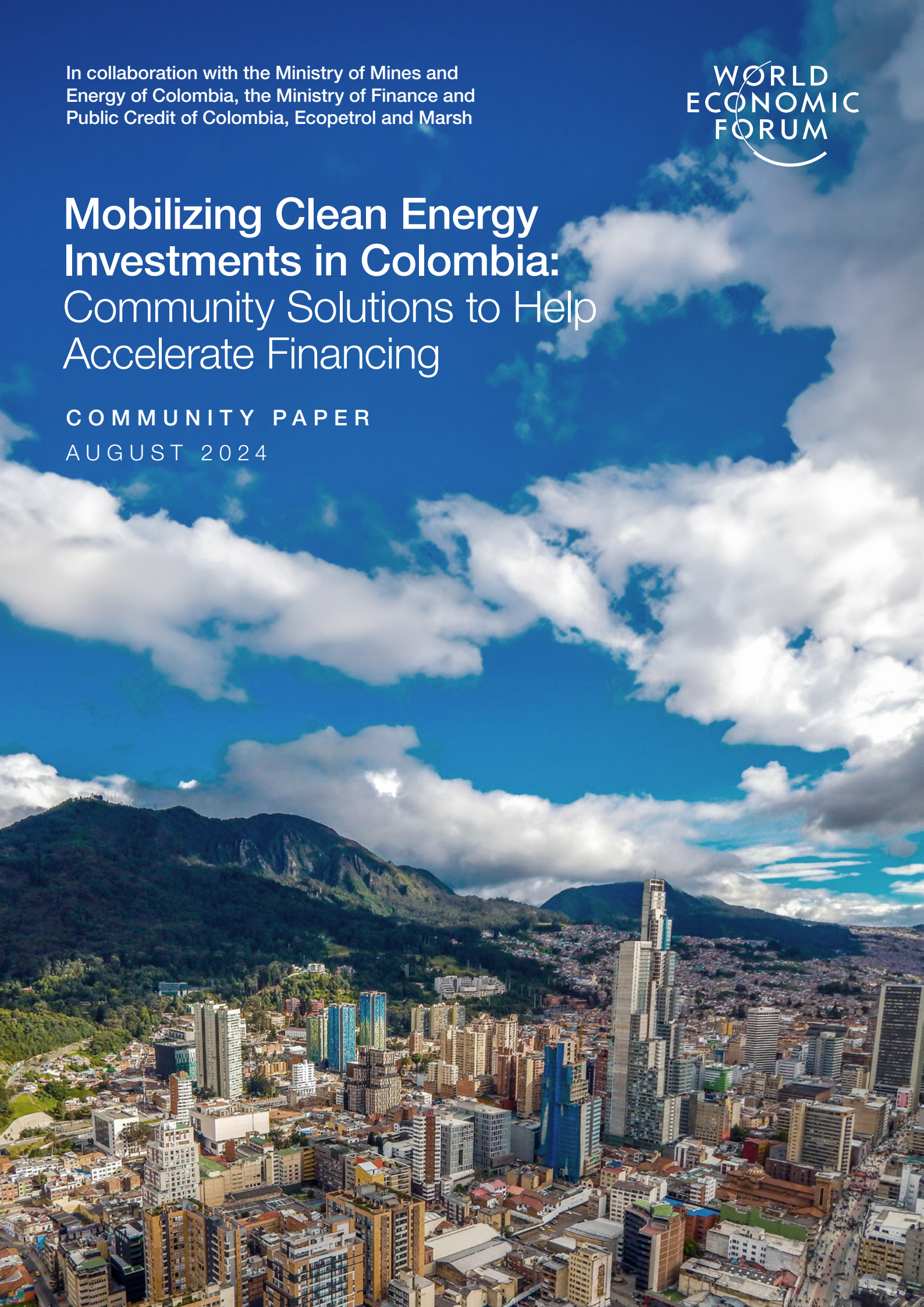


In collaboration with the Ministry of Mines and Energy of Colombia, the Ministry of Finance and Public Credit of Colombia, Ecopetrol and Marsh



Mobilizing Clean Energy Investments in Colombia: Community Solutions to Help Accelerate Financing

COMMUNITY PAPER
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Executive summary

Colombia has abundant renewable resources but needs to accelerate its energy transition to meet ambitious emissions targets. The country has set a goal of achieving net-zero greenhouse gas (GHG) emissions by 2050, with an interim target of reducing GHG emissions by 51% by 2030.¹ This ambitious goal will require significant investment in renewable energy (RE) capacity and infrastructure. Clean energy investments will also be important to deliver energy security and open new economic growth and green job opportunities for the country and local communities. Fortunately, Colombia possesses abundant resources in hydropower, solar, wind and biomass, offering tremendous potential for RE. In recent years, the government has made substantial efforts to harness this potential and attract investment, leading to an eightfold increase in RE development investments between 2018 and 2021.² The current challenge is to further accelerate and scale the transition by removing barriers to clean energy development (see Appendix A).

In the first half of 2024, the World Economic Forum, supported by Marsh, collaborated with Colombia's Ministry of Mines and Energy, Ministry of Finance and Public Credit and Ecopetrol to identify, prioritize and address the main barriers to clean energy finance. A public-private working group comprising Colombian and international stakeholders from industry, finance and academia was established to explore solutions for unlocking capital for clean energy investments. The group selected three main areas for investment, based on the investment gap and the importance of the barriers: solar, wind and clean hydrogen.

This paper summarizes the working group's main findings and offers recommendations for improving the regulatory and policy environment, as well as non-policy solutions to facilitate clean energy investment. The overarching goal is to support Colombia's net-zero targets and ensure a long-term just transition.



TABLE 1: Summary of identified policy messages and non-policy solutions



Policy opportunities to advance clean energy investment in Colombia

Policy message #1: Policy planning and clean energy project implementation

Align policy planning with project implementation based on effective guidance and measures at all government levels.

Policy message #2: Grid availability and permitting

Facilitate clean energy uptake through increased grid deployment and enhanced permitting measures.

Policy message #3: Incentive mechanisms for clean energy

Create a level playing field for renewable electricity to compete with fossil fuel-based electricity and incentivize the use of RE sources and clean hydrogen.

Policy message #4: Social acceptance supporting a just energy transition

Develop and strengthen relationships among all parties involved in clean energy projects.



Non-policy solutions to accelerate financing for Colombia's clean energy sector

Solution 1: Social cooperation model for RE projects and a just energy transition

An engagement model aiming to structure and strengthen relationships between stakeholders and local communities.

Solution 2: Unleashing the full power of industrial clusters

The formalization of industrial clusters' decarbonization commitment to improve cooperation from co-located companies and public institutions and drive investment in clean energy.

Solution 3: Clean hydrogen lending facility

A model to mobilize financial resources from the private sector and other multilateral partners to develop and stimulate the sector.

Solution 4: Insurance facility for energy transition projects

A specialized risk-transfer programme that can bring global expertise to bear on local conditions in order to facilitate energy transition projects.

1

Overview of Colombia's energy sector

With its ambitious energy plans, Colombia is well positioned to become a leader in the region's clean energy transition.

Following significant socioeconomic progress over the past two decades, which has led to a tenfold growth in its gross domestic product (GDP) since 1990, Colombia now ranks as the fourth largest economy in Latin America.³ A big proportion of this growth is from the export of natural resources – namely coal, crude oil and precious metals – as well as its strategic geographical location and policy reforms that have created a strong legal framework for businesses.⁴

In 2021, Colombia's total final energy consumption reached 1,319 petajoules (PJ). Fossil fuels accounted for 67% of this total, with oil being the primary energy source (49%), followed by natural

gas (11%) and coal (7.1%).⁵ Electricity, primarily sourced from hydropower, constituted the second-highest consumed energy source, contributing 19%. This was followed by biofuels and waste, accounting for around 14%. Transport accounted for the largest share of consumption, followed by industry and residential usage (see Table 2).

It should be noted that while Colombia's installation of new clean energy projects was indeed affected by the COVID-19 pandemic, Colombia today displays strong transition readiness, ranking 35th among 120 countries in the World Economic Forum's Global Energy Transition Index 2024.⁶

TABLE 2: Colombia's energy consumption by sector (2021)



Source: International Energy Agency (IEA). IEA 50 – Colombia Energy Mix. <https://www.iea.org/countries/colombia/energy-mix>

1.1 Colombia's power market structure

While several governmental bodies are involved in the country's energy transition planning – including the Ministry of Finance and Public Credit, the Ministry of Environment and Sustainable Development, the Ministry of Interior and the National Planning Department (DNP) – the government entity tasked with steering the country's overall energy transition is the Ministry of Mines and Energy (MME).

With a mandate to oversee the formulation and coordination of policies, plans and programmes for the national energy sector, the MME operates through several technical sub-entities.

From an administrative standpoint, these include the Commission of Energy and Gas Regulation (GREG), which establishes the regulation of electric energy and gas services in compliance with policies issued by the MME; the Superintendency of Residential Public Services (SSPD), which monitors utilities' compliance; the Superintendency of Industry and Commerce (SIC), which oversees fair competition in the energy market; the Mining and Energy Planning Unit (UPME), responsible for coordinating matters related to energy and mining planning together with other agents involved in the sector; and the Non-Conventional Energies and Energy Efficiency Fund (FENOGE), which is the financing vehicle established through Law 1715 of 2014 to drive non-conventional RE and energy-efficiency investment. In addition to these entities, the National Environmental Licensing Authority (ANLA) directly oversees activities related to licensing and environmental permitting of projects exceeding 100 megawatts (MW) in generation, while projects below this capacity are overseen by regional authorities known as *corporaciones autónomas regionales* (CARs).

Colombia's National Energy Plan (PEN) 2022–2052, launched in 2023 as an updated version of the original NEP 2020–2050, lays out a pathway for integrating wind, solar and geothermal energy into the country's electricity mix. In its revised nationally determined contribution (NDC), submitted at the 2021 United Nations Climate Change Conference (COP26), Colombia set a target of a 51% reduction in GHG emissions by 2030, encompassing all sectors.⁷ These targets were subsequently enshrined in the E2050 Strategy, the Energy Transition Law and the Climate Action Law. It should likewise be noted that the government in

2022 approved the National Council for Economic and Social Policy (CONPES) Energy Transition policy, which creates a framework for achieving these plans and targets.⁸

Furthermore, in 2021, the MME published the Colombia Hydrogen Roadmap, aiming for 1–3 gigawatts (GW) of electrolysis capacity by 2030 and the production of 50 kilotons of blue hydrogen through implementation of carbon capture, utilization and/or storage (CCUS) technologies in existing facilities or new methane steam reforming or gasification plants by the same year.⁹

Similarly, in 2022, Colombia released its roadmap for offshore wind development as part of a broader strategy to reduce reliance on hydropower and fossil fuels. The roadmap outlines a best-case scenario of achieving 1GW of capacity by 2030 and 3GW by 2040.

At the time of writing, in mid-2024, the national Just Energy Transition (JET) roadmap was being amended and a revised PEN that aligns with the National Development Plan (PND) 2022-2026 was under way. This updated PEN is expected to strengthen policy coherence and specify national targets.

The legal framework governing the electricity sector and public utilities is rooted in Laws 142 and 143 of 1994, which define regulations concerning electricity generation, interconnection, transmission, distribution and commercialization.

Up to 1995, electricity services were provided through Interconexión Eléctrica (ISA) and other state-owned entities with limited participation from the private sector. The sector has since been restructured, with the state assuming the role of regulator and the introduction of more market-focused principles, including vertical integration restrictions and open entry for the participation of the private sector. This restructuring has led to the separation of ISA into two entities: one focusing on transmission and market operations (ISA), and the other (ISAGEN) dedicated to electricity generation. ISA now owns between 67% and 70% of the assets comprising the national power grid National Transmission System (STN). Finally, ISA's subsidiary company, Compañía Expertos en Mercados (XM), operates Colombia's national interconnection grid (National Interconnected System, or SIN) and manages the local wholesale energy market.

1.2 Renewable energy in Colombia

Colombia is endowed with a phenomenal potential for renewables due to its abundant hydropower, solar, wind and biomass resources. In 2021, RE accounted for 25% of Colombia's total energy

supply and 29% of final consumption, of which hydro accounted for 14%, biomass 12%, biofuels 2.5%, solar 0.1% and wind 0.01%.¹⁰

TABLE 3: Installed and planned capacity in Colombia (2024)

	Installed capacity	Planned capacity (in line with 2052 goals)	Required investment
 Wind	0–31.9MW ¹¹	9.3–38.6GW	\$13.3–72.1 billion
 Solar	0.48–1.1GW ¹²	14.5–30.9GW	\$10.2–20.3 billion
 Clean hydrogen (green and blue)	3 polymer electrolyte membrane (PEM) = 237kW 1 “other types of electrolyzer” = 4kg H ₂ /day	16GW (3 million tonnes per annum [mtpa])	\$2.5–5.5 billion
 Transmission and distribution infrastructure	29,179km	+32,000km	>\$4.7 billion
 Nuclear	0	1.8GW	\$6.3–12.7 billion
 Geothermal	100kW	<1GW	\$7.5 billion
 Biomass	2.1 million litres/day bioethanol; 0.750mtpa biodiesel; 200MW biomass	(Not defined)	(Not defined)

Source: Mining and Energy Planning Unit (UPME). National Plan, 2022–2052. https://www1.upme.gov.co/DemandayEficiencia/Documents/PEN_2022_2052/PEN_2022_2052_Tomo1_VF.pdf

While wind and solar capacity has grown in recent years due to the introduction of RE auctions in 2019 – one of which secured around 1.3GW of new wind and solar photovoltaic (PV) capacity and attracted \$2.2 billion of investments¹³ – significant investment in Colombia's largely untapped resources is still needed to reach the 2052 goals. Meeting these targets could enhance the reliability and affordability of energy supply, while simultaneously decarbonizing the country's energy mix.

Moreover, with solar and wind resources mainly concentrated in regions remote from demand centres, realizing the country's wind and solar potential will also depend on further investment in grid and transmission capacity as well as improved system flexibility.

Efforts to unlock this investment include the passing of Law 1715 in 2014, supplemented by Law 1955 of 2019, the Energy Transition Law (Law 2099 of 2021) and Decree 895 of 2022, which introduced distinct regulations and incentives for diverse RE sources.

It is important to note that the term “non-conventional renewable energy sources” (FNCRE) refers to any RE technology distinct from large

hydroelectric power plants, such as wind, sun, biomass and small hydropower.¹⁴ This means that despite being widespread and supporting around 70% of the electricity produced in the country, large hydroelectric power plants are not considered FNCRE and are therefore not an approved source for renewable hydrogen production.¹⁵

Nevertheless, different regulatory instruments, such as Decree 1476 of 2022, which adopts provisions to promote innovation, research, production, storage, distribution and use of hydrogen, as well as Decree 2235 of 2023, relating to the development of white hydrogen projects within the framework of the JET roadmap in Colombia, are contributing to greater hydrogen production.

Moreover, the MME published a draft decree establishing that green hydrogen producers supplied by self-generators with FNCRE, or marginal producers with FNCRE, will be exempt from charges for transportation and distribution of electric energy. While this measure would reduce energy costs representing between 70% and 80% of the operational costs of green hydrogen projects, the measure could potentially have adverse effects on incentivizing certain stakeholders.

1.3 Clean energy finance requirement

In recent decades, the government has taken steps to promote Colombia's RE potential and make the country an attractive investment destination, notably through its state promotion agency ProColombia. This led to foreign direct investment (FDI) doubling between 2010 and 2019, reaching 4.4% of GDP. While these investments were mainly directed towards extractive industries, there was also a significant surge in investment in RE development, with investments growing eightfold between 2018 and 2021 (from seven projects, worth \$446 million, in 2018 to 24 projects totalling \$3.8 billion in 2020).¹⁶

While on a positive trajectory, to achieve the 2052 targets for installed capacity (see Table 3), it is estimated that Colombia will still need to unlock up to \$122 billion in investments. Following a thorough analysis of the country's context and needs for it to close the financing gaps, the working group identified key policy aspects and non-policy solutions that, if implemented, could help create a conducive environment for further investment.



2

Policy opportunities to advance clean energy investment in Colombia

The working group identified four areas to improve Colombia’s current regulatory and policy environment governing clean energy investment.

2.1 Policy planning and clean energy project implementation

Situation

Various roadmaps and plans have been published identifying alternative technologies for generation, transmission and distribution, and assessing electricity demand, market competitiveness and sustainability of solutions. These are frequently reviewed by federal agencies such as UPME, MME and DNP.

However, while several planning and coordination entities coexist, certain barriers have prevented RE projects from being implemented at the desired pace.

The working group found that targets and roadmaps are not always aligned or integrated at national and regional levels. This misalignment of policy enactment, planning forecasts and implementation of projects is perceived as a constraint on the further development of RE. In 2023, only 36% of the 41 projects identified for that year were executed, with the remainder rolling over to subsequent years.¹⁷

The generation mix is also affected by these constraints. The latest round of auctions,

announced in February 2024, awarded 4.4GW of generating capacity by 2028; however, 99% of the awards were for solar PV projects.

Onshore wind, biomass, geothermal and other RE sources remained largely underused, partly due to the absence of guidance on procurement diversification and ways to integrate private investment.

While recent amendments to the regulatory framework can be seen as a major step forward, investors are still disincentivized from initiating new RE and transmission projects, arising in part from changes to fiscal incentives, tax schemes and pressure to secure lower prices, which have created uncertainty and instability.

Finally, despite the federal government’s active commitment to create a national green hydrogen market, as reflected by the Hydrogen Roadmap and other initiatives, there is currently no green hydrogen investment regulatory framework nor structured national and regional coordination, green hydrogen standards or certification mechanisms in place. These factors are preventing a predictable pipeline of projects from being implemented and executed in Colombia.

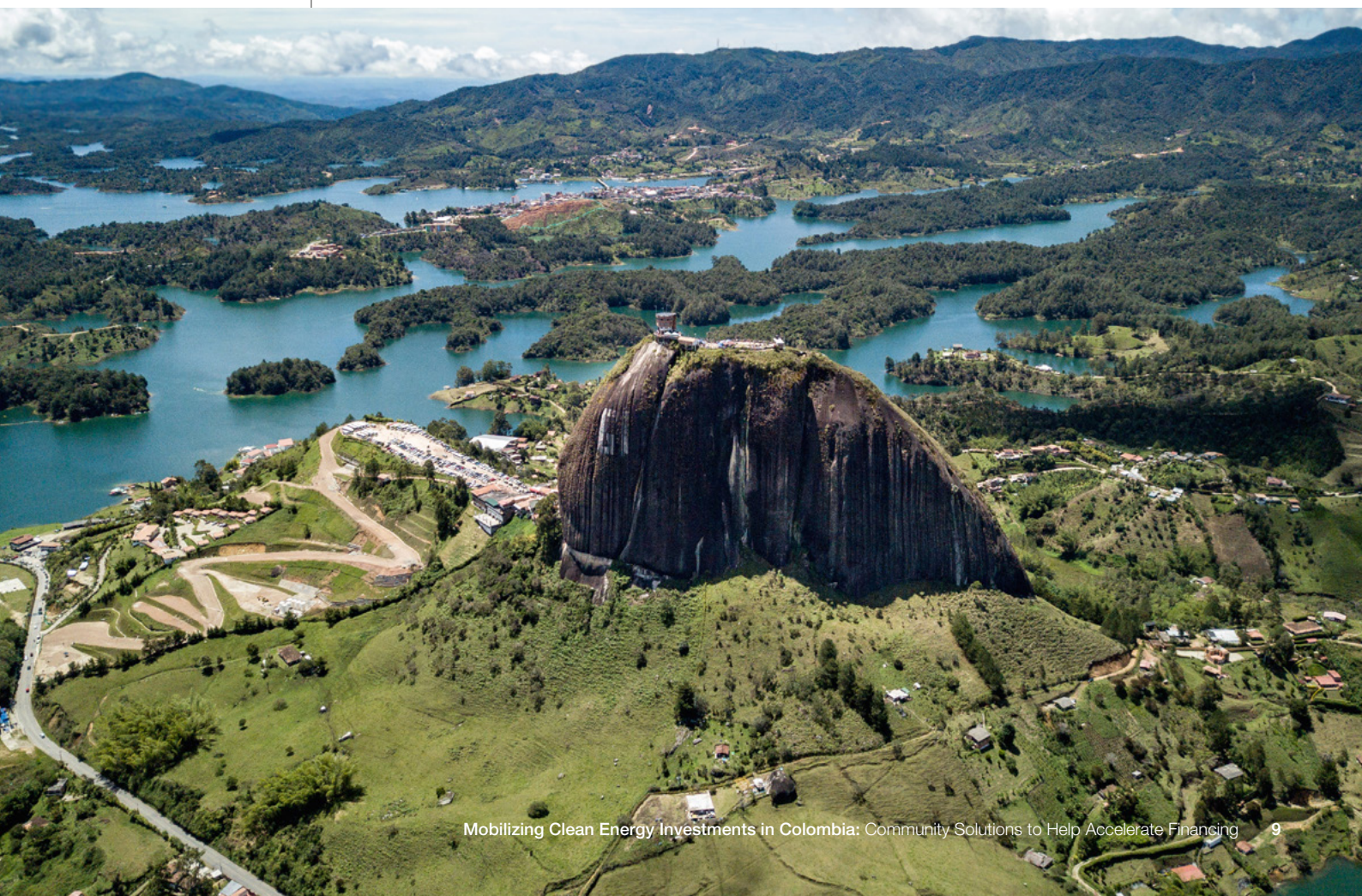


Policy message #1

Align policy planning with project implementation based on effective guidance and measures at all government levels.

The following measures could help enhance policy planning and complement the existing policy and regulatory framework for renewable projects and clean hydrogen:

- Enhance coordination in energy policy formulation and regulation to ensure that planning and implementation processes are harmonized. This could include defining the roles and responsibilities of different agencies at federal, territorial and local levels.
- Promote the implementation of energy transition initiatives by building a pipeline of key strategic projects (Projects with National and Strategic Interest, or PINES) with the support of the Intersectoral Commission for Infrastructure and Strategic Projects (CIPE).
- Establish a dedicated business unit with intersectoral coordination capabilities to promote the implementation of a broader energy transition portfolio without the requirement to qualify as PINES. This unit should advise on the implementation strategy throughout the full life cycle, from planning to auction and development all the way to operation, power sale-back schemes and deployment measures.
- Develop a regulatory framework for large-scale clean hydrogen and clarify its governance ownership. This framework should be aligned with local transmission and distribution plans to ensure the availability of resources and projects needed to support the emerging clean hydrogen market.
- The framework should include clarity on standards for clean hydrogen that correspond with international standards as well as power certificate mechanisms, such as the CertHILAC system.¹⁸
- Risk allocation mechanisms could be defined in this framework to create incentives for investments beyond traditional financing vehicles, focusing on the early stages of clean hydrogen projects throughout the value chain.
- Implement a reskilling and upskilling programme, enabling workers active in carbon-intensive sectors to contribute to emerging clean energy activities. Such programmes would increase productivity and local skilled labour availability and help promote the transition of the national energy workforce while safeguarding jobs.



2.2 Grid availability and permitting

Situation

While energy auctions have contributed to the acceleration of wind and solar projects in Colombia, insufficient transmission capacity to transport electricity from the northern regions to the main load centres, as well as prolonged permitting and licensing processes, have slowed down the overall deployment of renewable capacity in the country. UPME's Transmission Expansion Plan lists critical avenues for unlocking new potential in transmission, but those are perceived as falling short on the timeline for execution or bids.¹⁹

Removing these barriers and expanding grid availability could put Colombia on the fast track to achieving its transition goals. For instance, the La Guajira region, which holds the greatest potential for generating RE due to high levels of solar radiation and strong winds from the north coast, boasts an estimated solar energy potential of 30GW²⁰ and wind power potential of 50GW.²¹

In June 2024, ANLA approved the second phase of the Colectora 1 transmission project in La Guajira, which is anticipated to contribute 500 kilovolts (KV) to the SIN and lay the groundwork for future projects in the region.²²

While these are positive developments, uncertainty about permitting and licensing processes is adversely affecting investors' confidence. Delays are partly due to community acceptance concerns, which have resulted in projects being deferred for years but also stem from the inadequate processing capacity of the relevant departments. Currently, smaller developments (<100MW) fall under the jurisdiction of CARs, while projects above 100MW lie with ANLA.²³ However, CARs are often not equipped to process the permitting requests they are sent, while ANLA has struggled to define time frames, leading to delays in project approvals and initiations.

Recognizing the delays that developers have been experiencing in obtaining permits and licences, particularly in the La Guajira region, at the end of 2023 the MME presented draft Bill 343 to the Chamber of Representatives with the twofold aim of expediting the processing of project submissions as well as making energy justice an integral part of these processes.²⁴

Furthermore, at the time of writing, the Ministry of Environment has published a draft decree proposing that permit applications for projects exceeding 50MW be assessed by ANLA.



Policy message #2

Facilitate clean energy uptake through increased grid deployment and enhanced permitting measures.

The following measures could help enhance permitting processes and grid capacity access:

- Strengthen qualified government support (for already-existing advisory groups) in prior consultations with communities to allow a streamlined licensing and environmental assessment process for transmission line extensions.
- Fast-track UPME's efforts to deploy transmission projects, while strengthening its intersectoral coordination role with entities such as the Ministry of the Interior, which is fundamental for prior consultations with communities (*consultas previas*).
- Reassess and prioritize short-, medium- and long-term strategies for entities to plan and coordinate projects, thereby ensuring stronger commitment from developers.
- Enhance the existing transmission infrastructure and network, while mapping current inefficiencies and risks associated with the current configuration. Regions with higher-than-average growth are more vulnerable to being underserved; however, enabling a modernization and reconfiguration of supporting substations and ancillary infrastructure might alleviate pressures from projected demand.
- Accelerate the planning of utility-scale storage solutions to not only prevent intermittency risks from FNCRE but also increase existing transmission-line capacity.

2.3 Incentive mechanisms for clean energy

Situation

Colombia's first legislation to introduce specific regulations and incentives for renewables – Law 1715 of 2014 – was later updated by Energy Transition Law 2099 of 2021. Law 1715 of 2014 aims to promote the development and use of

non-conventional energy sources, mainly RE sources, in the national energy system, by integrating them into the electricity market. It provides fiscal incentives among other stimuli to attract private capital investment in RE, green and blue hydrogen and energy efficiency. Some of these incentives are summarized in Table 4.

TABLE 4: **Incentives for investment in non-conventional energy projects and green and blue hydrogen**

Income tax	A deduction of 50% of the total value of the investment, applicable to a maximum of 50% of the taxable income over a period of 15 years. ²⁵
Sales tax	Value added tax (VAT) exemption. exemption in procurement of goods and services for non-conventional energy, and green and blue hydrogen projects. ²⁶
Tariffs	Import duty exemption for non-locally produced machinery, equipment, materials and other supplies needed for non-conventional energy projects, and green and blue hydrogen projects. ²⁷
Other	RE and green and blue hydrogen energy investments benefit from accelerated depreciation, allowing for up to a 20% depreciation rate per year, a rate increased to 33.33% by Law 2099 of 2021. ²⁸

Source: Government of Colombia. Law 1715 of 2014. http://www.secretariassenado.gov.co/senado/basedoc/ley_1715_2014.html

In terms of hydrogen, progress is being made in the development of market and tax incentives as well as in the identification and support of existing pilot, medium- and large-scale projects. Among these, more than 10 pilot projects have been identified involving the production and use of hydrogen in different sectors of final energy consumption. These pilots have helped pave the way for the development of larger projects. For example, the 28 projects identified (across different regions of the country) are estimated to total an installed electrolysis capacity of

approximately 12.8GW.²⁹ Furthermore, these projects have enabled those involved to estimate the possible costs of hydrogen and its derivatives in the national and international market.

Nonetheless, the working group has highlighted the need to incentivize demand as a determinant element to accelerate clean energy investments. As an example, the recently issued Resolution 40123³⁰ set up a framework to strengthen demand, including by enhancing access to mobility infrastructure.





Policy message #3

Create a level playing field for renewable electricity to compete with fossil fuel-based electricity and incentivize the use of renewable energy sources and clean hydrogen.

The following measures could help to further enhance RE tariffs and incentive mechanisms supporting clean energy:

- Accelerate the existing reduction plan for fossil fuel subsidies, similar to those for diesel. This measure should consider the impacts on vulnerable populations through complementary clean energy demand incentives (e.g. promoting an alternative mobility fleet powered by clean energy sources and its supporting infrastructure, such as charging stations).
- Balance selected fiscal tools, such as a carbon tax, with budgetary recovery mechanisms through requirements for local production participation or social impact contributions, so that incentives are targeted on improvements in national production and social welfare.
- Promote science and innovation pilot programmes, while accelerating the off-campus applicability of research and development projects. Furthermore, enable public and private collaboration to promote innovation in technologies in clean energy solutions.
- Allow for new clean energy technologies and innovations to qualify for tax benefits, tariff schemes and other similar incentives – for example, by expanding incentives for clean hydrogen projects (see next two points).
- Consider redefining “green hydrogen” to include hydropower as a production source and ensure that the incentives and benefits outlined in Law 2099 are equally applicable to this.
- Promote demand for clean hydrogen in energy usage because it will directly affect new demand for clean electricity. Demand generation mechanisms should consider the blending of clean hydrogen into the natural gas distribution system and hydrogen buses in metropolitan transport systems that are replacing a large part of their fleets with electric vehicles.

2.4 Social acceptance supporting a just energy transition

Situation

The La Guajira region, located in the northern part of Colombia, is abundant in RE sources, with the potential for up to 50GW offshore wind, 30GW solar and ideal conditions for large-scale hydrogen production.³¹ The region is key to reaching Colombia’s ambitious clean energy transition targets and NDC. Despite this, the region is characterized by a complex social environment, where communities, most of them Indigenous, have opposed new developments. These challenges derive from variations in governance structure, communication barriers and geographical distribution issues as well as differences in local vs. federal law.

Although some organizations have been able to interact with local communities and reach agreements to enable project development in the region, others have failed to engage and secure buy-in, leading to project cancellations. This has affected developers’ confidence in their ability to secure local acceptance of their projects.³²

In recent years, federal and local government participants have become involved, with the aim of supporting engagement with local communities and improving trust between parties. Such efforts have concentrated particularly on working with communities on prior consultation processes (*procesos de consulta previa*). In this regard, the working group noted the importance of securing projects in this region, while obtaining communities’ buy-in and full support to develop critical infrastructure in their territory on just and equitable terms. Any effort to streamline the negotiation process or prevent an unfavourable outcome for investors will boost interest in these projects.

One of the national strategic investment blocks mentioned in the PND refers to a just energy transition as one that encompasses the democratization of energy generation and consumption, the development of energy communities and the promotion of clean energy. However, differing interpretations of this has led to uncertainty regarding responsibilities and varied actions, especially when it comes to engagement with local communities.



Policy message #4

Develop and strengthen relationships among all parties involved in clean energy projects.

The following measures could help further enhance the integration of social acceptance for RE projects supporting the country's clean energy transition:

- Formalize a law for prior consultations, augmenting its institutional status and enhancing the process efficiency and legal warranties for all parties involved in clean energy projects. Also aiming to promote transparency and manage expectations of the process and timelines expected, the proposed structure should include a mechanism to improve verification of the certification process and periodic review of its effectiveness throughout the proposed stages.
- Increase institutional support in RE projects, especially in regions and territories more affected by social inequality or remote access. By involving national, regional and local government bodies at all stages of the development, this ensures clear roles and responsibilities.
- Increase awareness of the JET roadmap, accounting not only for technical considerations but also ensuring clear communication of the barriers and benefits to multiple stakeholders (for example, Indigenous communities) so that the terminology of the country's energy transition is consistent.
- Develop tangible key performance indicators (KPIs) to measure and guide the process, including better metrics to determine the applicability of the “just” component in energy transition initiatives.



3

Solutions to accelerate financing for Colombia's clean energy transition

The working group proposes four non-policy solutions that can help increase clean energy investment in Colombia.

Acknowledging that creating a conducive environment for clean energy in Colombia cannot depend solely on policy measures, the working group is also focusing on non-policy solutions that can be implemented immediately. Four such solutions have been formulated. Like the policy measures, these non-policy solutions

aim to address the barriers identified and promote the scaling up of clean energy investments in the country. In the coming months, local institutions spearheading each proposed solution will work towards implementation, with the support of the working group members.

Solution 1

Social cooperation model for RE projects and a just energy transition

The majority of Colombia's RE potential is concentrated along the northern border of the country – mainly in the La Guajira region. However, the lack of infrastructure combined with complex relations with the local communities have made it challenging to scale RE. Delayed timelines and cost overruns springing from these difficulties have proven to be a major barrier to clean energy investment in the country.

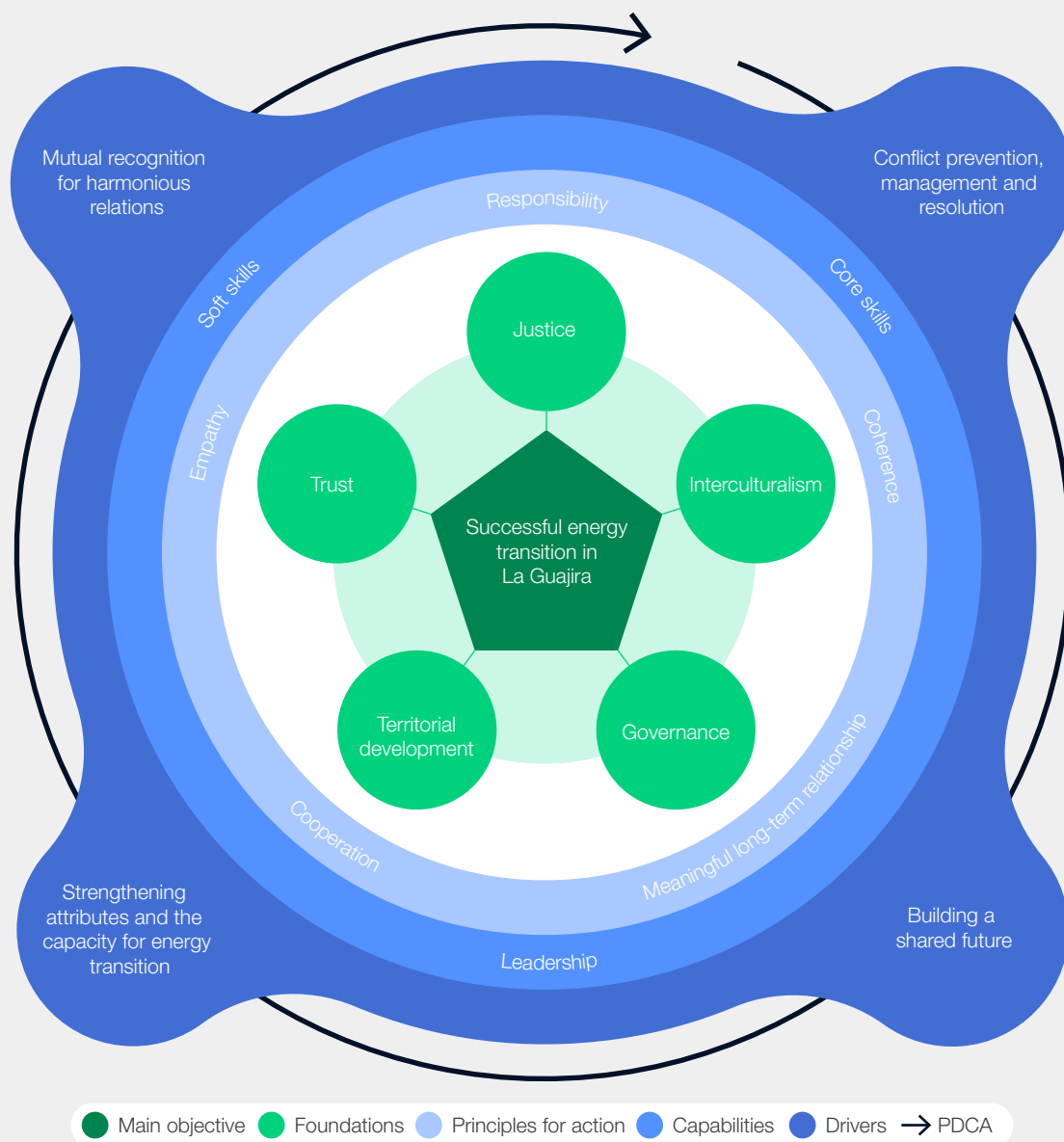
As a response to this barrier, TRUST, with key regional stakeholders, including Enel, AES, ISA, Empresas Públicas de Medellín (EPM), Grupo Energía Bogotá (GEB) and Asociación Nacional de Empresas de Servicios Públicos y Comunicaciones (ANDESCO), has developed an engagement model for the sector, aiming to structure and strengthen relationships between stakeholders and local communities (see Figure 1). The model, which is anchored in core values of territorial development that benefits local populations and cultures, governance, interculturalism, justice and trust, outlines specific drivers, which, if implemented in a holistic manner, can help ameliorate interaction and foster these relationships. This framework sets out to enable long-term relationships among

key stakeholders – communities, developers and government – and thereby ease the process of approving and developing clean energy projects in La Guajira. The model also prioritizes improving the social, environmental and economic conditions of the territory and promotes the protection of public goods and territorial governance.

Applying this model to clean energy projects will help ensure a more cohesive and satisfactory relationship with local communities and will be a major step towards regaining trust in the feasibility of RE projects in La Guajira, easing financial concerns and uncertainties about developments in the existing context.

At the time of writing, TRUST and the championing stakeholders were developing a process to present the model to the authorities, communities and local stakeholders and a strategy to build a collaboration platform for implementing it in La Guajira with multiple actors. TRUST and the stakeholders were also seeking international cooperation and the support of the public sector to bolster the implementation of the model and its initiatives.

FIGURE 1: Social cooperation model for RE projects and a just energy transition



Note: PDCA = plan-do-check-act.

Source: TRUST. (2023.) <https://bit.ly/45yainH>

Solution 2

Unleashing the full power of industrial clusters

Colombia’s industrial sector accounted for more than 25% of the country’s GDP in 2022, making it crucial to the nation’s energy transition. The country already has various decarbonization strategies in place, including plans that focus on enhanced energy efficiency, electrification and the development of RE and green hydrogen. The working group suggested that stronger public–private and private–private collaboration could help further cooperation and contribute to a unified vision in terms of achieving national energy targets.

Industrial clusters – geographical areas in which industrial companies are co-located – present a

unique opportunity to drive investment in clean energy. In addition to unlocking scale, sharing risks and enhancing efficiency, they also bolster regional competitiveness, contributing to GDP and job creation.

To this end, and to maximize its economic, employment and energy potential, the Cartagena Industrial Cluster is considering joining the World Economic Forum’s Transitioning Industrial Clusters initiative. This network includes over 20 industrial clusters in more than 10 countries and five continents, all committed to accelerating the transition to net zero.

Solution 3

Clean hydrogen lending facility

Colombia has set ambitious targets to become a regional hub for hydrogen, aiming to offer production at the competitive cost of \$1.70/kg.³³ However, sparking the clean hydrogen market in Colombia has proven challenging, notably due to the lack of financial commitments at an early stage of development, when demand is not yet clearly defined and financial vehicles are limited.

At the initiative of the European Union, and based on lessons learned from other countries, the concept of a clean hydrogen lending facility was proposed by the working group as a way to bolster investment in Colombia. Such a facility was implemented in Chile, where multilateral development banks (MDBs), such as the Inter-American Development Bank (IDB), the World Bank and KfW Development Bank, together with the Chilean economic development agency CORFO, helped raise more than \$1 billion for

scaling clean hydrogen production. In order to establish a clean hydrogen lending facility in Colombia, a strong local management institution with technical, financial and transactional power is a prerequisite. Moreover, building on the Chilean model, the involvement of MDBs as well as the Colombian government will be required, and monitoring and auditing processes will be needed to enhance transparency and measure the performance of the fund. Finally, allowing blended finance to diversify the lending instruments will strengthen the fund's operation.

Acknowledging that the facility would need to be tailored to the local context and capabilities to manage the financial and sovereign risks, MDBs, such as the IDB and World Bank, will actively champion this concept in the coming months with a view to finding a suitable agency in Colombia to replicate the Chilean model.

Solution 4

Insurance facility for energy transition projects

As with every emerging technology, financing challenges can be reduced by the ability to limit and transfer risks. For Colombia to grow the potential bankability of hydrogen projects and improve their risk profile, the working group proposed a specialized risk transfer programme that can bring global expertise to bear on local conditions to alleviate concerns regarding insurance market provisions for emerging technologies.

In that spirit, Marsh has introduced a first-of-its-kind insurance and reinsurance facility with dedicated capacity for new and existing green and blue hydrogen energy projects in all countries. This facility is led by global insurers Liberty Mutual, AIG, Starr Insurance and Axis Capital and supported by other insurers including Munich Re, Allianz, SCOR, Chubb and Markel. It provides up to \$400 million of pre-agreed

insurance coverage and uniform terms for all risks related to construction, operation and marine cargo, including delays in start-up during those phases, as well as property damages, business interruption, third-party liabilities (some countries excluded) and risk engineering services.

This solution currently affords Colombia's clean energy market an option to transfer risk in a standardized way, which will not only expedite the process of securing insurance but can also incentivize capital and financial deployment for these developments and reinforce the bankability of projects. Leading this effort, Marsh is partnering with international carriers to secure capacity and guarantee conditions stated in the facility. The solution is expected to be deployed by Marsh and used on larger developments for hydrogen in Colombia.

Conclusion

Colombian stakeholders and government entities are urged to consider the recommendations presented in this paper and take action to create an enabling environment for clean energy investments in the country.

Over the coming months, local institutions will work to put this paper's recommendations into effect, guided by detailed implementation plans and supported by working group members. For example, MDBs involved with the working group are striving to implement a clean hydrogen lending facility tailored to Colombia's context, while an industrial cluster in the city of Cartagena to scale and unlock clean energy finance is being explored. Equally,

Marsh expects to deploy an insurance facility for energy projects in the country, and TRUST, together with championing stakeholders, is taking steps to implement a social cooperation model.

The group's members anticipate that the insights gained from this initiative will support Colombia's energy transition efforts as well as Latin America's overall regional decarbonization journey.



Appendix A: Barriers to clean energy investment

The following barriers to investment were identified through consultations with members of the working group and serve as the basis for the proposed solutions in this paper.

FIGURE 2: Analysis of barriers to clean energy finance in Colombia

Barriers to investment – solar and wind

← +++ Barrier criticality + →

	Permitting	Social acceptance	Regulatory/policy framework	Supporting infrastructure	Financial market
↑ +++ Frequency during consultation + ↓	1. Non-specialized process for licensing of RE technologies	1. Difficulties in cooperation and negotiation with local communities have delayed the implementation of key enabling projects, generating distrust in future developments and engagements	1. General institutional uncertainty and regulatory instability lowering investors' confidence and appetite to invest (e.g. removal of RE incentives, change in RE tariffs, tax reform and announcement of price caps)	1. Insufficient transmission and distribution (T&D) infrastructure is the biggest impediment to RE deployment (especially wind)	1. High cost of capital compared to other countries in the region
	2. National and regional agencies present limited operational capacity to process social and environmental licences	2. Lack of coordination and definition of roles among key stakeholders	2. Targets and implementation paths sometimes uncoordinated across national, subnational and local governance levels	2. Lack of clarity and institutional integration on T&D deployment planning for short, medium and long term	2. Currency risks lower attractiveness of energy projects that are financed in Colombian pesos
	3. Permitting delays due to complex procedures, extensiveness of information required, long response times and missing guidelines on quality standards in the case of equipment and project elements	3. Lack of awareness and clarity on tangible objectives as well as minimum requirements for project developers on just energy transition aspects	3. Uncertainty on potential amendments to utility Laws 142 and 143, affecting expectations concerning future power-market dynamics	3. Infrastructure deficiencies to support untapped high-potential areas limiting access to these projects	3. Transactional costs for local developers when dealing with concessional finance
	4. Uncertainty on timelines and lack of clarity on roles and responsibilities over the project life cycle as well as high turnover				4. Counterparty risk is perceived to be high
	5. Complexity and lack of anticipation regarding procurement and auction processes and prior consultation processes				
					Incentives
					1. Fiscal incentives for RE are perceived as inefficient in fostering the energy transition
					2. Lack of strategic partnerships to generate efficiencies and manage risks

Note: These barriers were identified during workshops and consultations with working group members.

Barriers to investment – clean hydrogen

← +++ Barrier criticality + →

	Regulatory/policy framework	Market maturity	Supporting infrastructure	Incentives	Financing
↑ +++ Frequency during consultation ↓	1. Unclear regulatory and policy framework surrounding clean hydrogen, particularly the absence of a regulatory framework for hydrogen production	1. Lack of domestic demand/difficulties finding offtakers (including in key sectors such as cargo transportation, air transportation and steel and cement production) limits project bankability	1. Limited installed capacity from solar and wind sectors affects the ability to generate and produce hydrogen at scale	1. Existing subsidies structure creates a competitiveness gap with fossil fuels	1. Limited access to financing vehicles and financial support for pioneering projects; concessional financing has moved the sector, but the local traditional financial market has historically been more conservative in the early stages of new technologies
	2. Inconsistencies across national transition roadmaps in hydrogen targets and trajectories	2. Current clean hydrogen projects tend to be smaller in size, which hinders competitiveness with other technologies and regions	2. Lack of supporting T&D infrastructure (new and existing) creates a bottleneck and increases the cost of electricity for hydrogen production	2. Lack of clarity and fiscal incentives' alignment to develop new energy transition projects and reach maturity of the hydrogen market	2. Limited availability of guarantees and multinational financial vehicles to help close the financial gap, as a result of the lack of long-term formal agreements in this industry
	3. Missing signals on environmental licences and social enablers in high-potential regions related to hydrogen production	3. Uncertainty on the purchase conditions of hydrogen and its derivatives	3. Poor port connectivity due to the absence of pipelines hinders the transport of hydrogen	3. Poor port connectivity due to the absence of pipelines hinders the transport of hydrogen	
	4. According to Law 2099, "green hydrogen" is only that produced through non-conventional renewable energy sources, excluding other sources of electricity generation (such as hydroelectric plants)	4. High costs due to a lack of competitive RE energy and transmission infrastructure	4. Difficulties in deploying technically trained workforce to develop clean hydrogen hubs		
+		5. Small and medium-sized enterprises are currently excluded from development processes			

Note: These barriers were identified during workshops and consultations with working group members.

Appendix B: Key abbreviations

ANDESCO – Asociación Nacional de Empresas de Servicios Públicos y Comunicaciones

ANDI – Asociación Nacional de Empresarios de Colombia

ANLA – National Environmental Licensing Authority/Autoridad Nacional de Licencias Ambientales

CARs – *corporaciones autónomas regionales*

CIPE – Intersectoral Commission for Infrastructure and Strategic Projects/Comisión Intersectorial de Infraestructura y Proyectos Estratégicos

CONPES – National Council for Economic and Social Policy/Consejo Nacional de Política Económica y Social

CREG – Commission of Energy and Gas Regulation/Comisión de Regulación de Energía y Gas

DNP – National Planning Department

FDI – foreign direct investment

FENOGUE – Non-Conventional Energies and Energy Efficiency Fund

FNCRE – non-conventional renewable energy source

GDP – gross domestic product

GEB – Grupo Energía Bogotá

GHG – greenhouse gases

GREG – Commission of Energy and Gas Regulation/Comisión de Regulación de Energía y Gas

ISA – Interconexión Eléctrica

JET – just energy transition

MDB – multilateral development banks

MME – Ministry of Mines and Energy

NDC – nationally determined contribution

PEN – National Energy Plan

PINES – Projects with National and Strategic Interest

PND – National Development Plan/Plan Nacional de Desarrollo

PV – photovoltaic

RE – renewable energy

SIC – Superintendency of Industry and Commerce/Superintendencia de Industria y Comercio

SIN – National Interconnected System/Sistema Interconectado Nacional

SSPD – Superintendency of Residential Public Services/Superintendencia de Servicios Públicos Domiciliarios

STN – National Transmission System/Sistema de Transmisión Nacional

T&D – transmission and distribution

UPME – Mining and Energy Planning Unit/Unidad de Planeación Minero Energética

XM – Compañía Expertos en Mercados

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Endnotes

- 1 Climate Action Tracker. *Colombia: Targets*. <https://climateactiontracker.org/countries/colombia/targets/>
- 2 Organisation for Economic Co-operation and Development (OECD). (2022). *Enabling conditions for bioenergy finance and investment in Colombia*. https://www.oecd-ilibrary.org/sites/20f760d6-en/1/3/1/index.html?itemId=/content/publication/20f760d6-en&_csp_=70262acfb1cd9004dc67320724a210c&itemGO=oecd&itemContentType=book#section-d1e803
- 3 Ibid.
- 4 World Integrated Trade Solution. (2021). *Colombia trade*. <https://wits.worldbank.org/countrysnapshot/en/col/textview>
- 5 International Energy Agency. (2023). *Colombia 2023*, p. 23. <https://iea.blob.core.windows.net/assets/2fa812fe-e660-42f3-99bc-bd75be3ca0b5/Colombia2023-EnergyPolicyReview.pdf>
- 6 World Economic Forum. (2024). *Fostering effective energy transition 2024*. <https://www.weforum.org/publications/fostering-effective-energy-transition-2024/>, p. 12.
- 7 Climate Action Tracker. *Colombia: Targets*. <https://climateactiontracker.org/countries/colombia/targets/>
- 8 Departamento Nacional de Planación. (2022, 30 March). *Aprobado CONPES de transición energética que consolidará el proceso hacia un desarrollo y crecimiento económico sostenible*. <https://www.dnp.gov.co/Prensa/Noticias/Paginas/aprobado-conpes-de-transicion-energetica-que-consolidar%C3%A1-el-proceso-hacia-un-desarrollo-y-crecimiento-economico-sostenible.aspx>
- 9 Government of Colombia. *Colombia's hydrogen roadmap*. https://www.minenergia.gov.co/documents/5862/Colombias_Hydrogen_Roadmap_2810.pdf
- 10 International Energy Agency. (2023). *Colombia 2023: Energy policy review* <https://iea.blob.core.windows.net/assets/2fa812fe-e660-42f3-99bc-bd75be3ca0b5/Colombia2023-EnergyPolicyReview.pdf>
- 11 The 18.4MW Jepiachi wind project (which ceased operations in October 2023) was officially noted by XM as retired in May 2024, temporarily bringing official wind capacity to 0MW. However, at the time of writing, two projects (Guajira 1 and WESP01), contributing 31.9MW, were being tested.
- 12 At the time of writing, additional solar capacity is in the testing phase, and total capacity is estimated to reach 1.8GW by the end of 2024.
- 13 International Renewable Energy Agency. (2021). *Renewable energy auctions in Colombia: Context, design and results*. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/March/IRENA_auctions_in_Colombia_2021.pdf?rev=e435cdecafc740c8a1bf2ce3fbfec84c
- 14 Government of Colombia. (2014). *Article 5, para. 17, Ley 17.915 de 2014*. http://www.secretariassenado.gov.co/senado/basedoc/ley_1715_2014.html
- 15 Gutiérrez, A. S., Morejón, M. B., Cabello Eras, J. J., Ulloa, M. C., Martínez, F. J. R., & Rueda-Bayona, J. G. (2020). Data supporting the forecast of electricity generation capacity from non-conventional renewable energy sources in Colombia. *Data in Brief*, 28, 104949. <https://doi.org/10.1016/j.dib.2019.104949>
- 16 Organisation for Economic Co-operation and Development (OECD). (2022). *Enabling conditions for bioenergy finance and investment in Colombia*. https://www.oecd-ilibrary.org/sites/20f760d6-en/1/3/1/index.html?itemId=/content/publication/20f760d6-en&_csp_=70262acfb1cd9004dc67320724a210c&itemGO=oecd&itemContentType=book#section-d1e803
- 17 Congreso de la República de Colombia. (2024, 15 May). *La primera década de la 1715*. <https://www.senado.gov.co/index.php/component/content/article/13-senadores/5502-la-primera-decada-de-la-1715>
- 18 Inter-American Development Bank. (2023, 8 December). *The IDB launches clean hydrogen certification system and sponsors decarbonization declaration for heavy industry* [Press release]. <https://www.iadb.org/en/news/idb-launches-clean-hydrogen-certification-system-and-sponsors-decarbonization-declaration>
- 19 UPME. *Plan de expansión de transmisión 2022–2036*. https://www1.upme.gov.co/siel/Plan_expansin_generacion_transmission/Plan_de_Expansion_2022-2036_VF.pdf
- 20 Stockholm Environment Institute. (2023, March). *Solar and wind power in Colombia: 2022 policy overview*. <https://www.sei.org/wp-content/uploads/2023/03/solar-wind-colombia-sei2023.015.pdf>
- 21 International Energy Agency. (2023). *Colombia 2023: Energy policy review*. <https://iea.blob.core.windows.net/assets/2fa812fe-e660-42f3-99bc-bd75be3ca0b5/Colombia2023-EnergyPolicyReview.pdf>
- 22 Autoridad Nacional de Licencias Ambientales (ANLA). <https://www.anla.gov.co/noticias-anla/luz-verde-a-licencia-ambiental-del-proyecto-de-energia-electrica-colectora-en-la-guajira>
- 23 Affinitas. (2020, December). *Investor's guide to the legal aspects of energy projects in the countries of the Pacific Alliance*. https://affinitaslegal.com/wp-content/uploads/2021/03/2020_ProColombia_Energy_LegalGuide-ENGLISH.pdf
- 24 Paez, A. D. (2024, 8 May). *Colombia racing to commit to Just Energy Transition in La Guajira?* Translated by V.H. Gómez. Latin America Bureau. <https://lab.org.uk/colombia-racing-to-commit-to-just-energy-transition-in-la-guajira/>

- 25 | Government of Colombia. (2014). *Article 11, Ley 1715 de 2014*. http://www.secretariassenado.gov.co/senado/basedoc/ley_1715_2014.html
- 26 | Ibid. Article 12.
- 27 | Ibid. Article 13.
- 28 | Ibid. Article 14
- 29 | Information supplied by MME.
- 30 | SIN Juriscol. (2024, 9 April). *MME Resolution 40123*. <https://www.suin-juriscol.gov.co/clp/contenidos.dll/Resolucion/30051458>
- 31 | International Energy Agency. (2023). *Colombia 2023: Energy policy review*. <https://iea.blob.core.windows.net/assets/2fa812fe-e660-42f3-99bc-bd75be3ca0b5/Colombia2023-EnergyPolicyReview.pdf>
- 32 | Reuters. (2023, 25 May). *Enel suspends Colombia wind farm construction after years of progress*. <https://www.reuters.com/business/energy/enel-suspends-colombia-wind-farm-construction-after-years-protests-2023-05-24/>
- 33 | Government of Colombia. *Colombia's hydrogen roadmap*. https://www.minenergia.gov.co/documents/5862/Colombias_Hydrogen_Roadmap_2810.pdf



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