

REGULATORY CHALLENGES AND IMPROVEMENTS

FOR ELECTRIC DISTRIBUTION IN THE LATIN AMERICAN ENERGY TRANSITION

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Regulatory challenges and improvements for electric distribution in the Latin American energy transition

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Date

May 2023

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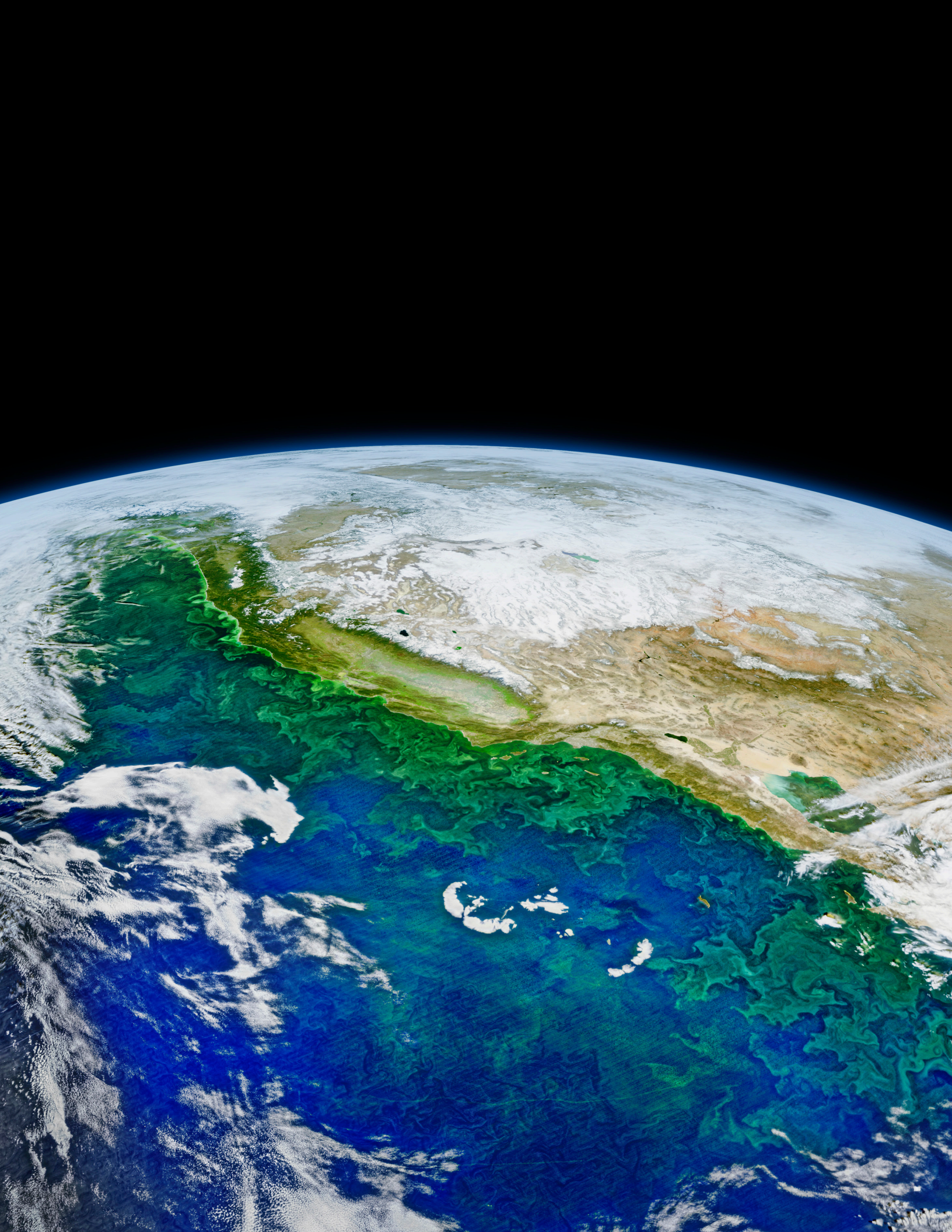
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1. Introduction and Objectives

All over the world, we are currently facing the challenges of limiting the impacts and adapting to climate change. In Latin America, we have taken important steps to replace fossil fuels with renewable energies for electricity generation, based on our immense natural resources: water, sun, wind, among others. However, the challenge of climate change is so great that we must address it from different fronts, since only 20% of the total energy we use corresponds to electricity and the rest is mostly fossil fuels: part of this remaining 80% can be decarbonized through energy efficiency and electrifying energy consumption. In addition, we have yet to adapt to climate change, which will lead to more frequent occurrences of extreme weather events, for which we must be prepared.

In this new scenario, Distribution System Operators ("DSOs") have a key role to play, since in order to advance in the energy transition it is essential to have a safe and reliable power supply; to transfer greater benefits to the consumer; and to enable and promote the massive entry of distributed energy resources ("DERs"), such as storage and renewable energy generation. In addition, DSOs should manage the charging of millions of electric vehicles in cities; enable millions of homes to be heated with electricity and enable thousands of businesses to electrify their processes.

All of the above, while ensuring that the benefits of the transition reach as many people as possible, which poses challenges in terms of delivering an affordable service to the entire population and ensuring coverage, quality and resilience not only in cities but also in large rural areas, often with little infrastructure. On the adaptation side, the DSOs will have to increase their resilience to face a scenario in which more and more extreme and unexpected climatic events will occur in some regions, such as snowfall and icing, floods, forest fires, storms, heat waves, high-speed winds, among others.

All of the above requires, as a matter of urgency, that DSOs and their regulations migrate towards a more dynamic approach of the grid operation, integrating new technologies and solutions, abandoning the paradigm designed in the 20th century for a unidirectional and analog electric system in which technology developments such as smart grids, electric mobility, distributed generation, storage, were not yet developed.



2. Challenges of Electric Distribution Systems in Latin America

The distribution infrastructure must be the digital platform that helps the energy transformation process to be an integral part of the economic, climatic, social, service quality and coverage changes that the inhabitants of our region are facing.

Although reliability levels have improved in Latin America, this new dynamic requires a substantial and faster improvement in quality service indexes, especially considering that the share of electricity consumption in the energy matrix will increase significantly in the near future. In order to accelerate this process in our region, incentives must be properly located, as has already happened in some successful experiences. A clear example of this is the experience in Europe, where in addition to increasing the benefits for consumers, the System Average Interruption Duration Index (SAIDI) is measured in minutes, while in our capitals we are still above five hours and in rural areas it is several times that value.

Reliability levels are directly related to the incentives provided by the regulatory framework, which in Latin America has been focused on minimizing distribution costs subject to a certain level of quality, and thus the lower investments have had an effect on reliability levels. Understanding the balance between costs and reliability is fundamental, as a higher level of reliability may require greater investments in the network which, in any case, will generate economic benefits for consumers.

In this sense, the energy transition will give **consumers a leading role in the management of their own energy,** through the DSO platform. They will cease to be a one-way receiver of electricity to assume an active role, evaluating and deciding in real time on their tariff options,

“Understanding the balance between costs and reliability is fundamental, as a higher level of reliability may require greater investments in the network which, in any case, will generate economic benefits for consumers.

> New role of distribution infrastructure as a platform and enabler of the energy transition.

consumption, surplus injections to the public grid, storage, all based on a wide range of available and traceable data and information provided by the grid or the platform.

This paradigm shift requires a change in the traditional vision of the electricity distribution regulation, moving from **an approach that seeks to minimize investment costs, subject to a certain level of quality, to a model that seeks to maximize, for society in general, the value of investments,** especially in the technologies needed to enable the energy transformation process and the **new role of distribution infrastructure as a platform and enabler of the energy transition.** This modernization process should address what we have defined as the three macro-challenges for the regulation and modernization of electric distribution:



a. Achieving higher levels of service quality and increasing resilience in distribution systems

The quality of service is key to the energy transition, ensuring the continuity and reliability of supply, which allows the efficiency and feasibility of energy consumption´s electrification. To improve quality, it is necessary to digitalize and automate the network; expand the meshing to increase the possibilities of available substitutes for a fortuitous event; substantially increase the number of tele-controlled and autonomously operating equipment at the different voltage levels of the network; ensure the coordination of the new elements that are incorporated into the network, whether they are owned by utilities or third parties; and especially, make maximum use of the available flexibility. An example of these improvements and their benefits are the systems that allow recovering in a few minutes or seconds, automatically, up to 90% of the service after an interruption, redistributing the affected customers to alternative lines (substitutions) by means of tele-controlled equipment and with its own logic of action, in case of unexpected events.

The concept of resilience should also be introduced in distribution systems, referring to the ability to limit the scope, severity and duration of system degradation after the occurrence of an extreme event (CIGRE, Working Group SC C4.47). This is key today, considering that as a result of climate change, what used to be exceptional events such as snowstorms, storms, floods, tornadoes or forest fires, among others, are now increasingly recurrent events or are occurring in regions where they are not normally expected to occur (such as snowstorms in tropical areas and strong winds in areas traditionally exempted from them).

To achieve this in the timeframes required by the energy transition, it must be ensured that DSOs have adaptability and incentives to make the necessary investments and expenditures to improve the quality of service and increase the resilience of their systems. Therefore, new regulatory developments different from those associated with classical reliability are required.



It must be ensured that DSOs have adaptability and incentives to make the necessary investments and expenditures to improve the quality of service and increase the resilience of their systems.

b. To sustainably transform the grid as a platform for connecting, disposing, exchanging and enabling a new set of uses, exchange models and actors associated with the energy transition

The energy transition will bring changes in the way users interact with technology and thus modify their consumption habits, which will be accompanied by new technologies, services and business models. In this new scenario, the DSO will be the enabling platform for these interactions to be carried out efficiently and securely.

> DSO must be an "orchestrator" of the system, interacting instantaneously with the various participants, through robust information systems that ensure the quality and interoperability of the new assets to be introduced into the grid.

- **Facilitate the entry of new technologies, actors and business models:** the DSO must be an "orchestrator" of the system, interacting instantaneously with the various participants, through robust information systems that ensure the quality and interoperability of the new assets to be introduced into the grid, whether these are its own or from third parties; fulfilling the role of platform, that registers and settles the entire set of new parameters and exchanges and; that allows the simultaneous operation of microgrids, distributed generation, storage systems and electric vehicle charging, among other aspects, guaranteeing a coordinated, safe and reliable operation.
- **Facilitate the integration of DERs:** in the coming years we will witness the massive entry of projects of different scales of distributed generation by industries and households, accompanied by various storage capacities. Faced with these new incorporations, the great challenge for the DSO is to connect them in a timely manner, simplifying the procedures, reducing the time together with the intervening authorities, and expanding the nodes with the highest number of simultaneous requests or of those that exceed the available power. In this sense, the challenge has technical, logistical, permitting, construction, financial and economic components. Regarding this last point, it is important to ensure the recovery of investments and expenses for the proper operation and maintenance of this new network dynamics.

This must be addressed urgently, as it is natural that self-consumers cover part of their consumption and sell their surpluses when the required solar or wind conditions are available, which, depending on

the type of regulatory methodology adopted by each country, could affect the recovery of investments from DSOs and compromise this technological evolution. Ensuring bi-directional flows and reliability of supply, regardless of the source of origin at any given time, will continue to be a central mission of distribution, a key element of the energy transformation and a primary need of each and every customer connected to the grid.

A power-based payment can effectively mitigate this demand risk, as has happened in Spain, Italy and recently Brazil, **becoming a great facilitator of the energy transition by giving clear signals before the integration of DERs,** avoiding cost transfers between them and consumers without distributed generation or self-generation.

- **Increasing grid flexibility:** as we have pointed out above, on the one hand, grids will have a massive penetration of renewable generation at the distribution level, which will operate intermittently, and on the other, they will have a greater variable demand for energy, as a result of the electrification of consumption. In this new scenario, it is key to have greater flexibility, which is the ability to temporarily or spatially modify



energy consumption or generation to meet power demand within the physical requirements of the system and the grid. The more generation or demand can be varied temporally or spatially, the more variable renewable energy can be incorporated into the system without requiring additional grid. In this sense, flexibility will be a key factor in optimizing power system costs.



Sandboxes are a great tool for stimulating innovation without requiring major legal changes in the first stage, until the benefits of the pilot are proven and it is decided to approve its generalized use.

- **Cybersecurity:** Cybersecurity is a key issue in view of the growing demand for data transmission, increasingly complex management systems and automated equipment distributed throughout the network. The incorporation of information systems, automation and network management software, among others, will increase the cyber vulnerability of the system, so it is crucial to have adequate and robust security measures in place to protect data and systems and minimize the consequences of cyber incidents.
- **Allowing the development of regulatory sandboxes:** evolving in a transformational environment requires innovation, which has led National Regulatory Authorities and DSOs to promote it through tests and pilots, known as "regulatory sandboxes", which allow, in controlled spaces and environments, to temporarily relax the current regulation, while new functionalities, technologies, products or services are tested and their objective benefits are proven, before their definitive adoption and scaling up. In Brazil, since 2021, regulatory agencies may authorize an experimental and temporary regulatory environment, subject to simplified rules, for the development of innovative business models and the testing of experimental techniques and technologies, in addition to allowing the use of resources from the Distributors' Research and Development Program (corresponding to 0.75% of net operating revenues) to finance sandboxes. In this sense, sandboxes are a great tool for stimulating innovation without requiring major legal changes in the first stage, until the benefits of the pilot are proven and it is decided to approve its generalized use.
- **Sustainably transforming the grid:** Investing in grid sustainability has environmental and social benefits consistent with the purpose of grid modernization, such as the industry's contribution to Net Zero by implementing a circular economy approach to this process, which in turn can impact a trend towards more affordable tariffs.

c. Promote economic efficiency of the entire electricity system, matching supply and demand

- **Apply hourly rates and incentivize demand management and response:** a more efficient and intelligent use of energy should be encouraged, generating the appropriate incentives to optimize the relationship between energy consumption and production. To this end, on the one hand, progress must be made in the use of hourly or time-of-use tariffs applicable to all supply chain of the service, to reflect the cost of the amount of energy available throughout the day and the level of network congestion. On the other hand, it is key to encourage the development of demand response programs, for which it is convenient to think about the **implementation of incentive mechanisms,** either in the context of large customers or demand aggregators, so as **to increase the attractiveness of participating and incentivize the development of enabling investments.** Demand response



> The grid –or platform of the near future– will require an unprecedented investment plan.

should become an additional resource for the Wholesale Market and an alternative in the retail markets.

- **Efficiently incorporate Advanced Metering Infrastructure (AMI), also known as Smart Meters:** in order to transmit efficient price signals to customers, increase service quality and incorporate new solutions and business models, AMIs should be an inherent part of distribution systems. There are certain limitations to its massification, such as the voluntariness of the consumer to install them, so additional incentives should be evaluated to allow customers to internalize the benefits of migrating to Smart Metering Systems, such as enabling dynamic bidirectional flows; real-time sectorized balancing; reduced fault location and replacement times; multiple daily measurements; increased facilities for electrification of uses by the customer; facilities for changing supplier, at zero cost; modulated energy



supply for required cases; reduction of reading costs and connection and disconnection operations.

This energy transformation in distribution will generate significant economic surpluses on the demand side. For this, **the grid –or platform of the near future– will require an unprecedented investment plan,** which makes it essential to have a **regulation that adequately locates incentives and recognizes investments *ex ante*, in order to ensure and accelerate the installation and construction plans of infrastructure, to be achieved in an efficient and timely manner and remunerated by all users.** This will require that regulatory institutions continue to incorporate new skills, knowledge and methodologies to keep pace with these new needs, as well **as a level of independence that guarantees a stable legal framework,** that seeks to maintain investor confidence over time.





3. Integrated and Adaptive View of Electricity Regulation

The region's electricity markets have many similarities in terms of their historical evolution and the challenges to be faced in the future. At the same time, the countries have adopted regulatory solutions with similar nuances, while diverging in some other respects. One of the common elements adopted so far is the role delegated to distribution and its low level of recognized investment costs.

Focusing on the near future and having as a fundamental objective to increase the competitiveness of countries and increase the benefits for the consumers, leveraging on the energy transformation, distribution requires accelerating its transformation and therefore, its investment train, which must be focused and efficient.

The regulatory adaptation necessary for the energy transformation, although it must consider the characteristics of each country, presents common challenges to advance in the issues of sustainability, quality, coverage, economic efficiency and equity. As noted above, regulation should seek to maximize social benefits and the most efficient use of the DSO digital platform, while developing the principles of Decarbonization, Electrification, Digitalization, Decentralization and Democratization of the market and access to new energy services.

In addition, in order to provide consistency, time coherence and effectiveness to the above principles, it is important that public policy presents goals and objectives to be achieved by regulators and companies in the sector, especially for the deployment of critical infrastructures. Specific goals should be defined taking into account the national context, especially the availability of resources to finance infrastructure investments, considering the need for affordable tariffs

> Regulatory schemes have prioritized minimum cost while meeting a defined quality standard, which has not generated the necessary –or sufficient– incentives for companies to focus on service quality.

for users and the maximization of their benefits. The implementation schedule should leverage on existing infrastructure, in addition to optimizing the replacement of infrastructure nearing the end of its useful life, taking advantage of the advent of new components and the existence of new frontiers of state-of-the-art technology, in order to include them in the network and, thus, start now the required evolution.

The first step for energy transformation in the region consists of establishing, in a decisive and timely manner, a set of political and public guidelines that will align the public interest, business models and regulation of the energy sector. In many cases, **this transformation requires regulatory changes that are within the reach of regulators, who can start this process now,** encouraging investment and innovation to modernize the networks in accordance with the requirements of the energy transition.

Notwithstanding the above, three aspects common to all countries have been identified, which should be prioritized in the short term, in order to achieve effective adjustments in the distribution activity, in preparation for the future scenario. These actions seek **to provide the necessary tools and economic signals to strengthen and modernize its networks,** in a timely and efficient manner, in its process of transformation into a reliable, open, concurrent and robust transactional platform, which is urgently required by the energy transition in the countries. These three aspects are:

a. Mechanism to promote continuous improvement in service quality and to increase the resilience of distribution systems.
b. Incentives for remuneration of actual costs associated with the distribution service asset base.
c. Timely and adequate remuneration of investments consistent with the needs and priorities of the energy transition.

a. Mechanism to promote continuous improvement in the quality of service and to increase the resilience of distribution systems

As the network is a natural monopoly, companies' tariffs are regulated. Regulatory schemes have prioritized minimum cost while meeting a defined quality standard, which has not generated the necessary –or sufficient– incentives for companies to focus on service quality. For this reason, since the end of the 1990s in the USA and since 2000 in Europe, regulations have been developed that focus on improving service quality, analyzing desirable and achievable quality levels and defining incentives to achieve the objective effectively.

In Latin America, the Inter-American Development Bank, in its study on the Impact of regulation on the quality of electricity distribution service in Latin America and the Caribbean (2021), showed the direct relationship between the adoption of service quality regulation based on SAIDI and SAIFI indicators and the improvements in country-average quality observed in 17 Latin American countries. Only two of the countries analyzed, Brazil and Colombia, also implemented incentive schemes for companies and, in these countries, more significant improvements were observed. In Colombia, since 2019, the starting year of the second incentive scheme, improvements close to 24% in SAIDI and 57% in SAIFI have been identified, which demonstrates the effectiveness in the implementation of this type of incentives.

Although it is evident that there have been improvements in quality in the region, the SAIDI is still between 5 and 8 hours for the main cities, and up to 10 times longer in rural areas, which shows a significant room for improvement, especially in a scenario of massification of distributed generation and self-generation, for which continuity of supply is key.

On the other hand, it is essential to increase the resilience of the network in parallel, because although quality and resilience are two complementary elements, each one requires a different investment and incentive strategy, since a reliable infrastructure is not necessarily resilient.

Reconciling quality, resilience, efficiency and fair prices is a great challenge, not only because users value quality differently, but also because, in general, the form of remuneration over several years and without ex ante recognition of investment efforts means that companies tend to shift their improvement plans to the end of the period in order to make their financing viable. Moreover, in some countries, remuneration is not based on the actual companies but on estimated costs of a hypothetical company considered as a "best practice" benchmark; on other occasions, remuneration methodologies do not explicitly recognize investments for technological improvements that help to improve network management, increase quality and reduce losses.

Based on international experience, **the first proposal is to incorporate symmetrical incentives to improve service quality and increase network resilience, at an efficient cost.** In particular, we suggest that the incentive scheme should have at least the following elements:

1. **Quality indicators:** they are key to diagnose current quality and set improvement goals. The most commonly used indicators, that also allow standardization, are those that measure average quality of service (SAIDI, SAIFI, CAIDI, CAIFI and MAIFI). However, they must be accompanied by criteria to exclude interruptions due to extreme events, which have a greater impact on resilience.



2. **Identification of resilience criteria:** work on resilience is still underdeveloped internationally and especially in our region, which makes it necessary to begin by establishing resilience measures and criteria that, together with investment plans and strategies, will make it possible to prevent the impacts of extreme events, strengthening networks and developing capacity for anticipation and coordination, in order to be prepared for their occurrence, react in a timely manner and recover service as soon as possible.

3. **Targets and/or Standards:** targets set the DSO on a path of continuous improvement. In the case of quality, defining incentives on average quality makes it necessary to establish other indicators to limit the dispersion of quality around the average, protect the "worst-served" users and promote generalized improvement, thus avoiding concentrating on circuits with higher density. In Colombia, for example, the segmentation of standards by risk level and the analysis of the configuration and actual state of the networks, made it possible to estimate achievable quality levels in the short term, with a moderate level of investment and expenses. This was complemented with compensation to users with poor individual quality indicators, to encourage them to work on the quality of the "worst served".

   In this regard, it is necessary to consider the exceptional characteristics some markets may have due to the difficulty in their operation, as well as investment efficiency variables when optimum levels of quality have been reached, in order to find an adequate balance of requirements.

   To develop resilience goals, it is key to start by identifying the type of risks or events to be mitigated and the parts of the system and the type of impacts that are of greatest interest.

4. **Incentives and compensation:** Targets are used to define economic incentives –higher or lower revenue– depending on whether or not they are met. Incentives tend to increase as the DSO improves with respect to the targets and must be sufficient to mobilize the DSO, but without excessively impacting the tariff or risking the DSO's financial viability. The higher the quality, the higher the costs may be hence the importance of reasonably defining short, medium and long-term objectives and setting



Although quality and resilience are two complementary elements, each one requires a different investment and incentive strategy, since a reliable infrastructure is not necessarily resilient.

caps on positive and negative incentives. Following the example of Colombia, the incentive –positive or negative– for each SAIDI or SAIFI indicator is estimated by the level of DSO investments in the year of evaluation.

> Regulatory incentives should seek to ensure economic efficiency and technological neutrality, avoiding predefined towards CAPEX-only or OPEX-only solutions.

One way to harmonize objectives, costs and remuneration is to include in the latter the recognition, in advance, of Investment Plans designed by the DSO and approved by the regulator, based on guidelines, principles and schedules previously established by the regulator. These procedures must be sufficiently flexible to allow the DSO to modify its Investment Plan upon approval, which facilitates the DSO's financial management and avoids the displacement of investments over time. This requires monitoring, audits and controls on the part of the regulator and preparation and a financing plan on the DSO's side.

Finally, regulatory incentives should seek **to ensure economic efficiency and technological neutrality, avoiding predefined towards CAPEX-only or OPEX-only solutions.** This is especially important, as the energy transition will require a high rate of investment and innovation such as digital assets, and the role of regulation as a promoter of efficient grid development and the recognition of new technical and market solutions will be vital.



b. Incentives for remuneration of actual costs associated with distribution service asset base

Once the technological and economic neutrality of the regulatory incentives have been assured, the tariff calculation methodology must also guarantee the recognition of a Regulatory Asset Base, the costs of which will be remunerated by the users of the distribution service.

There are two approaches in the region for remunerating distribution services. On the one hand, there is the approach based on the actual company, i.e., the existing infrastructure and operating capacity is recognized and valued. To prevent cost recognition leading to overinvestment (Averch-Johnson effect), incentives are established to ensure that investments are efficient. On the other hand, there is the approach based on idealized benchmarks, where the costs and revenues of real companies are compared with those of a model company. This company corresponds to an efficient fictitious company with optimized assets and capacity, which is used to set tariffs and remuneration. Brazil and Colombia have a remuneration mechanism based on real companies, while Chile, Argentina and Peru use model companies.

In a mechanism based on real costs, companies generally have the guarantee that their infrastructure and investments will be remunerated, with the benefit for the consumer of a low cost of capital. In order to avoid overinvestment, generating inefficient decisions (although leading to higher quality levels), regulation should control the volume of investments, establishing incentives for savings in addition to verifying prices, approving investment plans and applying audits. In the case of investments in new or advanced technology elements, in Colombia, for example, the concept of Special Constructive Unit was implemented, whereby the DSO makes a special remuneration request to the regulator for a specific asset.

In the model company-based compensation mechanism, on the other hand, compensation is set ex ante, based on the costs of an ideal company. Therefore, any cost savings of the real company translate into higher profits, as the compensation is decoupled from the company's decisions. While the mechanism leads to cost savings for the firm, it also necessarily leads to a significant rise in the cost of capital and a potential service quality problem if there are not adequate incentives

> There is a temporary mismatch between the remunerated asset base and the existing one, so that the new assets may not be fully compensated, creating an unbalanced incentive to use the infrastructure to the maximum, until the end of its useful life and postpone investments.

to invest (to counteract the incentive to save) and improve quality. In addition, there is a risk that the model company will be an unattainable and/or unpredictable benchmark, if applied in greenfield mode (not recognizing the legacy), resulting in higher capital cost increases for investments, slowing them down (reverse Averch-Johnson effect) and exacerbating quality problems.

The state-of-the-art and modern regulations show that a good remuneration scheme considers both the recognition of real costs and efficiency incentive schemes. Consequently, **it is recommended that Latin American countries move towards a scheme based on real costs, together with a package of incentives to ensure efficiency and the continuous improvement of performance indicators.** It is important that this process be carried out gradually, probably spanning several tariff periods until its full implementation.

c. Timely and adequate remuneration of investments consistent with the needs and priorities of the energy transition

We have already reviewed the importance of including incentives for quality and efficiency in the remuneration, in addition to using the real asset base. In this section we will address the convenience of including in the tariff calculation the investments foreseen in the tariff cycle.

There is a temporary mismatch in many countries in the region between the remunerated asset base and the existing one, so that new assets are remunerated, until the next tariff review, with the authorized revenues on the portion that should have been depreciated and written off of the old assets, so that the new assets may not be fully compensated, creating an unbalanced incentive to use the infrastructure to the maximum, until the end of its useful life and postpone investments.

In a context of technological maturity and market stability, this contributes to economic efficiency without compromising quality. However, in the context of the energy transition, which requires large investments in infrastructure and digitalization, failure to consider the planned investments may compromise quality and generate long-term economic inefficiency.

Internationally, Italy, Spain and Portugal, as well as Colombia and Argentina, allow annual review of the asset base to adjust for depreciation, amortization and investments, which requires greater supervision and audits.

Colombia's experience, on the other hand, with the use of investment plans aimed at achieving quality objectives, is an interesting example of how regulation can combine different instruments to serve the public interest effectively. Considering investment plans, while requiring rigorous monitoring and supervision, implies lower risks of loss of economic efficiency in the long run.

Therefore, following the European and Colombian experience, **it is recommended that the regulation of the distribution activity in Latin America include the remuneration of the assets foreseen in investment plans for the tariff cycle**, with timely follow-up, linked to the expected objectives, including the development of new technologies, such as the deployment of AMI, the digitalization of the network and the inclusion of DERs, linked to the results of quality objectives and other innovation and sustainability objectives, as well as those set by the regulation.





4. Conclusions

All the countries analyzed have adopted public policies, laws or regulations to comply with their respective climate change commitments. These commitments, from the energy sector, are part of the current energy transition, which consists of decarbonization, achieved by replacing fossil fuels with electricity from renewable sources, electrification of energy consumption and energy efficiency.

In this context, the main challenges for the Distributors are to achieve higher levels of service quality and increase resilience in distribution systems; to sustainably transform the grid as a platform for connecting, arranging, exchanging and enabling a new set of uses, exchange models and actors associated with the energy transition; and to promote the economic efficiency of the entire electricity system, coupling supply and demand.

The traditional regulatory approach of minimizing distribution costs subject to a certain level of service quality is incompatible with this new scenario, and we must move to a **focus on maximizing the benefits, for society, of investments in distribution**, which allows improving quality, increasing resilience and flexibility, as well as promoting innovation, economic efficiency, the massive entry of DERs and new business models with attention to sustainability issues.

This energy transformation in distribution will generate great social benefits, such as improved supply quality, greater grid resilience, lower losses, increased capacity for the integration of distributed renewable generation, as well as the electrification of mobility and buildings, among others, which will result in lower energy costs for users by replacing the use of fossil fuels.

For this, **the transformation of distribution will require an unprecedented investment plan**, which makes it essential for the

regulation to generate the appropriate incentives for investments to be made in an efficient and timely manner, which also requires a **regulator with great technical and independent capacity** to promote stable rules that maintain investor confidence over time.

To advance along this path, we have proposed **three regulatory improvements** that should be present in all countries, following international best practices. It should be noted that several of these recommendations have already been incorporated in some countries in the region and that several of them can be addressed by the regulator, without necessarily requiring legal changes.

The recommendations set out here seek to provide the DSO with the necessary incentives to improve, on the one hand, the quality of supply, a common issue in the countries analyzed and; on the other hand, to strengthen the networks to increase their resilience and thus make them more adaptable to the increasingly severe effects of climate change; a challenge that practically no country in the region is addressing and that must be tackled immediately.



The energy transition will require a modern, digital, automated, safe, resilient, flexible and sustainable distribution network, for which the traditional distributor will have to evolve considerably, which is in fact the desire and the strongest will of all our associates.

In addition, the recommendations seek to generate certainty for DSO investments, which will allow an efficient planning and encourage innovation and technological improvements, key for the energy transition.

Finally, the recommendations will enable the development of new business models around the distribution network, in addition to providing the right signals to consumers to do more energy efficiency and incorporate DERs.

The energy transition will require a modern, digital, automated, secure, resilient, flexible and sustainable distribution network that allows for the incorporation of new business models and DERs, for which the traditional distributor must have to cease to be just the operator of distribution networks and become the operator of the distribution system (DSO) capable of incorporating new business models and DERs on a robust, bidirectional and smart system.





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