction to regulate the environment and their natural resources. Notwithstanding that, Article 41 of the National Constitution vests the Federal Government with the power to enact setting forth minimum environmental standards.

The amendment to the Constitution meant a vast expansion in the sphere of fundamental freedoms that are explicitly protected by law, while at the same time, as a necessary consequence, requires strongly enhancing the capacity of the State to carry out all those actions necessary to that end in order to ensuring citizens the effective enjoyment of these additional fundamental freedoms.

More than eight years after the reform of the constitution was adopted, the Congress sanctioned the General Environmental Law, by virtue of the mandate established in the third paragraph of article 41 of the National Constitution.

In addition, as regards to the environmental impact assessment legislation and related procedures and regulations, from the perspective of a project assessment and productive value chain activities achievements, the relevant federal legislation connected to environmental assessment consists of the following significant corpus and its hierarchy:

The National Constitution and international human rights treaties of constitutional rank

- International treaties without constitutional rank;
- Laws enacted by Congress;
- Executive power decrees;
- Resolutions issued by members of the executive branch, such as ministries, secretariats, and other governmental agencies;
- Other rules, such as those issued by bodies of lower administrative rank.

Since, as mentioned, the provinces retain absolute domain over the natural resources located in their territories, the regulatory architecture is in this realm also rather complex, both from the legal and institutional perspective.

In order to solve jurisdictional conflicts and provide a uniform minimum level on environmental matters throughout the country, the Argentine National Constitution vests the federal government with the power to enact rules setting forth “minimum



standards for environmental protection”, as Article 41 has established. Notwithstanding that, the provinces still retain the power to enact supplementary regulation to those established federal rules for definite purposes of harmonization as well as in order to making them applicable at the territorial level, albeit without altering existing jurisdictions.

The primary law issued by the federal government related to project environmental impact assessment is the General Environmental Law (No. 25.675), and the associated Law on Access to Environmental Public Information.

The General Environmental Law created a Federal Environmental System with the aim of coordinating policies between jurisdictions. This same issue has also been addressed in new constitutional policies passed, since 1986, in most provinces, and in the autonomous city of Buenos Aires.

There are additional federal laws related to water and waste management, and several other laws associated with the productive operations in specific economic sectors (inter alia mining, electricity, oil and gas, and forestry), that also include relevant environmental assessment provisions to be complied with as applies.

Many provinces have also issued supplementary laws, decrees, and regulations related to environmental protection and assessment pertaining to their respective territories.

In addition, various items of federal and provincial legislation exist, related to some key technical aspects of environmental protection and assessment, such as those primarily related to natural habitats, pest management, and dam safety; forests and physical cultural resources; as well as the ones related to the treatment of issues associated with expropriation, involuntary resettlement, and also with the well-being of indigenous peoples.

A key aspect of the processes of environmental assessment in vigour relates to the governmental institutions (more specifically agencies), that are effectively responsible for the implementation of the applicable legislation. At the federal or national level, the Ministry of Environment and Sustainable Development until recently was in charge of environmental policy and interjurisdictional (including



provincial, but also international) matters.<sup>4</sup> This institutional architecture is in the process of being reformed, but that process is being delayed by internecine discussions on the on the model to be adopted.

In addition, there are several federal agencies that play an important sectoral role - also pertaining to environmental assessment and protection-; a similar architecture is in a way replicated at the provincial level, and to avoid or solve potential overlapping of jurisdictions and contentious views on use of resources and economic rights, the federal and provincial governments sought building overall consensus on these matters through a Federal Environmental Agreement, that provides for a Federal Council of the Environment, in practice a national coordination and consensus board (COFEMA).

The existing regulation not only identifies this council as the basic arena for federal policy coordination, but also instructs the National Executive Power to propose to the COFEMA Assembly that it would issue recommendations or resolutions, according to the case under review, "for the adequate operation and application of the law of minimum assumptions, complementary provincial laws and their regulation in different jurisdictions."<sup>5</sup>

In addition, when referring to the existing regulatory framework, in particular those related to environmental assessment processes, it is worth mentioning that there is a set of environmental risks that should be contemplated when considering the production processes of GH<sub>2</sub>, which is not exempt either from the origination of a number of environmental impacts that require observation, and monitoring, as well as the inception of a series of normative arrangements to prevent and minimize those risks.

A priori, when considering the potential for the development of green hydrogen, preventive measures should encompass, inter alia, the following environmental risks, at the local level:

- Water consumption and discharges

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<sup>4</sup> At least until December 2023. A state reform process is presently under way at legislative level and its outcome is to be integrated into this regulatory landscape and its implications as regards GH<sub>2</sub> production and derivatives elucidated.

<sup>5</sup> The future environmental interprovincial coordination is part of the elements to be decided upon in this transformational process, while it is clear there are a number of relevant issues that requires a domain for seeking agreement and decision making.



- Waste Generation
- Production of noise and vibrations
- Disruptions to the fauna and flora

Those risks should be identified, assessed, and managed, as applicable.

Moreover, there are global atmospheric impacts with the use of H<sub>2</sub> as a fuel, that need to be further explored, including possible uncontrolled emissions that might worsen global warming, and the potential for the depletion of atmospheric, ozone through the increase of moisture of the atmosphere, as well as the contribution to climate change through the increase of growth rates of methane and tropospheric ozone, when used as part of systems that are using this gas for heating.

The environmental risks associated with the production of GH<sub>2</sub> mentioned and the procedural approaches to assess them are to be considered in the context of a larger set of overall risks associated to the development of that production and its derivatives to be examined, that a priori encompass, at least:

- Risks to health and safety
- Financial risks
- Normative and institutional risks
- Capital risks, and
- Environmental risks (as already mentioned previously)

## 4.2 Fiscal federalism and its impacts on public policies and resource allocation

Argentina is a federal country. Furthermore, Argentina is the most decentralized country in Latin America, with approximately 50% of total public spending occurring at the subnational level.

At the same time, the country has a high degree of vertical fiscal imbalance. By the end of the twentieth century an average of only about 35% of provincial expenditures were financed by taxes collected directly by the authorities of each province, while the remaining 65% were financed from taxes collected by national (federal) authorities.

The process by which these taxes, once collected nationally, are then allocated between the national government and between the provinces, is generically



referred to as “Coparticipación Federal de Impuestos” (Federal Tax-sharing Agreement), the so called Coparticipación; which main purpose is to distribute part of the income raised by the federal state.

The first such regime dates to 1934 with successive modifications being introduced throughout its history while the current law dates to 1988. The last one, as mentioned, was the Constitutional Reform of 1994. Even if the sanction of a coparticipation law has not been complied with, a set of specific rules and temporary agreements with different distributional criteria governs in its place, provisionally, including the law that determines the rate of primary and secondary distribution, and a specific distribution treatment for taxes such as the Income Tax and the Value Added Tax.

However, throughout the decades, the underlying legal framework of the tax sharing system was repeatedly altered, and it has been the source of numerous conflicts and added a measure of instability to political negotiations on different matters. These periodic modifications led to a situation where the whole system is highly convoluted, has reached a high level of intricacy, and there is a degree of consensus that it may be also a source of highly increased inefficiency.

Initially, the federal development of Argentina, was characterized by an overall baseline with large differences in between the regional units, the provinces, which originally were signatories of the Federal Constitution. Given those ample initial differences between the provincial states regarding issues such as their respective economies, physical geographies, resource endowment and demographic status, while the Federal Constitution aimed to achieve equality regarding competences and rights.

Today, more than a century and a half later and despite significant variations in some of the key variables in a number of cases, those important differences between regions basically remain. To reach the goals of ‘equivalent development’ and ‘equality in the living conditions’ set during the Reforming Constitutional Convention, finally incorporated in the agreed text of the Constitution, it was then necessary to recur complementary to the revenue sharing regime, a mechanism that provides the tenet to the functioning federal fiscal system.

Art. 75, para. 2, of the Constitution now states on this matter that ‘the distribution among the Nation, the provinces and the city of Buenos Aires and among the latter [...] will be equitable, solidary and shall give priority to the achievement of an



equivalent degree of development, quality of life and equal opportunities in the whole national territory’.

The Complementary Clause Six to the Constitution stated that for the year 1996 a new revenue sharing law should have been enacted, but achieving that objective was not by then politically feasible anymore and no general law for the distribution of taxes among Nation and Provinces was then or later approved in a matter that grew increasingly contentious and made reaching consensus virtually impossible, being supplanted by short-term trade-offs resulting from quid pro quo agreements on issues that might have been well distant from the common good interests.

In addition, uneven economic growth among provinces and regions in the country has persisted along time and, more than a quarter of a century after the sanction of the reform of the Constitution, the decision on a new revenue sharing system is still pending, with the exception of a number of (rather minor) modifications emerging from different Intergovernmental Agreements.

In a way, the entire political system is relinquishing its constitutional obligation since 1994 by not passing a law that fully determines national intergovernmental fiscal transfers, creating then inevitably a degree of uncertainty, allowing a space for arbitrary federal decisions and room for contentiousness and eventually conflict between provinces, enabling also, in the process, that the basic principles of accountability and transparency be hindered in the process.

Under this transient system, provincial governments undertake a large share of total spending done in Argentina, yet they collect only a small fraction of taxes. In this way, provincial decision makers enjoy a large share of the political benefit of spending (when this is appropriately done), yet seem to pay only a small fraction of the political cost of enforcing taxation and enjoy a huge negotiation power when discussing the legislation to be newly introduced and discussing budgetary matters.

On average, the provinces finance only about a third of total provincial spending, with their own source revenues. This fiscal imbalance is, in addition, uneven across provinces and extremely large for some of them. In a considerable number of the less densely populated ones, the transfers received from the federal government constitute even more than 80% of their total provincial revenues.



## 4.3 Regional development trends

When looking at the current situation and the potential for redressing the enormous existing territorial imbalances (that are even expanding at times) and the progressive economic distance between the poorest and the richest territories in the country, it can be concluded:

- that the fiscal federal system inexorably requires a necessary revision and update, as well as a radical reform;
- notwithstanding that, those inescapable changes are most likely not sufficient to boost a radical transformation and reversal of the current imbalances and to be able to propel a more even-handed development between the different regions.

There are several reasons for this assumption: firstly, the initial gap between provinces was huge and it has actually increased due to the secular patterns of growth adopted by the national economy, so that the pre-existing asymmetries have expanded rather than diminished.

Secondly, the financial flows of the co-participation (“sharing”) regime are typically negatively related to bilateral trade flows, thus significantly discouraging sales to other provinces, from the most lagging provinces. This negative impact of the current allocation structure is virtually reinforced by the level of co-participation received by the provinces located in the environs of the province of origin.

Thirdly, if a structural framework for fiscal transfers is eventually agreed and applied to reallocate resources, and a new method of distribution of national resources is adopted, there would be cases in which less developed provinces should resign a percentage of their distribution rate, in opposition to their population expending needs, with the necessity of elucidating the political feasibility of these changes and whether they are actually politically viable and thus enforceable.

It is worth mentioning that while Argentina decreased its overall Gini coefficient by more than ten from 0,53 to 0,42 between 2001 and 2021, inequality within provinces is still substantial, with Tierra del Fuego being very equal (a provincial Gini index of 0.32) for Latin America standards and Corrientes one of the most unequal (with a Gini index of 0,46). Being these the prevailing conditions, the possibility of a reform of the federal tax sharing regime faces enormous political obstacles to achieve a minimum level of political consensus in a period of substantive economic hardships and dire social indicators.



Both when the Argentine economy was going through a phase of an outward-looking growth model with differential regional competitive advantages and insertion in the world economy, resulting in a highly concentrated regional growth, and when this model was superseded by an 'import-substitution' one, economic and demographic concentration persisted in the same area, around Buenos Aires (in the Pampean region), with rather moderate spillovers in its hinterland, and in the center of the country (mainly, Cordoba), propelled by the progress of the car manufacturing industry there and its related industrial activities.

In this regard, we posit that the GH2 economy can play a pivotal role in Argentina in contributing to a balanced economic growth, strongly spur job creation, promote the expansion of robust value-added industrial decentralized hubs and the integration of internationally competitive value chains that may be integrated competitively and make substantive part of global value chains, creating wealth, broadening national exports and widening new business opportunities, as well as increasing tax revenue bases, collaborating to enhance fiscal revenues, in particular at the provincial level, throughout the country and provide several other co-benefits.





## 5 Key Issues for the development of GH2 and its value chain

### 5.1 Heterogeneous Distribution of Natural Resources

Argentina's vast territory results in a heterogeneous distribution of high-quality natural resources among its provinces, offering strengths and potential synergies through local value chains and joint developments.

Each province's unique resource endowment, from wind and solar potential to biomass balance and biogas potential, shapes its role in the national energy landscape.

### 5.2 Need for Inter-Provincial Cooperation

The diversity of resources across Argentine territory translates into potential different strategies and roles in the H2 value chain among provinces. Cooperation between provinces is essential to maximize the benefits of their distinct energy resources and capacities, whether through shared projects, technology transfer, or joint infrastructure development.

### 5.3 Energy Infrastructure Prioritization

Argentina's current energy infrastructure is insufficient, limiting the full utilization of its energy resources. The upscale of H2 production will increase pressure precisely on the energy infrastructure, especially in regions rich in renewable resources and sometimes lacking adequate infrastructure installed capacity.

### 5.4 Legal and Regulatory Framework on Environmental Issues

Argentina's environmental regulation is complex and challenging, as mentioned, with federal, provincial, and municipal laws and regulations sometimes overlapping or eventually contrasting.

### 5.5 Impact of Fiscal Federalism on Public Policies



The architecture of fiscal federalism in Argentina impacts public policies and, in particular, mechanisms of resource allocation, having also a potential influence on the development of hydrogen and its derivatives that needs to be assessed adequately.

## 5.6 Regional Development Trends

Actual differential growth, nature of resource endowment, and market size in each jurisdiction contribute to shape regional development trends in Argentina and the overall outcome of economic growth and long-term perspectives.

# 6 Policy recommendations

## 6.1 Promote Inter-Provincial Collaboration and Policy Consistency for Resource Utilization:

To address the heterogeneous distribution of natural resources, it is imperative to foster inter-provincial collaboration and development of a regulatory framework cohesive among them.

Provinces should establish partnerships and agreements to share updated technological know-how and best practices. This cooperation can lead to joint projects that leverage the strengths of diverse provinces, creating synergies in GH2 production and distribution and particularly, for PtX, in harnessing the availability of different resources and infrastructure, including those related to the availability of sustainable carbon sources.

Additionally, the federal government should facilitate this cooperation by providing incentives and facilitating the access to financial support for cross-provincial border initiatives. A national framework that encourages provinces to work together on H2-related projects, would help overcome the starkest resource disparities, restrictions, and contribute to maximize the country's GH2 and PtX overall potential.

Furthermore, a regulatory framework should be established to govern inter-provincial cooperation in the energy sector. This framework would envisage how the



roles and responsibilities of each province may be optimized, ensuring a fair and transparent distribution of benefits from joint and common projects.

## 6.2 Invest in Critical Energy Infrastructure:

Given the importance of energy infrastructure, Argentina should prioritize investments in upgrading and expanding its energy network, enabling and fostering further investments in energy production from the private sector and through multilateral and other financial sources.

Provinces with significant renewable energy potential should receive special consideration when planning infrastructure development, for the benefit of the provinces being part both of the supply and demand sides of energy.

The federal government should focus on international financing opportunities and allocate resources to modernize the energy grid, enhance transmission capacity, and integrate renewable energy sources into its long-term energy strategy. This will help to create a robust and forward-looking energy infrastructure, capable of supporting increased H2 production and of the impacts of catalyzing private investment.

## 6.3 Streamline Environmental Regulations:

To address the complex regulatory landscape, Argentina should thoroughly streamline environmental regulations related to H2 production and utilization. A unified set of federal regulations, beyond minimum standards (“presupuestos mínimos de protección ambiental”) should be developed to provide clarity, consistency, and proficiency.

Provinces should collaborate in establishing environmental standards that align with national objectives, while accounting for local conditions, and also work with local governments to facilitate processes and reduce administrative burden and uncertainty. This approach should ensure that environmental regulations are both stringent and flexible, promoting sustainable hydrogen development and ensure ecosystem protection and sustainability.

The central government should play a coordinating role in harmonizing hydrogen related environmental regulations and providing technical assistance to provinces. By fostering cooperation among jurisdictions, Argentina can create a conducive



regulatory environment for the H2 industry and ensure compliance with international environmental standards, so as to be able to participate competitively in international markets.

## 6.4 Strengthen Fiscal Federalism Mechanisms:

To mitigate the impact of fiscal federalism on public policies, Argentina should establish mechanisms that balance fiscal responsibilities and resources between the national and provincial governments.

Particularly for H2 (and carbon for PtX), the federal government should work with provinces to develop a revenue-sharing framework that allocates a portion of H2-related revenues to both levels of government. This mechanism will ensure that provinces benefit from H2 development, while supporting national goals.

Furthermore, the federal government can offer tax incentives and grants to provinces to encourage their active participation in H2 initiatives and provinces should match those efforts. These incentives should be linked to the achievement of specific H2-related targets, thus promoting alignment between federal and provincial policies.

## 6.5 Tailor Policies to Regional Development Trends:

Recognizing the impact of regional development trends, Argentina should tailor its policies to the specific economic and resource conditions of each province.

The central government should support provinces in identifying their comparative advantages and developing strategies that align with their unique characteristics. This tailored approach will ensure that H2 initiatives contribute positively to local economies and foster inclusive growth.

Additionally, the central government should facilitate knowledge sharing and collaboration among provinces, allowing them to learn from each other's experiences and best practices, and benefit from a wealth of practical knowledge. This knowledge exchange can lead to the development of additional innovative solutions and strategies for H2 development.



## 6.6 Establish H2 Hubs in Strategic Provinces:

To capitalize on regional strengths and to enhance them, Argentina should establish H2 hubs in provinces with significant renewable energy potential and existing infrastructure.

The development of H2 hubs in regions with abundant renewable resources can accelerate the growth of the GH2 industry.

These hubs can serve as centers for H2 production, storage, and distribution, attracting private sector investment and expertise and bringing together supply and demand, capturing new investment and promoting dynamic regional development and the development of a network of service and product providers.

By strategically locating hubs, Argentina can optimize the use of its renewable resources and create regional centers of excellence and highly efficient clusters for the entire H2 industry.

Each hub should be supported by a comprehensive policy framework to provide incentives for businesses to establish operations within the hub. This includes a clear and stable governance structure, tax benefits, research and development grants, and access to financing for H2-related projects.



## 7 Conclusions

The pursuit of a GH2 and PtX economy in Argentina is a complex, while worthy and promising endeavor that requires a multifaceted approach. The country's federal system, coupled with its rich natural resource endowment and domestic technical and existing industrial capacities, provides a solid basis for Argentina to become a key player in the global hydrogen market.

However, this potential can only be realized through comprehensive strategies that address both the environmental and fiscal challenges inherent in such a transition, as well as the technical and financial ones. The interplay of legal and regulatory frameworks, fiscal federalism, and regional development trends will significantly influence the trajectory of GH2 development in Argentina.

In this line, the PtX opportunity is strongly tied to those challenges posed by Argentina's federal structure as well as the need for a cohesive approach to environmental governance and fiscal federalism.

Argentina's fiscal federalism, characterized by a high degree of decentralization and vertical fiscal imbalance, poses significant challenges to the equitable distribution of resources at the national scale and the efficient implementation of policies, and at the same time a virtually persistent exposure of potential investors to political risk and to the lack of a unified approach to taxing energy production in the territory. Further reforms on tax structures may be able to alleviate or eventually remove the barriers remaining.

The environmental risks associated with GH2 production, such as water usage, and potential atmospheric impacts, necessitate an exhaustive environmental assessment as well as a comprehensive management framework. Addressing these fledgling risks is crucial to ensure sustainable and responsible development of the GH2 sector.

Strategic environmental assessments and the management of associated risks are critical to ensuring sustainable H2 production. Meanwhile, addressing the existing fiscal imbalances and overhauling the tax-sharing system are essential steps toward equitable and efficient resource allocation across provinces.

In embracing the GH2 and PtX economy, Argentina has the opportunity not only to enhance its energy security and contribute to global decarbonization efforts, but



also to drive forward economic growth, job creation, and regional development, among other several co-benefits. The proactive and collaborative efforts of both the national and provincial governments, as well as the decisive intervention of private sector stakeholders, will be crucial in harnessing the full potential of GH2 for a sustainable development in line with its national strategic priorities and circumstances.

By recognizing the unique challenges posed by its federal structure and embracing the transformative potential of PtX, Argentina can establish itself as a leader in the region, in transitioning to a carbon-neutral economy, fostering sustainable development, and propelling regional equality within its borders, as well as promoting an inclusive society through investment in new beneficial economic endeavors.

The potential of the GH2 value chain to drive balanced economic growth, job creation, and the development of competitive value chains cannot be overstated. This sector has the capacity to transform the country's energy landscape, strongly contribute to global decarbonization efforts, and promote regional development.

But to be successful in this endeavor, existing resources are not enough: Argentina should focus on key decisions to untap those vast resources.



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