

Report of the VIII World Forum  
on Energy Regulation (WFER)

# The Energy Transformation Challenge



**VIII WFER**  
PERÚ 2023

 **Osinergmin**  
Organismo Supervisor de la Inversión en Energía y Minería

 **ICER**  
International Confederation  
of Energy Regulators

**Report of the VIII World Forum on Energy Regulation (WFER)  
The Energy Transformation Challenge**

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# Table of contents



## Presentation

p. 04

## Welcome Remarks

p. 06

## WFER in numbers

p. 08

## Keynote Speech

p. 10

## 01

## Energy transition

p. 14

## 02

## Institutionality

p. 54

## 03

## Competitiveness

p. 90

## 04

## Universal Energy Access

p. 130

## 05

## Closing Remarks

p. 176

## 06

## Best of the Best at the ICER Awards

p. 182

## 07

## By way of conclusion

p. 186

## Reviews from the protagonists

p. 192

# Presentation



For the first time, a South American country, Peru, hosted the World Forum on Energy Regulation, the world's most important energy regulatory event that brings together regulators, companies, and experts from all over the world.

The VIII World Forum on Energy Regulation, entitled "The Energy Transformation Challenge: Competitiveness and Sustainability of Energy Markets, Opportunities, and Achievements," was attended by chairmen and representatives of regulatory agencies from more than 50 countries in the Americas, Europe, Africa, Oceania, and Asia.

At the forum, we shared ideas and perspectives on the challenges faced by the global energy sector and the institutions that oversight and regulate its dynamics.



As Osinergmin, we are proud to have organized this global event, which is a milestone for Peru and was listed by David Danner, former President of the International Confederation of Energy Regulators, as one of the most successful of the forums held so far.

Additionally, we believe that it achieved its objective of contributing to build a sustainable and resilient future and sharing information and good practices from different realities in the processes of energy transition, the development of renewable energy, e-mobility, and the impact of climate change in the energy sector, among others.

This document is intended to share the highlights and the main conclusions of the presentations. It is divided into five main sections including presentations in each thematic area: Energy

Transition, Universal Energy Access, Competitiveness, and Institutional. In addition, it summarizes the main activities developed in this transcendental event.

We hope you will find it a useful resource and it will make us renew our commitment to a world that faces these challenges with knowledge, optimism, and determination. We would also like to thank all the people and institutions that made this forum possible. Their talent and dedication were key to assisting our guests and ensuring that they have gained an unforgettable experience from their visit to Peru.

**Omar Chambergo Rodríguez**

Chair of the Board of Directors of Osinergmin





## WELCOME REMARKS

**David Danner**  
ICER Chair

**Omar Chambergo**  
Osinermin Chair

**Óscar Vera**  
Peru's Minister of  
Energy and Mines

The regulatory landscape is undergoing a profound global transformation, and nations are working to ensure the availability of secure energy services amid climate change and technological advances.

The Russia-Ukraine war and the COVID-19 pandemic, among others, have disrupted supply chains and the energy market globally. The challenges have no simple solutions and are shared by all. Therefore, this forum is an opportunity for dialogue



between regulators, authorities, and companies to identify problems, discuss possible solutions, and share success stories, said David Danner, ICER Chair.

On behalf of the International Confederation of Energy Regulators, he also acknowledged the work, perseverance, and commitment of Osinermin to organize the forum, even in difficult times marked by the global pandemic.

In turn, Omar Chambergo, Osinermin Chair, highlighted that, for the first time, a South American country hosted the world's most important energy regulation event. "At a time of unprecedented global transformation, Peru is presented as a living example of the richness and diversity of the nature and culture that unites us," he said.

He emphasized that energy regulators have a key commitment to building a sustainable and resilient future and pursuing innovative solutions to ensure that energy can reach the populations that need it most and improve its quality. In this context, he highlighted the diversity of the speakers at the forum, making it possible to address the challenges in the energy field from a global, inclusive, and equitable perspective.

Currently, Peru has a portfolio of 10 hydroelectric power plant projects and 12

wind and solar energy generation projects, accounting for a combined investment of US\$ 3.5 billion, said Peru's Minister of Energy and Mines Óscar Vera.

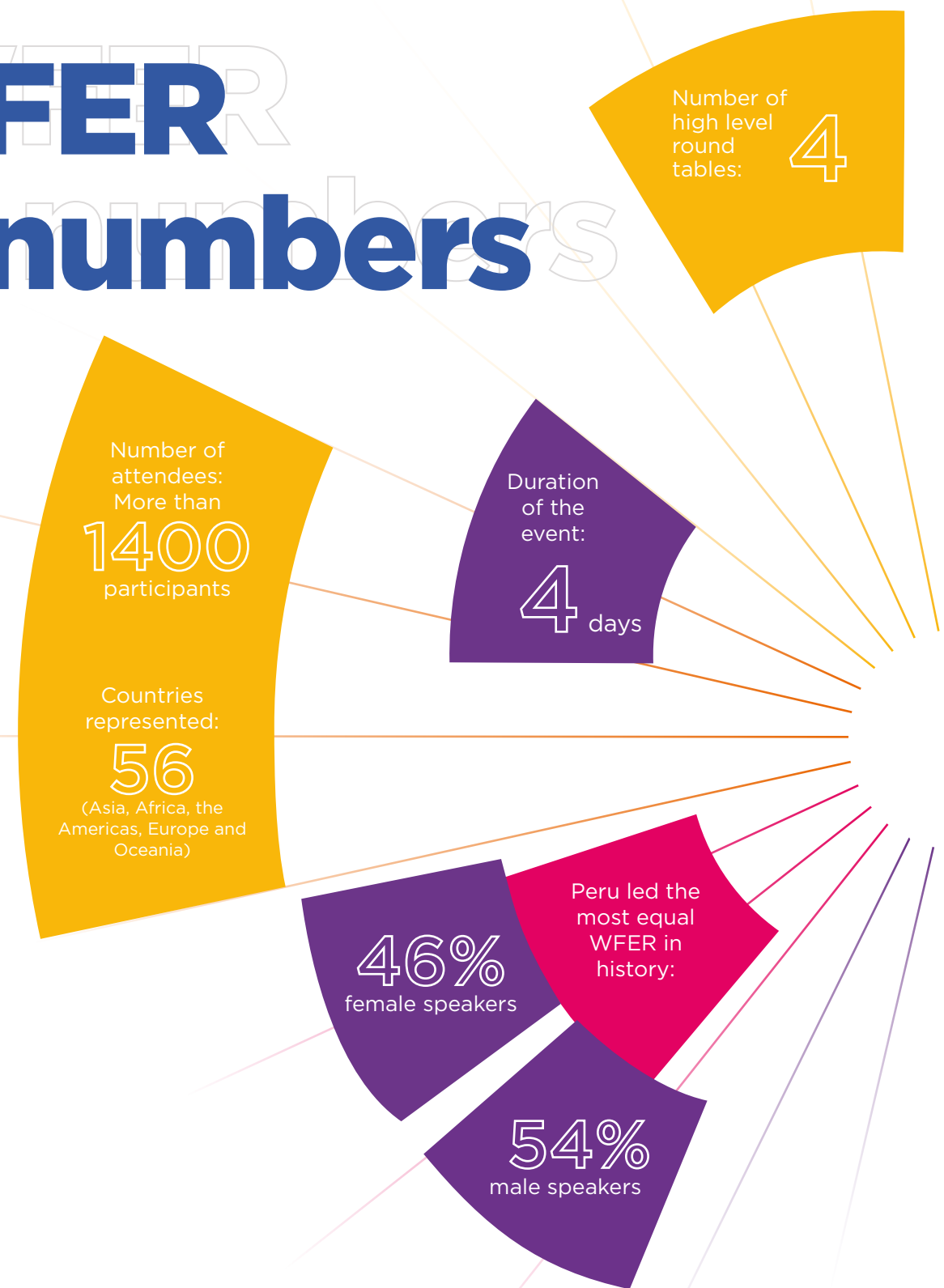
The Peruvian Government, he announced, will continue to promote the arrival of more investments in various renewable energy projects, both wind and solar, for the benefit of thousands of Peruvians who have the right to have a reliable and quality service. It is also key to optimize the legal framework to ensure the efficient development of electricity generation, boost complementary services to improve the Peruvian Power System and allow our country, within this energy transition scope and vast natural resources, to develop different energy sources like wind and solar, but also others such as green hydrogen.

The Minister also pointed out that a Multisector Commission for the reform of the Electricity Subsector is working to improve regulatory conditions in Peru to attract new investments associated with new technologies and the energy transition towards cleaner energies.

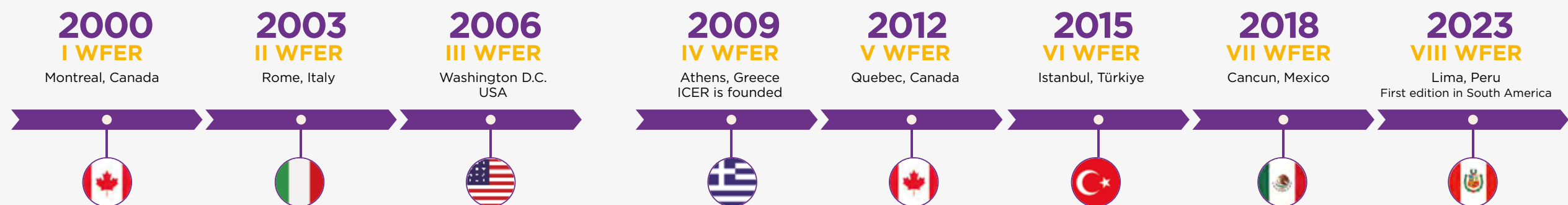
This global event becomes a valuable opportunity to learn about the latest trends in regulation and, as it is a platform for exchanging knowledge, it will positively impact the future of the energy sector.



# WFER in numbers

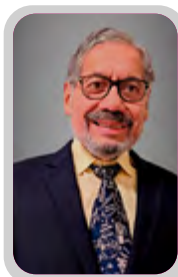


## The WFERs in history



## Keynote Speech

# Vehicular Transportation Electrification: The Transition from Fossil Fuels to Rechargeable Electric Batteries



SPEAKER

**Jorge Seminario**

Professor and Researcher at Texas A&M University

Since the 1980s, and with further developments since the 1990s, experts from different areas of knowledge—chemists, biologists, physicists, mathematicians, and many others—began to work on what is now known as nanotechnology. This technology, which transformed microelectronics into nanoelectronics and, among its achievements, gave rise to e-mobility, opened up the possibility of creating much smaller, more energetic, and durable rechargeable batteries.

While current batteries, known as lithium-ion batteries (LIBs), work acceptably with small devices, their weight for transportation in electric vehicles is the subject of concern and intense research. Batteries in electric cars weigh approximately more than half a ton.

The main components of a battery are the anode (negative electrode), the cathode (positive electrode), and the electrolyte, which is a medium that can be liquid or solid

and allows lithium ions (positively charged) to pass from the anode to the cathode during discharge and vice versa during charging. Likewise, the electrolyte prevents the passage of electrons (negatively charged) that are used to carry energy from the battery to the external device to be powered with electrical energy or to carry electrical energy from a charger and store it as chemical energy in the battery.

The big question is how we improve batteries. Their weight is due to the low gravimetric energy density (approximately 200 watt-hours per kilogram or Wh/kg) that even current best batteries, LIBs, can store. This storage capacity is very small compared to the 100,000-watt hours or Wh energy necessary to move a car for 500 km. This tells us that we need a LIB weighing approximately 500 kilograms ( $100,000 \text{ Wh} / 200 \text{ Wh/kg} = 500 \text{ kg}$ ).

Research efforts to reduce the weight of batteries are focused on finding better materials for its three important parts. The anode is the high-energy side, where the lithium is stored and ready for use. The typical material for storing lithium is graphite, with the problem that 72 grams of graphite are required to store only 7 grams of lithium during charging. In other words, 79 grams of anode weight is required to store 7 grams of lithium interleaved between the graphite planes. The situation in the cathode is even worse: the preferred material is lithium cobalt oxide ( $\text{LiCoO}_2$ ), requiring 98 grams of cathode to store 7 grams of lithium during discharge and also in interleaved form.

Due to geopolitical reasons, most of the cobalt was replaced with combinations of

While current batteries, work acceptably with small devices, their weight for transportation in electric vehicles is the subject of concern and intense research.



manganese and nickel, thus giving rise to an electrode known as NMC with different proportions of nickel (Ni), manganese (Mn), and cobalt (Co), but in most cases with a higher contribution of nickel, slightly decreasing the 7/98 ratio when only cobalt was used. Finally, the electrolyte research is somewhat more complicated since it must be a material compatible with those selected for the anode and cathode. Current batteries usually use organic electrolytes, but their adaptation to the new materials proposed for the electrodes is becoming very difficult. Therefore, other types of electrolytes are being developed in many private, national, and university laboratories.

One way to increase the gravimetric energy density of LIBs is to reduce the material used to store the lithium atoms in both the anode and cathode. For example, instead of using graphite in the anode, simply let them be deposited as lithium and metal in the anode during charging and pull them out of the metal to the cathode during discharge. This process would no longer occur in an interleaved form because there is no structure to interleave the lithium. They would simply accumulate one after the other, forming





a metal so that the weight of the anode is equal to the weight of the lithium (1/1). The same is desired to be done in the cathode, where there would be a sulfur (S) structure that, when the lithium arrives, transforms into lithium sulfide ( $\text{Li}_2\text{S}$ ), but here we will have a weight ratio of 7/23, which is much better than the 7/98 of the LIB cathodes.

The previous description gives us an idea of the central problem: the available energy per unit mass of the battery for electric vehicles. There are, of course, other factors, such as the life time of the battery, its robustness to harsh climates, safety, risks of its operation, and a very important one: its cost. The problems with extracting and refining or synthesizing raw materials such as lithium, sulfur, cobalt, nickel, and manganese, among others, is that they require integrated energy and high water demand, which will raise costs, as well as the carbon footprint they produce, but which could be much smaller than that of internal combustion cars.

LIBs were researched and developed back in 1991. Coincidentally, the 2019 Nobel Prize was awarded to Goodenough, Whittingham, and Yoshino for developing LIBs using intercalation chemistry. LIBs represented a major advance over traditional batteries.

### Electric efficiency put to test

Electric vehicles, on average, have a lithium battery with an energy density of 185 Wh/kg, weigh 540 kg, and have a total energy of 100 kWh. For a range of 500 kilometers, this electric vehicle has a performance of 200 Wh/km. In contrast,

a gasoline vehicle has an energy density of 13,200 Wh/kg, a full tank weighing 70 kg, and a total energy of 854 kWh. Over the same range of 500 kilometers, it has a performance of 1,708 Wh/km.

This comparison shows that electric vehicles are much more efficient in energy consumption than gasoline vehicles (200 Wh versus 1,708 Wh per kilometer, respectively). Thus, instead of spending 1,708 Wh per kilometer on gasoline vehicles, it is recommended to use this gasoline in plants to produce energy or in products more efficiently and sustainably. In addition to efficiency, electric motors are simpler than internal combustion engines. They operate on a two-magnet system and are easier to control. Electric vehicles can be virtually single-pedal, as they can brake by simply releasing the pedal. This simplicity and ease of control make electric motors a more attractive option than internal combustion engines.

### Conclusions and Challenges

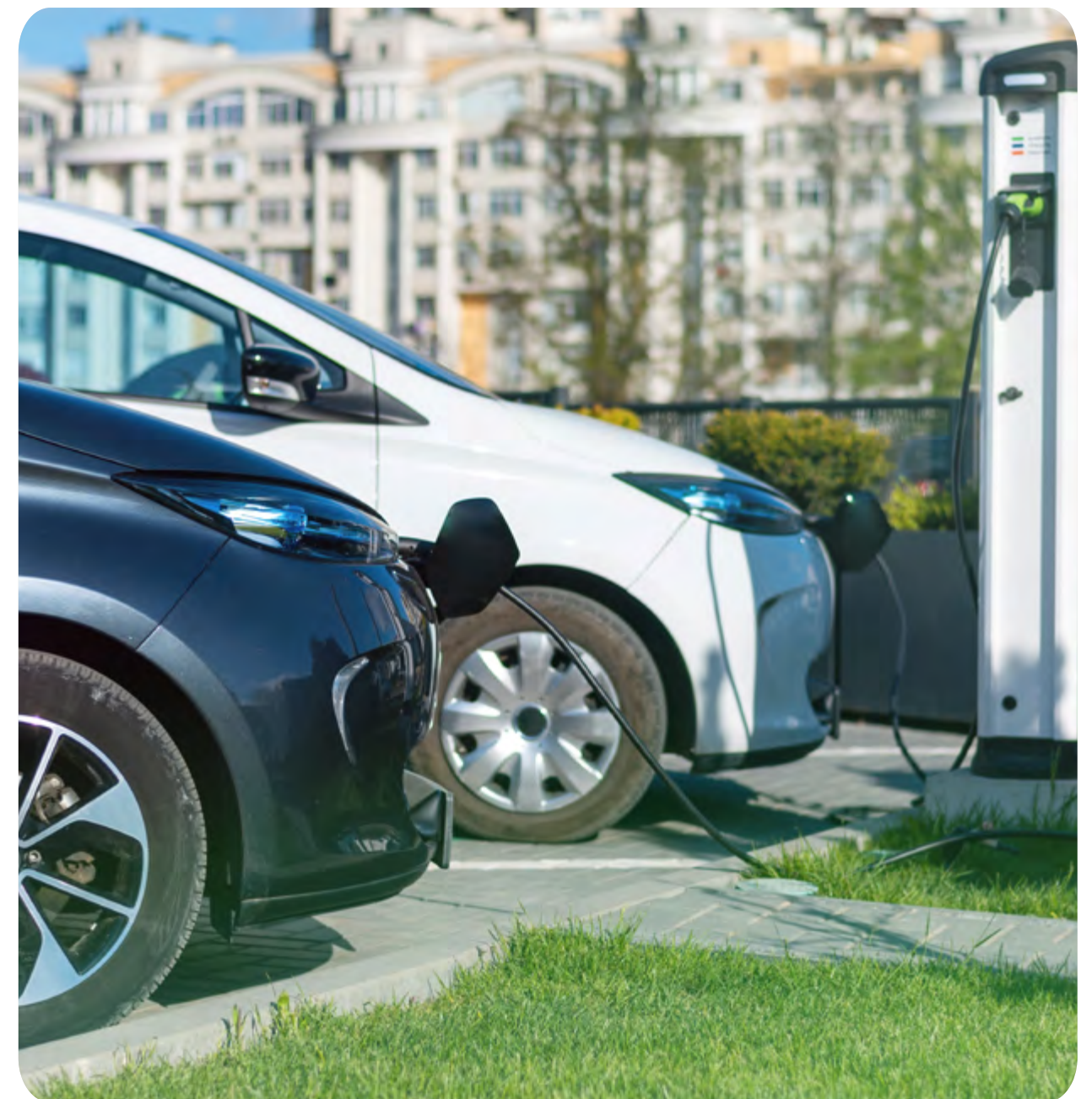
Regardless of how we have come to this current global warming situation, what is most relevant is that the planet is warming. Unlike localized fossil fuel emissions—such as a factory or chemical plant—delocalized emissions—such as vehicles—are much more difficult to control. It is not complicated to demonstrate directly that the chemical formulas for the combustion of 108 grams of gasoline in a car require the extraction of 400 grams of oxygen (irrecoverable) from the atmosphere, emitting 352 grams of carbon dioxide and 162 grams of water



vapor, both greenhouse gases ready to further warm the planet.

In light of this problem, one of the most effective solutions to reduce carbon

dioxide emissions is to replace internal combustion vehicles with electric vehicles and strengthen research in energy storage materials and collaboration with other researchers and laboratories.



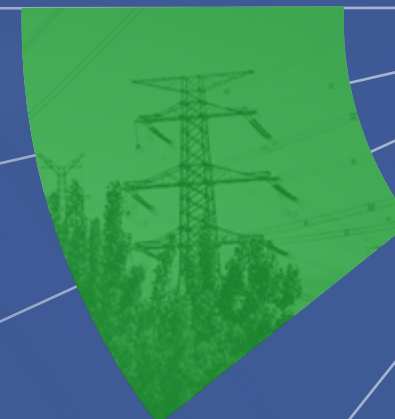


# 01

## Energy transition

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The energy transition was addressed during a plenary session on the promotion of strategic alliances with mining, and different conferences on innovation and disruptive technologies to foster it, including the decarbonization in regulators' decision making, the race to electromobility, and the dynamics of interdependence in the regulation of energy and water.







01

# Fostering strategic alliances for the energy transition: the mining and energy partnership

## SPEAKERS

### Tilsa Oré Mónago

Fellow in Energy and Market Design at the Baker Institute

### Omar Chambergo

Chair of VIII WFER and Osinergmin

### Luis Moreno

Director of the Mining Law Department at Universidad Externado de Colombia

Moderator: Lily Irma Ruiz Celi

Technological advances in the energy sector have a strong impact on the mining sector, as it is a major energy consumer. In some countries, such as Peru, mining

represents an important component of GDP. Considering that the incorporation of more clean energy sources in mining processes can help decarbonize the



economy and, in turn, that the use of minerals such as copper and lithium can support the development of storage and electromobility technologies oriented to the same end, the mining sector can be an ally for energy transition.

## Mining and energy in Peru

The mining industry contributes significantly to the country, accounting for 14% of the national Gross Domestic Product and attracting 16% of private sector investments. It also plays a fundamental role in Peruvian exports, contributing 60% of the income generated by this means, and contributes considerably to the tax

The incorporation of more clean energy sources in mining processes can help to decarbonize the economy.



system by providing 18% of the resources of the country's tax pool. Furthermore, approximately half of the electricity generated in the country is consumed by the mining industry, highlighting the





importance of the energy sector in both production and consumption.

Given the significant position of the mining sector in the Peruvian economy, it is essential that it focuses on establishing short-, medium-, and long-term objectives to reduce its carbon emissions and promote the use of clean energy. This would not only benefit the environment but would also have a positive impact on the economy by promoting the generation of clean income. It is also aligned with the concept of formal and socially responsible mining that has been developed by mining companies,

which have designed programs that define their objectives and goals.

One of the mining industry's most ambitious goals is to achieve zero emissions by 2050, in addition to promoting clean energy consumption in its operations. However, to achieve this purpose, it is fundamental to consider that the growing operation of additional mining projects would significantly increase energy demand. At present, the existing energy generation capacity is not sufficient to meet the needs of the mining sector. Therefore, many mining companies are



investing in the construction of their own hydroelectric power plants to ensure a clean and sustainable energy supply for their operations. This approach reflects the critical importance of the energy sector in the context of the Peruvian mining industry, both in terms of production and consumption.

### Minerals for the energy transition: The vision of the Baker Policy Institute

Markets are evolving significantly in response to the need to combat climate change. However, achieving carbon neutrality by 2050 represents a challenge that requires a drastic reduction in the Peruvian economy's dependence on fossil fuels. To achieve this goal, it is essential to address climate change on multiple fronts. Fossil fuels are widely used worldwide for electricity generation and transportation. The economic growth of nations is closely linked to energy consumption, creating a marked disparity in consumption between developed and developing countries.

One of the key solutions is the adoption of electromobility, which requires significant investment in clean energy sources, using materials extracted from mining activities. However, to achieve carbon neutrality, it is imperative to increase global investment, a task that currently presents serious challenges. Working together to facilitate investment in mining, prioritizing sustainability in this industry, is essential.

Funds earmarked to combat climate change are being channeled into development sectors such as solar and

wind energy. These clean energy sources are highly dependent on minerals such as copper, cobalt, nickel, lithium, rare earths, manganese, and zinc. If the demand for decarbonization of the economy continues to grow, there is a possibility that demand will outstrip supply, representing a significant challenge. Mining plays a crucial role in countries such as Peru and Chile. This requires policies that facilitate investment and promote mining growth that comprehensively considers socio-environmental impacts.

In Peru, social conflicts are on the rise due to the need to extract more minerals to supply the growing demand for clean energy. It is crucial to involve all stakeholders, including local communities, in the dialogue to prevent conflicts that increase uncertainty and put mining activity at risk.

It is essential to implement policies that focus on reducing energy poverty. The energy transition cannot be sudden. Peru will not switch from fossil fuels to clean sources in one or two years. The transition will be gradual and will depend on the resources and market conditions of each country. However, political will and clear goals to

One of the mining industry's most ambitious goals is to achieve zero emissions by 2050, in addition to promoting clean energy consumption in its operations.





move towards decarbonization should be a recurrent concern in all countries.

Countries with abundant fossil resources are likely to continue using them, especially natural gas, as part of efforts to reduce emissions in other sectors.

An inspiring example is Chile, a South American country that, despite its limited hydrocarbon resources, is leading a clean energy revolution, including solar and wind energy, and green hydrogen production.

In northern hemisphere nations, the need for energy transition arises mainly from the electrification of transportation and the transformation of the energy matrix to cleaner sources to maintain existing standards of living. In developing countries, however, which still face high levels of poverty and limited economic development, energy transition requires that access to electricity be expanded, and that a secure and reliable supply be guaranteed. Energy access is a key factor driving productivity and economic growth in these regions.

### The vision of Osinergmin

As mandated, Osinergmin has the responsibility to supervise and oversee the

Peru is aligned with global policies in terms of technological development and equipment. The transition to electromobility is inevitable.



energy and mining sectors. In these times of global energy transition, it is crucial to recognize that the mining sector plays a fundamental role. In this regard, this organization has focused on designing strategies for the joint development of both sectors.

Energy transition is a reality that cannot be postponed. Scientific evidence supports that climate change is mainly due to CO<sub>2</sub> and greenhouse gas emissions. The world is still highly dependent on fossil fuels and its consumption continues to increase, even after 30 years. In this line, renewables still face challenges in terms of continuity and storage. In these regard, countries, including Peru, should develop energy transition strategies based on their energy resources assessment along with the required infrastructure. Energy policy needs to be updated to address issues such as dependence on LPG during adverse weather conditions and the massification of natural gas.

For example, Chile, with abundant solar resources, is focusing on solar energy and the production of green hydrogen through water hydrolysis as a viable alternative. In Peru, CO<sub>2</sub> capture, use and storage technologies are being developed to reduce fossil fuel emissions and ensure orderly and efficient growth that benefits the most vulnerable and remote populations. This is the essential agenda for achieving the energy transition over the next 30 years.

Energy transition should be based on two pillars: climate change and energy security. The recent war in Europe forced idle coal-fired power plants to be put into operation

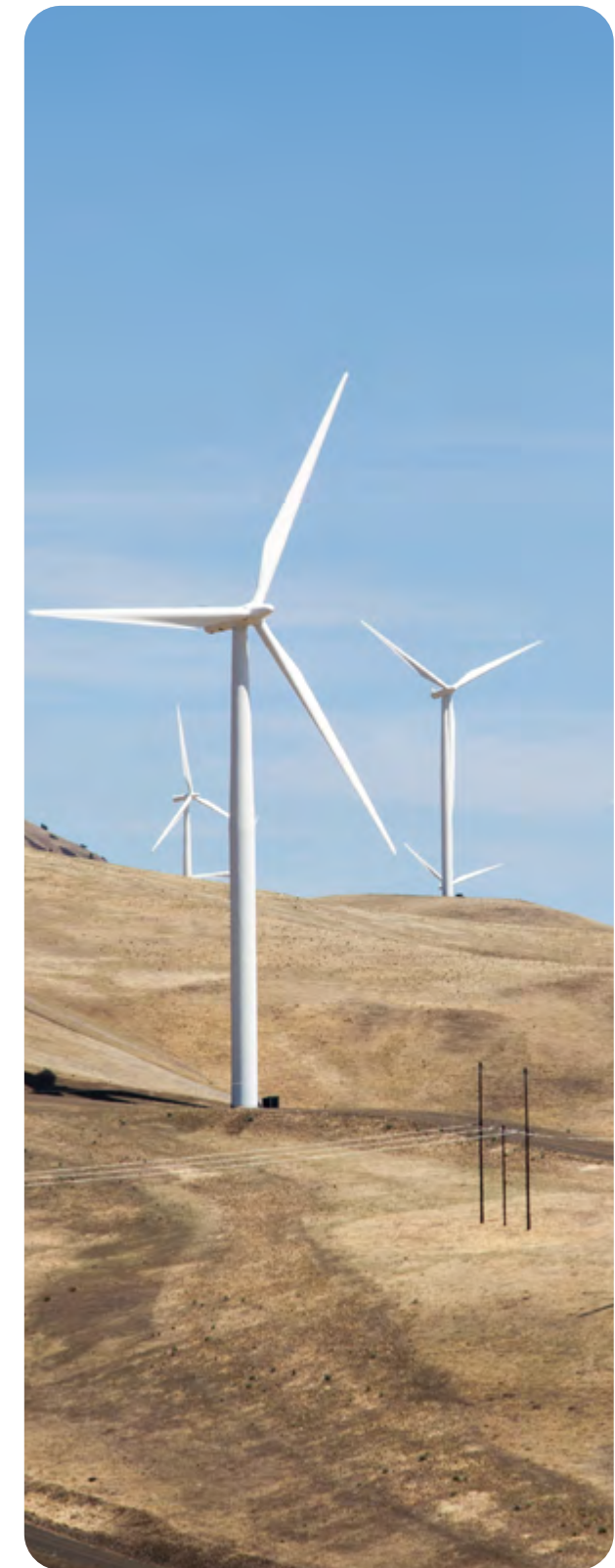


to ensure energy supply, underlining the importance of energy security. A clear energy policy would protect the country from variations in world energy prices or supply.

Peru is rich in energy resources with a diversified energy matrix. Its energy consumption is composed of 41% oil, 29% natural gas, 23% hydroelectricity, and 5% renewables. But its global energy consumption is minimal. However, the country is aligned with global policies in terms of technological development and equipment. The transition to electromobility is inevitable. In Europe, several countries have indicated that after 2030 they will no longer be producing vehicles with fossil fuels, and the window of opportunity for hydrocarbons is shrinking, requiring a focus on the valorization of fossil resources, such as abundant natural gas and undiscovered oil reserves. State institutions, such as ministries, Perupetro, and Osinergmin, have a crucial role to play in overseeing and promoting safe and efficient investments.

Peru, as the world's second largest copper producer, is essential in the manufacture of technologies such as solar panels, wind power plants, and electric vehicles, which depend on minerals such as graphite, lithium, and cobalt. According to World Bank estimates, demand for critical minerals such as tellurium and neodymium is on the rise.

The following debate arises: the policy of exporting copper, other raw minerals or adding value. This discussion has been going on for several years in the regions of the world where these minerals are produced. It is important to learn from what developed countries are doing on how they are implementing a critical minerals policy





with these resources, and to discuss these issues in forums to make better decisions in the country and the region where there are lithium producers, such as Bolivia, Argentina, and Chile.

### Perspectives from Colombia

National regulatory systems in different countries have been influenced by an international regulatory system that has driven the energy transition, mainly focused on decarbonization. This international regulatory system is composed of

international organizations, conferences, and conventions, addressing issues related to the environment, sustainable development objectives, and climate change mitigation. This international global regulatory framework has influenced national regulatory systems.

This international system establishes a sequence of global actions starting with the 1994 United Nations Framework Convention and developing through the Kyoto Protocol the Sustainable Development Goals and finally the Paris



Agreement, and so on. From an academic point of view, this sequence proposes to start with a focus on energy efficiency, followed by the transition to low-carbon energy production, including the promotion of renewable energy sources. In addition, the transition to increased use of electricity instead of fossil fuels is promoted with transformations in the electricity sector to facilitate this transition.

In this decarbonization sequence, low-emission energy solutions are simultaneously addressed. These solutions include the continued use of renewables, the consideration of gas as a renewable energy source, the exploration of technologies such as green, blue, and white hydrogen, as well as the implementation of emission capture and use technologies (CCUS). In the context of the mining sector, it focuses on the conversion of technologies used for energy generation and consumption, with an emphasis on the transition to cleaner and renewable energy sources.

In the specific case of Colombia and several Latin American countries, this energy transition sequence began in 2001 with an initial focus on the efficient and rational use of energy. Regulation materialized through a series of laws, which were later complemented by measures to promote low-carbon energy production. This included the introduction of biofuels and the incorporation of renewables, especially wind and solar, into the electricity market.

As the sequence progressed, a gradual shift away from fossil fuels in favor of greater use of electricity was prompted by laws supporting electric mobility. In addition,

there was a restructuring in the electricity sector, with a focus on energy storage and decentralized energy sources, such as self-consumption and self-generation.

In 2021, a law that consolidated these low-emission solutions, including blue and white hydrogen, non-conventional renewables such as wind and solar, energy storage, biofuels and biomass development, was enacted.

In the mining sector, we promoted the conversion of mining projects to use cleaner energy sources, thus contributing to the energy transition. Strategic minerals such as silicon, copper, nickel, and cobalt, which play a crucial role in the energy transition, were also promoted. The State supported the development of mining projects related to these minerals through auctions, calls for investors, and public companies.

The mining-energy partnership was initially not considered as such but has gained relevance due to the importance of minerals in the energy transition and the capacity of mining activity to generate clean energy as consumers.

The mining-energy partnership was initially not considered as such but has gained relevance due to the importance of minerals in the energy transition.



# Innovation and disruptive technologies: the role of the regulator and the dilemmas we face

## SPEAKERS

Moderator: Claudio Martins de Souza

### Yolanda Domingo

Executive Director of Rates at the British Columbia Utilities Commission (BCUC)

### Paulo Oliveira

Advisor at Infrastructure and Network Department for Energy Services of Portugal (ERSE)

### Katherine L. Peretick

Commissioner at the Michigan Public Service Commission

### Tatsuya Shinkawa

Secretary General, Electricity and Gas Market Surveillance Commission of Japan

In the field of energy, disruptive technologies play a key role in the energy transition and in achieving global goals. Although many companies are not required to do so, they have already publicly committed to achieving carbon neutrality by 2050.

## Evolution of regulation and technology

The energy industry has transformed over the years. In the beginning, regulation focused mainly on physical infrastructure, such as cables and power

plants. However, in recent years, there has been a technological explosion that has completely changed this dynamic.

Today, discussions about regulation include topics such as technology, climate change, customer demand, and public investment. This change in the outlook raises the question of the role of regulators in integration, innovation, and technology.

One of the most important challenges today is to find a balance between promoting innovation and ensuring the security and reliability of energy supply.



Consideration should also be given to how climate policies and regulations can affect the profitability of companies and costs for consumers.

It is crucial that regulators work collaboratively and overcome divisions in climate policy discussions. Objectives and regulations may vary by jurisdiction, complicating the creation of a coherent framework.

In addition, care for consumers should not be overlooked. While it is important to encourage innovation, companies must not be allowed to neglect their responsibility

One of the most important challenges today is to find a balance between promoting innovation and ensuring the security and reliability of energy supply.

to provide safe and reliable services. It is impossible to bet everything on a single technology without considering the needs of consumers.







Regulators should be aware that their primary objective is to ensure the security and reliability of energy supply, while fostering innovation and addressing climate challenges. This requires a balanced approach and collaboration between different stakeholders.

### The experience of Portugal's Energy Services Regulatory Authority

European regulators recognize the need to adopt new regulatory strategies to address the challenges of energy transition. They are working in several countries, implementing experimental regulatory tools in various trials.

These trials cover new technologies and business models, such as renewable energy, distributed energy, local power grid services, service flexibility, and electric mobility. These examples illustrate their approach to defining an effective regulatory framework.

When working on pilot projects, several aspects need to be considered, including project objectives, governance, participants' obligations, and the possible need to adapt existing rules. These projects have a limited time frame to achieve significant results.

It is essential to establish clear criteria from the outset to evaluate the results of each



project and draw valuable conclusions for regulation and the industry. There are different categories of experiences, such as regulatory "sandboxes" and regulatory pilot projects, among others.

In Portugal, numerous pilot projects have been carried out, including the implementation of dynamic grid tariffs, consumer participation in services, and information and energy sharing among grid users. These projects address current and future challenges.

However, regulators need a legal basis to carry out these projects and face challenges such as transparency and managing multiple projects simultaneously. In addition, it is important to develop unique

regulatory tools, share knowledge, and standardize procedures.

These regulatory experiences allow us to adapt to the energy transition, involve new actors, and ensure transparency in decision-making.

As we incorporate new consumers and actors into the energy community, we must learn and evolve to establish more robust and effective regulation.

### The Michigan Public Service Commission

The energy transition is a key issue for regulators, as they need to use all the tools at their disposal to ensure grid availability

### Characterisation of different forms of regulatory experimentations

#### Regulatory sandboxes

#### Regulatory pilot projects

#### Pilot regulations

Innovation approach	Bottom up		Top down	
	The identification of regulatory barrier is initiated by innovators		The regulator identifies legislative provisions for testing and calls for Applications by interested organisations	
Way of granting the derogations	Case-by-case-basis		Derogations are only granted to the actors that are succesful in the application procedure	Derogation automatically applies to all parties that comply with certain elegibility criteria
Geographic scope of the experimentation	Nationwide		Local	Nationwide

Source: European Commission's Joint Research Centre (2023)



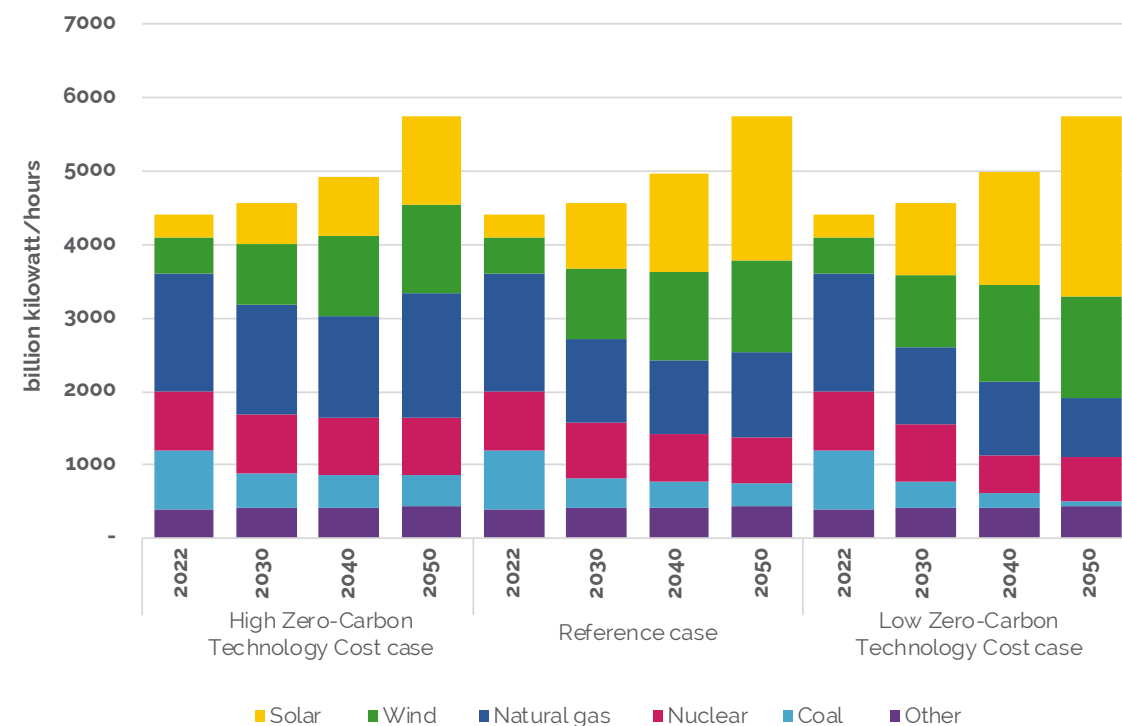
and provide efficient service to users. The main objective of the commissioners and regulators in Michigan is to ensure that technology services meet the highest quality standards. Energy transformation is crucial due to changes in energy generation and distribution, as well as the growth of extreme weather events.

There is an increase in the frequency and duration of weather events, which requires specific resources. This is reflected, for example, in the transition to decarbonized energy sources, both for residential and industrial customers. In addition, the need to replace 18 disused generators is evident.

In the United States, many coal plants dating back to the 1960s have been phased out, prompting a shift to cleaner energy sources. This process has become more efficient and cost-effective in recent decades, including the adoption of solar and wind power.

The cost of technologies is a critical factor for their adoption and disruption. If a technology is expensive, its disruptive impact may be limited. Therefore, attention should be paid to the cost and time required for implementation. Renewables are set to replace coal by 2050, reflecting the global trend towards cleaner energy sources.

### U.S. Electricity Generation Mix Changes



Source: U.S. Energy Information Administration, Annual Energy Outlook 2023 (AE02023)  
 Note: Solar generation excludes off-grid photovoltaics.



Renewables are set to replace coal by 2050, reflecting the global trend towards cleaner energy sources.

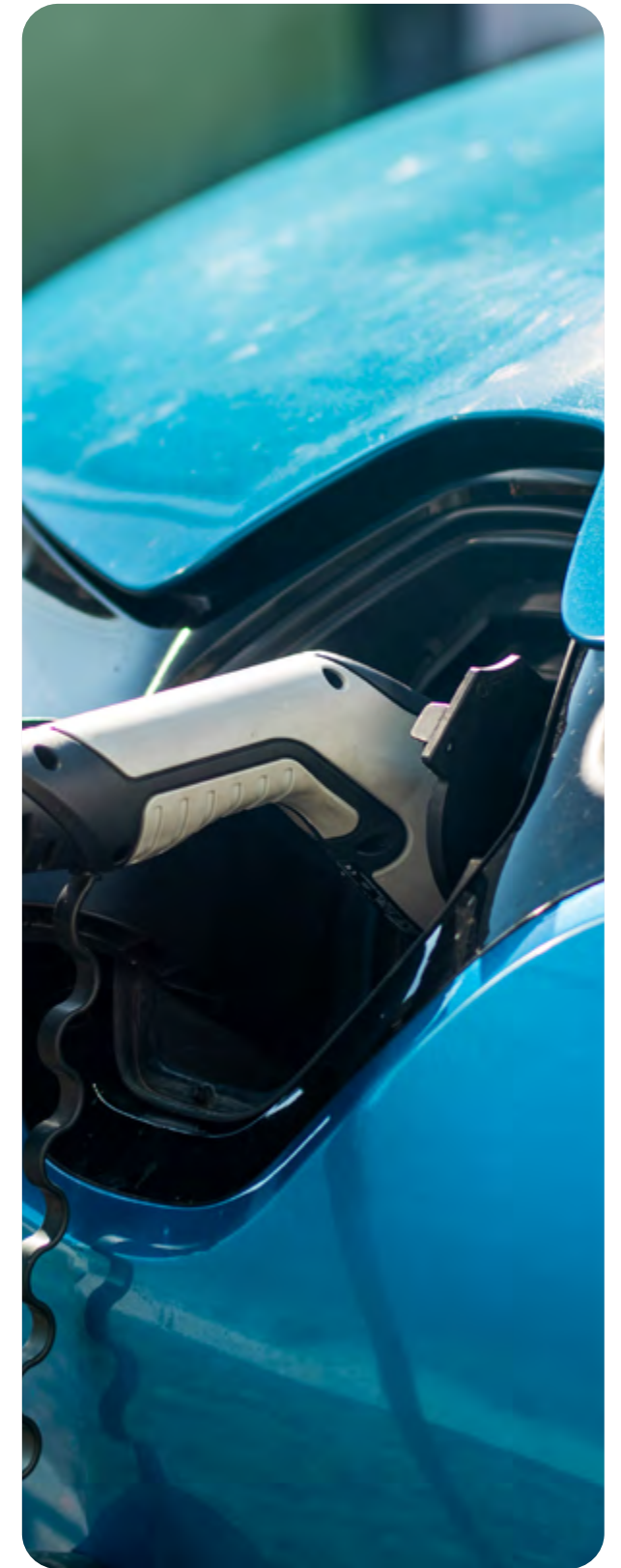


Investment in energy technologies, such as batteries and fossil fuels, has undergone significant changes. This year, global investors are showing increased interest in investing in solar panels, with a total of US\$ 180 billion invested. The solar industry in the United States has increased by 50% compared to the previous year, reaching a capacity of 0.4 GW in the first half of 2023.

The comparison between traditional and renewable technologies shows a dramatic reduction in the costs of the latter. For example, natural gas and coal have maintained stable prices for 14 years, while renewable technologies have experienced a significant cost reduction.

Thus, the adoption of technologies such as lithium batteries and electric vehicles has been driven by decreasing costs and increasing available financing. In addition, battery grid applications play an important role in the modernization of the electricity system.

Similarly, technological innovations are driving a faster transition to cleaner and more efficient energy sources. This includes the decentralization of power generation and battery management, as well as the expansion of renewable energy. The use of hydrogen in industry





is also being explored. Regulators play a key role in preparing for these changes, adjusting business models, and promoting innovation through pilot projects.

Strategic planning is essential to this process, and various approaches are used in Michigan to ensure the reliability and security of the electric system. Regulators work closely with stakeholders to drive changes and assess their impacts.

In short, regulators must adapt to disruptive technologies and encourage innovation in the energy sector. Their role is crucial to ensure resilience, equality, and fairness in energy supply. They must also consider economics, risk, data security, and efficiency in decision making. The ability to adjust to these changes and contribute to building stronger grids is essential for the future.

### Lessons from Japan's Electricity and Gas Market Surveillance Commission

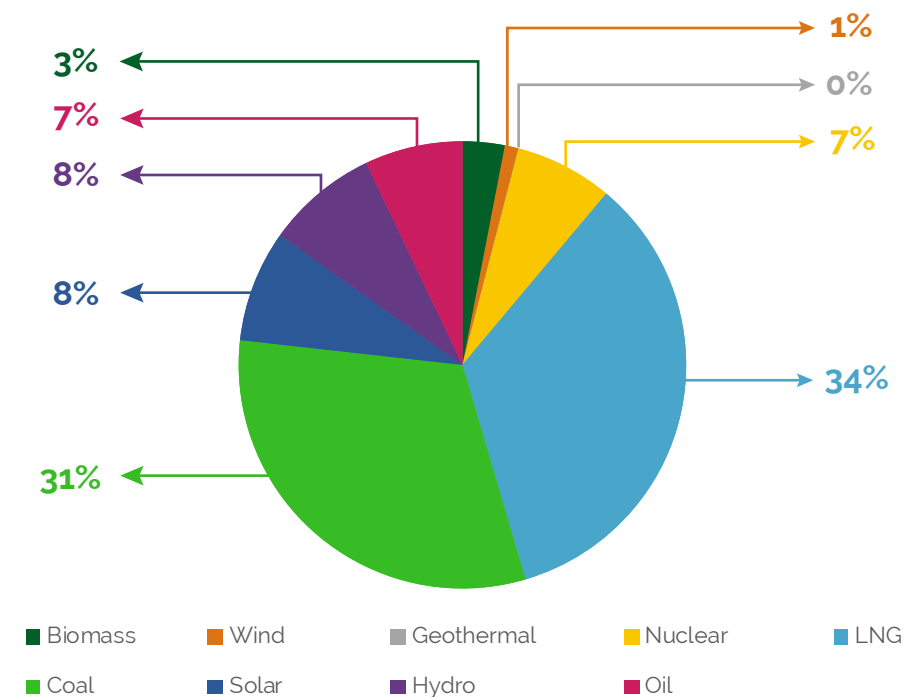
The Japan's Electricity and Gas Market Surveillance Commission newly established in 2015. It has a total of 140 employees in the Ministry of Economy, Trade and Industry (METI), and has an office dedicated to gas business.

The Japanese electricity system has a generating capacity of 297 GW, distributed mainly in natural gas from LNG regasification (34%), coal (31%), hydro and solar (8% each), and oil and nuclear (7% each), among others. Consumers have also been allowed to generate energy for their suppliers since 2016.

Japan's electricity market resembles the European model, as opposed to the U.S.



### Outline of Japan's Electricity System (Electricity generation by source)



model. The introduction of a more efficient model in Japan has been discussed, and The Japan Electric Power Exchange (JEPX) had a solid share as of March 2023, accounting for 40% of the market.

As for renewable energy, a pilot program started in 1992, and electric utility companies played a key role in its implementation. However, the reactivation of nuclear plants has faced difficulties due to safety concerns and complaints from local communities. Some of the nuclear plants have been reactivated, but some remain inactive.

Japan's regulators face a number of challenges, including rising fuel prices due to events such as Russia's invasion of Ukraine and the need to maintain

regulated tariffs for low-voltage consumers. They are also working on regulating non-discriminatory access to electricity generation services and how to manage fixed costs and subsidies in a high-demand summer and winter environment.

Despite these challenges, no power shortages have been experienced, but plants have had to be restarted to increase capacity. The Japanese government is also committed to reducing carbon emissions, which poses an additional challenge.

As such, Japan faces regulatory challenges in a changing power generation environment and is working on solutions to maintain the stability and security of power supply.



# Decarbonization in the decision-making of energy regulators

## SPEAKERS

Moderator: Andrew Flagg

**Luis Enrique  
Gutiérrez Tavarez**

Energy Analyst  
(Electricity) at the  
Renewables Integration  
and Secure Electricity  
Unit of the IEA

**Jane  
Dennett-Thorpe**

Deputy Director Net  
Zero Transition, Ofgem

**Allison  
A. Jean**

Chief Executive Officer  
of the National Utilities  
Regulatory Commission  
(NURC)

**Alejandro  
Hernández**

Director of India and Global  
Opportunities Program at  
the Regulatory Assistance  
Project

Energy regulators face the challenge of how to accelerate the transition to cleaner sources. Collaborating with them in this energy transition is a priority to ensure efficiency and meaningful change. Their mission is critical in a world concerned about climate change and business sustainability. For this reason the Regulatory Energy Transition Accelerator (RETA) was launched at COP26 in 2021, at the initiative of Great Britain's energy regulator Ofgem, with the RETA Administrator housed in the International Energy Agency. One of RETA's Flagship Projects is looking at energy regulators' mandates globally, and how decarbonization can be taken into account in regulators' decision making. This work is being carried out by the Regulatory Assistance Project, a RETA delivery partner. The panel brought together the IEA, RETA

Chair Ofgem, RETA Steering Committee member NURC of Saint Lucia, and the Regulatory Assistance Project to discuss this important work, moderated by RETA Coordinator Andrew Flagg.

## The vision of the International Energy Agency

The International Energy Agency (IEA) was created by the Organization for Economic Co-operation and Development (OECD) after the 1973 oil crisis. It seeks to coordinate the energy policies of its member states to ensure reliable, affordable and clean energy for their respective populations.

A better understanding of the IEA's work can be gleaned from the World Energy Outlook report, published in 2022, detailing

all the changes needed in the energy sector. Its main objective is to ensure that the actions being implemented are aligned with its long-term goals, particularly those extending to the year 2050.

Its priority is to verify that these actions consistently contribute to the reduction of greenhouse gas emissions and the control of global warming. In recent years, there have been several changes and goals set, such as the pursuit of carbon neutrality by 2030 and 2050. It is clear that there has been a decrease in emissions, but there has also been a significant transformation in investments aimed at strengthening the energy system.

It has detailed projections that can guide energy generation and the transition to more sustainable forms of energy.

Today, two different scenarios are considered: one considers the advances driven by the current policies of different countries, and the other is a more ambitious approach that requires an in-depth analysis of the real economy of nations.

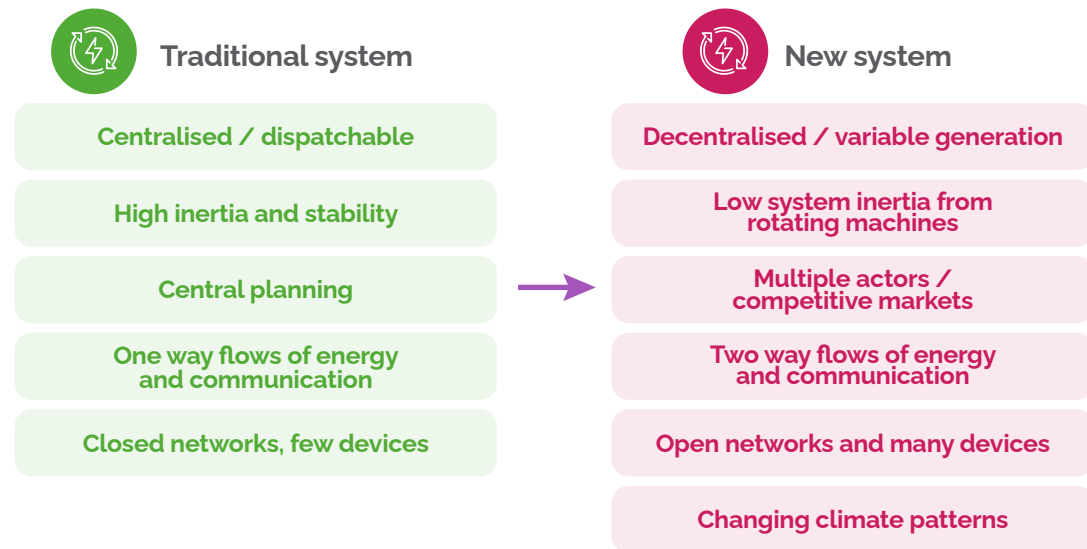
The electricity system is undergoing a series of significant transformations, especially in energy generation, and the IEA wants all these steps to be successful and lead to considerable investments that will bring it closer to its goals, particularly by 2050.

This change implies substantial investments and a review of the resources used in the electricity system. The year 2020 marked the beginning of a crucial decade, with a noticeable increase in the momentum of initiatives and decarbonization efforts in the electricity sector, as well as in mobility and construction.

By 2030, a major transformation of regulators is needed, they will have to adapt to a new paradigm and focus on stability, fairness, and energy demand management. In addition, they seek to move from centralized energy generation to a more distributed and consumer-oriented generation, which will promote competition in the market and the incorporation of diverse energy sources.



## Power sector transformation requires new tools for regulators



Source: IEA 2022

All of this entails a change in the way regulators operate and address the challenges posed by variability in power supply, as well as the influence of climate change on the sector.

Today, the IEA is immersed in a process of regulatory transformation to guide the transition to a more sustainable and efficient energy system. The increasingly complex energy sector makes it necessary to adapt and develop regulations that encourage innovation and adaptation to new technologies and energy demands.

In addition, it is essential to consider the community's vision and remove barriers that hinder the transition to cleaner and more efficient energy sources. The IEA's

task is to promote this awareness and work on the implementation of these benefits for all those involved in the process.

### From the United Kingdom Office of Gas and Electricity Markets

In the United Kingdom, there is a specific role for the Office of Gas and Electricity Markets (OFGEM), which is the energy regulator. It does not regulate utilities as a whole but focuses on the electricity and gas markets.

In addition, it is expanding its focus to other forms of energy and considering regulation in those areas. Its responsibility is to regulate all aspects of the liberalized energy system, from generators to grids and suppliers, all belonging to the private sector.



It is essential to consider the community's vision and remove barriers that hinder the transition to cleaner and more efficient energy sources.



A crucial aspect of its work is the transition to a more sustainable approach in collaboration with the UK Government, which plays a key role in the market. It also oversees the subsidy market and seeks to drive the adoption of digital technologies for continued growth.

In this context, it is essential to consider binding technologies over a five-year

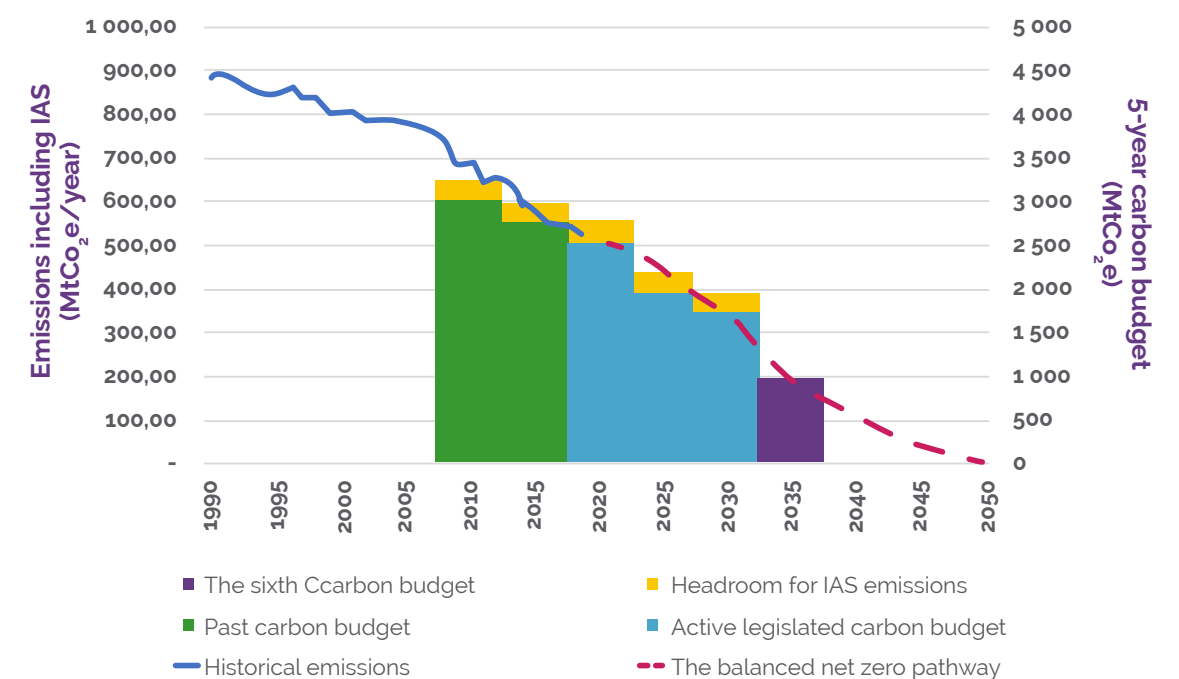
horizon and to address both technical aspects and citizen concerns.

OFGEM actively collaborates with various groups and regulates the system according to their regulatory guidelines.

Legislation is a key component to the system, and laws that will be critical to its operation are awaiting passage. Despite the changes, they will continue to regulate the system and adjust their regulatory approach accordingly.

In terms of achievements, they have reduced their emissions significantly in recent years, reflecting a strong political commitment to climate. Emissions have been reduced by 50% since 2019 and the electricity system has lowered them by 40% in the last ten years.

## Historical emissions







Its focus on decarbonization and expansion of the electricity system is fundamental to achieving its objectives and meeting the needs of current and future consumers. Its commitment to emissions reduction is an ongoing task, and it is focused on creating a positive impact in the future. This involves a constant effort to incorporate renewable energy sources and improve its networks, in collaboration with industry and civil society.

The energy transition is a major challenge, and they are determined to act quickly as well as take risks to achieve their goals. Regulators play a key role in this process and are committed to doing their part.

Regulators have the power to make a difference and, although they face legal and technical challenges, they believe they can overcome them with optimism to make a positive impact on the world.

### The challenges of the National Utility Regulatory Commission of Saint Lucia

Saint Lucia is a small island in the Caribbean with a population of 179,151 inhabitants and in 2010 created a national energy policy.

Currently, its generating capacity is 85.2 megawatts per unit, with a 3-megawatt solar plant and a 2-megawatt solar power distribution. Annual consumption is 350.07 million kilowatts per hour, and the GDP is US\$1.6 billion.

There is an enabling environment for energy solutions in the country. In 1964, the Ministers of Sustainability and Electricity granted an exclusive license to national companies to generate, use, distribute,



and sell electricity for 80 years, from 1965 to the present. These utility companies are the only entities entitled to generate, transmit, distribute, and sell electricity in St. Lucia.

In 2001, the government of Ernesto Márquez began working on a sustainable energy plan to improve the security of energy supply and use in all sectors of the economy. In 2010, a national energy policy that created an adequate and favorable regulatory environment for local renewable energy production was established.

Its objectives include increasing energy security and achieving energy independence. In addition, in 2016, a National Utilities Regulatory Commission, known as NURC, was created to act as

the economic regulator for the water, wastewater, and electricity sectors. This agency was instrumental in establishing a regulatory framework for the electricity sector.

The Government is also reviewing current legislation to give NURC the authority to regulate all electricity generation, especially that generated from renewable sources. This has generated increased interest in renewable energy investment in St. Lucia.

The National Energy Transition Strategy was also developed, which is a resource plan to work as a team to identify the most efficient mix for the country. It has been seen that a mix of wind and solar energy could produce the lowest cost solution.

Evolution of Enabling Environment for Electricity	National Energy Transition Strategy (NETS) specifies results of analysis and strategy by defining techno-economic opportunities, pathways, and implications of energy transition, established through creation of an Integrated Resource Plan (IRP)		
	Scenario	2023 RE Penetration	Description of Generation Assets in 2025
	Fossil Fuel Only (Reference Case)	0%	Continued diesel, new diesel installed in 2023 (12.4M)
	Solar - Decentralized - Debt constrained	18,60%	Solar (47MW, 60% owned by LUCELEC) storage (16MWh). And continued diesel.
	Solar - Hybrid	33,10%	Solar (54MW, 80% owned by LUCELEC), storage (18MWh) and diesel
	Solar, Wind - Centralized Recommended	38,90%	Solar (54MW), wind (18MW), and storage (27MWh), diesel - Optimal rate reduction
	Solar, Geo, Wind - Decentralized	75,30%	Solar (23MW), wind (12MW), Geothermal (30MW), storage (18MWh) and diesel
	Thermal Independent Power Producer (PP)	0%	Natural gas (40MW) from retrofits and diesel (46.3MW w/ new 12.4MW in 2023)





In terms of risks, the Caribbean faces natural hazards, such as hurricanes and storms, which should be considered in the regulation of electricity tariffs. Flexibility in accepting proposals is essential, and attention should be paid to the efficiency of the proposed energy systems.

The Government is also considering decarbonization as a key objective in regulatory decision-making. This implies a greater focus on the costs of investment, modernization, and transition to a cleaner energy matrix. The cost recovery strategy and costs related to existing generation must be carefully evaluated in this context.

Saint Lucia is moving towards a more sustainable future and is opening up new opportunities in the energy sector.

### The Regulatory Assistance Project: a study in the making

The developer assistance project, "The Priority of Decarbonization and Energy Linked to Generation Decision-Making," is a practical initiative that seeks to address key issues concerning institutions related to energy development.

These institutions have been in existence for 40 years and were designed at a time when efficiency and costs were the main objectives, which is still relevant.

However, the scenario has evolved considerably in recent years, and they now face one of the greatest challenges of the century: governance and energy autonomy. This raises the question of how these institutions and regulations, designed in a

It is essential that regulations allow consumers to choose options that align with their preferences and are energy efficient.



very different context, should be adapted to meet today's objectives.

Regulators play a crucial role in this process, as they are responsible for maintaining the balance and ensuring compliance with regulations, although they need to be updated to address current problems.

Why focus on regulators? Because they are in charge of managing resources and setting guidelines. However, it is clear that many of the current regulations need to change. For example, some governments have set ambitious targets for clean energy generation, but regulations must be adapted to address these new targets and emerging technologies.

Consumers also play an important role in this process. Their preferences are changing, and many of them want to contribute to the solution rather than be part of the problem. It is essential that regulations allow consumers to choose options that align with their preferences and are energy efficient.

In addition, coordination between different actors in the energy sector is a crucial challenge. In an increasingly complex



distribution system, it is essential that regulators facilitate interaction between energy developers and suppliers.

All these decisions by regulators will have a significant impact on the decarbonization process. Therefore, the question of whether these decisions are aligned with social objectives and how to close the existing gaps between national targets and their effective implementation should be asked.

To address these challenges, interviews were conducted with regulators from various coalitions, from national to state and provincial levels. The goal of the study is to better understand how these decisions

are being made and how they might evolve in the future. It is also intended to identify gaps in regulations and provide recommendations.

The project focuses on sharing regulators' perspectives on how they are addressing decarbonization in the electricity and gas sector on a day-to-day basis and how they are adapting their roles and regulations to meet national targets. The interviews are expected to be completed in September and the final report will be published in early 2024. The aim is to foster collaboration and the exchange of experiences among regulators from different institutions and countries to move towards a more sustainable future.



# The race to e-mobility: a new era?

## SPEAKERS

**Marsha Atherley-Ikechi**

Chief Executive Officer  
of the Fair Trading  
Commission in Barbados

**Andrew Giles Fay**

Chair of Florida Public  
Service Commission

**Jana Haasová**

Vice President of the  
Council of European Energy  
Regulators (CEER)

Moderator: Charles Esser

The transition to electric vehicles has caused regulators to reconsider issues about the nature of a utility, conventional rate design, and legal authority. The highway line is changing. How can we be sure that everyone stays in their lane when the map keeps altering? The potential impact of electromobility on the grid should take into account new generation requirements, reconfiguring the load curve, the effect on utility grids, and the need for better approaches to grid management.

## The experience of the Barbados Fair Trading Commission

Being a Caribbean country located in the middle of the ocean, Barbados has the potential to access wind and thermal energy, and its regulator, the Fair Trade Commission, is on a mission to reduce the use of fossil fuels. As a result, Barbados

adopted its first 100% renewable energy policy in 2019.

The country has 16 targets for the transportation market, showing the importance of this sector for the final goal. In addition, the Government of Barbados provides and facilitates access to loans of up to US \$50,000 for public officials or civil servants to purchase electric vehicles and train mechanics in the repair of electric vehicles. With this boost, it hopes to promote electric mobility.

The cost of providing the charge for an electric vehicle is a saving, it is one third of what a traditional vehicle would cost. Therefore, the Government of Barbados has reduced taxes on electric vehicles by 10%.

However, these measures face a series of limitations that still exist to boost



e-mobility, such as restrictive battery costs and performance limitations, as well as the lack of battery cooling systems in a hot climate such as the Caribbean.

## From the Florida Public Service Commission

If Florida were a country, it would have the 14th highest GDP in the world. The size and rapid growth of Florida has positioned it as a leader when it comes to electric mobility. However, even with higher adoption rates, the overall impact to the electric grid is still very limited at this time. The emergence of fully electric school buses and garbage trucks has created an interest beyond standard passenger vehicles, but

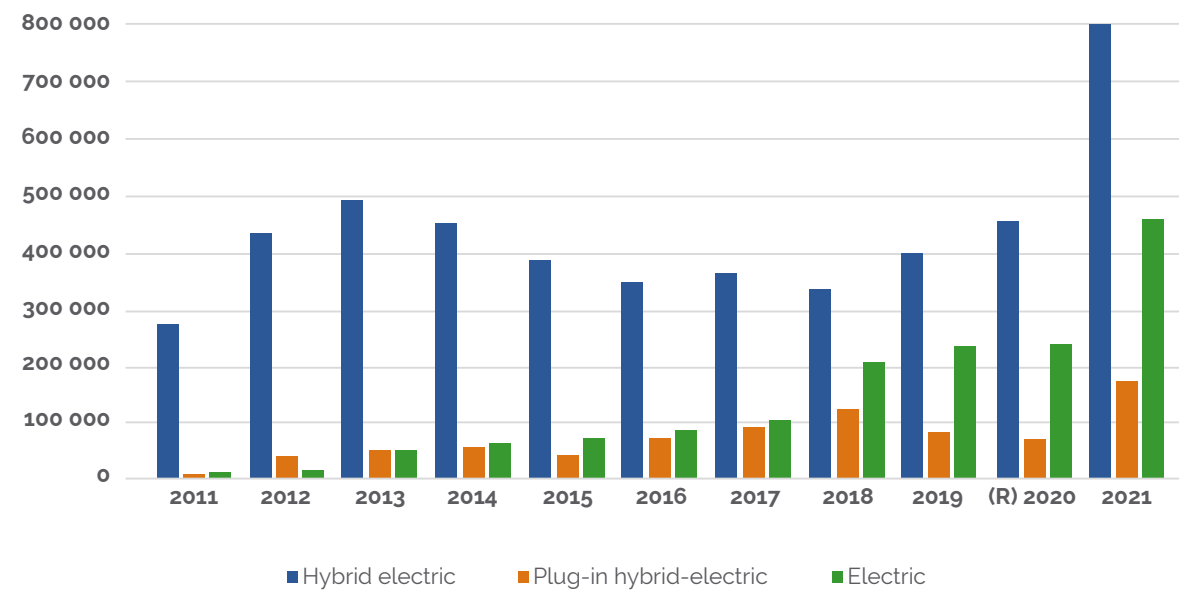
government funding of EVs has been key to reducing total acquisition costs.

In the U.S., there have been a myriad of incentives from the Federal Government to promote a migration to e-mobility. What is driving the growth of e-mobility? This chart shows how low the actual adoption numbers were until a recent rise. The most significant change was in 2021, featuring nearly double the sales of hybrids, electric vehicles (EV), and plug-in hybrid-electric vehicles (PHEVs). More recent data also show that this trend is continuing, as the percentage of new EV sales in 2022 increased by 58% from 3.2% in the previous year.





### Hybrid-Electric, Plug-in Hybrid-Electric, and Electric Vehicle Sales



One example of the benefits of EV technology is the possibility that these vehicles could be used as energy storage or backup. Ford has begun promoting its F150 Lightning, which can provide home backup power for up to three full days after a power outage has occurred.

Manufacturers have also begun to investigate how stored energy can be fed back into the grid in times of need. This is also known as vehicle-to-grid or V2G technology. This process will require regulators to consider not only the economic impact of V2G during peak demand, but also the safety concerns that arise when returning power to the grid. The other regulatory issue that will have a significant impact on the growth of electric vehicles is whether public utility companies will be allowed to build and recover the costs of publicly available charging stations.

### The word from the Council of European Energy Regulators

The Council of European Energy Regulators, known as CEER, focuses on consumer protection and grid management. Its task is to analyze how the situation has evolved and how it addresses the issue of electricity transmission and the main problems facing regulators in Europe.

It also seeks to identify differences and similarities, as well as best practices among regulators, and to consider what its role as a regulator may be in this context.

The impact of e-mobility on the system has often been heard about due to the need for charging infrastructure to support the development of electric vehicles. E-mobility plays a key role in the future of the energy



system. It cannot be overlooked how the environment is changing for electric vehicle users as well as for traditional drivers.

A CEER's report presents a comprehensive review of the state of electric transportation and the key challenges regulators are facing. The report begins by assessing electric vehicle charging infrastructures

One example of the benefit of this technology is the possibility that these vehicles could be used as energy storage or backup.





and their integration into the system. It also considers mobility in general.

First, it is essential to ensure a rapid and sustainable deployment of charging points across Europe, especially in residences, and to optimize the costs

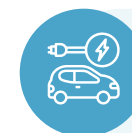
required to strengthen the grid. Second, the effective integration of electric vehicles into the electricity system must be ensured, maximizing charging to optimize infrastructures and contribute to flexibility in the energy transition.



## Main issues



Ensuring that the rollout of charging points is sufficiently rapid



Ensuring that electric vehicles can be integrated into the electricity system



Promoting consumer participation and guaranteeing their protection

Source: Council of European Energy Regulators

It is also important to consider continued participation and consumer protection in the e-mobility market. This involves not only participation, but also consumer protection and empowerment. Regulators have been evaluating their powers, including regulating technology, infrastructure investment, and market participant obligations. A survey of regulators has also been conducted to address issues such as radiofrequency and microelectronics.

The report notes a wide variety of approaches taken by regulators in different European countries. Each country approaches e-mobility in a unique

way, taking into account its specific circumstances. Collaborations have been established, legislation has been amended, and transparency and consumer protection have been promoted.

The report highlights how regulators are adapting to current and future challenges in the field of e-mobility. Measures are being taken to ensure an efficient charging infrastructure, the integration of electric vehicles into the energy system, and the involvement of consumers in e-mobility. This process seeks to empower users and promote an efficient e-mobility system throughout Europe.



# The dynamic of energy and water regulation interdependence

## SPEAKERS

Moderator: Elijah Sichone

### Veli-Pekka Saajo

Deputy Director General  
of the Energy Authority  
Finland

### Chenée Riley

General Counsel at  
the Office of Utilities  
Regulation of Jamaica  
(OUR)

### Andrijana Nelkova Chuchuk

Energy Regulators Regional  
Association (ERRA)

### Rota Šnuka

Board member of  
the Latvian Public  
Utilities Commission  
(Regulator)

The dynamics of economic growth and climate change impact the availability of energy and water resources. Water is vital not only for daily human use but is present in almost all energy production processes. According to the World Bank, electricity accounts for "5% to 30% of total water and sewerage operating costs in utilities, but in some countries such as India and Bangladesh it can be as much as 40%".

In addition, energy is used to extract, transport, and deliver water with the appropriate quality standards for human use and wastewater treatment before it is returned to the environment. Both areas have historically been regulated

and managed separately, although an integrated planning approach may be useful to use these resources more efficiently.

### Finland: exclusive dedication to water regulation

All regulators share a common approach to the protection of regulated interests.

A study conducted by European authorities in 2020 on water regulation highlights that in Europe there were only eight regulators dedicated to water alone, which matches the regulation in the electricity sector. Additionally, European guidelines clearly state that each



sector must have its own regulator, whereas, in the case of water, there is no specific guideline addressing this issue.

Norway, for example, has no regulatory authorities. In electricity, however, there have been European guidelines for years.



This has led to the fact that in some European countries multisectoral authorities are led by ministries or municipalities. This raises the need for a deeper analysis and the development of guidelines for water regulation. The study mentions the importance of regulating tariffs, although there is a general consensus on the need for independent regulators in the sector.

In the European Union, all-natural gas and electricity distributors are regulated, and

this is established in national guidelines and laws. However, it is important to note that in Europe there are separate networks for different sectors, which includes the separation of monopolies, grids, and production, both majority and minority production. This competitive approach is supported by European legislation.

However, regulation is a constantly evolving field, with the continuous introduction of new rules and regulations. A recent





example is the case of the decision of the European Court of Justice in 2021, which forced Germany and Sweden to change their legislation due to pricing practices that contravened common regulations in the European Union.

The water sector poses significant challenges, not only in Europe but also in other regions. The lack of independent regulators in many places and the need for investment in the sector are important issues. In addition, the interdependence between regulators in different sectors and the motivation for establishing multi-sector regulators are relevant issues that

deserve further analysis.

The most difficult challenge was found in the gas transmission system subsidy issue because, when the Russian war against Ukraine broke out, the system operators started to move gas, and all the possible implications of this situation are being examined. Overall, this issue is of great relevance and represents a case that illustrates the challenges to be faced.

Some studies indicate that investments of almost 40 million euros are required in the water sector, highlighting a significant deficit in this area. This challenge is further



Between 11% and 46% of total operating expenses in the water and sewerage sectors are directly related to electricity consumption.



complicated by the complexity of the situation, as there are about 1500 water-related utilities, of which 19 are multi-sector companies operating in the fields of electricity, gas, and water.

This scenario poses a significant challenge for regulators, since, for example, gas and electricity are regulated, but there is no jurisdiction over water itself, posing an additional challenge. In Finland, jurisdiction only applies to the water sector, which, unfortunately, can be more expensive than electricity by as much as double the price. Although there is no interdependent regulator, there is one exception: when municipalities increase their tariffs by more than 15%, the regulator steps in.

This boundary marks a crucial point and becomes an issue of national importance. In the past, plans were established but could not be implemented due to the lack of regulators in the sector. Therefore, there is a clear need for an interdependent regulator to oversee and regulate the water sector in Finland.

In this context, it is crucial to address the issue of interdependence, a topic that is being explored in both Europe and Africa.

One of the fundamental aspects to be discussed in this panel is the motivation behind the need for an exclusive regulator for water. Understanding this motivation will help us chart a way forward.

### The Office of Utilities Regulation of Jamaica

The Office of Utilities Regulation of Jamaica (OUR) is a multi-sectoral regulatory body with responsibilities covering water, sewerage, and telecommunications.

It was established in 1987 as a result of an act of parliament. Its responsibilities include reviewing and supervising economic standards, as well as setting and monitoring service standards, handling consumer complaints, and administering licenses.

In addition to these responsibilities in the water sector, it is a member of the Organization of Caribbean Utility Regulators (OOCUR), a non-profit entity where English-speaking regulators in the Caribbean share information and experiences related to improving regulation in their jurisdictions. OOCUR members include regulators from countries ranging from Cuba to Guyana.

It has always been said that energy and water should not be mixed, as this could have serious consequences. However, in utility operation, there have always been synergies and areas where efficiencies can be found that benefit all parties involved.

There are remarkable similarities between the electricity and water sectors. Both are critical to economic development and







people's quality of life. Both require large, long-term capital investments and are based on market structures that often involve monopolies. The economic principles that apply to these sectors are similar, as are customer needs and technologies.

A crucial link between these two sectors is the use of electricity in water extraction and distribution, which represents a significant cost. Between 11% and 46% of total operating expenses in the water and sewerage sectors are directly related to electricity consumption. This is important because it highlights the dependence of these sectors on electricity for their operations, which can have significant cost and efficiency implications.

Currently, in most Caribbean jurisdictions, there is no interdependent regulator covering more than one sector. The question to consider is whether it would make sense to have a single regulator for both sectors.

There are advantages and disadvantages to this proposal. The advantages include the ability to take advantage of synergies and interconnections in both sectors in the search for solutions, such as economies of scale. Since most Caribbean countries are small economies, it would make sense to have a single regulator rather than several regulators competing for resources and reduce the regulatory burden by easing reporting, scheduling, support services, and financial requirements. It could also simplify the provision of support services and help address the informal economy by allowing greater coverage of the regulator. However, disadvantages could include a possible lack of adequate specialization and the risk of excessive concentration of power in a



single agency, and prioritizing resources in one sector at the expense of the other.

### Perspectives from North Macedonia

North Macedonia's experience in water and energy regulation is interesting. For those unfamiliar with Macedonia's location, it is in southeastern Europe, in the heart of the Balkan Peninsula. It enjoys 283 sunny days a year and has abundant water resources. Despite being a small country, it has a great natural wealth, including 35 rivers, 53 lakes (natural and artificial) and about 1,100 water sources. This public service covers practically the entire territory, which makes it a very important resource.

North Macedonia is also a democracy divided into eight economic regions and 85 municipalities. These municipalities are

managed by the local administration. In terms of water and energy regulation, the Water Administration used to be the only regulatory entity under the government. However, in energy, it has been part of a liberalized market since the 2000s and has previously adopted European energy legislation. In addition, they have a strong connection to the European energy markets and their neighboring countries. This implies that the regulation of water and energy has notable differences.

However, the energy regulator in the north was established in 2003 and is celebrating its 20th anniversary this year. The approach covers various criteria, such as the appointment of commissioners, the preparation of finances and other relevant aspects. Initially, there were five commissioners, and like water regulation,



the regulatory commission's authority in the energy sector works with data. Observation groups are maintained to monitor energy markets and energy emissions.

Since 2016, with the installation of smart meters, progress was made in the measurement of water consumption. Priority was given to the regulation of water resources and the size of the population and its distribution in the region, including areas with hundreds of inhabitants, were evaluated. In addition, they were committed to autonomy, electrification, and operability. They worked closely with the electricity working group on issues related to oil and emissions. The goal is to ensure that water resources are available in an efficient and sustainable manner.

They work on multi-sectoral regulation that encompasses water and energy. They have implemented methodologies based on regulatory experience in the energy sector, with benefits for both water consumers and water service providers. They have established specific rates and systems to address variability in water prices.

The implementation of this regulation has significantly improved the capacity to offer quality utilities, boosting education and employment. The ultimate goal is to guarantee security in the production and supply of water and energy, contributing to the sustainable development of the region.

### Lessons from Latvia's Energy Regulator

Latvia boasts a low population density, with just 28.33 individuals per square

kilometer in 2023, a factor that poses unique challenges for regulators and public service infrastructure. This sparse population drives up the cost of services compared to more densely populated regions.

The evolution of economic regulation in Latvia has been gradual. The Regulator, established in 2001 operated under the Ministry of Economy's supervision, initially oversaw various sectors including electricity, natural gas, telecommunications, postal services, and railways. However, conflicts of interest arose, notably when the Ministry of Economy held stakes in energy companies while also influencing the Regulator's decisions. Similar conflicts arose in cases where municipalities were responsible for service provision, yet owned companies that provided those services. To address these issues and ensure uniform regulation, the responsibility for centralized heating, water supply, and waste disposal was transferred to the Regulator in 2009.

Further strides towards regulatory independence were made with the EU's Third Energy Package in 2009, culminating in the Regulator's full autonomy in 2011.

Speaking of global challenges, the electricity sector is intrinsically linked to

Efficient water use in electricity production is crucial amidst competing sectors. Investments and regulatory measures must facilitate sustainable infrastructure development and usage.



water use, which significantly impacts the environment. It constitutes approximately a quarter of global water consumption, which means that other sectors such as agriculture, manufacturing, and domestic use also compete for water resources. Hence, there is a critical need to advocate for efficiency and investments. This requires effective infrastructure utilization and regulatory decisions that ensure future-proofing of infrastructure.

Another significant challenge for regulators is demographic trends. In Latvia, the population has been declining since 1990, with more people moving to major cities and suburbs. This shift affects infrastructure usage and requires careful consideration of what to do with underutilized infrastructure.

In Latvia, only distribution and transmission infrastructure in the electricity and gas sectors are regulated, with energy resources traded openly in the market. This

setup allows the multi-sector regulator to compare electricity costs and advise other public service providers on energy procurement strategies.

One of Latvia's successful practices is the regulation of district heating. There are projects where district heating efficiently utilizes renewable energy resources in combination with water resources. For instance, "Salaspils Siltums," a district heating supply company, invested 7 million EUR in solar panels, hot water storage tank and biomass boiler reducing tariffs by 5%.

In conclusion, Latvia's regulatory landscape has evolved to address challenges posed by low population density, conflicting interests, and environmental concerns. Continued efforts in regulatory independence, infrastructure optimization, and renewable energy integration demonstrate the country's commitment to efficient and sustainable service provision.







# 02

## Institutionality

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Institutionality was addressed through a plenary session on the pursuit of regulatory excellence, and lectures on how to recharge the UN 2030 Agenda, being an independent regulator, and the art of communicating complex regulation.





# In pursuit of regulatory excellence

## SPEAKERS

Moderator: Kathleen Riviere-Smith

### Silvana Romero

Chair of Uruguay's Energy and Water Regulator (URSEA)

### David Danner

ICER Chair

### Hasan Özkoç

Director of the Association of Mediterranean Energy Regulators (MEDREG)

### María Julia Aybar Solís

Vice president and general manager of PERU LNG

The energy regulator has two fundamental missions: to establish or propose rules to develop the legal framework through regulatory mechanisms to achieve energy or environmental policy objectives efficiently and at the lowest possible cost and to supervise the functioning of energy markets and the performance of regulated activities.

But does the energy regulator have the conditions of independence, economic autonomy, specialization, and competence to perform these functions?

## The experience of the Regulatory Unit of Energy and Water Services of Uruguay

Uruguay's Energy and Water Services Regulatory Unit (URSEA) has undergone a process of continuous evolution that began 20 years ago.

Uruguay, with its 176,000 square kilometers and a population of close to

3.5 million inhabitants, according to the last census, is a continental republic located between two South American giants, Argentina and Brazil.

URSEA's entrance into the regulatory arena dates back to 1997, with the creation of the Electricity Regulatory Unit, playing a crucial role in overseeing electricity and water quality, in addition to certain fuel- and oil-related activities. Over time, URSEA has expanded its competences in energy efficiency, agrofuels, steam freezer safety, and floating energy.

In 2020, due to the growth of the regulatory activity, the Executive Branch decided to modify its legal administrative system by initially transforming the executing agency into an entity with greater autonomy and independence, which made it possible to address deficiencies in the supply of energy and drinking water.

Thus, URSEA's responsibilities include the evaluation and monitoring of the



quality of energy and drinking water services, ensuring the quality, safety, and uniformity of procedures in the context of business operations. It is also responsible

for advising the Executive Branch in carrying out critical tasks, such as reform of the fuel sector, which lacked specific regulation until then.

## Historical evolution and regulated services of Uruguay's Energy and Water Regulator



This change in regulation has impacted the entire chain, from engineering to final sale, ensuring transparency in costs, subsidies, and business activity. It is currently working on petroleum diesel reform, representing a significant advance in its competences and responsibilities.

To better understand the growth of the regulatory activity, it is essential to highlight the transition experience in electricity generation in Uruguay. At the beginning of the new millennium, the electricity matrix was highly dependent on hydro and thermal generation, which made the country vulnerable to fluctuations in oil prices.

In the 1980s and 1990s, Uruguay undertook a significant transformation towards non-

conventional renewable energy sources, such as hydro, solar, photovoltaic, and biomass, resulting in an 80% growth in its generating park. This effort allowed reaching a 97% renewable component in the electricity matrix between 2017 and 2020.

However, new challenges started in 2020, with a historic drought and rising global fossil fuel prices. Despite these obstacles, renewable energy remained an integral part of Uruguay's energy matrix.

The key to success in this energy transition has been the definition of a long-term energy policy and the coordinated effort of all public and private stakeholders. A solid transmission system and institutional stability that has attracted significant



investments have also been fundamental. Uruguay's regulatory framework for the electricity sector provides for public and private participation in the wholesale electricity market, ensuring free access to the transmission and distribution grid. In addition, the direct participation of consumers in contracting with companies is ensured.

Public consultation plays a crucial role in regulation, promoting participation and transparency in all the stages of the process. Comments and suggestions from all stakeholders are valued, as they enrich regulations and improve decision-making.

In terms of supervision and oversight, thorough investigations have been carried out to ensure compliance with regulations and user interest protection.

The regulator works in collaboration with several institutions and external experts to maintain high standards and ensure the quality of services and products. Its commitment to excellence is reflected in the creation of certification systems that apply rigorous criteria for the accreditation of companies and laboratories. If violations are detected, sanctions and corrective actions are applied to ensure compliance with regulations.



Team commitment is critical to success, and the dedication of both permanent and external staff is valued. It is important to constantly address conflicts of interest and ensure the impartiality of actions.

However, challenges are faced, such as the need to define a new organizational structure that fits the objectives and resources. Its vision for the future focuses on the need to address changes in the global energy landscape, including energy decarbonization and adaptation to geological and technological changes.

The recent global crisis triggered by the COVID-19 pandemic and exacerbated by Russia's invasion of Ukraine has increased fossil fuel prices and posed significant challenges in energy production. In this context, investments in renewables are presented as a solution to reduce price volatility and ensure energy security.

In this context, URSEA's commitment is to work efficiently and collaboratively to achieve a fair and inclusive energy transition by promoting efficiency and adopting advanced technologies. Likewise, innovation and commitment to environmental protection are fundamental in the pathway towards a sustainable future.

As regulators, our responsibility is to lead this transition and continue collaborating with all stakeholders to build a prosperous and sustainable future for generations to come.

### The International Confederation of Energy Regulators' perspective

The core mission of the International Confederation of Energy Regulators (ICER) is to ensure that energy services are

affordable, safe, and clean and that the system's benefits are distributed equally to all parts of our society.

Agencies should have workers who are passionate about what they do. And since the COVID-19 health emergency, it has been very difficult to hire people. We have gone through the "great resignation," in which people have decided to retire at an earlier age and leave the workplace for a certain amount of time, and that has created certain gaps in agencies.

Work has been done to train people and invest in them. To this end, it is necessary to have resources, so some changes have also been introduced to pay them more and hire more people, but it is very important to have the human resources to do this work.

Another very relevant aspect is independence. If our decisions do not benefit the public, then we are not in the right business. It is also important to recognize that, despite being independent, we operate within a political environment, and it is important to maintain relationships with legislators. We work in a complex area, and we have to make sure that the legislators we work

Public consultation plays a crucial role in regulation, promoting participation and transparency in all the stages of the process.







with have the opportunity to know what we are doing and about the processes. How complicated is this? Obviously, energy is a very important political issue, climate change is a political issue, and we live in this environment but we have to be able to explain decisions to legislators and be able to get their support.

Transparency is key. Therefore, decisions must be explained, not only the reason of the choice but also why other alternatives were rejected. The regulator's decisions are reviewed by a court, and as long as they are reasonable and based on the law, they will stand. But if any arbitrary or capricious decision is made, then the court will reject it, and we will have to start from scratch.

Decisions need to be explained not only in technical language. They also need to be explained clearly. That means that they can be understood by the citizens who are interested in the subject. In that sense, communication efforts should aim to ensure that your work can be understood by the citizens for whom you are working.

In the processes that are used for determinations, it is also important to allow transparency, that is, that the processes are open, that any citizen who comes to see the work can hear you deliberate, that they can participate, that they can offer comments to the commissioners on any procedure, that the hearings are accessible, even by Zoom or by telephone.



Another very relevant aspect is independence. If our decisions do not benefit the public, then we are not in the right business.



Another thing that is important in excellence is to know how to help. You have to interact with the public if they have a problem with their basic utility bill, if they need assistance, for example, because they have low income during a very hard winter, you have to be there to help them.

Many messages about safety are sent, pipeline safety in the states is regulated, and a great deal of utility information is sent, but it is necessary to think in terms of the customers' needs.

According to the law, if a utility company wants to increase the prices in the bills, they have 11 months to review it and see if it is approved or not. It is time consuming. Even though the resources are sufficient, they will be busy during those 11 months. Ways should be sought to speed up the process to issue decisions earlier to be more efficient.

It is helpful to facilitate discussions between different parties to reach agreements. If a utility company wants to increase its tariffs, they may have to discuss it with the unions or the representatives of the public because what is wanted is for them to go into a room, sit down, and see if they can

work it out between them. And, then, the regulators can maybe offer an agreement and sometimes it works.

We have to be active. We have seen in the past that regulatory commissions waited for the utility company to come in with a proposal and then reacted to that. That is how the system is set up, but we have to think outside the records of these proceedings, we have to know what is going on and know what the new technologies are.

Utility companies are complex organizations that provide essential services and it is important to work with them. That does not mean that they will be given everything they ask for, but it is necessary to have an honest conversation, to know their needs, and how we can help them because we have to be partners if the idea is to decarbonize the energy sector.

### From the Association of Mediterranean Energy and Gas Regulators

The Association of Mediterranean Energy and Gas Regulators (MEDREG) is composed of 28 members from 23 different countries. Its main mission is to promote equal, coherent, and compatible energy regulation that ensures stability and competitiveness in the Mediterranean market.

This platform provides an exceptional meeting point for its members, where they can share experiences and benefit from each other. Most of its members operate with independent regulators.

Recently, MEDREG has provided support to two members, Lebanon and Tunisia, two





countries that do not yet have regulators. The goal is to have these countries join the group of independent regulators by the end of this year.

Why is regulation essential and what is its impact? Everyone understands that regulation is fundamental for predictability, transparency, accountability, and competition in energy markets.

Before joining MEDREG, Özkoç worked in the energy sector of Turkey. He often received investors interested in the Turkish

market, and more than 90% of them asked about the existence of an independent regulator and how prices and tariffs were defined. Regulation is therefore vital for investment since it provides predictability and transparency.

Regulation around the world originated in the United States and then expanded to the European Union (EU), including 27 members (now excluding the United Kingdom). This process began in the mid-1990s, with electricity regulation in 1996 and gas regulation in 1998. These directives laid the



regulatory foundations for the EU and were essential to establishing a functional energy market where everyone could benefit economically, ensure supply security, and guarantee high standards and consumer protection. Regulation plays a crucial role.

Initially, the intervention of regulators was limited, although they were independent in the legal framework. Hiring competent staff was essential to develop secondary legislation, as the law sets the general framework. Considerable challenges would be faced without knowledge and experience in the market dynamics.

Adopting good administration and governance practices is critical. Involving all stakeholders in regulation is imperative; otherwise, there are significant risks.

Regulatory development should be a transparent process and include input from key stakeholders in each country. Regulators' staff are not exclusively from the energy sector, and their training and experience are highly important.

It has been shown that legislation should be as concise as possible, establishing a general framework, as changing it frequently is impractical. Constant market oversight and monitoring are essential to keep abreast of developments and avoid significant regulatory errors.

Many regulators are implementing methodological models to quickly assess the performance of new regulations. In the context of the energy transition, cooperation between regulators and stakeholders is crucial as challenges are becoming more frequent and unpredictable.

The energy transition will require detailed planning and a gradual approach. Regulators must have independent planning departments. Making mistakes in categorizing fossil fuels can have serious consequences. It is necessary to address coal first, then oil, and finally natural gas to move towards the energy transition.

Although there is not yet perfect regulation in the world, cooperation and joint learning are fundamental. The recent energy crisis demonstrated the interdependence of markets, so working together is essential to meet energy transition goals and develop dynamic regulation that adapts to the changing market.

### **From the National Society of Mining, Oil, and Energy of Peru**

The National Society of Mining, Oil, and Energy (SNMPE) represents Peru's private sector and perceives the role of the regulator from the other side of the table. In reality, the principles and objectives are the same. The difference lies in communication.

The SNMPE is an association dedicated to hydrocarbon, mining, and electricity activities. It is mainly focused on the sustainable development of industries related to the use of natural resources, always taking into account environmental and social aspects.

Currently, the SNMPE has 148 member companies, including approximately 90% of the companies in the mining sector, and a significant presence in the hydrocarbon sector, including the exploration and exploitation of natural gas.





In addition, it has an important number of companies related to the electricity sector, both in generation and transmission, together with those that provide ancillary services in the industry. It is important to note that the sector is of vital importance to the country, emphasizing the relevant role of the regulator. It has worked hand in hand with Osinergmin for more than 20 years. This organization was established in 1996 to regulate the activities of the hydrocarbons and electricity sector, and the activities of the mining sector were incorporated years later.

It is undeniable that Osinergmin's participation in the sector has contributed significantly to maintaining high standards in regulatory compliance and contractual commitments.

However, it is crucial to recognize that this regulatory role, although beneficial, has existed for many years and it is necessary to review and update the regulatory reality to move forward. One of the aspects that should be emphasized is the importance of regulatory quality and the analysis of the impact of regulation, both before and after its implementation.



## OECD Recommendations



**Proactive relationship with those administered to communicate your mandate and functions.**



**Interinstitutional coordination: Instrument development to ensure adequate coordination.**



**Comprehensive review to ensure that has the resources, structures, systems and capabilities to fulfill with its function and objectives.**

This includes the review of previous regulations to prevent undesired effects and collaboration between the regulator and the private sector to better understand the reality and ensure effective and transparent regulations. In addition, it is essential to address over-regulation as this can adversely affect investment and competitiveness. Inter-institutional coordination must also be ensured to facilitate access to regulation by private companies and improve efficiency in supervision and oversight.

Another important aspect is that the regulator must have adequate resources, structures, and systems to perform its functions efficiently and effectively. Furthermore, in a country with a highly regulated activity, as is our case, it is essential to address legal security as it

provides investors with the necessary confidence to invest in the country.

Active collaboration between the regulator and the private sector is essential to achieve the country's development and attract investment. As a strategic sector, the SNMPE has the responsibility to work together on regulation that is fair, reasonable, and beneficial to all involved.

Osinergmin's participation in the sector has contributed significantly to maintaining high standards in regulatory compliance and contractual commitments.



# Recharging the United Nations 2030 Agenda

## SPEAKERS

Moderator: Carolyn Calwell

### Andrew Flagg

Coordinator of the Regulatory Energy Transition Accelerator (RETA)

### Simon Turmel

Member of Regula E.Fr and Commissioner of the Régie de l'Énergie du Québec

### Erin Hammel

Director, International Programs, National Association of Regulatory Utility Commissioners (NARUC), USA

### Ana Isabel Moreno

Head of "Energy Supply 4.0" project in Peru of the German Agency for Development (GIZ)



Public policy coordination is key to addressing the challenges of the energy sector. The 2030 Agenda for Sustainable Development, COP26, and the European Green Pact are just a few examples of international coordination mechanisms in an increasingly interconnected world. How is international cooperation helping us generate regulatory intelligence?

### RETA: Accelerating the energy transition

Today's topic is the Sustainable Development Goals (SDGs) towards 2030. But one in particular is relevant to us, namely SDG 7: to ensure access to affordable, reliable, sustainable, and modern energy. That is the main objective of the Regulatory Energy Transition Accelerator (RETA): to have a sustainable energy system for all.



## 2030 Goals



**675 million**

people still live in the dark



If current trends continue,

**1 in 4 people**

will still use unsafe and inefficient cooking systems by 2030



**4 of 5**

of them are in sub-saharan africa

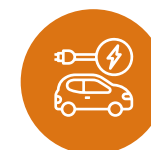


Modern renewables power  
**nearly 30% of electricity**  
but remain low in heating and transport



**Heat**

**10,4%** modern renewables



**Transport**

**4%** modern renewables



**Electricity**

**28,2%** modern renewables

Source: The Sustainable Development Goals Report 2023: SPECIAL EDITION- UNSTATS.UN.ORG/SDGS/REPORT/2023/







In terms of energy access, two regions are lagging behind. They are Oceania, including Australia and New Zealand, and sub-Saharan Africa. Another challenge is related to emerging countries in terms of access to cooking facilities, i.e., they do not have fuels for cooking. That is a health-related problem, but it is also environmental.

A third challenge is that although the percentage of renewable energy production has increased, its use in transportation and heating is scarce.

Energy regulators, as stakeholders, are key to meeting these 2030 goals.

And there are new frontiers for energy regulators.

Clean cooking facilities and heating goals should be written into regulation. However, their mandates have limitations, and so do their mandates for sharing their expertise. For example, organizations working globally on energy transition historically work with Governments but not necessarily with regulators.

The World Forum on Energy Regulation shows how many regulators exist in the market and facilitates dialogue between them.

RETA has a committee made up of regulators and other organizations such as the International Energy Agency (IEA), the International Renewable Energy Agency (IRENA), the World Bank, the



The main objective of the Regulatory Energy Transition Accelerator (RETA) is to have a sustainable energy system for all.



and network with each other, promoting further discussion and collaboration. For RETA, accelerating to achieve energy transition is important. There is an environmental emergency surrounding us, and regulators need to feel empowered to make decisions and consolidate their progress on this issue.

### French-speaking cooperation

Rocky Mountain Institute, and the Global Green Growth Institute, among others. It is a space where they interrelate with each other and with Governments.

After a series of debates, today, there are five energy projects. The first deals with decarbonization in regulators' decision-making, a project that will help carry out the energy transition to face climate change.

The second is the Principles for Interconnectors project, which addresses the interrelationships and power of different jurisdictions to implement more flexible systems and create more energy resources. Another project is related to the Island Developing States, working with Caribbean and Pacific regions and regulators that have a lot in common.

The fourth project is related to digitalization and how regulators can benefit from new technologies to make systems more flexible.

Finally, the last project is to create the RETA Knowledge hub, which will be a space for regulators to find information

Despite a diverse context, regulators have a common mission: to ensure fair and transparent competition, preventing discrimination. They must prevent concentration of supply, define the quality and reliability standards of the electricity system, establish cost-reflective tariffs, and ensure rigorous transparency and enforcement of the regulatory framework. There are also common trends in the issues being addressed by regulators, such as electrification, renewable energy development, and decentralization of production. Therefore, there is a natural interest in cooperating and sharing experiences.

The development of regional and continental markets requires cooperation as it is complex and needs a more effective regulatory system.

RegulaE.Fr, International Cooperation Network was created in Paris on November 28, 2016 at the initiative of the Commission de régulation de l'énergie (CRE) of France and in collaboration with L'Autorité Nationale de Régulation de l'Electricité de Côte d'Ivoire (ANARE-CI) of Ivory Coast, the



Commission de Régulation de l'Electricité et du Gaz (CREG) of Belgium, and the Régie de l'énergie de Québec of Canada.

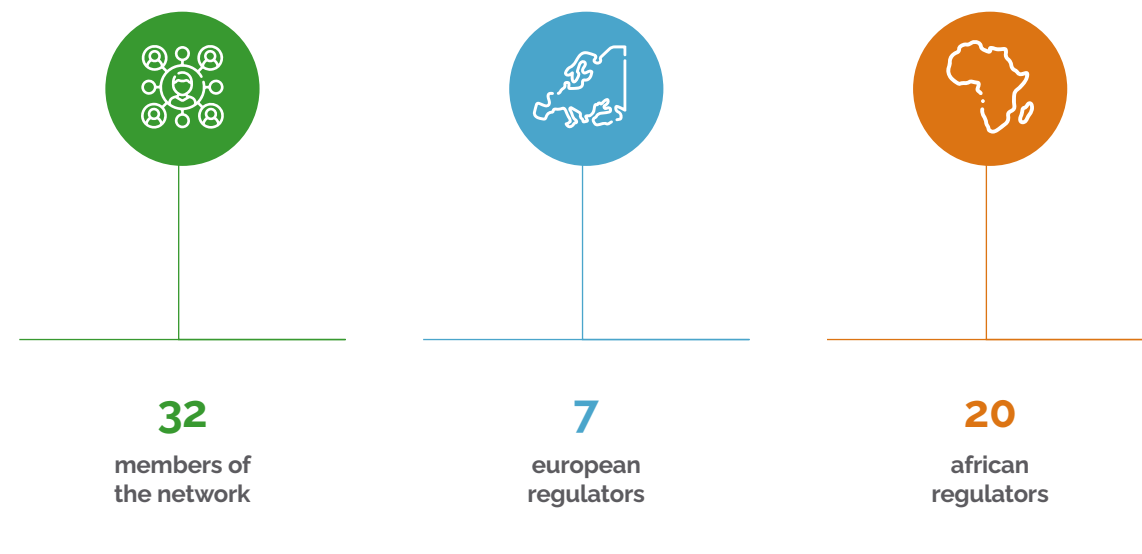
Its objective is to bring together French-speaking regulators in a single network to facilitate exchanges of experience and foster collaboration among its members. It also seeks to facilitate coordination with international training programs and funding from European and international donors. Experiences and best practices in energy regulation are shared.

Today, it has 32 members, of which 20 are from Africa, seven from Europe, four from the Americas, and one from Eurasia.

RegulaE.Fr holds two annual meetings on specific topics, aiming to meet the SDGs, especially the goals 7, 9, 13, and 16. It also contributes to meeting the objectives of European policy in terms of cooperation and partnership, particularly in the industrialization of Africa, so that it has better access to the electricity grid.

RegulaE.Fr also organises bilateral meetings between members who want to talk about the needs in their jurisdictions. It also conducts webinars in which specific regulatory issues are addressed. Communication is made via the website and social media. It seeks to be present in all international energy forums.

#### RegularE.Fr, international cooperation network



In seven years of existence, RegulaE.Fr has organized ten events leading to 12 energy workshops. Of these, one was held in Kinshasa, Republic Democratic of Congo, in July 2023, and dealt with off-grid electrification. The next one will be held in November 2023 in Rabat, Morocco and will discuss the energy interconnections and regulation for cohesive regional integration.

As an example of bilateral cooperation, in 2021, the regulatory authorities of Morocco and the Democratic Republic of Congo signed a support and cooperation agreement as regulators of the electricity sector to promote the exchange and transfer of experiences.

#### Gender equity from NARUC

The National Association of Regulatory Utility Commissioners of the United States (NARUC) has worked on various activities to develop gender equity.

The United Nations 2030 agenda wants all people in the world to prosper. To that end, the SDGs have been established, but they have left some gaps. One of them is in the development of gender equity for women and girls. Thus, NARUC has prioritized three goals: SDG 5, Gender equality and women empowerment; SDG 8, To promote inclusive and sustainable economic growth; and SDG 10, To reduce inequality within and between countries.







There are marginalized groups in the energy industry, especially women. Therefore, NARUC proposes more efforts for equity. Without women's leadership in the sector, they will never prosper.

Positive examples of equity include Power Africa, a U.S. Government-led association that brings together the collective resources of the private sector, international development organizations, and Governments around the world to increase energy access and end energy poverty in sub-Saharan Africa. This organization is helping women develop.

Like Power Africa, regulators should focus on integrating women into the energy sector, getting them to make decisions and participate in regulatory policy. And, of course, women need to remember that they are not only employees of companies and end-users, they can also participate in the value chain as entrepreneurs and regulators.

The female labor force should be greater in the energy sector because in the world; that is, in other sectors, it is much greater. There is an imbalance here, and it is necessary to achieve equity. There are many women in the sector holding junior and middle management positions, but they should also hold positions of responsibility and project development.

Another positive example is Guatemala's regulatory entity, which has improved female participation in the community.

The United States has intervened in many countries to help women have greater participation, working with regulators in Africa, Europe, and Southeast Asia to strengthen their programs.

For example, there is the government-supported Advancing Women Leaders in Energy program, an economic empowerment initiative for women, and is



supported by law to have a more inclusive labor force.

Men and women working in the energy sector also need to be mentors, coaches, and actors of change to support young women and youth in general because the presence of women generates prosperity.

### The participation of the German Development Cooperation




The German Corporation for International Cooperation (GIZ) contributes to meeting the UN Agenda 2030 goals and making it possible for national authorities to meet them. In this context, regulators play an important role in implementing the vision of international cooperation.

GIZ's framework, especially in a middle-income country like Peru, focuses its actions on closing the basic needs gap and, now, is also concerned with cooperating with a country vulnerable to climate change.

Therefore, the actions are focused on a climate alliance. There are 38 mitigation measures related to protecting the environment, and 17 are under the responsibility of the Ministry of Energy and Mines.

Peru still has a long way to go, especially in ensuring access to electricity. There are 1.5 million people without access to electricity, and they are precisely those who are in the last mile. In addition, there are 4.8 million people still without access to modern cooking technologies.

### Framework for action of the German Development Cooperation: Supporting the implementation of the SDGs

	World	Peru
 Ensuring Access	675 million people without access to electricity (2021) 2.3 billion people without access to clean cookstoves	1.48 million people without access to electricity (2021) 4.88 million people without access to clean cookstoves
 Increase renewable energy	19.1% of total final energy consumption comes from renewables (2019)	31.6% of total final energy consumption comes from renewable energies (2019)
 Double the Energy Efficiency Rate	4.63 MJ/USD Primary energy intensity (2020)	2.46 MJ/USD Primary energy intensity (2020)



To contribute to this climate change mitigation framework, there is a three-strand strategy: environmental sustainability, which has to do with energy efficiency and savings in supply and demand, and with the supply of renewables and other low-carbon sources; energy equity or access, which deals with accessibility and affordability of supply for all; and energy security, which is the management of resources to meet current and future demand, and the availability of modern energy infrastructure.

This strategy is being implemented in four areas: capacity building, process optimization, Government advisory, and reliable data generation.

The first supports people to acquire specialized knowledge, skills, and management experience. The second provides advice to optimize organizational, management, and production processes. The third focuses on providing advice to the Government on how to meet the objectives and implement change processes at the national level, incorporating them into legislation and strategies. Finally, the fourth deals with providing advice on data monitoring and evaluation to develop new policies.

With this strategy and performance, since 2008, the German Cooperation has developed projects that have allowed 365 thousand families in the country to have access to modern energy cooking technologies.

Peru still has a long way to go, especially in ensuring access to electricity. There are 1.5 million people without access to electricity.



It has also accompanied access to lighting, basically complementing the National Rural Electrification Plan, which contemplates the expansion of electrical grids. However, this does not necessarily ensure people's access because indoor electrical connections are not included in this plan. Therefore, the photovoltaic systems market has been promoted and introduced, taking the experience of other regions such as Africa.

In the area of environmental sustainability, if we focus on renewables, work has been undertaken with the electricity distribution sector to develop new business models, preparing for the changes generated by the energy transition. And there, the development of business models such as roofs with solar panels has been promoted. Some experiences and initiatives related to the use of energy efficiency have been developed, accompanying the development of standards and studies to support the Peruvian State and promote e-mobility. Likewise, there is a strategy to promote the replacement of electric heaters with solar heaters, expanding the



market for this type of heaters from the south of the country to the entire territory.

Finally, the efforts of the German Cooperation are also reflected in the regulations of institutions such as the Ministry of Energy and Mines, Osinergmin, and the National Institute of Quality. Among them are the referential plan for efficient energy use to 2050 or the proposed regulation for the

installation and operation of e-mobility charging infrastructure, both from MINEM, or the guidelines for formulating energy efficiency projects in the tariff process, the strategy for the deployment of smart meters, or the technical documents that recommend the application of hourly rates for e-mobility, from Osinergmin.





# Being an independent regulator

## SPEAKERS

Moderator: Natasha Avendaño García

### Luciano Paulin

Chair of Argentina's Association of Electricity Regulators (ADERE)

### Michael Caron

President of the National Association of Regulatory Utility Commissioners of United States (NARUC)

### Agnes Maria de Aragão da Costa

Director of the Brazilian Electricity Regulatory Agency (ANEEL)

### Annegret Groebel

Vice Chair of ICER

The energy transition requires a stable regulatory environment that promotes innovation and investments. The role of energy regulators in monitoring the retail market is more important than ever, and the need to achieve a balance between investors, state intervention, and consumer protection is increasing.

Ensuring good regulatory practices is an important task and should be maintained through a comprehensive strategy. Some elements consist of deflecting external influences from stakeholders. This can be achieved by the independence of the regulator, which should be hedged by protecting it from the influence of national or regional Governments and industries.

In addition, the legislative framework is very important in establishing the environment where the regulator works. The duties and powers of a regulator

should help identify a minimum set of competences that define its specific responsibilities to promote competition and consumer empowerment.

The effective organization of the regulator requires a process to make clear decisions and perform clear actions, as well as an operational internal structure with distinct roles and responsibilities. A regulator must enforce the regulations it approves since enforcement involves ensuring compliance with the rules by market participants and regulatory entities. Finally, transparency and accountability are cornerstones in the work of regulators and must be maintained at all times.

### From the Association of Electricity Regulators of Argentina

To achieve effective regulation, it is crucial to be impartial and maintain



independence. Regulators must stand out and support collaborators starting in this field, providing them with the necessary tools and competencies to promote quality in providing affordable public services.

The challenge of being an independent regulator involves ensuring the separation of roles and responsibilities, as well as establishing an appropriate regulatory framework. In addition, transparency, accountability, and the protection of users' and consumers' rights must be ensured.

Regulatory principles are fundamental in this process, and it is important to understand that independence does

not mean operating without a legal framework. On the contrary, legality is essential to define responsibilities and make decisions based on clear and fair regulations.

In this sense, neutrality is a challenge, but it is also relative. A regulatory body must be detached from the vicissitudes of politics. In addition, citizen participation and transparency in the process are crucial to maintain confidence in regulatory institutions.

Being an independent regulator is a challenge that implies maintaining impartiality, having an adequate



regulatory framework, and promoting citizen participation. By complying with these regulatory principles, effective regulation that benefits society as a whole can be achieved.

### Notes from the International Confederation of Energy Regulators

To be effective regulators, decisions must be made that, at times, may not be popular, which is a key requirement in this work. There are three fundamental elements related to the legal perspective

of the legal and judicial systems, as well as the importance of maintaining a coherent internal organization and complying with state regulations to ensure that objectives are aligned both technically and professionally.

It is essential to exercise decision-making to achieve objectives and to consider how these determinations are made based on expert and professional knowledge, carefully applying the legal framework. This allows balancing the various tools available as regulators to achieve objectives in the best possible way.



As regulators, we are accountable to the State, the public, users, and operators. Maintaining the balance between these stakeholders is essential.



Impartiality is relative since, as regulators, we are accountable to the State, the public, users, and operators. Maintaining the balance between these stakeholders is essential and drives decisions based on professional standards and how objectives are achieved.

Wait and patience are also crucial factors in this work. It is not simply a matter of waiting without knowledge but exercising decision-making to achieve objectives effectively. This aspect is especially critical in the work of any regulatory body and can be difficult to implement without independence.

It is important to remember that emergency measures must have a time limit. These exceptional situations should not become the norm, and we should return to the regular work routine as soon as possible. Independence, even during a crisis, is essential to maintain integrity. Short-term decision-making, while necessary, can distort the market in the long term, which





is contrary to the forward-looking mission of regulators.

Actions during a crisis should be transparently communicated as exceptional measures. After dealing with the crisis, we have to return to operation as usual and think about long-term measures to sustain the energy transition while maintaining a flexible and dynamic goal-oriented approach for the future.

As regulators, we must take responsibility for making effective decisions even when they are unpopular, maintaining a balance between short- and long-term

responsibilities, and adapting to changing circumstances to effectively achieve energy transformation.

### The perspective of NARUC

The National Association of Regulatory Utility Commissioners of the United States (NARUC) considers that the independence of regulators is essential for them to make decisions autonomously for the benefit of the institution.

The essential work of regulators implies acting with competitive mechanisms without yielding to pressure from



monopolies or competitors with better offers. They must make decisions based on the idea that their investments and operations are prudent and reasonable in similar circumstances.

There are four main barriers to the independence of regulators. The first relates to courts and legal challenges, which can lead to decisions facing trials at higher instances. Due process must be granted to all stakeholders promptly and fairly to maintain confidence in the regulatory process.

The second barrier relates to legislative challenges since each state in the United States has its own ways of regulating and awarding processes. Regulators depend on state legislatures to define their powers and criteria, which can change at any time. Effective communication with legislators is essential to ensure independence and mutual understanding.

Financial markets create the third barrier since utility companies need to maintain long-term investors' confidence. Regulatory decisions must be based on reasonable expectations, recorded evidence, and consistent standards to maintain that confidence.

The final barrier relates to the public, who sometimes may not understand why certain decisions are made. Regulators must effectively communicate their commitment to the public interest, explaining the benefits of regulatory decisions and demonstrating that it is a fair and equitable process.

To maintain independence, regulators must balance the expectations of all stakeholders and effectively communicate their decisions and processes. Training and support provided by organizations such as NARUC is critical to prepare commissioners for their roles and to ensure that they understand both the technical and human aspects of regulation.

Energy reliability and accessibility are essential to ensure the well-being of society.

### The Brazilian case

The National Electric Energy Agency (ANEEL) is Brazil's regulatory agency and is aligned with the objectives of the Organization for Economic Co-operation and Development (OECD). Understanding the regulatory agency's competencies and making sure they are defined is key. This implies that the agency must know its role and responsibility in the market it regulates. This clarity is fundamental to the proper functioning of any regulator.

Thus, regulators play a fundamental role in the modernization of the State.

Regulators must balance the expectations of all stakeholders and effectively communicate their decisions and processes



The regulated sector has undergone significant transformations, and regulators must find ways to incorporate elements of modernization into their work. They also face challenges, such as managing unexpected crises and maintaining the regulatory agenda.

In this regard, the need for regulators to be flexible and able to adapt to unexpected crises is especially relevant in economic or health crises when regulators must make quick decisions to maintain market stability.

Likewise, communication and transparency are also key since actions must be explained

to stakeholders. Maintaining independence and a long-term vision is essential to ensure the sustainability and reliability of the system.

Accountability and evaluation of the regulatory agency's performance is also important. This includes holding public hearings, public participation, and regulatory impact assessment.

Furthermore, impartiality is a critical aspect of regulation. Regulators must be impartial and fair in their dealings with both economic agents and consumers. This is especially critical in the case of



Brazil since the agency acts as a mediator between agents and consumers in specific situations. In a developing country, it is also necessary to focus on gaining the attention and support of consumers, legislators, and the State to promote the sector's development.

It is important to emphasize that the agency must remain focused on the technical aspect and guarantee the stability of its workers. If government interference can be avoided and technical independence maintained, the difficult job of establishing effective regulations can be accomplished.

In terms of governance structure, there are several entities in Brazil such as ANEEL, distribution regulation, system operator and

market regulation, and the Office of Energy and Research, which work together to lay the foundations for the sector's expansion.

The decision-making process at ANEEL involves a series of stages, from technical review to public evaluation, ensuring greater transparency and preventing undue influence. Effective communication and transparency are key to gaining the trust of stakeholders and the market in general.

In addition to financial and human resources, challenges include independence, modernization, transparency, and the importance of maintaining the regulator's technical independence and stability. This is achieved by ensuring that regulatory decisions are based on technical criteria and are not subject to political interference.





# The art of communicating complex regulation

## SPEAKERS

Moderator: Maia Melikidze

### Ana Carolina Mora

Head of the Communication Department of Costa Rica's Regulatory Authority of Public Services (ARESEP)

### Greg Lyle

President and founder of Innovative Research Group

### Jesús Roberto Tamayo Pacheco

Former Chair of Osinergmin (2012- 2017)

Many of the decisions made in the regulatory field are considered technical and objective but all such effort may not be taken as such if it is not communicated correctly to the public. Therefore, it is important to make the necessary effort to make the regulatory work understood. There are no right tools or methods to achieve this. It is a matter of applying the sum of experiences in impact communication strategies to achieve the right results.

### Costa Rica: the importance of convincing

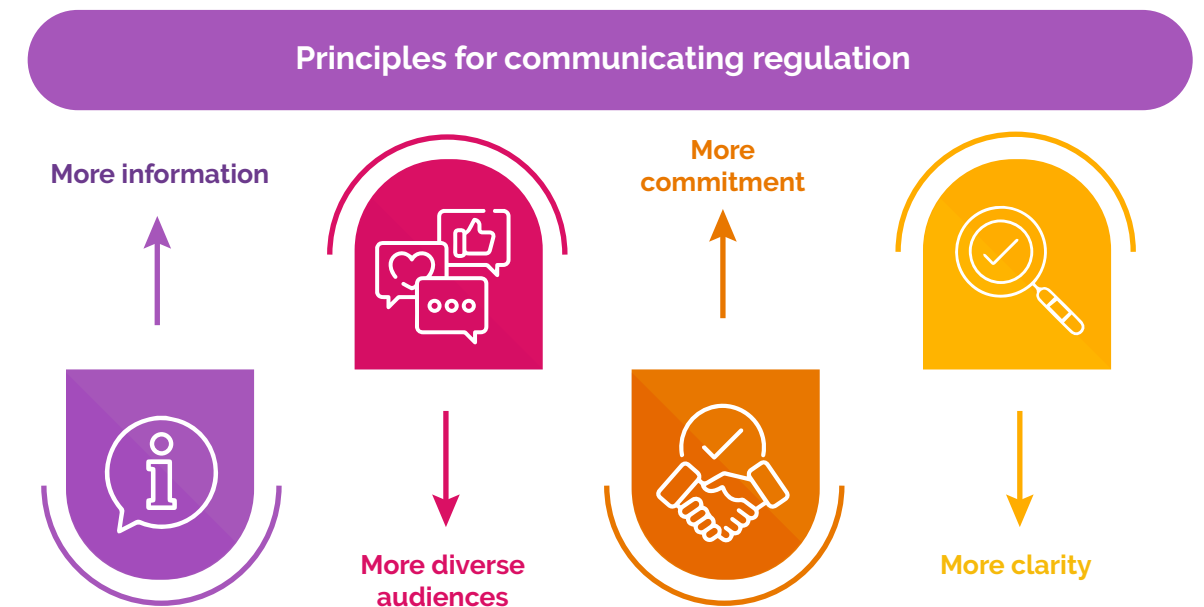
The communication teams of regulatory institutions must consider the importance of convincing. This is necessary because, through communication, it is possible to approach all people, whether internal or external, and achieve institutional objectives.

There is a maxim built into the Communication Department: "What does not pass through

the Communication Department does not exist." This is important since it raises a new dynamic in which the communication offices must play a much more active role.

Currently, communication is a two-way process. Today, inhabitants have direct access to institutions to demand information through platforms such as Twitter or Facebook, which is why we must evolve from being a serious and distant institution to a close and accessible one.

Public institutions are subject to three fundamental principles: transparency, efficiency, and proximity, ensuring access to public information. Today, with the new dynamics of communication, regulators must add a new role: to provide information and respond to citizens' demands. Therefore, more information must be provided to a more diverse public in a clearer and more committed manner.



Everything a regulator produces, from the directors to the technical teams composed of economists, engineers, and lawyers, is done in the best possible way. But it is written in a complex way for a group of experts. It is important to simplify and make this information accessible, bearing in mind that not all audiences are specialists in the field.

The work of the Communication Department is based on aspects that draw on various subjects and skills such as communication theory, neurolinguistics, political communication, digital media, artificial intelligence, and, above all, creativity and patience. These are the key elements that define communication teams.

Today, people consume all kinds of information without paying attention to its seriousness or duration. There is a demand for versatile and fast content that responds to the needs of the public.

In this context, it is the responsibility of communication departments to ensure that the information processed and created by different sources has influence and becomes the truth.

To achieve this, it is necessary to face the challenge of conveying information of public interest in a fast and pleasant way. Communication departments must adapt regulatory information to the new media tools, taking into account human and technical resources, graphic design, platform accessibility, advertising, and the participation of society as a whole.

It is essential to generate a corporate communication vision and unite internal and external interlocutors to effectively manage communication. In addition, it must be ensured that reports and results are adapted to a simple and concise language so that they are accessible to citizens.





To achieve the objectives, it is necessary to use different forms of communication. This includes collaborating with journalistic organizations, creating communication banks, and generating content on social media, relying on journalists and influencers.

### The importance of attention

The issue of communication from the customer's point of view is not always similar to what the organization expects in that area. The first thing the organization's customers want to know is why the issue should matter to them. The second question is why they should spend some of their time on the issue. Organizations have to answer both questions if they want to have their attention. There is a lot of information reaching people (customers) and they cannot hear it all.

Today, it is important to reinforce the use of images and words to reach customers. We work in an environment run by lawyers, engineers, accountants, and economists, focused on numbers and very specific words that the public neither know nor recognize and they do not have time for that. The challenge is, if we want to get their attention, to tell the story in a simple manner, and the way to do that is usually with an image.

Likewise, we have to be honest about the risks and challenges we face in communicating. What if we don't? If we start, for example, with the challenge of the energy transition and we do not explain what it entails, the costs in terms of money and whether people will have to pay higher prices for utilities. This can have an adverse outcome.



An important case study is, for example, the strategy used for the case of Toronto Hydro-Electric System Limited, an electricity distribution company, addressing three key areas for effective communication with energy users: costs, building tariffs, and consumer behavior. These aspects are critical to ensure a clear understanding of the challenges and opportunities in the sector.

To capture people's attention, it is important to use a variety of communication channels. In this case, slides were posted on the website and social media such as Twitter and LinkedIn. This helped reach a wider audience and generate interest in energy issues. Direct interaction with customers is essential. Providing detailed information and answering their questions allows them to make informed decisions. It is also important to promote a two-way conversation to understand their needs and concerns.

Furthermore, concrete examples are very effective in illustrating complex concepts. They help people better understand the issues and connect with them. Likewise, transparency and honesty are critical to building public trust. When addressing challenges and concerns, it is important to be transparent about aspects linked to the energy infrastructure and related policies applied to the project. Any ongoing studies or research should also be reported to keep people informed.

Simplifying information is essential to make it accessible to everyone. Asking relevant questions helps customers reflect on their energy behavior. It also provides additional resources for those who want to delve deeper into the issue, promoting continuous learning.

Likewise, it is important to have respect for the audience. It is very useful to accommodate and provide them with





sufficient information according to their expectations, readiness, and priorities. The way the information is presented will be driven by how the audience responds, not by the personal interests of the organization's representative or the institution.

### Addressing communication needs

Communication can be complex, especially due to existing regulation. Some various equations and regulations may not be legible to the public, such as aspects involving international parity prices or economic variables that have to do with regulatory decisions. There is some regulation in utilities, but there are also international contracts and agreements that influence their distribution and prices. It is common that, for example, in security and

Communication can be complex, especially due to existing regulation (...). To address all the challenges, it is necessary to work with a clear strategy and updated objectives.



infrastructure issues, the authorities are the first to be consulted since they affect both the economy and people's lives.

To address all these challenges, it is necessary to work with a clear strategy and updated objectives. This has been done at Osinergmin to quickly address the communication needs of the different stakeholders in an understandable,



fast, and effective way. In addition, it is important to establish a close relationship with stakeholders: citizens, media, concession companies, and the State. Communicating with the central Government, ministries, and Congress can be especially challenging.

With these needs in mind, organizational changes were made to improve communication, for example, to approach the different regional stakeholders. To this end, Osinergmin implemented 25 regional offices with specialized staff. Likewise, synergies were established with institutions in each region to boost their presence.

However, we also faced budget cuts due to the need to comply with state regulations. As

a result, there were difficulties in the provision of utilities and two-way communication with the population. In light of this situation, mechanisms were implemented to foster communication in the provinces, such as assistance via text messages, and then to improve communication via various platforms and social media. This facilitated communication and increased interaction with the population.

Work was also done to improve the internet infrastructure in the country, providing greater facilities in terms of communication. This was important because through digital services there is a permanent approach to the community's needs.





# 03

## Competitiveness

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The competitiveness theme was addressed through a plenary session on building the next generation of combined energy resources and presentations on the prospects for post-pandemic energy markets, the development of the game rules for cross-border integration, ensuring reliable utility services and the promotion of regulatory reforms.





# Building a next-generation mix of energy resources

## SPEAKERS

Moderator: Francisco Salazar

**Annegret Groebel**

Vice Chair of ICER

**Alda Ozola**

Chair of the Board of the  
Latvian Public Utilities  
Commission (Regulator)

**Clare Savage**

Chair of the  
Australian Energy  
Regulator

**Bruno Meyer**

GO15 Secretary  
General

The success of the implementation of the energy transition will depend on the types of incentives for the development of the necessary investment to make this change and on the countries facing the challenge of building a generation mix of energy resources that will provide reliability of supply, especially of the electricity system.

## Infrastructure and consumers in the European energy transition

The Council of European Energy Regulators (CEER) thinks of the role that energy

regulators will have to play in promoting and supporting the transition of this system, as well as the roles of the economy as a whole and society to counteract climate change.

Regulators should consider this new objective to give the sector players incentives to react, act rationally, and move in the right direction on the road to climate neutrality. Likewise, the CEER has also contemplated that this objective should not only be seen as an infrastructure change but should focus on motivating and empowering consumers to contribute to and benefit from the energy transition.



## Strategy: Empowering Consumers for the Energy Transition

### Three regulatory dimensions



Well functioning markets/IEM  
**FLEXIBILITY**

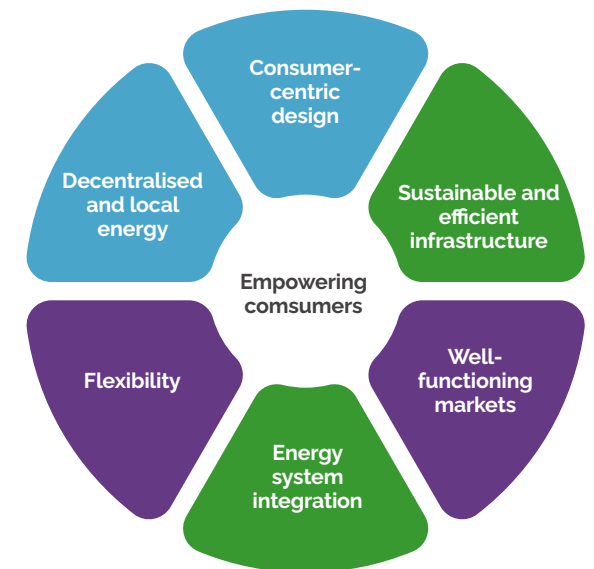


Consumer centric  
dynamic regulation  
**VISION 2030**



Energy system  
integration  
**SUSTAINABLE INFRASTRUCTURE**

### 6 core areas of the strategy



Regulators should consider this new objective to give the sector players incentives to react, act rationally, and move in the right direction on the road to climate neutrality.



It is key to have an empowered consumer and customer playing an active role in this transition. Therefore, CEER's strategy for 2022-2025 consists of three main dimensions. The first dimension is to enable the energy system integration, which means integrating renewables and promoting innovation. The second dimension is to place the consumer at the

center of energy markets with a dynamic consumer-focused regulation. Last but not least, the third dimension is that all this should be reflected in a well-functioning energy market, where regulators ensure an open and resilient market in each country and Europe as a whole.

Focusing the scheme on the consumer is relevant because the consumer plays an important role in driving local and decentralized energy markets, where decentralized renewable generation and distributed generation are promoted. Likewise, the aim is to promote a sustainable, effective, efficient, and decarbonization support-oriented market. Under this scheme, the regulator has an essential role to play in keeping markets open and properly operating to ensure



As regulators, there is an interest in promoting an appropriate mix of solar power and wind power.



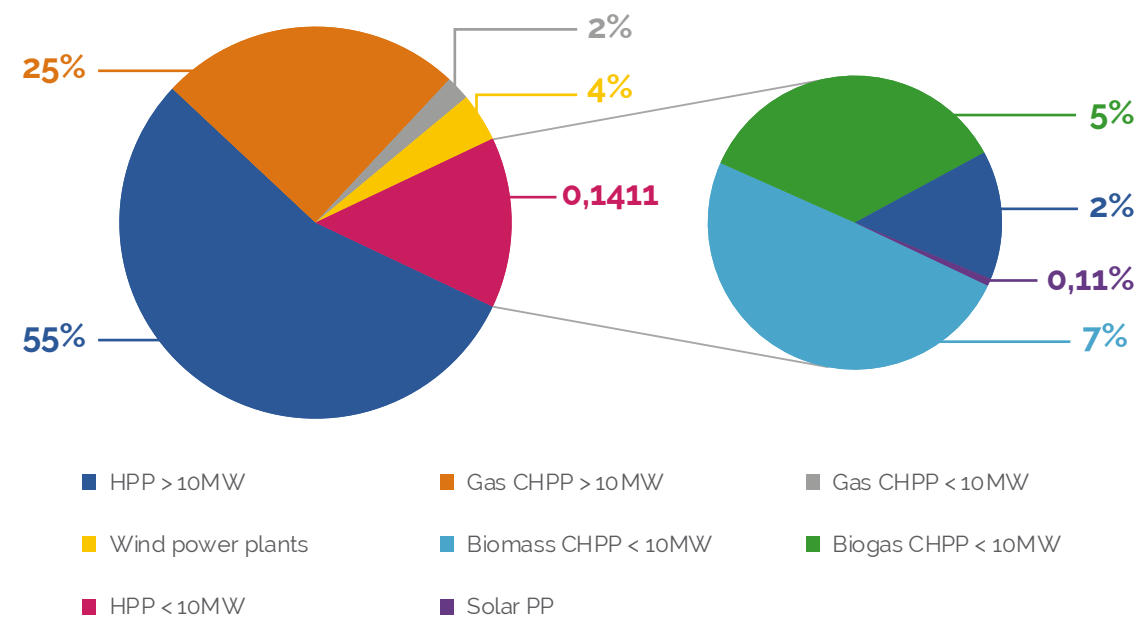
that the system not only integrates but also becomes more flexible because, without flexibility, the system will neither work nor

be able to integrate renewables as needed in this process.

### Lessons from Latvia

In Latvia, more than half of the annual electricity generation comes from hydroelectric sources, while about 25% of cogeneration plants are fueled by natural gas. Additionally, other resources such as biomass, wind, and solar power are used; however, the potential for solar power in Latvia may be limited due to the absence of sunny days. Latvia imports about one-third of its electricity because it is a small and variable market in terms of power demand.

Mix of energy, 2022



As a regulator, the objective is to promote an adequate mix of renewables and

ensure an optimal load on the grid without investing too much in infrastructure. For



example, a net accounting system for microgenerators has been implemented but will be phased out by 2026 due to associated costs and inequitable cost sharing. Guaranteed payments for reserved capacity have also been introduced to prioritize more mature projects in renewable development.

In addition, ways to minimize the impact of the entry of certain types of energy, such as solar, are being explored to ensure grid stability. As regulators, there is an interest in promoting an appropriate mix of solar power and wind power despite recognizing that wind power development may take longer due to environmental considerations and challenges in

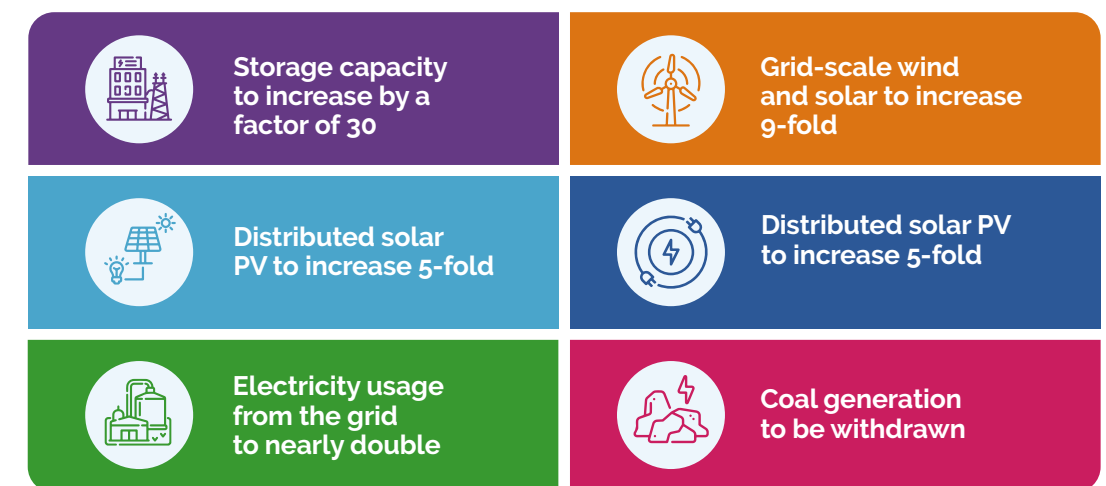
persuading local communities of the benefits of installing wind farms.

In general, the regulator faces several challenges, looking for solutions and how to address them in the next years.

### Lessons from the Australian energy regulator

The first thing to understand about the complexity of regulation in Australia is that it is a large country. It is about the size of the United States, but the most populous part, Western Australia, is about the size of Western Europe. So, it is a big country, but not populous, with about 27 million inhabitants.

Expected energy transition to 2050





Australia does not have a physical interconnection of its electricity system. So, three systems operate: Western Australia, the Northern Territory, and the rest of the East Coast. So, there is no physical electrical connection between half the country and the other half. In addition, it has 40,000 kilometers of transmission lines, 204

terawatt hours of energy, and 65 gigawatts of installed capacity, of which 15 gigawatts is solar energy from residential rooftops.

The regulator is a consumer protection agency, acts as an administrator of the retail energy market, and enforces laws and regulations.



One of the aspects being developed in Australia is the integrated planning of the energy transition-oriented system. Thus, Australia's state-owned energy market operators prepare a least-cost development plan between now and 2050 and analyze the mix of resources necessary to achieve net zero emissions, using several different scenarios.

In an energy-only market design, there is no availability or capacity payment. Governments are often uncomfortable with very high prices, creating tensions in the system. This raises the question of whether prices should be changed and whether such change will be allowed to be made, which may affect investor perceptions. Uncertainty in Australia about when and how coal will be retired may also be a barrier to new investments.

There are some requirements to order the closure of coal plants, but their application may be difficult since a plant cannot be forced to continue operating if it fails. With this in mind, work is underway with sub-national governments to establish better, more orderly exit mechanisms for plants to operate when necessary and retire when appropriate, which is fundamental for investment.

Although there is an increase in renewable generation, sometimes there is not enough capacity to meet demand, especially in times of high demand and absence of sun or wind. Therefore, flexible capacity is still required.

There has been an ongoing debate in Australia regarding whether the current market design is suitable to drive energy

Although there is an increase in renewable generation, sometimes there is not enough capacity to meet demand.



investment or whether something similar to a capacity market is needed.

Another fundamental aspect of unlocking investment, especially in renewables and other new resources, is upgrading the transmission grid. The current transmission system was built to connect major cities and coal plants or coal mines without necessarily considering the best locations for wind or solar resources.

It is necessary to gain community support to build new transmission lines, which span about 10,000 kilometers. However, there are challenges because some people do not endorse the idea of having high-voltage transmission lines in the middle of their properties. Therefore, it is necessary to establish efficient and effective discussions with communities and find solutions that involve community contributions and land tenure.

Additionally, clear signals are needed to attract investment to the areas where the transmission will be developed. Currently, generators choose locations based on the quality of wind or solar energy without



considering grid availability. It is necessary to establish adequate market signals to align investment with transmission infrastructure.

The Australian regulator is also exploring new ways to help grid companies manage risk and submit early funding applications to calculate costs rather than regulate incentives.

### The experience of the Very Large Power Grid Operators

EGO15 is an association created in Europe in 2004 after the blackouts caused by the

tsunami in Japan in 2003. It has successfully built a community that prevents discontinuity of power supply and aims at decarbonization in partner countries.

The association has a broad global community of operators with different political, economic, and historical backgrounds. Despite the differences, they all have similar systems. The electricity system is sensitive; therefore, it demands collaboration and mutual information exchange among the association's members.

GO15 Overview



The association aims for a rapid and sustainable energy transition. Several energy problems are associated with the mix of energies, its affordability, and its sustainability.

GO15 organizes seminars, disseminates documents, and discusses topics as a way to share information and build a community that aims for efficiency.

Today, renewables are intermittent, such as solar and wind, but they are experiencing rapid growth and gaining efficiency. However, it is necessary to ask what percentage of intermittent renewables each system can support. This can be a matter of debate since there are different perspectives on this topic.

In this sense, it is necessary to manage a correct energy mix, implying changes in how the system is managed and its

expansion. Currently, there is a challenge to transport electricity from regions with high renewable generation to other areas, as has been experienced in Germany and Australia.

The reliability of power supply is crucial and sometimes requires generation to be available when intermittent renewable sources are not available. It is also essential to optimize and rationalize the transmission infrastructure.

Finally, problems in the supply chain caused by the high demand for equipment and materials for renewable projects cause manufacturers to have capacity constraints and long lead times. In this sense, it is crucial to cooperate and share information and experiences among the association's members, much of which can be found by accessing the website <https://www.go15.org/>.





# Energy market perspectives in a post-pandemic world

## SPEAKERS

**Anna K. Fung**

Deputy Chair of British Columbia Utilities Commission

**Fernando Alfredo Moscoso Lira**

Manager of Planning and Surveillance of Electricity Markets in the National Electricity Commission of Guatemala

Moderator: Hasan Özkoc

With the depletion of fossil fuel-based energy sources, the competitiveness of new sources becomes crucial. The analysis of global energy market conditions and trends to see how sustainable public policies and economic power can help reach more consumers worldwide is important for identifying other energy sources and methods to make electricity more competitive and more consumer-accessible.

Therefore, a comprehensive understanding of energy markets is necessary. On the one hand, risk management and regulation for new regulatory interventions in a post-pandemic world, considering different geopolitical scenarios, and on the other hand, the impact of energy reforms,

state-of-the-art technology, and climate ambitions, should be addressed.

## From the British Columbia Utilities Commission

The world is committed to CO<sub>2</sub> capture and sustainability. This commitment demands ever-increasing efforts in various aspects of everyday life, even more so when there is a growing demand for energy in Canada towards 2050.

There is uncertainty about meeting zero emission levels as electrification will be opted for as an alternative, raising questions about the feasibility of projections on the road towards sustainability.



The world is committed to CO<sub>2</sub> capture and sustainability. This commitment demands ever-increasing efforts in various aspects.



Currently, several scenarios have been evaluated in Canada. One scenario proposes that Canada meets its objectives, but the rest of the world moves more slowly, increasing electricity demand. This is questioned because the scenario suggests the use of electricity to capture CO<sub>2</sub>, which would increase electricity demand in Canada.

The geopolitical impact of the pandemic has caused Canada's liquefied Natural Gas (LNG) exports to fall, and the possibility of continuing to build more infrastructure to transport gas or to export it as LNG to become uncertain. Furthermore, Russia's invasion of Ukraine has led to the search for alternatives to natural gas in Europe, generating uncertainty in the modeling of LNG demand for Canada.

The question of how to achieve a cleaner source of electricity generation, and the need for new electricity, arise in this scenario. Canada's generation system has low carbon emissions and relies on renewable sources, making 61% of the electricity load in 2021.

In this sense, wind power is expected to significantly grow, being projected to increase more than nine times the current



levels by 2025. Hydroelectric generation, which accounts for the largest generation in Canada, will also grow 26% from 2021 to 2050.

Another expected scenario is the solar and wind energy cost reduction, thereby driving their adoption as generation sources. Carbon capture and storage will also be key energy sources, especially in provinces with high fossil fuel generation, such as Alberta, where a single energy market is expected, considering the high decarbonization targets set by this province.

Likewise, nuclear generation, especially through small reactors, is expected to grow between 2040 and 2050, and solar generation will account for 50% in 2050 in zero-emission scenarios. These scenarios

demand a high level of participation of both provincial regulators and the Government, which must promote efficient and sustainable energy alternatives.

### Guatemala's National Electric Power Commission

Guatemala's market is strongly oriented to renewable energy production, with this type of source accounting for 60% of total electricity production. The importance of this figure is highlighted when compared with the scale of clean energy in other contexts or regions. In the current context, it is estimated that 66% of renewable energy is produced in Central America.

In terms of energy requirements, renewable technologies have aroused great interest



Renewable technologies have aroused great interest due to their competitive prices. This leads us to address the concept of the energy society and to analyze the importance of clean energy.



However, renewables and decentralization also raise the concept of flexibilization, including the use of energy storage technologies such as batteries. This is particularly relevant in the post-pandemic context, where decisions and approaches taken on flexibilization, diversification, and decentralization should consider the different contexts and realities of each region.

due to their competitive prices. This leads us to address the concept of the energy society and to analyze the importance of clean energy in the current scenario. Additionally, energy security is focused on two fundamental aspects: diversification and decentralization.

Energy diversification is a crucial aspect, both in Latin America and worldwide. Likewise, decentralization implies that users become active energy producers, which has been a growing trend. More and more users can generate their own energy, resulting in less emissions and less dependence on traditional supply.

In addition, it is essential to balance technical sustainability and the environmental impact when taking measures to promote the transition to more sustainable energy sources. Every decision should consider both inclusiveness and competition since users are the ones who pay and want access to diverse energy options.

It was learned in the past that decisions made solely in response to recent events were insufficient. It is necessary to develop strategies to introduce elements of resilience and solidarity in energy supply, considering long-term perspectives and the interaction between supply and demand.





# Developing the game rules for cross-border integration

SPEAKERS				Moderator: Beatriz Estrada
<b>Alison Archer</b> Director of Standards & Assurance at the Midcontinent Independent System Operator (MISO)	<b>José Fernando Prada</b> Executive Director of the Energy and Gas Regulatory Commission of Colombia (CREG)	<b>Alda Ozola</b> Chair of the Board of the Latvian Public Utilities Commission (Regulator)	<b>Rodrigo Rodríguez</b> Vice president of the Ibero-American Association of Energy Regulators (ARIAE)	

Interconnections and integration proposals are crucial for a number of aspects ranging from reliability of supply to quantity and quality of energy. Meeting an interconnection and integration objective is not simple; it requires the stakeholders to make decisions according to the characteristics, the number of actors, and technical aspects. In addition, these decisions should include actors such as regulators, communities, and the Government, which, in the end, are made up of various representatives who do not always speak the same language regarding the objectives. Some experiences of interconnection and integration are shown below.

## The vision of MISO in the United States

The Midcontinent Independent System Operator (MISO) is a central transmission organization and an independent operator located in the middle of the United States. Its area of operations spans from Manitoba, Canada, to Louisiana in the south. MISO operates in 15 states, each with its own commission and state regulations. MISO's primary function is focused on managing the flow of high-voltage electricity across its region, facilitating one of the world's largest energy markets, and planning the grid of the future.



MISO's objective is to ensure the reliable operation of the power transmission system. It works collaboratively with state regulators and other interested actors to meet each State's energy goals and comply

with their policies, provides sustainable and viable services, and partners with stakeholders to ensure visibility and balance in the delivery of energy services.

Key facts about MISO\*

- ✓ 15 states+ Manitoba
- ✓ 42 million customers
- ✓ \$22 billion market
- ✓ > 6700 generation units with 184 000 MW capacity
- ✓ 65 800 miles of high voltage transmission lines
- ✓ > 180 member utilities
- ✓ > 470 market participants

Long-term planning is a fundamental part of MISO's work. For this, it considers different scenarios, such as the adoption of electric vehicles and electrification to project future transmission needs, and develop large-scale investment plans. In addition to building new transmission lines, MISO also focuses on improving the capacity to transport electricity from

where it is generated to where markets are located.

Currently, it has more than \$10.3 billion in power expansion projects approved by its Board of Directors, especially in transmission lines to integrate and strengthen systems. These projects are focused on different regions, such



as the north and center of the country, and are designed to meet future power transmission needs.

MISO develops an interregional planning process that considers interconnection and conducts transmission planning studies and partners with RTOs in the south and west on initiatives such as the Joint Targeted Interconnection Queue (JTIQ) study, which seeks to develop projects, use resources, and benefit both MISO and the country as a whole. In particular, the JTIQ study identifies transmission projects needed to address power transmission constraints that limit the opportunity to interconnect new generation resources.

### Colombia's Energy and Gas Regulatory Commission

Colombia has significant electric-power generation capacity and is one of the countries that has had both successful and challenging electricity interconnection experiences with its neighbors in the region. The first interconnections were developed with Venezuela, mainly based on bilateral intercompany agreements. However, due to the difficulty in maintaining a robust energy exchange, these interconnections had limitations.

On the other hand, cooperation with Ecuador has been successful and has led to a robust

interconnection, with a capacity of 4000 megawatts. This energy exchange agreement has taken place within the legal framework of the Andean Community of Nations (CAN by its Spanish Acronym). Currently, Colombia is also developing a connection with Panama, which involves significant challenges. This project seeks to unite both countries and, potentially, the entire Central American region.

The regional energy integration has benefited the energy security and the economic development.

### International Electric Ties

- **Colombia – Ecuador:** In operation since 2003, under the Andean Community (CAN) common market framework, synchronous link 220 kW 450 MW and asynchronous link 138 kW 110 MW.
- **Colombia – Panamá:** planning stage, 400 MW 300 kV HVDC link, 500 km.
- **Colombia – Venezuela:** Non operational interconnections







The regional energy integration has benefited the energy security and the economic development. Colombia has the vision of integrating with Chile in the future.

Interconnection should be based on solid agreements, creating a reliable system for the purchase and sale of megawatts. This has been crucial for Colombia's energy exchange with Ecuador, an agreement that should be replicated in other experiences such as the one Ecuador had with Peru. Regulation has a lot to do with the integration process to standardize criteria. It should be considered that integration achieves security in the electricity systems.

### From the Latvian Public Utilities Commission Board

Latvia is a small country in Northern Europe with less than 2 million inhabitants, making it ten times smaller than Colombia in terms of population and electricity consumption. Its experience in cross-border integration has taken place along more than 30 years.

In 1991, Latvia, together with Lithuania and Estonia, became independent from the Soviet Union. In those days, electricity was imported and exported under bilateral agreements and state monopolies. With the liberalization of the economy, changes took place in the energy sector.

In that context, Latvia started as an "energy island" as it was not connected to any European energy market but to the Russian market. However, all Baltic countries aimed to become members



of the European Union, implying major changes in the integration process.

Between 2007 and 2016, there was significant progress on joint planning and physical infrastructure. An important milestone was the Baltic interconnection plan involving countries such as Denmark, Germany, Estonia, Lithuania, Poland, Finland, and Sweden.

The main objective of this regional plan was to set up an interconnected gas and electricity market in the Baltic region. In parallel, the regulatory framework was adjusted to make this integration possible.

Many projects achieved interconnection between the countries of the Baltic region, but they are not enough and will be

completed in the coming years to extend the level of energy security and reliability achieved. The European Union financing schemes cover part of the costs of these projects. The synchronization of these Baltic systems with Europe is expected to occur in 2025.

The Agency for the Cooperation of Energy Regulators has helped coordinate the work of the national regulatory authorities, bearing in mind that this is a complex process.

Regarding infrastructure financing, there is a need to find a balance. Europe is seeing its regional benefits, but, in the end, the common interest will prevail given that these interconnection decisions are based solely on cost-benefit analyses.





For its part, Latvia is looking for long-term perspectives, aiming at 2050. So, there will be different prepared scenarios with the need to maintain the vision and policies for better results.

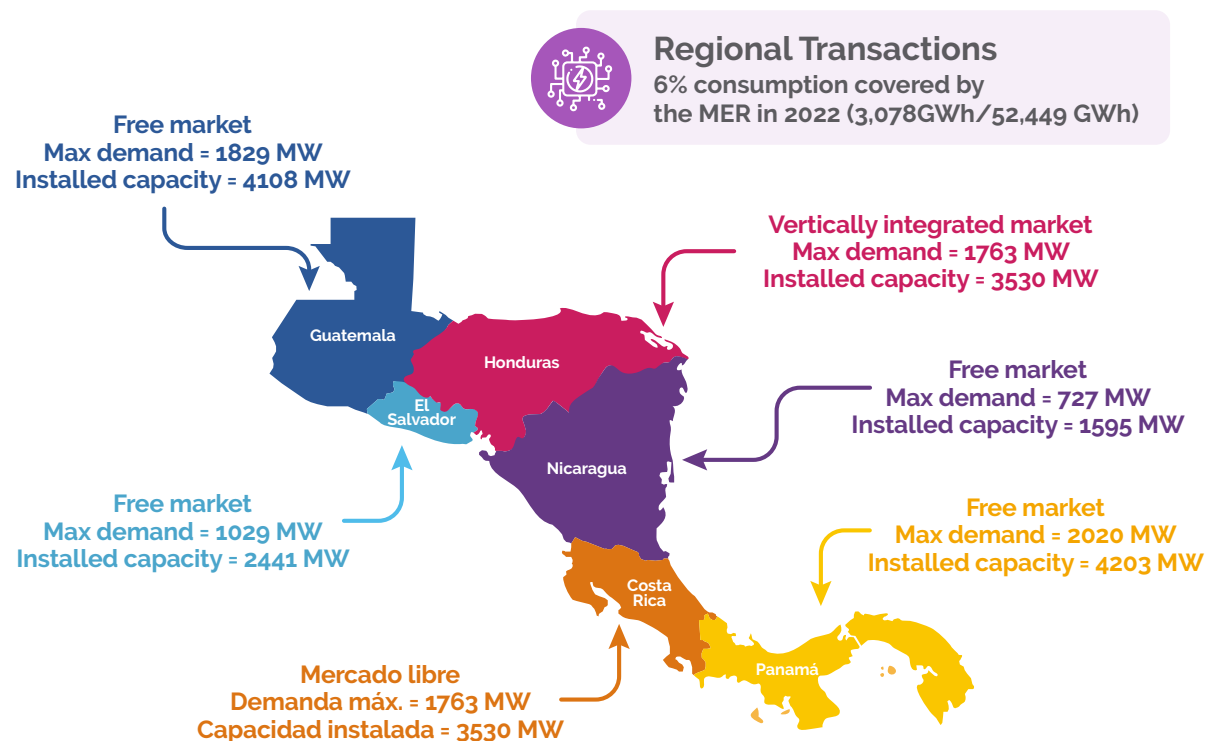
In conclusion, it is necessary to identify what is most important when looking at cross-border integration, so it is fundamental to set policy goals and define Europe's needs. In this regard, the European Parliament and the European Commission should rely on the actors to define the rules of common development to create an energy market that benefits everyone.

### Regional Commission of Electrical Interconnection of Central America

The electricity market is very complex and difficult to understand, and each region has its own way of developing these markets. Six national markets overlap in the Regional Commission of Electrical Interconnection of Central America (CRIE by its Spanish acronym).

This market has benefits of energy security and supply for the population. It also has environmental benefits, although this may vary depending on the power generation in each country and the associated costs.

#### Status of regional integration in the MER



During the period of growth, it can contribute to neutralizing certain aspects. The Central American regional interconnection treaty included six countries: Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama. This treaty has created regulatory institutions such as the Regulatory Commission and the Ecological Determination Commission.

This institution regulates regional actors and cannot impose regulations or obligations on national institutions. The regional market operates according to domestic rules and the rules of the Regional Regulator established in the treaty.

More than 300 agents participate in this market, carrying out energy exchanges. Until 2022, approximately 6% of the total consumption of Central American countries was realized through this market. Although this percentage may seem low, it has increased from 3% to 11% from 2014 to date.

Although the six countries linked to the regional market are relatively small in terms of installed capacity, they have approximately 17,000 MW of combined capacity. There are differences in the predominance of renewables and the size of the countries.

Four countries are larger than the other two. The treaty established that there should be a trunk line, a double circuit transmission line of approximately 1,800 kilometers of 230 kilovolts. One circuit is already operating. The main challenge of the operation is maintenance. To overcome this, an integrated operation with greater power is sought.

In 2021, Guatemala resigned from the treaty. Even though the treaty states that a country must wait ten years to withdraw, only two years have passed. This is a difficult decision of economic impact for the rest of the countries that has to be addressed.





# Are regulatory reforms the final leap?

## SPEAKERS

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To talk about regulatory reforms is to refer not only to one type of change but to several aspects linked to them. The first regulatory reforms dealt with market organization and the granting of powers to regulatory bodies. In general, the reforms sought to provide certainty and stability to investors and other market agents. However, with the introduction of topics such as climate change and how to address it, the challenge of new regulatory reforms is to maintain stability, reduce uncertainty, and incorporate new technologies.

Regulatory reforms are, above all, of a legal nature, so regulators need to work with public policymakers and adjust the legal framework. However, reforms often begin

with public policies, without modifying the legal regime, leading to uncertainty and potential problems in the future.

## The Colombian experience

The energy sector in Colombia has grown hand in hand with institutionality. The legal basis that designed it is the 1991 Constitution, with Laws 142 and 143 of 1994, which gave birth to a structure that has been maintained for 29 years and has allowed reaching 100% electricity coverage in the urban sector and 96% in the rural sector.

The energy sector in Colombia has generated confidence thanks to its institutionality as it has attracted

significant investments and has made it possible to forget a dynamic that even led to blackouts and deficient utilities.

It is noteworthy to highlight the participation of the Energy and Gas Regulatory Commission of Colombia (CREG) in the energy system. It is a regulatory body with a technical structure headed by three members: The Ministry of Mines and Energy, the National Planning Department, and the Ministry

of Finance, which make joint decisions related to the regulator. Likewise, there are integrity and control bodies such as the Superintendence of Public Utilities and the Superintendence of Industry and Commerce. Furthermore, there are other entities, such as the Mining and Energy Planning Unit (which provides information), and agents for the operation and administration of the system. This design is well articulated and has formed an effective and strong system.





Public companies managed utilities in the past. Through Laws 141 and 143, the sector was opened to free competition and the private sector, generating market conditions that would improve the quality, coverage, and continuity of all utilities, which has indeed been achieved.

Currently, institutional reforms in Colombia are being evaluated along two paths. The first path is the expansion of the current system. Even though adjustments and updates are required, the suggested change aims to expand regulatory intervention, giving negative signals to private investment.

The second path aims to amend Laws 142 and 143 by including consumers in regulatory decisions. Even though regulations already protect consumers, the aim is to promote their participation and interaction as supervisors.

It should be noted that the State, not the companies, will assume these amendments and their associated costs. The pillars of the reform also seek to expand the solidarity tariff. The reforms should aim to universalize services and increase coverage, seeking to give more power to the jurisdictional authorities to make decisions against companies and in favor of users.

Today, it is necessary to promote investment projects of greater capacity for energy transmission. This requires a clear policy, as well as institutional and regulatory trust.



Today, it is necessary to promote investment projects of greater capacity for energy transmission. This requires a clear policy, as well as institutional and regulatory trust, which are the pillars for improving the energy sector in Colombia and throughout the region.

### New paths for growth in Chile

There is nothing more constant than change, especially in a sector like the regulatory sector, in which there is a dichotomy: it is urgent to provide solutions- not problems-, and it is also necessary to look to the future, evaluating possible solutions from now on.

Likewise, the regulator should coexist with the entire industry and the political authority, pursuing the common good of society and the end customer.

The energy infrastructure in Chile has been developed thanks to the institutional framework. The sector authority is the Ministry of Energy, and there are also the National Energy Commission and the Superintendence of Electricity and Fuels. They regulate the generation, transmission, distribution, and customer (large and civil) sectors.



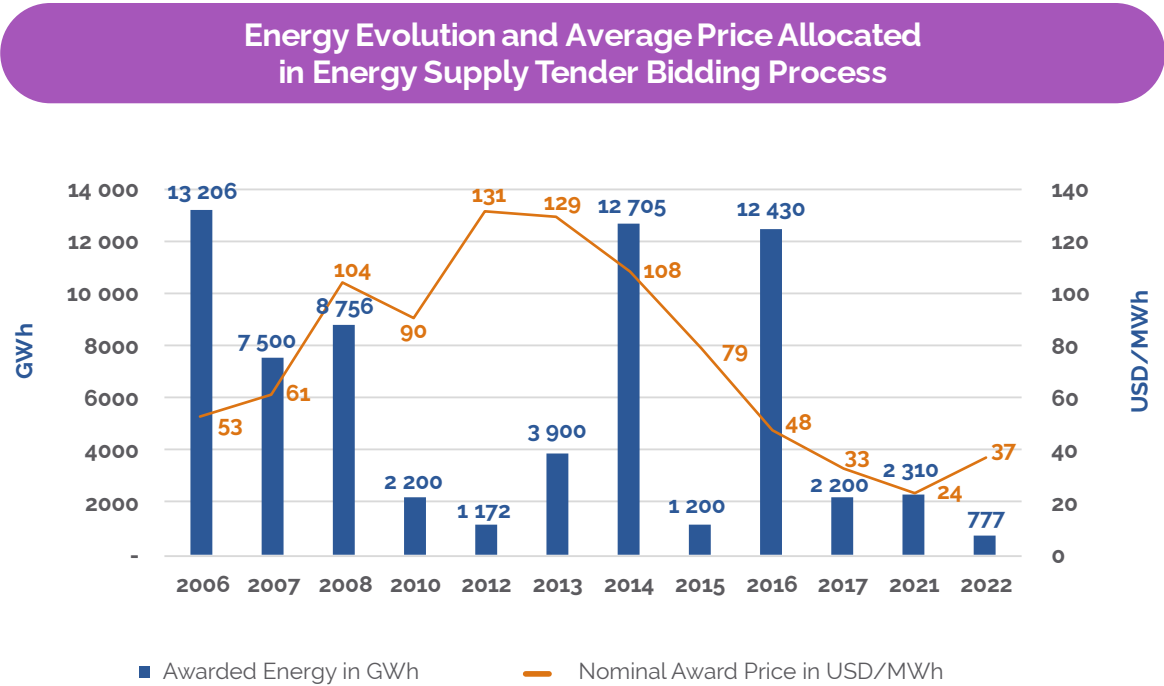


Another important element of the institutional framework is the expert panel, which is the entity that defines the differences among the actors in the sector, including the regulator, and resolves any discrepancies. It has been good to have this expert panel, which may be exportable due to the excellent experience gained with it.

In the case of the Chilean electricity sector, each generator can participate in the energy market, ancillary services, and capacity. In the coming years, Chile will have the entry of 6 gigawatts in renewable projects only, many of which are already under construction. The country has three large blocks of electricity generation in general terms: large generation, small generation (generators that can inject their capacity and surplus up to 9 megawatts), and residential generation.

Likewise, the country has a privileged situation for what has been called "green generation", to such an extent that only in the northern zone the production of solar energy reaches 37% of the total production. Renewable electricity generation is an important component of energy production due to the supply bidding mechanism, a regulatory innovation implemented in 2012, 2013, and 2015.

Renewable technologies in Chile did not have a level of competitiveness like Australia as they have now; it was necessary to open spaces based on economic competition and other attributes, such as sustainability. This innovation brought results between 2012 and 2022, as the participation of renewables increased ten times.



Source: Comisión Nacional de Energía de Chile



The success of this expansion has been the collaboration of technical institutionality, being the regulator one of the main axes due to its greater permanence and stability. The political authority should generate the context for all stakeholders to talk, to have the certainty that things are being done well and that there is trust.

Currently, a consensus is being generated around green hydrogen through the National Green Hydrogen Strategy, in which an action plan has been developed. Likewise, efforts are being made for decarbonization and the placement of technologies, such as energy storage, with which new growth paths will be developed.

**Angola: A commitment to energy reforms**

Angola is a dynamic African nation with a population of approximately 35 million inhabitants. In 2002, it succeeded in establishing peace, which has helped the country grow. Its energy source comes mainly from fossil fuels, and there is also great potential to diversify its energy system by developing solar and wind energies, and biofuels, among others.

However, Angola faces several challenges, including establishing a sound regulatory framework, attracting investors to support the energy transition, developing human resources, and having the political power to implement reforms. Despite these challenges, there is a commitment to energy reforms, and Angola is in a process of transformation towards sustainable development.

It was necessary to open spaces based on economic competition and other attributes, such as sustainability.

Under this scheme, the National Agency for Oil, Gas and Biofuels (ANPG) is Angola's national oil concessionaire, one of the main oil producers in sub-Saharan Africa, currently being restructured to promote sustainability and attract more investors.

Under the supervision of the Ministries of Mineral Resources, Oil and Gas, and Finance, the ANPG is also responsible for ensuring energy transition, protecting the environment, and managing tax aspects related to the sector. It works closely with the oil and gas sectors to promote transparency and flexibility and reduce bureaucracy.

Reforms in the oil and gas sectors have enabled this and companies to meet their objectives. Similarly, Angola has established regulatory provisions to address the development and exploration of additional areas, allowing operators to carry out more exploration activities. In addition, Presidential Decree 86 establishes the processes for public tenders and activities in the oil sector and boosts contracts and incentives.

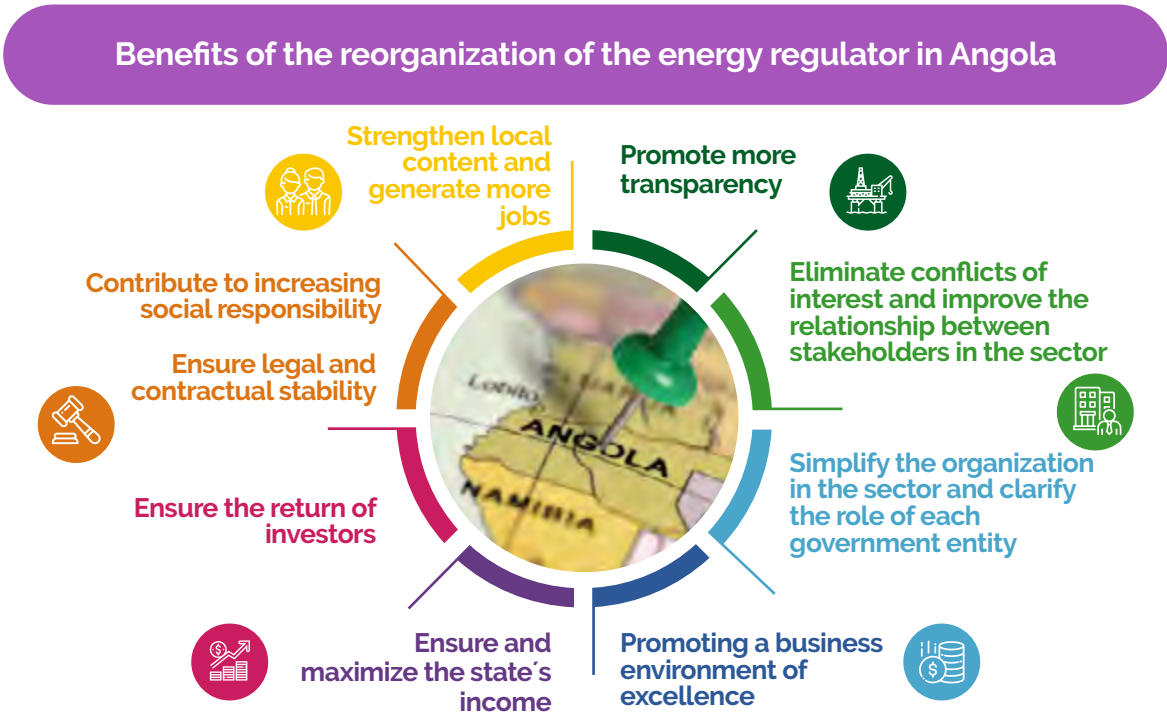
Another important achievement of the reforms is the local laws that defend the gas industry's interests. These laws



promote technological development and the recruitment of Angolan workers and ensure that Angolan families benefit from gas exploitation. These aspects show the regulator's dedication to keeping profits within the country and its focus on promoting economic development.

In addition to the above decrees, the biofuels law is also being reviewed in the

energy transition context. The objective is to boost the biofuels sector to benefit the oil and gas industry, the agricultural sector, and the diversification of energy sources. The diversification of the energy matrix secures energy supply and contributes to decarbonization efforts as part of a commitment to environmental policies and collaboration with other countries in this global effort.



These reforms generate employment, create opportunities, increase social responsibility, and ensure that profits remain in the country. In addition, they promote a stable legal framework, foster transparency, and eliminate conflicts of interest, improving the relations with stakeholders. They also simplify the organizational structure and governmental roles.

The commitment to investor attraction and transparency of the energy reforms is fundamental. These reforms do not represent the end of the road but rather the beginning of a prosperous sector in the oil and gas industry.

**Technical and political challenges in Peru**

Peru is crossed by the Andes, which separate the coast from the rest of the country. This geography imposes tremendous challenges for development and, of course, for government policies, including energy policy.

Sixty-five percent of the population lives on the narrow coastal strip, accounting for 5 percent of the entire territory. In terms of electrical infrastructure, this means a great challenge, considering how difficult, dangerous, and costly it is to transport goods and services in a country with this geography.

In the last 30 years, significant progress has been made in the electricity sector, increasing coverage from 50% to almost 98%. Although there is always room for improvement, a great work has been done so far: the generating capacity has been diversified and the service quality has been enhanced.

However, there are challenges. Electricity generation relies heavily on two sources far from the capital: the Mantaro hydroelectric plant and the natural gas from Camisea. This increases costs during dry years or when there are problems in the natural gas supply. In addition, the transmission grids need upgrades and have not kept pace with energy production. These problems require immediate attention and action.

Energy matrix diversification, distributed generation promotion, and taking full advantage of renewables are necessary to overcome these problems. Likewise, it is essential to strengthen the sector's economic structures and institutional framework to ensure greater stability. Political instability has affected the country's capability to drive the necessary reforms.

In summary, the energy sector has technical and political challenges; however, there are opportunities for improvement and moving towards a more efficient and sustainable system.





# Ensuring reliable utilities. Houston, we have a problem?

SPEAKERS

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In addition to seeking energy security and utility efficiency, today, it is crucial to balance utilities and environmental sustainability. As sector operators and actors, the goal is to manage this change, oriented to energy transformation and environmental protection in a controlled way; accelerating this transformation may lead to an imbalance that impacts the economy and security of energy supply. While changes are being made, it is necessary to maintain the reliability of the electricity supply.

Lessons from the European Union

The risk of natural gas supply to Europe has worsened with the ongoing war between Russia and Ukraine. Natural

gas shipments fell drastically –which was seen coming. This situation is pushing for a greater mix in the supply of energy resources, leaving traditional energy generation behind.

In Europe, it has been necessary to resort to imports of Liquefied Natural Gas (LNG), interdependence between countries and communication between them to meet natural gas demands has increased, tending towards integration, which will continue to escalate as the associated risks are understood.

In addition, extreme weather complexities also pose a new challenge. For example, when working on the planning, assessments made were based on particular weather conditions that did not

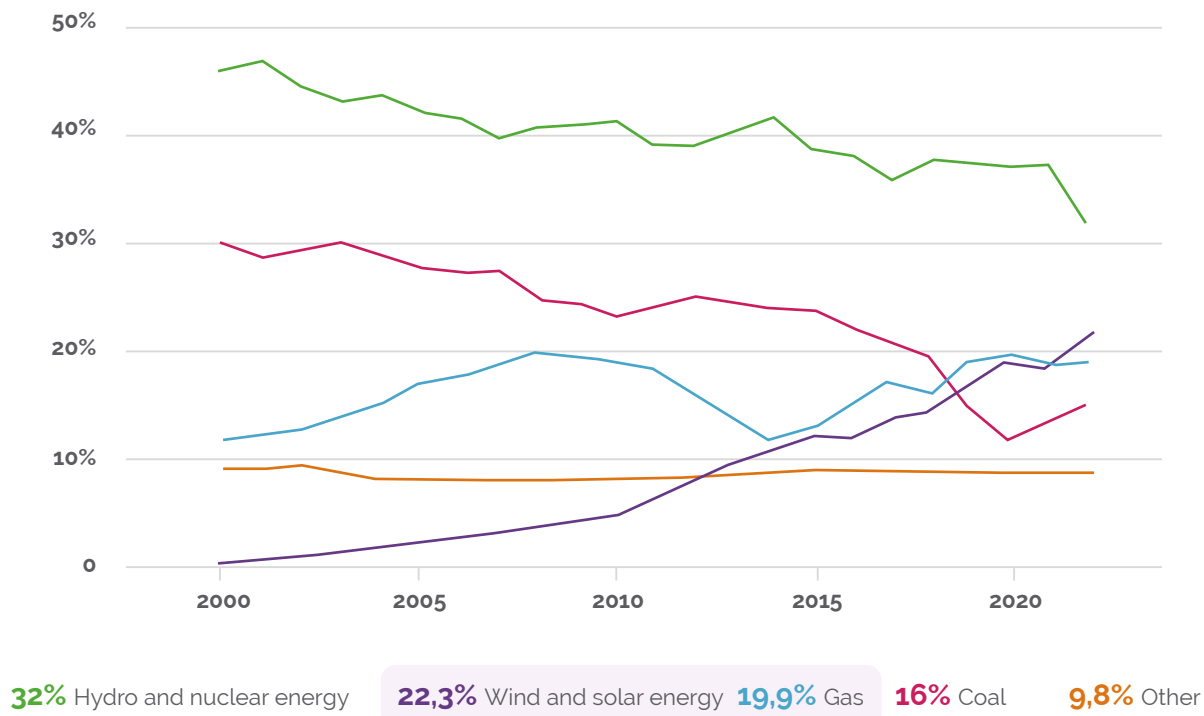
occur as often. As a result, projects had to be adjusted. Today, these adverse weather conditions are increasingly frequent impacting the physical infrastructure.

The road to energy diversification and integration in Europe is based on electrification, which is increasingly intense, accompanied by new technologies. But despite this, the interdependence of countries will not change. This is

something we must consider as new technologies are implemented.

Renewables are expanding faster. In 2022 alone, solar energy produced more electricity than natural gas, but there is still the challenge of its volatility and the need for flexible energies. Volatility is present in Europe, and the call from the region is to solve it through various approaches, for example, through better management.

Share of EU power generation per technology – 2022 (%)



**Note:** For the first time in the EU, wind and solar generation produced more electricity in 2022 than gas. New solar capacity additions - a particularly low-lead time generation source - doubled in 2022 compared to the year before.





### The challenges of energy transition in Europe: an academic perspective

Since the late 1990s, one of the main policies implemented in Europe was the creation of a single market for electricity and natural gas. That guaranteed a steady energy supply and allowed addressing environmental risks with specific monitoring and maintenance. However, it is crucial to discuss this issue looking to the future to ensure reliable utilities, as they constantly face evolving external challenges.

In Europe, massive electrification is foreseen by 2050, implying a transition towards energy neutrality with the support of renewables.

Another important aspect of the discussion is the decentralization of energy generation, as there is a shift from centralized generation in large power plants to more decentralized generation, involving consumers not only as users but also as energy producers. This is reflected in the so-called energy communities.

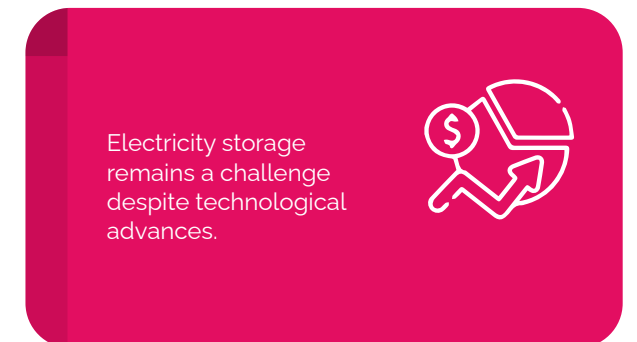
Electricity storage remains a challenge despite technological advances. However, plans are being implemented in Europe to improve energy storage in storage plants. In addition, the possibility of converting electricity from renewable sources into hydrogen is being explored as an additional form of storage.

The current situation of natural gas is different from that a few years ago. The decarbonization policy and the effects of energy shortage, including Russia's invasion of Ukraine, have strongly



impacted electricity generation and energy infrastructure. This has led to changes in energy flows and a reconsideration of the infrastructure needed to ensure a reliable gas supply in Europe.

Likewise, decarbonization policies and the use of cleaner energy resources, such as biomethane and hydrogen, require rethinking the infrastructure needed for gas supply in Europe. Direct injection of hydrogen into the grid and staggered distribution of biomethane are part of these considerations. Hydrogen production requires the cooperation of different technologies and specialized knowledge and involves the conversion of electricity into electrons and molecules.



Therefore, hydrogen planning has been reviewed.

Furthermore, it is important to talk about resilience in the energy sector, referring to the capacity of systems to recover after a power interruption. In the context






of energy security, resilience is a broad term that differs between electricity and gas. Gas security is related to supply and geopolitics, while electricity security focuses on improving and ensuring efficient flow without interruption. Resilience is linked to security, property security, balance, flexibility, adequacy, solidification, diversification, and solidarity, among other terms.

Resilience requires specific conditions to ensure it. In the case of electricity, interruptions can be classified into different types and can have different durations and dimensions, such as infrastructure and geopolitics. Interruptions can affect electricity flow and, in the long term, be related to delays due to political decisions, such as the abandonment of nuclear power. There are also electricity challenges, such as price volatility and the need for flexibility due to the intermittency of renewable sources.

The need to diversify natural gas supply sources is recognized. Europe has reacted quickly and efficiently, significantly diversifying its gas suppliers and reducing its dependence on Russia. New contracts and agreements have been established with suppliers in other regions, such as

It's important to talk about resilience in the energy sector, referring to the capacity of systems to recover after a power interruption.





North Africa. However, Europe also faces the decarbonization challenge, which poses a dilemma between the need to reduce gas use and ensure its supply.

Decarbonization and the injection of hydrogen into the electricity system are making it more complex rather than simplifying it. Hydrogen is a more complicated molecule than natural gas, and its integration into the system requires consideration of how it reaches the end user. In addition to hydrogen, biomethane also poses challenges in terms of infrastructure and location of plants in the grid, as well as political issues. In summary, there are many challenges to consider in the energy sector.

**Perspectives of The North American Electric Reliability Corporation (NERC)**

Electricity has achieved a high level of penetration in the modern world. As technology evolves, our dependency on this commodity increases. Today a reliable supply of electricity is essential to our economies, our security, and the proper functioning of our society.


It is imperative for policymakers to understand and embrace the fact that good energy policy must find a balance across the following three components. First, energy must be affordable and accessible to the population. Second, energy needs to be reliable and secure. And third, the environmental footprint of energy must be managed. Finding a sustainable balance across these three components is the goal of policies that support resilient utilities.

We find ourselves in a hypercomplex risk environment characterized by a rapidly changing resource mix, extreme weather conditions, changing energy and environmental policies, and a rapidly evolving threat landscape. Regulation today needs to be clearly effective and adaptable in response to the technologies of the future.

From our perspective, four pillars are essential as we go through the energy transition: i) ensure sufficient amounts of no/low carbon energy to achieve decarbonization goals, ii) develop adequate transmission to integrate renewables and transmit energy, iii) maintain a robust fleet of balancing resources needed to serve energy along with integrated renewables, and iv) ensure healthy energy supply chains for balancing resources to serve the load even under extreme conditions.

The rate of change in these four pillars represents a challenge that the energy sector will have to face in the upcoming years. Collaboration across the industry will be key in achieving the objectives for the benefit of society.

Problems linked to energy are different in each human generation. Today, for example, the impact of energy and climate is complex, and must be considered to regulate energy and environmental policies

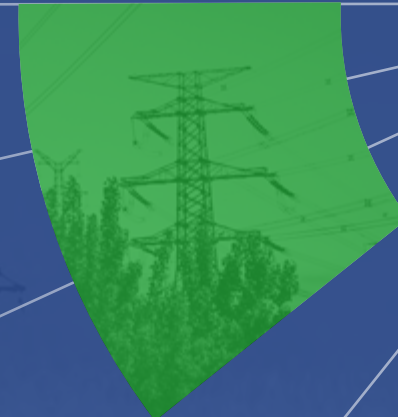




04

# Universal Energy Access

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# Safe and sustainable: opposing goals or mutually reinforcing goals?

## SPEAKERS

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Collyer**

Chair of the Australian  
Energy Market  
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Chief Executive Officer  
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**Dan  
Scripps**

Chair of Michigan Public  
Service Commission

Energy transition is a necessity, but it is often forgotten or comes second when discussing the security of energy supply and, in particular, the fear of any energy disruption. On the road to carbon emission neutrality, security of energy supply will remain as important as today, if not more so, although it will likely manifest itself in different ways.

## Opportunities of crises in Australia

We must start with a couple of remarks. The first is that Australia is blessed with a safe and secure supply of energy. In the past, there have been abundant supplies of coal and gas, and, in the future, there will be an abundant solar and wind supply. So, it has been a net energy exporting nation and will seek to remain so.

Having said that, we are going through a very rapid shift from a system strongly dominated by thermal energy to a variable system dominated by renewables. Right now, 25% to 30% of the system is powered by wind and solar energy, but the goal is to reach 82% by 2030. This shift raises some real issues like some of the security of energy supply issues.

A second remark is that a crisis can also be a catalyst for real change. There is a saying that comes to mind: do not waste a crisis. Much of the reform agenda in Australia was driven by an event experienced in 2016. There was a then-unprecedented blackout across South Australia, caused by a one in a 50 year storm that knocked down several transmission towers.

After that, there was much debate about

how the latest technological advances were not in place and how they would be managed in the grid. So, fortunately, the Government's response at the time was not an instinctive act of backtracking on energy transition, but to make an effort to thoroughly review the reforms that would be essential to move forward.

Thus, reforms were made to have an integrated plan in the transmission system and to facilitate new wind and solar energy. From that experience it was also learned that 100 megawatt batteries could be installed in 100 days and that was the real start for these large-scale batteries to support wind and solar energy on the grid. They were the positive benefits of that crisis.

Recently problems with global supply chains hit Australia due to rising coal and gas prices, which are linked to global commodity prices. This was combined with difficulties at the coal plants, along with the onset of winter. There was little wind,

Australia is going through a very rapid shift from a system strongly dominated by thermal energy to a variable system dominated by renewables



little solar energy, and a cold snap. All this resulted in very high wholesale prices in the Australian electricity market.

Then, a protection mechanism was incorporated into the market after a period of very high prices: a ceiling was imposed on energy prices to stabilize the market. That price ceiling had not been reviewed for many years and when it started, it was very low.

Suppliers who feared operating below cost pulled out. Those who relied on opportunity cost signals did too. This resulted in the regulator having to intervene directly and eventually suspended the market. The Government's reaction was to review price ceilings.

Thus, temporary ceilings on coal and gas prices have been put in place to stabilize the market. In particular, there has been a change in gas from a price ceiling to a reserve, so it is a supply measure rather than a price ceiling.

At the other extreme, the regulator set customer cost management limits that allowed the industry to recover costs and the government stepped in to provide subsidies to customers. Price ceilings can have negative consequences, but there are also ways to deal with them to overcome a crisis.

In Australia, however, consumers have led the way in the energy transition to address climate change. Not only businesses, but



also households have invested in solar energy with panels, making a difference in the way they think about the grid. This is a risk and an opportunity.

In South Australia, which is a world leader in renewable resources, another incident happened: it ended up becoming an energy island. There is enough photovoltaic solar energy from households to power that entire state, and what happened one day was that there was an oversupply. The operator needed to manage the grid stability and did not have sufficient tools to do that. So, some connections were safely disabled, but in others blunt tools were used.

In this regard, it is necessary to emphasize that a crisis can be help provoke a response because this incident caught the attention of policy makers and regulators.

Therefore, the regulator anticipates that by 2050, 20% of the energy supply will be covered by household resources (to combat oversupply). For the time being, solar panels are used, but electric vehicles are also a possible source of demand and supply on the grid. Perhaps household and community batteries could also play a role in this situation. What is certain is that, to prevent this situation in South Australia, systems must be integrated.

Now, there are two important things to focus on: first is the technical work. We are analyzing reforms designed to better integrate these systems. For example, the implementation of smart meters to have better data and more visibility of what is happening in the grid. We are analyzing

reforms so that customers can have two products in the same connection point. One product for their general use and another for their flexible assets.

Second is to analyze how technical standards are regulated. Sometimes, we can have three million small generators connected to the system, but there are not three million engineers taking care of them. Therefore, it is essential to have the right technical standards so that they are integrated.

Finally, we must talk about the gender equality proposed by the Global Equality in Energy Transitions initiative, of which Australia is a member. This includes a network of 12 member countries and aims to advance the transition to a low-carbon economy by increasing women's participation in clean energy and closing the gender gap in the energy sector.

There are two really important challenges. The first is to achieve 82% renewable energy use by 2030. The other global goal is to achieve gender equality in renewable energy by 2030, i.e., that is, a 50-50 participation between men and women.

There is a real synergy between the objectives established in the energy transition and in relation to diversity.

There are three reasons why diversity can contribute to what we are trying to do. The first reason is the workforce. The fact that we have so many assets to build, so much work to do, simply does not make sense if 50% of the workforce does not fully participate. In Australia, of the total number of electrical technicians, only 3% are women. Simply by







increasing the participation of women in this field, we can have the workforce we need to move forward in the transition.

The second reason is that, for the different actions to be implemented for the energy transition, multiple skills must be involved. To this end, it is necessary to increase the participation of women in areas where they are not traditionally represented and also in areas where it is already recognised women have important skills.

The third reason is that, given the complexity of the problems we are trying to solve, it is essential that they be approached from different perspectives, including those of women, in order to think of a larger number of solutions.

That is something that has been achieved in this forum, which has achieved almost 50-50 male/female speakers, which is a fantastic progress.

**The Eswatini Energy Regulatory Authority's experience**

Eswatini, formerly known as Swaziland, is a small country located between Mozambique and South Africa in Africa. The Eswatini Energy Regulatory Authority is considered an independent regulator but is, in turn, of the Southern African Regulators Association. As a small country, it has been privileged to be part of a regional network.

Eswatini generates 100% renewable energy, but this is not enough, so 70% to 80% is imported from Mozambique or South Africa. This dependence creates some challenges. South Africa faces significant challenges



and a reduction in its energy charge. A good number of energy companies have had to close. Importing energy became a problem; however, it has been possible to continue supplying energy 24 hours a day without interruption.

Thus, it was learned very quickly to mitigate the loss of energy charge through an integrated grid. Therefore, energy can be purchased from Angola, Zambia, Zimbabwe or whichever is available in the market. The market is open and, depending on the energy price and its availability, energy can be marketed and made available to the population.

Second, energy is stored and used during peak hours. Also, when it is very expensive, we use our own generators and they do not necessarily run on diesel.

The Eswatini regulator is also responsible for procuring new generation capacity, unlike other jurisdictions. This is challenging because the bidders have an international reputation, and the regulator is exposed to foreign risk and competes with the rest of the world in terms of equipment.

Security of supply is also a major responsibility. The regulator's experience has focused on the procurement of new generation capacity and renewables, but, in most developing countries, there is no experience in the procurement of these programs.

And it becomes a challenge if the appropriate legislative framework is not in place and if robust procurement systems are not implemented. This challenge was

largely overcome by ensuring that capacity was in place and then obtaining the services of specialist advisors who knew how to work with very experienced companies.

This is not engineering knowledge, but a combination of technical engineering skills, legal skills, understanding of international agreements, processes, and foreign law.

**Portugal and renewables for security of supply**

It is a myth that renewables are bad for supply security. On the contrary, renewable energy can help to guarantee the adequacy of the electricity system.

During the year, for example, water, fuels, renewable energy and flexibility solutions can be used for different purposes at different points in time. According to the technology and energy vector, we must consider the availability in the next week, next month, in summer, and in winter, and at times of peak consumption.

Security of supply depends on various factors, including imports and geopolitical issues. For example, following Russia's invasion of Ukraine, we face a security of

Security of supply depends on various factors, including imports and geopolitical issues.

A white line-art icon on a pink background showing a hand holding a dollar sign, symbolizing financial aspects of energy security.



supply problem, due to the role of natural gas in our energy mix. This situation forced regulators and Governments to intervene in the markets. The positive differential between natural gas's summer and winter prices, (the latter being higher) was inverted. There was a threat to security of supply. But it did not happen. Markets, reserves, and prices performed quite well, albeit with high prices, and gave the right signals.

In this case, the serious issue of security of supply is over the long-term. Will we have energy for next year? And the year after that? Also, considering the variability of natural gas reserves.

But when we talk about solar energy, its annual variability is -5% or +5%. This is a 10%

variation. In the case of wind energy, the differential is between -9% and +18%, so it is a little more complicated to achieve a balance, but it is manageable.

For water, it is more difficult because in dry years, we have -41% of energy. And in rainy years, with a lot of water, we have more than 33%. So, it is quite difficult to manage this uncertainty.

Thanks to new technologies, security of renewable supply can be easily overcome. We now know with a high degree of certainty whether we will have energy next year. The problem here is to balance intermittency in the short term, which is also quite easy with the available technologies. We must look at the system from a different perspective and



try to find technologies that are affordable for consumers to manage the situation and for prices to stabilize.

We can do this by providing the right combination of energy. For example, in Portugal, at night there is a lot of wind but not during the day, when it is sunny. Therefore, we should choose a suitable combination of wind and solar energy, preferably, at the same injection point to better utilize the available grid. We must look for new flexibility tools, and seek a balanced market. Renewables, with the right investments, can participate in the balancing market.

To speak of energy is to speak of globalization, of global energy economy. Markets are a great provider of flexibility, and this flexibility is necessary to combine it with renewables, to integrate them at low cost and on a large scale. Globalization is fundamental. There is a crisis in Europe, and it affects everyone, the international natural gas market and energy sectors everywhere.

Over the last 20 years, Portugal has undertaken a significant amount of work with Europe. Investing across borders, in interconnections with neighboring countries, is a fantastic source of flexibility to share investments in renewables. When there is excess energy, you share it with your neighbor, and if there is no energy, you use their surplus.

We have three perspectives with the European Union to promote the energy transition: 1) the integration of energy systems with the circular energy economy, which has to do with the Green Deal and a

carbon neutral society; 2) local integration and a local energy economy - referring to the clean energy package and consumer empowerment; and 3) the intensification of the integration of markets with the global energy economy, liberalization, with a new European Union legislative package.

### Decarbonization lessons from Michigan

Security of service and sustainability are necessary. As much as we might want to make a pause in the energy transition, while we get the right market frameworks and everything else in place to ensure supply security, we simply cannot afford that luxury. Customers are driving this transition. Not the regulators, not even the pace of technology, it is the customers who want this.

Last year in Michigan, an energy purchase agreement was approved between Ford Motor Company and DTE Electric, the largest renewable energy agreement ever made through utilities in U.S. history. Two months later, the second largest agreement was signed with Stellantis, another automotive company, also through DTE.

The interesting thing is that companies are signing these agreements —the largest in U.S. history— every two months. But not only them, but also their tier one, two, and three suppliers, as they are evaluating how they can decarbonize their manufacturing operations.

At residential level, there is increasing evidence of climate change, wildfires, extreme heat events, and flooding, among others.





Michigan experienced the worst storm in 2017 in terms of the most power outages and the most extreme polar vortex in 2019. In 2021, the state's largest utility company suffered due to major storms more than once a week during the summer season, with hundreds of thousands of outages each time. In 2022, historic late summer storms were reported.

Earlier this year, the worst ice storm in 50 years occurred. But if there are historic storms every year, they are no longer historic, they are simply the new normal. When the evidence of climate change becomes tangible to ordinary people, there will be more pressure for an accelerated response from the authorities. It would be nice to have a couple more years to try to get the energy transition right, but we simply do not have that time.

What needs to be done? The straightforward answer is that the grid operators and regulators need to keep up with the times.

Most of Michigan, 90% of the electric load is on the MISO operator. They have a reliability imperative, analyze market design, transmission expansion, capacity markets, renewable energy integration, and their impacts on the existing systems and reliability, all really important efforts.

Last year, MISO approved a \$10.3 billion portfolio of transmission projects, the largest portfolio ever in U.S. history. A couple of weeks ago, the COO mentioned that it is no good to be the fastest runner in a slow race. This is because there can no longer be comparisons with what other grid operators are doing. It must be ensured that climate

change is responded to with the urgency that this problem requires.

Finally, it is necessary to talk about trust. Trust in the utilities sector is low, but when thinking about how to get to a decarbonized global future, trust must be placed on utilities provided by the grid operators. Whether talking about the electrification of transportation, heating, or industrial processes, trust is important in the pursuit of short-term goals, whether financial or in the approval of a project.

There are a couple of things to review about which market model might give the right signals for zero-emission supply security in long-term investments and short-term supply.

First, there will be a shift in revenues from energy markets operating at production capacity. Right now, most of the revenue flowing through the markets, at least in the United States, is centered on energy, and is paid per kW/hour.

Production capacity in much of the United States is worth almost nothing, priceless until you can put a price on it. Unfortunately, you do not know what you have until you lose it. MISO is moving in this direction, just

When the evidence of climate change becomes tangible to ordinary people, there will be more pressure for an accelerated response from the authorities



as PJM Interconnection and others have done as well. As a result, we will see many more production units, including thermal power.

There is enough revenue in the production capacity market, even if they are not making money in the energy markets. These units—including coal plants—can run at 10% or less of capacity, but at times when really needed. And that is fine, in terms of how we get to a decarbonized future.

The other thing is that we will see an increase in the way we value attributes. If voltage stability, through spinning reserves or other technologies, synchronous condensers and the like becomes more important, we have to price it.



# Micro-grids, “energy islands,” energy planning, and other energy access solutions

## SPEAKERS

### Dan Scripps

Chair of Michigan Public  
Service Commission

### Agnes Maria de Aragão da Costa

Director of the Brazilian  
Electricity Regulatory  
Agency (ANEEL)

### Daniel Cumpa Exebio

Global Energy  
Transformation Project  
(GET.transform) in Perú

Moderator: Lorraine Akiba

Universal energy access is one of the United Nations Sustainable Development Goals for 2030. According to the World Bank, globally, the number of people without access to electricity decreased from 1.2 billion in 2010 to 759 million in 2019, with decentralized electrification solutions gaining relevance through the use of renewables.

Increasing attention is being paid to micro-grids, as they can be connected to a central grid and their services can be used. This is seen as a means to help rural communities, as well as developing countries, to provide energy access solutions. Micro-grids are more resilient systems, as they can be

isolated from the central grid and deployed in a staggered manner.

## Micro-grids for the Michigan Public Service Commission

The current state of the U.S. micro-grid market is growing. They are growing not only because they are novel, but also because they can improve resilience, and are also a way to expand energy access.

The U.S. micro-grid market shows 10 gigawatts in operation as of 2022, according to consulting firm McKinsey. There has been an annual growth of nearly 25% over the past five years in terms of gigawatts,



plus a 25% growth rate for micro-grids as a service.

Micro-grids are expensive, like many energy technologies. They can be offered and paid for as if they were services, without bearing the full capital cost of building them. However, they are increasingly accessible to the population. There are a diverse range of micro-grid technologies in Michigan that have reported a 47% increase in those using solar power.

However, it has been found that policy is, in some ways, stopping the growth of micro-grids. There is a Federal Inflation Reduction Act, including incentives for the use of hydrogen, cogeneration, and other technologies, but those three in particular can be integrated into the micro-grids.

Not too surprisingly, micro-grids are considered a resilience solution and the key market segments are trade and industrial. In fact, almost half of the micro-grids in the United States are in the trade and industrial sectors although they are also present in the government sector, reaching 22% in the case of waste management and some hospitals. This same use is reflected in educational centers.

The current state of the U.S. micro-grid market is growing because they can improve resilience, and are also a way to expand energy access.







that, by definition, they are divided into four parts, according to the Department of Energy. A micro-grid is defined as a group of interconnected loads including: 1) Distributed energy resources, 2) Generation and load within the micro-grid, 3) Clearly defined electrical boundaries, and 4) Acts as a single controllable entity.

There are three types of micro-grids. Level One is a single customer micro-grid, with a single meter and very simple. Level Two is the single customer campus setting, a system that serves multiple buildings, but has only one meter. And Level Three is the advanced micro-grid, a system that serves multiple customers that are not on the same meter but share a point of coupling.

An example of a micro-grid is the Fox in the Bronx project, the largest housing development in the Bronx. When tropical

storm Sandy hit, it served as a beacon because the city had a cogeneration system that helped them function. Another example is the Texas Medical Center, which had electricity despite the passage of Hurricane Sandy.

This leads to talk about reliability. In the Michigan context, there have been some reliability challenges, as it has low reliability rates. In 2021, the utility company left many of its customers without electricity, on average, once a week during the storm season. In another season there was the worst ice storm that year.

This has become normal. How should it be managed? How to provide resilience to the system through micro-grids?

One recommendation is that micro-grids are necessary as utilities, but customers



should not be forced to have them, but rather left as an option. This can also help empower vulnerable communities. Then, customers can build their own micro-grids and not just have to rely on utilities. A whole set of micro-grids is about community resilience to deal with some of Michigan's extreme weather conditions.

However, it must be understood that utilities require authority-customer relations, financing, strategies and may even require legislative changes.

In the case of micro-grids, monetization of the grids over the years, including the integration of new technologies and business models, has been seen as a major effort.

As conclusions, it can be noted that there are tensions between micro-grids and the current regulatory framework, especially for advanced micro-grids when there are several customers, and they are not necessarily directly connected to the same facilities.

The processes used by regulators do not reflect all the benefits offered by the micro-grids, for example, sustainability or resilience. It is known that they can be sustainable and resilient, but it is difficult to obtain information on these values.

Micro-grids are not fully included in all energy grid planning processes, and this is problematic because to be effective it is necessary to have a comprehensive planning approach to see if micro-grids work. It is necessary to adapt and add financing mechanisms, and this response is needed in calculating the initial costs.





## The Brazilian Electricity Regulatory Agency (ANEEL)

In Brazil there is, of course, a mix of clean energies as in other Latin American economies. And there are also interconnected transmission systems with a large number of interconnected grids with a single operating system. Therefore, resilience is not a big issue in Brazil. However, these transmission systems need to be further improved and expanded.

Now, with the increased control of new renewable energy sources, it is still a difficult task, but the transmission system network has been centralized. So, it is an ongoing job that is working.

In terms of consumers, Brazil has more than 214 million inhabitants, 90 million consumer units, and 103 distribution concessionaires. There are approximately 50 very large cooperatives and 50 rural cooperatives. These are the actors with which the regulatory entities relate.

So, when talking about responsibilities, they are several and well differentiated. Many of the Brazilian energy institutions work under a law that was passed in 1996. There is a lot of work focused on the awarding of contracts, the economic regulation of monopolies and, of course, the monitoring of agencies' compliance with the rules. ANEEL has historically implemented universal access policies. There is also a specific role of



All urban areas in Brazil are already covered by the interconnected system. But there are still 346,000 families who still do not have access to electricity services.



mediation between agencies and between consumers. In short, it regulates all actors in Brazil's electricity sector.

A first piece of information is that, until the early 2000s, all universal access was at the expense of consumers. So, there was a point where no progress could be made in rural areas. However, in urban areas there was about 90% coverage.

Therefore, the solutions were a new state policy framework, not government policies that change all the time. We had the first one in 2002, when universal access and the right to social or affordable tariffs for low-income families were discussed.

Luz para Todos (Electricity for Everyone), a universal access program for the grid expansion, was implemented. This is what we were looking for, to help the concessionaires accelerate their universal access goals.

In 2009, a law seeking services for isolated systems was passed, which is called the sectoral charge. All consumers pay for this, and it is known as the Energy Development Fund.

Until that year, this fund was dedicated to isolated areas and covered the cost of a few in these spaces. But this changed. Then, it was used more to cover the difference between the tax payments for energy in isolated systems and interconnected systems, so that there would be an incentive for other solutions.

In 2020, another program called Más Luz para el Amazonas (More Electricity for the Amazon) was implemented, in which everything was connected, and access was given to isolated systems. This turned out to be quite costly in the end. Then, they migrated to micro-grids or isolated solutions.

Now, in 2023, we have the Energía para el Amazonas (Energy for the Amazon) program seeking supply solutions. There are very complicated processes for public and organized systems where companies can apply for these supply solutions. This change is slight, but there is more focus on these green solutions.

Brazil has 99.8% coverage. All urban areas are already covered by the interconnected system. But there are still 346,000 families who still do not have access to electricity services.

Of course, the Sustainable Development Goals are to be achieved. Connecting all Brazilians by 2030. What does the legal framework say? Consumers have the right to access energy.

There is a technical criterion, but not a socioeconomic one, in the country. This makes the policy broader, but perhaps





Thanks to GET.transform, technical assistance services for the energy transition, such as long-term energy planning, integration of renewables, and development of regulation and markets, are now available in Africa and Latin America.



it could focus on low-income people. Therefore, there is an intersectoral fund paid for by all consumers with payment capacity in the country, which finances those who cannot pay for access.

This program pays for external and internal installations in rural areas, as this is something that is sometimes not affordable in these areas. Why is it important and good? Because they are separate policies from the federal budget. They increase energy tariffs for the rest of society but allow low-income families to access energy.

What has been done to ensure that this policy can be successfully implemented in different areas? Universal plans have been approved for each of the distribution areas. Distributors only pay according to the progress of the works. If they are not met, your tariff or the amount to be paid may be reduced.

And citizens can anticipate the service and can receive a reimbursement from the companies. Therefore, there is a lot of predictability. One of its advantages is that there is still a minor penalty for the program.

## From the Coordination of Peru GET.transform

There are some figures on the potential of using micro-grids to achieve universal access to electricity worldwide. There are still approximately more than 900 million people to be connected.

Micro-grids can be an important part of the solution. Costs have been reduced in recent years and are expected to reach 30 cents per kilowatt hour by 2025, and probably 20 cents by 2030.

There is an opportunity here to have the least expensive alternative for almost 500 million people by 2030. The issue is that the investment to achieve the goal is more than US\$ 105 billion. If current trends continue, not even half that amount will be reached.

Global Energy transformation (GET.transform) as an international cooperation program helps with the expansion of micro-grids. It is a technical assistance and capacity building program for the public sector, established to achieve an energy transition policy. It is a knowledge center and it is implemented through regional and national windows with experts.

Most of the focus for the past two years has been on Africa and Latin America. There are technical assistance services available for the energy transition, such as long-term energy planning, integration of renewables, and development of regulation and markets on and off grid. Cooperation agreements have been signed with regional or country

partners. There are knowledge products to replicate the technical assistance with the partnerships.

When talking about micro-grid projects, it is understood that it is a single system composed of electricity generation, distribution, metering, and consumption. These are isolated micro-grids that operate individually for each household and could be close to the interconnected system. In Africa, where most of the work is being done by GET, an estimated 400 million people are connected to micro-grid solutions. For them, a great deal of investment and international cooperation is needed.

In the case of Latin America, an estimated 7.2 million people will be connected to off-grid electricity solutions. This is still a significant number for micro-grid solutions.

Why do we talk about the scalability of the micro-grid market? Because each country has different conditions.

For example, there are projects that are feasible with a specific technological solution, there are some conditions that could be addressed in a common way for all countries and all cases. A list of supporting objectives that could be country- or region-specific is discussed. For example, there is a separate activity with the African Forum





of Utility Regulators (AFUR), which aims to promote knowledge and experience sharing among African utility regulators on micro-grid implementation.

AFUR helps regulators and accelerate the implementation of micro-grid programs. This could be an outline of a micro-grid market development. The program focuses on medium-sized countries, it is related to the development of their regulation and we could also assist in the integrated electrification planning process.

AFUR is now focusing on finding the mechanism or incentive to put together the funding windows and work with the rules or regulations so that the private sector is interested in developing. This would be easy to understand, but the implementation is complicated because everything must happen at the same time. All interests must be aligned.

The objectives do not have to be the same, but they must be aligned with a common window or target, which is the electrification of the country.

The objective of mini-grid regulators is to ensure that the market functions properly and that consumer protection is in place. This requires a clear framework with requirements for all stakeholders, including mini-grid developers, operators, consumers, and regulators.

For GET.transform this framework must address four areas:

1. **Concessions and licenses.** It is necessary to clarify where microgrids



can be deployed, as well as the procedures and guidelines for obtaining licenses and permits. These licenses should include the terms of duration of the concession, the ownership model, the provisions for renewal or extension, and the rights and responsibilities of all parties.

2. **Tariffs.** The amount should allow the micro-grid operator to recover costs while ensuring affordability for consumers. In an ideal world, uniform tariffs would be preferred. However, considering the practices for the funding shortfall of a uniform tariff, the important question remains who and what covers it. At present, most utility companies in Africa are unable to fully recover their costs at current grid tariffs. In addition, utility companies suffer from performance issues. The good thing is that there is a lot of support for utility companies to address governance, technical, service, tariff, and billing issues.

3. **Grid arrival.** We should be aware of the existing framework for grid interconnection. Micro-grids are sometimes expected to be designed to grid standards and to support interconnection from the outset of the project, leading to increased capital, operating, and tariff costs. The arrival of the main grid must be comprehensive, i.e., the options must incorporate commercial, legal, and technical considerations. The overall priority is to ensure that, whichever option is chosen, whether the microgrid operator becomes a small energy producer,

distributor, both at the same time, or sells and transfers assets to the utility companies, in all scenarios the service quality is maintained, consumer rights are protected, and micro-grid developers have mechanisms to protect their investments. In addition, there is the requirement for clear processes that leave no room for interpretation and that define the rules for compensation and tariff setting after the arrival of the main grid.

4. **Technical.** This also must be analysed, for example, how to maintain a certain quality level without compromising the viability of the micro-grid business model. This includes both design and construction standards and service standards. For each country's scenario, different standards must be considered based on the expected system availability, installation practices, among other technical parameters, to understand the impact that the standards will have on tariffs.





# Towards universal energy access: empowering and educating the consumer

SPEAKERS				Moderator: Jennifer Nicholson
<b>Jorge Valencia</b> Partner of Asesorías en Proyectos y Energía SAS	<b>Natalie McCoy</b> Head of International Relations Office at Portugal's Energy Services Regulatory Authority (ERSE)	<b>Luis Jesús Sánchez de Tembleque</b> Executive Secretary of ARIAE and head of the Department of Consumer Protection of the CNMC, Spain	<b>Siamelie Latu</b> Chair of the Office of the Pacific Energy Regulators Alliance (OPERA)	

The challenge of decarbonization is unprecedented: in scale, complexity, and speed. Smart grids enable consumers to actively participate in meeting this challenge, but the public may not support it without a full understanding of the benefits. Solar PV and micro-grids can help connect communities without access to energy but they may not be considered in utility planning, and tariffs may become unaffordable without some form of subsidy.

**The challenge of empowering communities in Colombia**

For Colombia, energy access represents equality and inclusion. It is to provide households with the opportunity to access energy, especially cleaner energies.

Access to cleaner energies has additional aspects, for example, giving families more fair and equal opportunities, so the time

spent on activities such as collecting firewood can be dedicated to receive education, generate income, and share with the family. And more than just the economic aspect, it also involves a public health issue.

The issue of energy communities is important in consumer and user empowerment, and it is being worked on in Colombia's public policies through the so-called micro-grids, also known as mini-grids.

Several elements are being analyzed to give communities greater responsibility in service provision and achieve universalization: giving them responsibility for proposing solutions to achieve universal coverage; in other words, empowering communities as opposed to the traditional service provision scheme. However, there are open issues.

The first issue is to ask how the prevalence of institutionalism will be maintained. This means, for example, solving the issue of equipment failure once the equipment has been delivered to provide the service. Responsibilities must be defined.

A second issue is service quality and technical problem solution. If a community member is responsible for that, will s/he be able to solve technical and quality-related problems?

But there is an even more important issue. In Colombia, the State is responsible for the reliability of supply through the Ministry of Mines and Energy and the Energy Regulator. That responsibility is being

handed over to the communities that will operate the system. So, again, how will that responsibility be strengthened?

And even more so when the demand starts to grow due to the growing electrification of society, with more and more electricity needs. What will happen when local supply problems arise or if the solutions implemented are not enough? From where will the additional resources come to increase and ensure energy supply? These are the issues that need to be solved.

Another important issue is the role of the regulator in meeting these challenges.

The regulator should seek to give signals of long-term sustainability based on tariff schemes and determine the efficient costs for service provision. However, the responsibility for communities to pay for the service and infrastructure subsidies lies with the State and not with the independent regulator.

Thus, the issue of universal access and user and community empowerment in energy access should be considered from these elements.

The issue of energy communities is important in consumer and user empowerment, and it is being worked on in Colombia's public policies through the so-called micro-grids, also known as mini-grids.





Today, the State and companies are responsible for ensuring that electricity, or the gas molecule, reaches homes. But when users are asked to try to solve the problem, responsibilities are transferred to them for which they may not be qualified.

And the last issue in user empowerment is knowing what is being done to change users' mindset, which plays an important role in how energy is used. Users should be empowered to better manage their energy consumption and be more environmentally responsible.

Europe's experience

It is vital to reflect on the issues of energy poverty linked to geographic and geopolitical issues.

Currently, the energy crisis is a key point on the political agenda and in the legal spaces of the European Union. There is the risk that not only the energy industry but also other areas are part of this problem.

Not only are the consequences of the pandemic, inflation, and the energy crisis being dealt with but also people are having to make difficult choices between going to the supermarket or paying their electricity bill.

The data show that energy access has dropped along with the purchasing power of the population. High peaks of poverty are being reached. The European Union has invested 800 billion euros to counteract the crisis.

But people's mindset has to be changed. This is a social service as well. We must consider that we are not only talking about consumers or users, we are also talking about citizens. And that is something that regulators should consider, that there is a positive correlation between the Human Development Index and energy access.

Promoting innovative projects, such as microgrids and Renewables, will allow people to become increasingly autonomous, but sometimes there is no technical or professional support to manage them.

Energy poverty is not having access to a quality of life with essential services, and that puts people at risk. The energy crisis put this issue on the table. Millions of consumers were affected by bankrupted suppliers and we found that some consumer protection processes needed to be enhanced.

The European experience has taught us an important lesson to understand that regulations and regulatory frameworks should provide a safety net for the energy consumer.

We need to know what it means to provide complete and comprehensive

access to consumers. Not only in essential services but also in other aspects. If energy communities are established, it will be necessary to have a sustainable framework. This is where the regulator should intervene.

Towards planning to empower the consumer

The evolution of the market can be seen in four stages. The first stage is energy access. The second stage is service quality, that there is continuity of service for user convenience, and, in turn, industrial development in the areas that need this energy. The third stage is good payment and affordability. Finally, once access, service quality, and affordability have been addressed, it will be necessary to think about consumer empowerment for a liberalized regulatory market that better allocates resources.

A document of the Ibero-American Association of Energy Regulators (ARIAE) on the occasion of the Ibero-American Summit of Heads of State and Government held in 2021 in Andorra addresses these stages, at least the first three. The situation presented in this document, which is called SDG 7 in Ibero-America, has to do with reaching the last mile with affordable, secure, sustainable, and modern energy for all users to achieve universal access by 2030.

Among the conclusions, regarding electricity, it points out that until the end of the last decade, only 2% of potential consumers in Ibero-America did not have access to electricity (approximately 10 million consumers). This means that the

Energy poverty is not having access to a quality of life with essential services, and that puts people at risk. The energy crisis put this issue on the table.







lack of access occurs mainly in isolated, remote rural areas. It also shows that even though there has been a tremendous effort since the first decade of this century, there has been stagnation because it is more difficult to reach the most remote places in the jungle or the highlands. This leads to an increasingly slower rate of electrification and a stagnation effect.

For example, Nicaragua, Honduras, Guatemala, Panama, and Bolivia have a high percentage of their populations without access to electricity, whereas the large economies in the region, such as Argentina, Brazil, Colombia, Peru, and Mexico, have a combined total of five million potential consumers without access.

But there are also solutions. On the one hand, the expansion of the distribution grid; on the other, third-generation home photovoltaic systems, which are modular in nature and are used on a current and continuous basis. The aim is to reach the last mile, to go beyond access, to boost economic and social development, to ensure utilities, education, and health, and to achieve reliable, more or less continuous access to ensure energy security for all people.

Globally, there are 70 million people without access to a clean cooking system and 12% of the American population uses firewood, liquids, and other materials that cause contamination and unhealthy living conditions, mainly affecting girls and women who do household chores. Thus, the clean cooking objective is to improve the situation of this target group.



What is the role of regulators? The State is the main responsible, but it has to get involved in public policies. Regulators should intervene in planning, a fundamental and integrated activity of all resources.

There are two options here. On the one hand, the expansion of the distribution grid and, on the other hand, the use of mini-grids, automated planning systems that provide a more economical solution. For example, integrated planning has been successful in Panama, Bolivia, Ecuador, and even Guatemala.

It is also necessary to determine a clear and efficient regulatory framework for the distribution of these systems. There must be a person responsible for the grid expansion or, in any case, for the installation of home photovoltaic systems or mini-grids.

For electricity tariffs, we have to start with subsidies based on location since there will be vulnerable people who cannot afford the equipment cost, and therefore, regulators will have to establish subsidized tariffs.

If these laws promote social funds, subsidies can be established for the difference between the equipment cost and the prices that vulnerable consumers will pay.

Once there is access to energy with an adequate service quality, it is necessary to address the regulation of distribution, mini-grids or photovoltaic home systems.

There, we have a consumer who, in a way, is using energy within a liberalized framework, that is to say, users must be given the

freedom to choose their supplier and be able to receive clear and certain offers. In addition, there must be mechanisms for comparing offers so that consumers can evaluate the most or least favorable for them and obtain the price signal they need.

Finally, many technological developments empower consumers, such as smart metering and home photovoltaic systems. Thus, consumers are somehow being driven to be much more active.

### From the Pacific Energy Regulators Alliance

The Kingdom of Tonga, very close to Fiji, has frequent volcanic eruptions. Two years ago, a violent volcanic eruption significantly affected the territory. So, that is enough to imagine how energy works in this region.

Tonga's priority is to have regulators that drive the country's development and facilitate the achievement of the Sustainable Development Goals in terms of providing goods and services for better performance. The second thing is to propose renewable projects. Thus, energy dependence can be reduced and decarbonization goals can also be achieved. And third, they want to improve access to energy through an energy grid program. In addition, they seek to promote private investment and have a strategic partnership between public and private sectors.

One of the priority tasks of the Pacific Energy Regulators Alliance (OPERA) is to form an operational group and alliances with other regulators in the world. Its policies are evaluated to be considered in the decision-making process and, thus, lay



the foundations for economic regulation. The next step is to have consultative actions, for which there is a consulting team with expertise in public policy and legal matters.

As for universal access, Pacific islands, just like their economies, have limited space to empower and educate consumers. The population is distributed across the different islands and, unfortunately, there are nations highly exposed to natural disasters, so they are dependent on importing fossil fuels. They also have high basic utility tariffs. Energy distributors have high costs and depend on imported fuels.

As for decarbonization, there is a call to action, which means that all people and entities must have a plan towards that goal, considering the process that users will go through.

OPERA's mission is to protect consumers, so institutions must act proactively in the energy transition, give them an understanding of the benefits of this transformation, empower them, and promote their education on this matter.

To what extent should the regulator be involved in energy access and clean cooking? We have to think about mini-grids and photovoltaic panels. There



Pacific islands, just like their economies, have limited physical space. They are highly exposed to natural disasters, so they are dependent on importing fossil fuels for energy.

An icon of a person carrying a large sack, symbolizing limited space or resource dependency.

is a duty for the entire population to be connected to electricity. The regulator has the power to indicate which areas need to be connected. Its reports are public documents useful for politicians to make proposals and take action.

In small countries like Tonga, there is not enough capital, so it will be necessary to seek investments to generate energy in the areas without it. Energy access in the Pacific islands ranges from 60% to 100%. They want to promote mini-grids to have subsidized areas where consumers access this resource and thus facilitate the energy transition. Today, they are also working on the design of mitigation policies as the electricity demand is growing.

Their communities are included in energy access and energy access planning. Not only is there the consent of the Executive Power, but also the communities are included to participate in the fight against climate change. Consumer participation is increasingly important for the energy transition. It is a good alliance, with simple rules for connection, grid operation, and its orientation to mini-grids and photovoltaic panels.





# Rethinking Infrastructure Development for 2025

SPEAKERS

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Midcontinent Independent System Operator (MISO) and GO15 President

Susana Cazorla

Director and founding partner of SICEnergy

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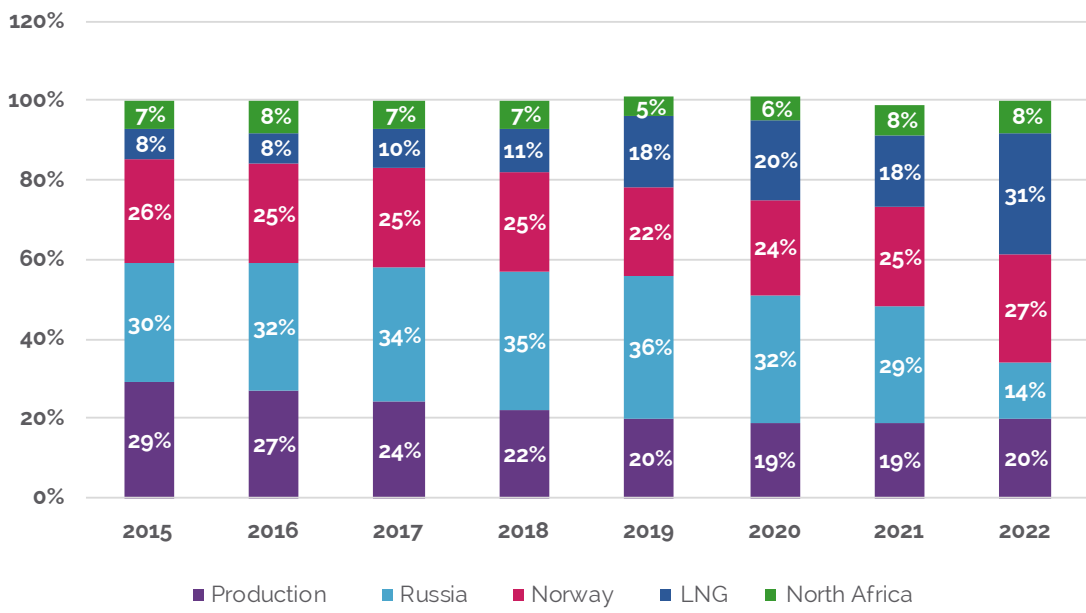


What will be the needs for infrastructure development from 2025 to remain a reliable pillar for different energy sources? What is needed from a growth-minded leader to ask the right questions to address the related challenges, especially in the era of digitalization, geopolitics, regionalization, climate change, and Agenda 2030? Instead of providing answers, ICER's Women in Energy Initiative (WIE) provided a space to reflect on the direction of the sector with the support of experts.

## From the Regional Centre for Energy Policy Research in Hungary

From the lessons learned in the European natural gas market, in the context of infrastructure development for 2025, it is known that Europe is a very much gas import dependent continent.

## Europe is very much gas import dependent



Its supply structure has a low percentage of own production, which has been decreasing. This is why imports and especially the pipeline supply from Russia grew, but since 2022, it has been drastically reduced.

Experts have mentioned that the exposure to supply disruption is a very serious problem, especially in Eastern European countries. In 2004, when this group of countries joined the EU they were very dependent on Russian gas. Obviously, for these former socialist countries there were a lot of political and economic connections with Russia. And so, when they joined the EU a supply security problem emerged for the whole EU.

The largest supply cut occurred in January 2009, when Russia halted all deliveries via Ukraine. Most countries could substitute the missing volumes from storages and

from neighbours or via reduction of supplies to gas power plants. Some countries, most severely Bulgaria experienced a reduction in its supplies, affecting its household consumers. There were some long lasting consequences of this crisis which was politically resolved in two weeks.

Russia's strategy to prevent supply disruptions in the future was to bypass its pipelines through Ukraine. They considered

Europe wanted to have a more interconnected market, but unfortunately the self-interests of national governments still stand in the way.



it a strategic threat to their transit via the EU and decided to build pipelines avoiding the territory of Ukraine from the south and from the north.

Europe wanted to have a more interconnected market to reduce isolation from other countries, to have access to more LNG, and, more importantly, to have an internal market.

So, how is it decided whether a gas infrastructure project is of common interest or, simply, of national interest? Europe set up a framework to select a project proposed by other actors. This was a complicated process. Methodologies were developed, different institutions participated, and, during a two-year cycle, regional groups and regulators discussed among themselves and with stakeholders to decide which projects of common interest for all should be implemented (Projects of Common Interest - PCI).

The first attempt resulted in a very large number of projects. There were some related to electricity, gas, and to oil infrastructure. Many did never happen, some were merged.

For seven years, the European Union dedicated US\$ 5 billion to energy infrastructure projects and to support the implementation of the PCIs, although the entire budget could not be spent because the projects were not ready. Nevertheless, a few, significant plans could be implemented with EU support.

What lessons were learned? During this process, EU member states learned to talk about cooperation and established specific frameworks to achieve it, although there was not necessarily cooperation in the end.

In Hungary, there is 80% import need. Next to it is Romania, which does have gas and the prices are much lower. Connecting the two countries could increase prices in Romania



and decrease them in Hungary. Romanian politicians did not like the idea of exporting their gas through the new interconnection.

Finally, Romania set a very high tariff and avoided marketing its gas. Nobody could use the gas because the tariff was too high. This type of measure shows that national interest very often prevents the materialization of larger European interests.

**MISO and GO15: the importance of planning**

The industry has advanced, is moving very fast, and has great potential. The evolution

and generation from traditional thermal production have accelerated significantly. Policy and management of renewable resources now need to be considered.

Availability, sustainability, and reliability are key matters in the global energy market. From one perspective, one could say that a lot of time is spent on sustainability and not so much on reliability and availability. They are two different perspectives.

MISO is the largest grid operator group in the United States and GO15 brings together the largest operators from around the globe. So, they bring together electric utility companies from almost half the planet, with the capacity to serve 3 billion consumers. And the exchange of information and collaboration among them is amazing.

The challenges posed by the energy transition are shared by GO15.

MISO operators face the same challenges as other grid operators and the global market. These may differ in pace, timing and intensity, but in general, they are similar.







The first is the exchange of technical collaborations. How can renewable supply be introduced into the system? What is its impact? What factors need to be looked at? What infrastructure is needed to make it work? There are good examples of this.

GO15 works —through universal dialogue— sharing perspectives and experiences. The nature of the operators, their configuration, and their role may be different, but they almost always face the same challenges with other grid operators and the market. These may differ in pace, timing, and intensity, but, in general, they are similar.

The value generated is being able to work on these challenges together. There is support for energy transition; however, it is necessary to think about reliability. A responsive operating system is needed, and achieving that is not always going to be popular.

Sustainability goals are interesting, but they are complicating the vision for the system, and some controllers are pulling out.

It is said that there is already a commercial substitute: batteries, and small reactors; however, they are not yet here on a massive scale. And until they are, something is needed to ensure the reliability of renewables. A lot of effort is put into producing wind and solar energy, but the challenge is batteries. They are used for panels and even cell phones.

Likewise, everyone is experiencing weather events at different times of the year in a context of much higher energy demand. And, from the transportation point of view,



Regarding electric transmission, MISO took a totally different approach to transmission planning to get a generator to where the customers were.

transportation is being massively electrified. There has been very significant progress here, and it is necessary to watch how it continues at this pace.

Some challenges will not be solved in the short term. Many variables have to be considered and we will depend on new resources to replace the traditional ones. This is why we are talking about the collection of renewables. How much value can we expect from this energy when it is

needed? Not just when it comes but when it is needed.

Hydro renewable technologies can always deliver what is needed, but there is a lot of work to be done to know how they work and how they can be made more reliable. There are different scenarios around the world. In the U.S., there are a lot of incentives now to put resources into interconnection services; they are overloaded now.

This is very similar to what is happening in other countries that need to prioritize to know the impact on the transmission system. There is also work to be done on the transmission budget.

And it should work better with lower spending. In other words, if there is an efficient transmission system when there is wind or a lot of sun that can transmit energy





from one side to the other, it is alright. Otherwise, there will not be a balance in the resources needed. And that is going to be very important.

Finally, everyone faces changes in the workforce. In addition to needing an approved infrastructure plan, the permits to start a project, and the materials, finding people to execute them is complicated.

Regarding electric transmission, MISO started with natural gas very early, almost in 2010, within the region. There were a lot of resources to interconnect. And it took a totally different approach to transmission planning to get a generator to where the customers were. It was operated with a big vision.

The state regulators developed a plan for weather forecasting and a forecasting program was created with much planning

to build a transmission system that would allow resources to interconnect into the grid successfully.

In 2011, it started with 17 projects, approximately 34,000 kilometers of transmission line with almost 675 KV. Looking back in retrospect, it only cost US\$ 3.5 billion. The execution of these projects was of great value.

The numbers in transmission are much higher now. In the first half of this year, phase 1 of a transmission line project was approved with an investment of almost US\$ 10 billion for 45,000 kilometers on the grid. That covers the length of New Delhi, for example, to put it in perspective. For the second stage of this infrastructure project, US\$ 20 billion is needed, including 67 transmission lines and a lot of work.



However, there are many problems in building infrastructure for renewables. They want to learn from the experiences of neighboring countries, interconnecting solar energy to solve the existing problems.

Now, it is important to know who will pay for this. It is necessary to use new methods that allow interconnection with lower costs for the group.

If we talk about the amount of transmission we want to have, its calculation has not yet completed. If extrapolated globally, the goals in terms of decarbonization need even more effort. There are many challenges that this community has to face. The supply chain and regulatory processes need to be maintained along with the planning process.

### Lessons from Mexico's market

Many things have changed since the World Forum on Energy Regulation held in Cancun five years ago. What was said about Mexico back then does not represent the current situation. This points out how delicate the institutionalization of energy regulators is in some countries.

It was believed that a constitutional change would give more autonomy and independence to Mexico's regulator, but it did not. And that is a governance issue that is directly related to infrastructure and investment confidence.

In 2013, a reform was made that opened markets and liberalized the electricity market. Mexico depends on natural gas for more than 60% of its energy matrix. Many

In Mexico, an infrastructure has been developed that has nothing to do with sustainability, with supply security, or with the inclusion of those who today are not properly served in the energy system.



believe that Mexico is an oil country, but it is not.

Mexico imports 70% of the natural gas it consumes, 70% of gasoline and diesel, 70% of LPG, and its matrix depends on two-thirds of natural gas. More than 90% of that gas comes from the United States. And what was done to limit the alerts that occurred during the first decade of this century was to develop natural gas pipelines connected to Texas, large pipelines, an underwater pipeline that was very complicated, and that was to get rid of Mexico's energy security problems.

The pipelines were anchored by the Federal Electricity Commission (CFE). Mexico has two vertically integrated public companies: the oil, natural gas, and petroleum company and the electricity company.

This is a problem because having strong state companies gives a lot of power and when we want to include private participation and competition to make costs and infrastructure more efficient, there is a tremendous clash and resistance.

The pipelines were installed by an electricity company, which also became a natural gas





trading company. Thus, a company with a lot of power was created. Long-term contracts were signed to develop this new infrastructure, which was supposed to come with solid regulation, and it was foreseen that this capacity would be used to generate electricity for the industrial market. But what happened? It was not used for that. In 2023, the CFE, which markets natural gas and has a lot of pipeline capacity, encountered a lack of natural gas worldwide after Russia invaded Ukraine and the European and Asian crises. What will happen in the future? Mexico will become one of the top five LNG exporters in the next two or three years. International companies are now making agreements with the electricity company. Why? Because the margins are huge.

Texan natural gas is still affordable, US\$ 4 or US\$ 5 per million BTU, compared to the margins they pay in Europe or Asia. Thus, it is enough to move it to Mexico and export it.

So, an infrastructure has been developed that has nothing to do with sustainability, with supply security, or with the inclusion of those who today are not properly served in the energy system. It has nothing to do with

the environment. It is a rent issue.

What is being done is to generate permits like hotcakes for floating LNG terminals. Mexico is becoming the maquiladora of natural gas from the United States, which liquefies it in Mexico and sends it to Europe and Asia. Even though these new pipelines may help serve a part of the southern Yucatan peninsula, the point is that the infrastructure being developed has nothing to do with the proposed objectives, and the regulator is no longer respecting the current regulations.

The regulator's objective must be aligned with the legitimate interests of the stakeholders, the government, and of course, politics, and consumers. However, this is not benefiting Mexican consumers.

We have to be very careful with short-term interests. There is planning, but it cannot foresee investment projects for one or five years; they are investments that are amortized in 20 or 25 years.

Planning has to be dynamic and based on minimum principles of guarantee of legal certainty. It should be known that if an agreement is signed, it will be complied with and that there will be someone who will pay because as long as the government and a state company are involved, investors have zero risk and it will be paid with the population's taxes.

In addition, there is the electrical part. Renewables have become public enemy number one because they belong to private companies and compete for large

The regulator's objective must be aligned with the legitimate interests of the stakeholders, the government, and of course, politics, and consumers.





consumers with the state company. Here, reliability can become a pretext because the regulator can argue that if a renewable plant starts to produce, reliability problems may arise.

This is a very hard barrier. The job of the regulator is to ensure that there is a clear methodology, that there is a supervisor that guarantees that the economic dispatch will be respected, but just the opposite is happening.

As for transmission lines, Mexico's strategic plan has more than 300 projects that should already be ready, as they were published in 2019-2020. Of those, only 30 have been executed. Recently, a solar park, a spectacular solar

farm in Sonora, was announced but there are no transmission lines. Then we'll see, they say in Mexico. And transmission lines are of public interest, they can only be built by the State. It is not that a private firm can come and ask for them.

These bad practices can be solved. But we have to try to do it for real. Whatever is done as regulators, it must be shielded, the agreements must be guaranteed, the investment must be guaranteed, and the short term should not win out over the long term.



# Shaping the energy landscape: Building trust with stakeholders

SPEAKERS

Maria Elena Martín Morales

Hydrocarbon Quality Manager from the Regulating Authority of Costa Rica's Public Services (ARESEP)

Bruno Meyer

GO15 Secretary General

James Danly

Commissioner at the Federal Energy Regulatory Commission

Sharleen Gale

Chief of Fort Nelson First Nation and Chair of the First Nations Major Projects Coalition

Moderator: Milene Yarixa Nuñez Espinoza

Stakeholder participation and engagement are key to energy projects and expectations on regulators and public utility companies. These groups demand more transparency as the increased use of renewables promotes public and community participation.

**From the Costa Rican Public Services Regulatory Authority (ARESEP)**

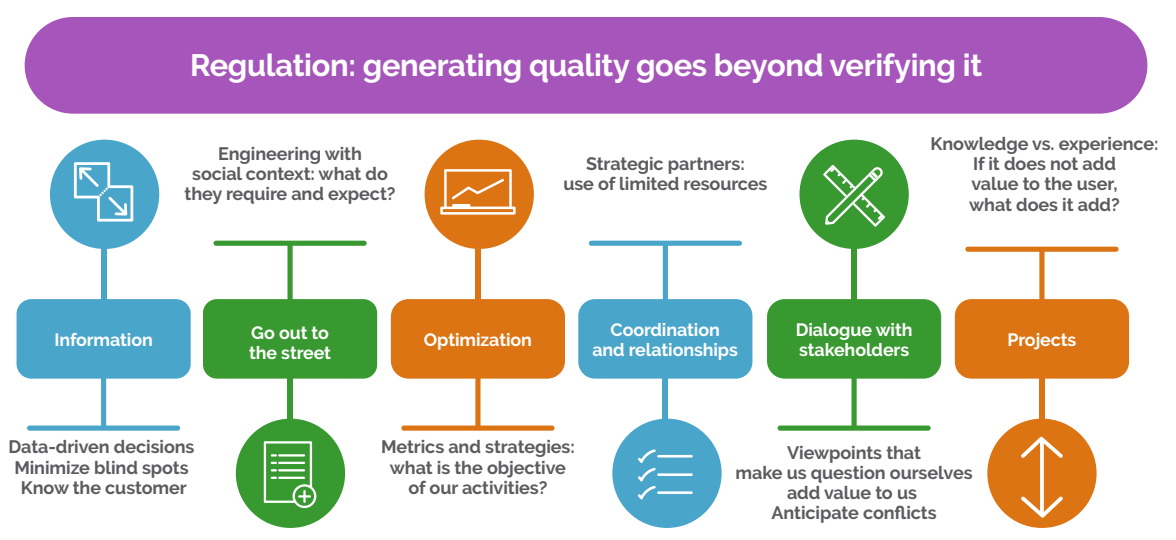
The building of trust in stakeholders is related to openness, dialogue, and public participation. Public participation usually consists of incorporating the parties that will be affected in designing a policy and engaging them in the different stages of its formulation. Unfortunately, this concept

has been relegated to the final stage of the project, when it is practically ready and is presented at a public hearing. And, then, it is discovered that people no longer participate, do not give their opinion, or oppose this process.

Public participation should not be understood as a call for people to validate decisions previously made because they will not be interested in what has already been decided. Public participation means explaining how a procedure impacts people, whether it will imply any cost to them or how, for example, a tariff is calculated.

ARESEP regulates the entire hydrocarbon chain, both liquid and gaseous, and even

though it has focused on generating quality at the level of intermediaries, at the user's point of contact with the service provider it seeks to generate quality beyond verifying it. This has been achieved through several lines of work:



These lines of work helped, in 2014, initiate the LPG regulation process, a widely used fuel in Costa Rica. The LPG market was formed 30 years before the creation of the regulator and continued for 20 more years without regulation for its safe use. This resulted in a very high number of accidents, becoming the leading cause of emergencies in Costa Rica.

The LPG Interinstitutional Commission, integrated by the Ministries of Health and Energy, ARESEP, and the Fire Department, was formed in the process. Together, they started to go outside, seek foreign regulatory frameworks, and visit hospitals, prisons, clients, and LPG users. With this, a linear public policy was developed through a technical commission that began

to issue new regulations. Knowledge transfer agreements were also made for all regulatory information to be on a single platform and for decisions to be made, considering the data generated by all.

Thus, a gas installation certification, a cylinder renewal plan, and a technological proposal with information on quality and tariffs for the user benefit were approved.

In Costa Rica, gas consumption continues growing in all sectors, but there is historical information since 2017 on tanks, cylinders, points of sale, and service stations. After five years, the LPG Interinstitutional Commission members continue making decisions on a weekly basis and verifying metrics, indicators, and goals. Today, LPG-related





accidents are the seventh leading cause of emergencies in the country, not the first, and firefighters went from attending 20 LPG emergencies a day to five.

When tools are well designed and are adopted by citizens, they usually remain in time. When tools are imposed, and people do not believe in them, they are usually forgotten. But when legitimate policies are made with public participation, they usually become State policies.

### The GO15 experience


For system operators, trust is a fundamental, key word. It is for GO15 —the association of Very Large Power Grid Operators — which has been operating globally for over 150 years. During such time, change has been permanent, as well as the form of discussion with users and stakeholders, which is becoming increasingly important.

If points of view are not shared or discussed with stakeholders, stagnation will occur.


GO15 members are global companies that together account for more than half of the world's electricity demand, with more than 3 billion consumers. The total of their members' supply capacity includes more than 25% from renewable energy sources.

Talking about renewables may be very obvious, but it is necessary to differentiate between the most well-known, which are the older ones —such as hydro energy— and the new ones —such as wind and solar energy— the two most popular. The difference between them is intermittency. In hydro generation, we know how much energy we will have, but when talking about wind energy, sometimes there is not so much wind, or when there is a lot of wind, the generation can be interrupted. And in the case of solar, a cloudy day makes a big difference.


GO15 power grid operators




**15** very large power grid operators




**More than half** of the world's electricity demand




**+2000 GW** of capacity



**+25%** renewable energy sources



Serving **3 billion** consumers



Reliable transmission service **24 hours** a day, for producers and consumers



The importance of energy supply reliability is that the public expects to have it available 24 hours a day, seven days a week, all year round. And it is lost if there is any disruption in the power grid.

GO15 brings together 15 companies from different continents, with diverse political backgrounds and geopolitical organizations, but with a common interest: that the energy transition takes place everywhere.

This transition should be fast and at the service of society, the public, and consumers. This purpose comes from shareholders but also from regulators. And it has to be done while the system is still up and running because a few hours without electricity and light can become a huge problem. So, we face a trilemma: reliability, availability, and sustainability.

It is difficult to explain and share these ideas with the public. But when talking about



For GO15, the energy transition should be fast and at the service of society, the public, and consumers.

energy transition, it is about developing new energy sources, such as solar and wind, but also about expanding the grid. New electricity grids are needed to connect them and to ensure their reliability.

Operators should not hide behind technical issues. The transition comes with challenges, and it is necessary to be clear to have a constant dialogue with all stakeholders, regulators, and customers.

### From the Federal Energy Regulatory Commission (FERC)

Regulatory action is complex, and regulatory agencies experience that complexity in trying to keep their communication channels open to ensure that the public is aware that their participation is valid and effective. Everyone faces this universal problem to varying degrees.

It is a problem because, in some ways, it determines the success of regulatory proposals. And if participation is not effective or not carried out, the public does not engage with these initiatives. They also generate frustration if people want to participate and find it difficult. So, there are two elements in this equation: participation (how many people participate and how many people want to participate



and don't) and the level of effectiveness, i.e., [the results] after their participation.

To solve these problems, it is necessary to be aware of them. Therefore, today, we seek to have as much participation as possible by promoting it, in simple terms, going out aggressively to communicate and make broader calls, focusing on communities that historically have not participated.

Effectiveness is solved with simplicity because if you disagree, you have the right to say so. Because of this, it is crucial to have articulated responses in the participation mechanisms.

Participation should be encouraged to the greatest maximum extent in any process, understanding that there is always a limited budget.

Another aspect to be analyzed is public engagement. As regulators, we need to assess the actions taken since public servants owe it to users and to evaluate the proposed policies.

A final point is the legitimacy of the regulatory system since everyone's participation can ensure its legitimacy.

### The First Nations Major Projects Coalition

Called the First Nations, the indigenous people of Canada own 100% of Canada's thermoelectric industry. They have built the first geothermal industry in British Columbia and are the direct beneficiaries of this project, but those who work there also benefit. Therefore, they try to ensure

working conditions, share their knowledge, and listen to everyone.

The indigenous people had occupied North America for many years before the arrival of European explorers. But, after their settlement, there was a process of assimilation. Today, the indigenous population is the fastest-growing population in Canada, and they will need energy from renewable sources. Therefore, they are leading this transformation to balance economic prosperity and environmental protection in their territories.

The First Nations Major Projects Coalition brings together 140 First Nations and seeks their economic growth, being aware that the economy impacts the environment. Therefore, they try to get a fair deal on projects developed in their traditional territories.

Today, they host more than 30 important projects, many of which are thermal energy projects, with investments of more than US\$ 45 billion. It is their responsibility to decide what happens in their territories, and they do not oppose projects but seek those that fit with their beliefs of respect for natural resources.

For the indigenous communities, participating in projects means a commitment and reconciliation. They have created different communication materials to involve their members in decision-making. Each year, they meet with more than 2,000 leaders of indigenous communities and other representatives to demonstrate how their inclusion has created added value in the development and operation of the different projects.





05

Closing  
remarks

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At the closing of the event, David Danner, outgoing ICER Chair, Omar Chambergo, Osinergmin Chair and host of the forum, and Giorgi Pangani, of the National Energy and Water Supply Commission of Georgia —the next host of the World Forum on Energy Regulation— gave the closing remarks of the meeting.



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Goals achieved

David Danner

This forum has achieved every ICER objective: constructive dialogue, educational dialogue, and inspirational dialogue. The speeches were of a very high level, detailed, and very timely.

Carlos Pascual gave valuable perspectives on the effect of the geopolitical situation amid climate change efforts. Professor Jorge Seminario explained the science of batteries and rare minerals and their importance in economizing energy

and transportation. The panels covered topics that are critical to regulators and showcased the insights of colleagues from around the world.

On this last day as ICER Chair, it has been a great honor to serve this institution for the past three years. I would like to thank Francisco Salazar, ICER Coordinator, and all the members of the Executive Committee for all their support.

The Executive Committee has appointed David Morton, Head of the British Columbia Utilities Commission in Canada, as the new ICER Chair until 2026.

Our gratitude goes to Omar Chambergo, Chair of the Board of Directors of Osinergmin, for conducting one of the best forum experiences we have witnessed in many years. Thank you all for your hospitality!



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Immediate action

Giorgi Pangani

It is a great honor for me to give our greetings on behalf of the National Energy Commission of Georgia. First, thank Osinergmin and

Omar Chambergo for the organization of the VIII World Forum on Energy Regulation and for the excellent organization and the opportunity to visit the beautiful city of Lima.

The latest news from the energy sector, after the VII edition of the forum, especially with the energy crisis and the COVID-19 pandemic, has highlighted the need for immediate action.

Once again, this news has drawn attention to the importance of diversification of energy sources and a transition to cleaner energy.



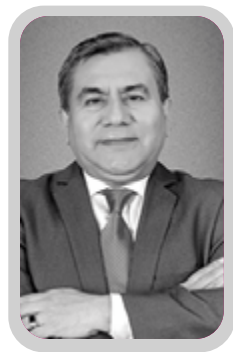


During these days, we have been involved in discussions on competitiveness, energy transition, and universal energy access. Once again, we have seen regulatory authorities and policymakers working hard to ensure the right regulatory frameworks and environment to promote fair competition with innovation and sustainability.

Therefore, collaboration, knowledge sharing, and the exchange of best practices are essential to ensure a more sustainable energy future. The forum creates opportunities

for decision-making and academic and regulatory authorities and other energy sector representatives to contribute to creating a better energy scenario.

Thus, we will be proud to host the IX World Forum. We can assure you that the National Energy and Water Supply Regulatory Commission of Georgia, with the help of local authorities, partners, and international organizations, is committed to its success, and we look forward to seeing you in Tbilisi in 2026!



## Fruitful dialogue and communication

Omar Chambergo

It is an honor to be in front of you. We feel satisfied after intense days of debate, meeting points, sharing good practices, and warmth and camaraderie that were experienced in this VIII World Forum on Energy Regulation held in Peru.

Meeting in person after more than five years awakens a very special feeling. We have achieved a fruitful dialogue and communication between the representatives of the various associations of regulators in the world and between speakers and participants, who contributed their vision from different realities, enriching the meeting.

In the same way, it is gratifying to highlight the quality and great contribution of each presentation. I thank each of the speakers, and I am sure that they will have a favorable impact on the structures of the sector.

This forum brought interesting presentations related to the renewable

energy market, energy access, the energy crisis in Europe and the European Union's response, and the development of regional energy markets.

There is still a long way to go to 2050 if the objective is to meet the goal of zero emissions. To this end, it is necessary to invest in technology with the participation of all market players. Likewise, the relevance of the relationship between energy and mining in the energy transition process was highlighted, as well as the role of regulators in innovation and disruptive technologies.

Each topic discussed opens a window of opportunity to establish energy policies that enable new types of businesses and technologies.

As regulators, we must adapt to the new times, ensuring access to reliable services and reasonable tariffs. Also, accountability and transparent communication must underpin our work. In addition, through the keynote speeches, we have had the

opportunity to analyze the geopolitical world and how it affects the energy transition that presents multiple challenges. Alternatives such as the carbon capture market, green hydrogen, increased demand for metals for electrification, the sale of carbon credits, and the development of efficient and lightweight batteries for vehicle transportation will be part of our future agenda.

With these issues addressed, it is clear that, as energy regulators, we play a fundamental role in the energy transition process, which is a great challenge for all countries.

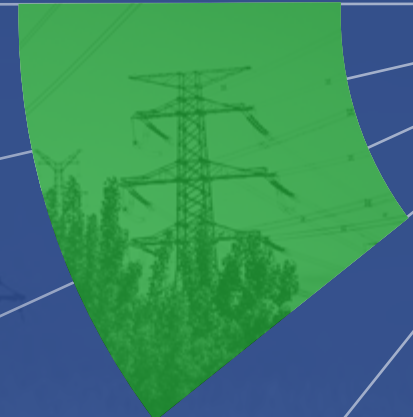
I am sure that we will leave full of proposals to implement them in our countries for the benefit of users, as well as the next generations who deserve a sustainable planet.

We appreciate your active presence at the VIII World Forum on Energy Regulation 2023 and your commitment. I would like to acknowledge and thank the Osinergmin team that has been behind the organization.



06

**Best of the  
Best at the  
ICER Awards**





The International Confederation of Energy Regulators (ICER) honored the ICER Distinguished Scholar Award winners, which celebrates, in this edition, contributions to studies in electricity and natural gas regulation.

The award theme was The Energy Transformation Challenge : Competitiveness and Sustainability of Energy Markets, Opportunities and Achievements.

An international panel of energy and regulatory leaders selected two papers in two categories: Impact on Developing Countries 2023 and Next Practices.

### Impact on Developing Countries 2023

The winner in this category was Charly Gatete from the Regional Electricity Regulatory

Authority of the Economic Community of West African States (ECOWAS) for his paper Competitiveness and Sustainability of Electricity Markets in the ECOWAS Region: Evolving Reforms, Regulatory Challenge, and Market Integration.

Gatete's article analyzes the liberalization process and evolution of competitive reforms in the electricity sector and the construction of competitive electricity markets, both nationally and regionally, in the ECOWAS region.

### Upcoming Practices 2023

The winner in this category was Marcio Andrey Roselli from the The National Electric Energy Agency of Brazil (ANEEL) for the study Pricing of Distributed Energy Resources. This study was conducted with André Luiz Veiga Gimenes from the Energy Group of



the Department of Energy Engineering and Electrical Automotive of the University of São Paulo, Miguel Edgar Morales Udaeta from the University of São Paulo, and Eduardo Crestana Guardia from the Federal University of Itajubá, Brazil.

The article examines the relationship between distributed energy resources and the impact of cost on the distribution network and tariffs. It presents a methodology to quantify the grid cost impact of distributed energy resources and establish an electricity tariff associated with the long-run marginal cost paradigm.

"The awards honor important contributions to energy regulation studies and promote research and innovative thinking that encourages us all to reflect on and consider

new approaches to meeting the challenges in our field," said David Danner, ICER Chair at the time, during the ceremony.

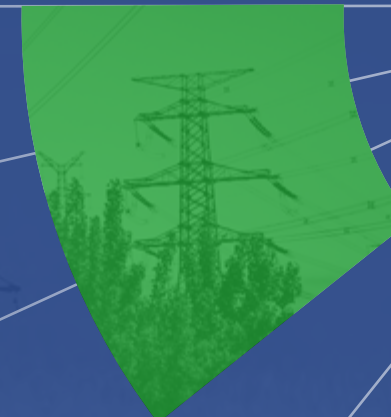




07

**By way of  
conclusion**

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The 2023 World Energy Regulatory Forum held in Lima, Peru leaves several conclusions to be analyzed. Among them are the following:

- The world faces a complex scenario to meet the goals of zero emissions of Greenhouse Gases by 2030 and 2050. The geopolitical and economic context, even more so after the impact of the crises of the COVID-19 pandemic and the war between Russia and Ukraine, suggests that there is much to be done to achieve an energy transition towards cleaner energy consumption, reducing fossil fuel energy, as well as safer and more reliable electricity systems.
- Regulators are responding to these challenges in different ways. In this scenario, the most obvious is that they will need to continue to seek dialogue with all stakeholders to propose legitimate reforms and encourage innovation so that more technologies can emerge to help the world meet the decarbonization challenge.
- Regulators do not face these tasks alone. Institutional networks woven to share information, best practices, and lessons will continue to be relevant, even more so if they include consumers, energy suppliers, and academia in this effort. Gender equality is also fundamental in this effort: the more diversity there is, the more points of view will be included and, thus, the more ideas will be generated to find solutions to the challenges posed.
- In the energy transition, innovation is key. The use of non-conventional renewable energies, microgrids, distributed generation, smart meters, e-mobility, the use of hydrogen, and energy storage, among others, are alternatives to be evaluated. But it is also necessary to work with various



pilot projects that can provide clues about more technologies and results in favor of urgent decarbonization.

- The alliance with the mining industry is key not only as a sector that uses energy intensively but also as a supplier of materials for the inexorable electrification of the planet. Thinking about collaboration alternatives with it can be an important step for innovation since it is working on various alternatives to reduce and make its consumption more efficient and can be a key agent for the social development of the communities with which it interrelates.
- Competitiveness requires pursuing efficiency, energy security, and sustainability and generating alternatives to this end such as cross-border integration. Public policies are a great ally in this pursuit.
- Universal energy access is necessary for development. And there, it is important not only to involve all stakeholders, but especially those who have been neglected because of their remoteness or lower consumption capacity. Empowering consumers is one of the ways but we must also ensure that they are in a position to assume this greater responsibility with planning and support from regulators.
- Regulatory excellence is possible, and it is not necessarily possible for a greater technical, legal, or engineering capacity, or because it seeks safety, stability, and strengthening of the electricity system, but because of values: ethics, honesty, transparency, independence, respect, ability to listen, teamwork, taking care of the talent that comes from workers, communicating to inform and explain decisions, taking care of the institutional framework, giving clear signals to attract investments, having a long-term vision, generating trust, and permanently seeking innovation.





# Training Day

The VIII WFER included the so-called preparatory Training Day, held on Tuesday, August 22, including different activities led by renowned international experts. This served not only to disseminate, among others, knowledge on the economic fundamentals of electricity and natural gas regulation but also to refine the processes and services that would be provided to visitors and participants of the forum.

Nine conferences were held that day: An Overview of Integrated Resource Plans and Performance-based Regulation, Integration of the Renewable Energy Market, The Energy Crisis in Europe and the European

Union's Response, The Independence of Regulatory Authorities, Renewables and Energy Storage, Energy Access in the Context of the Energy Transition, Public Ownership of Assets "Behind the Meter", Facilitating Universal Electricity Access, and Connectivity and Integration to Support the Development of Regional Energy Markets.

The XII Meeting of the General Assembly of the Ibero-American Association of Energy Regulators (ARIAE), the Meeting of the Regulatory Energy Transition Accelerator (RETA), and the Executive Committee of the International Confederation of Energy Regulators (ICER) were also held.







Ruraq Maki: Peru's Heart at WFER 2023

The participants of the World Forum on Energy Regulation had the opportunity to visit the Ruraq Maki handicraft sale exhibition, where they appreciated the Peruvian cultural richness, embodied in handicrafts from the coast, highlands, and jungle regions. This initiative was achieved thanks to an alliance between Osinergmin and the Ministry of Culture.

Ruraq Maki, handmade, is a strategy implemented by Peru's Ministry of Culture, which promotes and safeguards the country's traditional arts and handicrafts. This proposal includes indigenous peoples, who exhibit their diverse artistic and handicraft expressions. A magnificent opportunity to put Peru in the world limelight. A piece of Peru's historical and cultural heritage was marked in the 2023 WFER participants.

International Relations

Crossing borders. The 2023 WFER has made possible a close relationship between professionals and academics from the energy sector from all latitudes. These ties enabled the exchange of experiences and innovations to improve the management of regulatory bodies. In this scenario, the Ibero-American Association of Energy Regulatory Entities (ARIAE) held its annual meeting. Similarly, the International Confederation of Energy Regulators (ICER) brought together its members, achieving a fruitful dialogue.



In the Media Spotlight

The organization of the 2023 WFER attracted the attention of the main media. Coverage was permanent and multiplatform. In addition, there was an exclusive web portal, and Osinergmin's social media were made fully available for the event. Here are some of the publications that the 2023 WFER left us:



## REVIEWS FROM THE PROTAGONISTS

### EXPOSITORES



**David Danner**

Chair of ICER



He is the current chair of the International Confederation of Energy Regulators (ICER), institution leaded by the National Association of Regulatory Utility Commissioners (NARUC) in USA, who regulate essential utility services, including energy, telecommunications, and water.

He is the current Chair of the Board of Directors of Osinergmin. He is a petrochemical engineer, graduated from the National University of Engineering (UNI), and he also served as General Director of Hydrocarbons and Advisor to the Ministerial and Vice Ministerial Office of Hydrocarbons at the Ministry of Energy and Mines of Peru (MINEM).



**Omar Chambergo**

Chair of VIII WFER and Osinergmin



**Annegret Groebel**

Vice Chair of ICER



She is the current Chair of CEER. She is also Director of International Relations at the German Regulatory Authority for Electricity, Gas, Telecommunications, Post and Railway (BNetzA).

He works in computational quantum materials science and quantum chemistry for the analysis, design and simulation of a variety of materials, especially for energy storage and electric vehicles. He holds the Fox Professorship in the Department of Chemical Engineering at Texas A&M University.



**Jorge Seminario**

Keynote Speaker



**Carlos Pascual**

Keynote speaker



Senior vice president at S&P Global Commodity Insights for Geopolitics and International Affairs. He was previously US Ambassador to both Mexico and Ukraine.

ERRA's presidum member and Comissioner at the Energy and Water Services Regulatory Commission of the Republic of North Macedonia.



**Andrijana Nelkova Chuchuk**

Energy Regulators Regional Association (ERRA)



**Anna Collyer**

Chair of the Australian Energy Market Commission (AEMC) and Energy Security Board (ESB)



She has more than two decades of public and private sector experience in energy and has worked extensively on industry reform.

Eswatini Energy Regulatory Authority is responsible for the regulation of energy sector and the petroleum industry through the licensing and inspection of downstream activities. Tasbedze has been instrumental in leading the transformation of the electricity supply industry in Eswatini.



**S'khumbuzo S. Tsabedze**

Chief Executive Officer of Eswatini Energy Regulatory Authority







## Marsha Atherley-Ikechi

Chief Executive Officer of the Fair Trading Commission in Barbados

Her portfolio includes consumer protection, fair competition and utility regulation. She holds a Ph.D. and M.Sc. from the University of the West Indies in Chemical/Environmental Engineering and Renewable Energy Management.

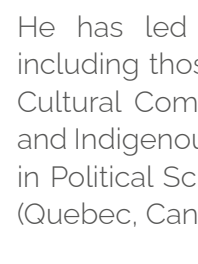


He is actively involved in international regulatory cooperation platforms, including the Mediterranean Energy Regulators (MEDREG), where he Chairs MEDREG's Renewables Working Group, and Ibero-American Association of Energy Regulators (ARIAE), where he Chairs ARIAE's Gas Working Group.



## Pedro Verdelho

President of the Portuguese Energy Regulatory Authority (ERSE)



## Simon Turmel

Member of Regula E.Fr and Commissioner of the Régie de l'Énergie du Québec

He has led various ministerial offices including those of Justice, Immigration & Cultural Communities, Mines & Wildlife, and Indigenous Affairs. He also holds a BA in Political Science from Université Laval (Quebec, Canada).



She was a member of Mercosur's Environmental Task Group. She has been a consultant in national and international public organizations. She is also a chemical engineer with graduate studies in marketing, specializing in the development and management of projects.



## Silvana Romero

Chair of Uruguay's Energy and Water Regulator (URSEA)



## Ana Carolina Mora

Head of the Communication Department of Costa Rica's Regulatory Authority of Public Services (ARESEP)



She has worked in the communication offices of the Ministry of Culture, the Ministry of Public Education, and the Regulatory Authority of Public Services. She holds a Master's Degree in Journalism and Political Communication from the Universidad de Costa Rica.

He is director of regulatory analysis and special studies at the Provincial Energy Regulatory Body of Entre Rios (EPRE) of Argentina. He is a lawyer specializing in notarial law, tort law, in-depth procedural law, and litigation strategies.



## Luciano Paulin

Chair of Argentina's Association of Electricity Regulators (ADERE)



## Clare Savage

Chair of the Australian Energy Regulator



She is a member of Australia's Energy Security Board (ESB). She has a Bachelor of Commerce (Economics) and a Bachelor of Arts (Politics and History) from The University of Melbourne.

He represents globally MEDREG and is in charge of developing activities, tools, regulatory standards and good practices to promote a functioning, interoperated, compatible and sustainable regulatory framework in the Mediterranean region.



## Hasan Özkoç

Director of the Association of Mediterranean Energy Regulators (MEDREG)





## Rota Šņuka

Board member of the Latvian Public Utilities Commission (Regulator)



She has served as a board member of the Commission since July 2016. Before joining the Regulator, she was Director of the Energy Department at the Ministry of Economics in Latvia.

He was Director of the Economic Operation Committee of the National Interconnected System (COES-SINAC). He was also chair of the Ibero-American Association of Energy Regulators (ARIAE).



## Jesús Roberto Tamayo Pacheco

Former Chair of Osinergmin (2012- 2017)



## Natalie McCoy

Head of International Relations Office at Portugal's Energy Services Regulatory Authority (ERSE)



She co-chairs the CEER Customers and Retail Markets Working Group. She also co-chairs the Agency for the Cooperation of Energy Regulators (ACER) Retail Working Group.

He was the first Head of the global Clean Energy Ministerial Secretariat at the IEA. He previously served as Deputy Permanent Secretary at the Danish Ministry of Energy, Utilities, and Climate.



## Christian Zinglarsen

Director of the European Union Agency for the Cooperation of Energy Regulators (ACER)



## Rodrigo Rodríguez

Vice president of the Ibero-American Association of Energy Regulators (ARIAE)



He is the National Director of Electricity, Drinking Water and Sanitary Sewerage in the National Authority of Public Services of Panama. He is also a specialist in Regulation of Public Services, and PhD in Electric Power from the National University of San Juan, Argentina.

She led the "Energy Supply 4.0" and "Circular Economy" projects of the GIZ. She is Doctor of Medicine, Surgery and Public Health. She has a Ph.D. in Project Management with a focus on energy.



## Ana Isabel Moreno

Head of "Energy Supply 4.0" project in Peru of the German Agency for Development (GIZ)



## Alison Archer

Director of Standards & Assurance at the Midcontinent Independent System Operator (MISO)



Her work includes investigation and completion compliance issue assessments, implementation of new or revised regulatory obligations, comment development for new or revised regulatory obligations, and audit preparation support.

He is Secretary General of GO15 since 2021, association of the Very Large Power Grid Operators that serves more than half of the world's electricity demand, representing more than 75 percent of the world's electricity demand and 3.4 billion customers on 6 continents.



## Bruno Meyer

GO15 Secretary General







## Andrew Flagg

Coordinator of the Regulatory Energy Transition Accelerator (RETA)



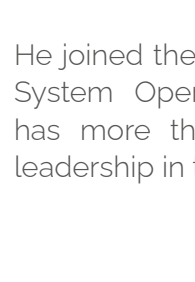
He works as an external consultant to the International Energy Agency as Coordinator of RETA. Before starting this role, Andrew led the work on the COP26 climate change conference for Great Britain's energy regulator, Ofgem, which involved developing and launching RETA.

He is a Utility Commissioner of the Connecticut Public Utilities Regulatory Authority (PURA). In addition, he is a member of NARUC's Electricity, Telecommunications & Critical Infrastructure Committees.



## Michael Caron

President of the National Association of Regulatory Utility Commissioners of United States (NARUC)



## John Bear

MISO and GO15 President



He joined the Midcontinent Independent System Operator (MISO) in 2004 and has more than 25 years of executive leadership in the utility industry.

His expertise ranges from electricity and gas tariffs to network operation to data measurement and handling to energy efficiency programs.



## Paulo Oliveira

Advisor at Infrastructure and Network Department for Energy Services of Portugal (ERSE)



## Erin Hammel

Director, International Programs, National Association of Regulatory Utility Commissioners (NARUC), USA



She has pioneered NARUC's international strategic vision through development of results-oriented energy and regulatory programs since 1999. She plays a central role in the USAID/NARUC Advancing Women Leaders in Energy (AWLE) initiative.

Her work focuses on the evaluation and continuous improvement of the quality of the public fuel service. She is a chemical engineer, and holds a Master's Degree in Hydrocarbon Management with a major in Statistics and Data Analysis.



## María Elena Martín Morales

Hydrocarbon Quality Manager from the Regulating Authority of Costa Rica's Public Services (ARESEP)



## Ilaria Conti

Head of the Gas, Hydrogen and Decarbonisation area at the Florence School of Regulation



She has worked in EU energy policy and regulation for more than 15 years. She worked for the United Nations (UNRIC), the Permanent Representation of Italy at the Europe Union (EU) and the European Federation of Energy Traders (EFET).

As chair of multi-sector regulator, she focuses on dynamic regulation that would foster energy transition towards climate neutrality. Also, she was a Deputy State Secretary at the Ministry of Environmental Protection and Regional Development.



## Alda Ozola

Chair of the Latvian Public Utilities Commission (Regulator)





## José Fernando Prada

Executive Director of the Energy and Gas Regulatory Commission of Colombia (CREG)



He is a senior energy specialist with broad experience in regulation, management and operation of energy markets and the electric power industry. He has a Ph.D. degree in Engineering and Public Policy from Carnegie Mellon University (CMU), and Master of Science degrees in Electrical Engineering and Energy Technology and Policy from MIT.

She is a lecturer for the Master of Energy Economics program in the Department of Economics at Rice University. She researches on renewable energy, green hydrogen, and the role of critical minerals in the energy transition.



## Tilsa Oré Mónago

Fellow in Energy and Market Design at the Baker Institute



## Tatsuya Shinkawa

Secretary General, Electricity and Gas Market Surveillance Commission of Japan



He worked on the electricity policy, nuclear safety policy and economic and industrial policy in the Ministry of Economy, Trade and Industry of Japan (METI) from 1991.

She is a dedicated Indigenous leader and member of the Fort Nelson First Nation, located in the unceded territories of Treaty 8. She has served as an elected Councillor since 2009 and currently holds the position of Chief.



## Sharleen Gale

Chief of Fort Nelson First Nation and Chair of the First Nations Major Projects Coalition



## Greg Lyle

President and founder of Innovative Research Group



He has a wealth of regulatory experience working with proponents, regulators and intervenors. He has designed and managed over forty customer consultation programs to support rate applications.

Civil Engineer with an MBA and a Diploma in Industrial Organization and Economic Regulation, specialization in International Business. More than 27 years of work experience in leading companies and entities of the energy mining sector.



## Jorge Valencia

Partner of Asesorías en Proyectos y Energía SAS



## Dan Scripps

Chair of Michigan Public Service Commission



He is president of both the Mid-America Regulatory Conference (MARC) and the Organization of MISO States (OMS). He helped to develop consensus around cost allocation for the largest-ever portfolio of electric transmission projects in U.S. history.

She has practiced law in British Columbia, Canada since 1986. She holds a Bachelor of Laws and Bachelor of Arts (English and French) from the University of British Columbia (UBC).



## Anna K. Fung

Deputy Chair of British Columbia Utilities Commission







## Borbála Takácsné Tóth

Researcher at the Regional Centre for Energy Policy Research (REKK)

She is economist and received her degree from the Budapest University of Economic Sciences in 1998. civil servant in government administration mostly in the field of energy regulation.

He has more than two decades of regulatory experience in energy. He is a member of the executive board of the Energy Authority Finland.



## Veli-Pekka Saajo

Deputy Director General of the Energy Authority Finland



## Luis Jesús Sánchez de Tembleque

Executive Secretary of ARIAE and head of the Department of Consumer Protection of the CNMC, Spain

He has been Director of Electric Power and Deputy Director of Special Regimes at the National Energy Commission (CNE), Spain's former energy regulator.

He held the positions of Market Manager and Head of the Department of Project Planning, dealing with topics on expansion plans, bids for generation and transmission, and surveillance of the national electricity market, among others.



## Fernando Alfredo Moscoso Lira

Manager of Planning and Surveillance of Electricity Markets in the National Electricity Commission of Guatemala



## Yolanda Domingo

Executive Director of Rates at the British Columbia Utilities Commission (BCUC)

She manages all general rate and rate design proceedings at the BCUC, including various high-profile and regulatory matters. She holds a Bachelor of Commerce degree from the University of Alberta and is a Chartered Professional Accountant in British Columbia.

He is an energy economist with more than 15 years of experience in the energy sector in West Africa.



## Charly Gatete

Economist expert at The ECOWAS Regional Electricity Regulatory Authority (ERERA)



## Jerson Reyes Sánchez

Head of Department of Information, Energy Innovation and Institutional Affairs at the National Energy Commission of Chile

He has more than 18 years of experience in the energy sector at a national and international level, collaborating in energy and regulatory development, design of energy policies and technological development.

She works at the Office of Utilities Regulation (OUR), a multi-sector utilities regulator with oversight responsibilities for electricity, telecommunications, water and sewerage services in Jamaica. As Head of the Legal Department, she is involved in the review of License Application of those sectors.



## Chenée Riley

General Counsel at the Office of Utilities Regulation of Jamaica (OUR)





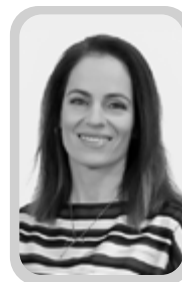
## Luis Moreno

Director of the Mining Law Department at Universidad Externado de Colombia



Lawyer expert in Mining and Energy Law. He is a member of the Board of Directors of the Ibero-American Association for the Study of Regulation (ASIER), as well as of the Ibero-American Forum of Administrative Law (FIDA) and the Iberoamerican Association of Energy Law (ASIDE).

She is member of the Energy Regulatory Office (ERO) of the Czech Republic and is head of the International Cooperation Unit. Since early 2020, she co-chairs the CEER Customers and Retail Markets Working Group and also co-chairs the European Union Agency for the Cooperation of Energy Regulators (ACER) Retail Markets Working Group.



## Jana Haasová

Vice President of the Council of European Energy Regulators (CEER)

He is a university professor. Also, he is editor of the Peruvian Energy Magazine and the website Elaw.com.pe. He is specialist in energy (projects, regulation, rates and financing, among others), public-private partnerships, public procurement and dispute settlement. He is arbitrator of the Lima Chamber of Commerce and American Chamber of Commerce of Peru (Ancham).



## Paul Súmar

Academic of the Pontificia Universidad Católica del Perú

He served as Chairman of the Federal Energy Regulatory Commission from November 5, 2020 to January 21, 2021.



## James Danly

Commissioner at the Federal Energy Regulatory Commission



## Siamelie Latu

Chair of the Office of the Pacific Energy Regulators Alliance (OPERA)



He was a former Deputy Commander and Joint Operation Commander of His Majesty's Armed Forces (HMAF) of the Kingdom of Tonga. He is the former Ambassador of the Kingdom of Tonga to the People's Republic of China from 2010-2015.

He currently leads the agency's engagement in the Regulatory Energy Transition Accelerator and as well as dissemination of the Agency's report on corporate procurement of clean electricity.



## Luis Enrique Gutiérrez Tavárez

Energy Analyst (Electricity) at the Renewables Integration and Secure Electricity Unit of the International Energy Agency (IEA)



## Katherine L. Peretick

Commissioner at the Michigan Public Service Commission



She is a member of the National Association of Regulatory Utility Commissioners (NARUC) and serves on NARUC's Committee on Electricity.

He is a lawyer and electrical engineer with more than 20 years of experience in energy regulation.



## Marcio Andrey Roselli

Specialist in Regulation of Brazil's Electricity Regulatory Agency (ANEEL)







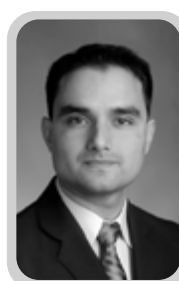
## Elzbieta Rabalska

S&P Global Commodity Insights



She heads up S&P Global Commodity Insights' sole regulated benchmark administrator, Platts Benchmarks BV, for the European Union and the UK.

He is a professional in the area of power system reliability with over 20 years of experience in regulatory, maintenance, planning and operations issues in the electricity sector.



## Hugo Pérez

Manager for North American Relations at North American Electric Reliability Corporation (NERC)



## María Julia Aybar Solís

Vice president and general manager of PERU LNG



She is currently vice president of the Hydrocarbons Committee of the National Society of Mining, Petroleum and Energy (SNMPE). María Julia is a lawyer from the law school of the Pontificia Universidad Católica del Perú and has a postgraduate degree from the Universidad de Lima.

She worked at the MME for almost eighteen years, recommending and formulating public policies for the sector. She was the Head of the Special Advisory Board on Regulatory Affairs of the Ministry of Mines and Energy (MME), specializing in Energy and Mining Economies.



## Agnes Maria de Aragão da Costa

Director of the Brazilian Electricity Regulatory Agency (ANEEL)



## Andrew Giles Fay

Chair of Florida Public Service Commission



He currently serves as the Chair of the National Association of Regulatory Utility Commissioners' (NARUC) Critical Infrastructure Committee where he leads a national effort to enhance the resiliency and reliability of America's energy grid.

He has an extensive experience in the energy sector, such as in the Energy Secretariat in Mexico, and in the International Energy Agency (IEA). He holds a Bachelor's Degree in economics from Autonomous Technological Institute of Mexico (ITAM) and a PhD from the Université Toulouse 1 Capitole.



## Alejandro Hernández

Director of India and Global Opportunities Program at the Regulatory Assistance Project



## Andrés Blancas Martínez

Specialist in economic regulation and regulatory policy in the Regulatory Policy Division of the OECD



He has coordinated and participated in various specialized projects and reports to improve the quality of regulation in countries across Latin America and Europe.

She is a Senator in the Upper House of Parliament in Saint Lucia. She has served in the Public Service of Saint Lucia for more than 30 years.



## Allison A. Jean

Chief Executive Officer of the National Utilities Regulatory Commission (NURC)



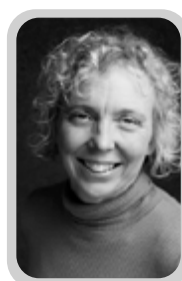


## Cândida Patrícia Veríssimo e Costa de Oliveira

Organizational Development Analyst at the National Agency for Oil, Gas and Biofuels – ANPG

She has a Master of Business Administration from the University of Liverpool, UK. Since 2019 to 2022 she has been working as Organisational Development Analyst at the Strategic Planning Department of the National Petroleum, Gas and Biofuels Agency (ANPG).

She led the development of Ofgem's Decarbonisation Action Plan and she has also set up the Regulatory Energy Transition Accelerator, now hosted at the International Energy Agency (IEA).



## Jane Dennett-Thorpe

Deputy Director Net Zero Transition, Ofgem

### MODERADORES



## David Morton

Vice Chair of ICER

He was appointed Vice Chair of ICER in June 2020. He is Chair and CEO of the British Columbia Utilities Commission (BCUC) since December 2015.

Founding partner of Enix, a consulting firm specialized in energy regulation. During 2015-2017, he led the Mexican Chapter of the World Energy Council (WEC).



## Francisco Salazar

ICER Coordinator



## Maia Melikidze

Chair of Energy Regulators Regional Association (ERRA)

She is Commissioner at Georgian National Energy and Water Supply Commission. In addition, she holds an MBA graduate from Harvard University in the field of Global Strategic Management.

Since 2005 he works at National Agency for Petroleum, Natural Gas and Biofuels (ANP). He is graduated in Geology from the Federal Rural University of Rio de Janeiro. In addition, he holds a Master in Geosciences (Geochemistry) from the Fluminense Federal University.



## Claudio Martins de Souza

Director of the National Agency for Petroleum, Natural Gas and Biofuels of Brazil (ANP)



## Jennifer Nicholson

Board Member of Nova Scotia Utility and Review Board

She is Vice-Chair of Canada's Energy and Utility Regulators (CAMPUT) and has been a Member of the Nova Scotia Utility and Review Board, Canada, since April 2018.

She is a member of Peru Young Energy Professionals a team of young professionals in the energy sector aimed at strengthening and promoting new generations' participation in developing and improving this industry in Peru.



## Milene Yarixa Nuñez Espinoza

Representative of Peru Young Energy Professionals







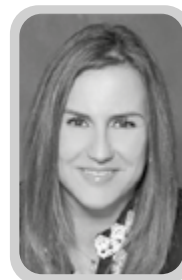
## Carolyn Calwell

COO & Chief Corporate Services Officer & General Counsel at Ontario Energy Board (OEB)



She is the Chair of ICER Virtual Working Group 3. She also leads the OEB's work with the Regulatory Energy Transition Accelerator (RETA).

She was Vice President of the International Confederation of Energy Regulators (ICER). She is an economist with a Master of Science in Public Financial Policy from the London School of Economics & Political Science (LSE).



## Susana Cazorla

Director and founding partner of SICEnergy



## Lorraine Akiba

President and CEO of LHA Ventures



She served as a commissioner on the Hawaii Public Utilities Commission. She continues to remain active with the National Association of Regulatory Utility Commissioners International Committee (NARUC) in peer-to-peer regulatory review programs sponsored by USAID and the U.S. State Department.

He worked for the then National Electricity Regulator (NER) of South Africa during which time he also served as the Executive Secretary of the African Forum for Utility Regulators (AFUR).



## Elijah Sichone

Executive Secretary of the Regional Electricity Regulators Association of Southern Africa – RERA



## Lily Irma Ruiz Celi

Member of the Board of Directors of the Chapter of Mining Engineers of Lima



She is a Mining Engineer with a Master in Environmental Engineering from Universidad Nacional de Piura and a MBA from ESAN. She has more than twenty-five years of experience in underground and surface mining.

Between 2018 and 2022 she served as Superintendent of Public Utilities. Before that, she was Director of Organizational Management of the National Taxes and Customs Administration (DIAN), where she also worked as Deputy Director of Operational Analysis and Advisor.



## Natasha Avendaño García

Former Expert Commissioner of Colombia's Regulatory Agency of Energy and Gas (CREG)



## Charles Esser

Secretary General of the Council of European Energy Regulators (CEER)



He has worked as a self-employed Energy Consultant for a wide variety of organizations; as an analyst for the International Energy Agency (IEA); and as the Energy Analyst for the NGO/think tank the International Crisis Group.

Daniel is responsible for the implementation of the Global Energy Transformation Project (GET.transform) in Perú, a European Program for specialized technical assistance to advance in the energy transition. He is a Mechanic-Electrical Engineer with MBA, Master in Corporate Law, with experience in energy markets, regulation and energy trading.



## Daniel Cumpa

Global Energy Transformation Project (GET.transform) in Perú

Information updates as of August 2023





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