

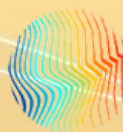
Summary of the **Global Symposium on Sustainable Water and Energy Solutions**

Itaipu Binacional, Paraguay/Brazil

13-15 June 2022



DEPARTMENT OF
ECONOMIC AND
SOCIAL AFFAIRS



UNDESA - *United Nations*
SUSTAINABLE
WATER &
ENERGY
PARTNERSHIP

Table of Contents

2	Acknowledgments
3	Executive Summary
6	Session Summaries
6	Session 1: Opening Session
8	Session 2: Sustainable Water and Energy Solutions & Energy Case Studies
13	Session 3: Sustainable Water and Energy Solutions & Water Case Studies
17	Session 4: Sustainable Water and Energy Solutions - Environmental Interconnections Climate Change
20	Session 5: Sustainable Water and Energy Solutions - Water and Energy Transboundary Cooperation and Environmental Interlinkages
24	Session 6: Sustainable Water and Energy Solutions - Social Interlinkages
27	Session 7: Sustainable Water and Energy Solutions - Economic Interlinkages
30	Session 8: Way Forward and Closing

Acknowledgements

The Global Symposium on Sustainable Water and Energy Solutions was convened by the United Nations Department of Economic and Social Affairs (UN DESA) in collaboration with members of the Sustainable Water and Energy Solutions Network, and hosted by Itaipu Binacional. First and foremost, a big thank you is due to Itaipu Binacional for hosting the event.

The strong engagement and guidance of the leadership of Itaipu and the professionalism, commitment and hospitality of its staff ensured the success of the Global Symposium. Moreover, a special thank you is due to the Governments of Brazil and Paraguay for enabling and supporting this global event.

Notably, the members of the Sustainable Water and Energy Solutions Network demonstrated their commitment before and during the Symposium, including strong engagement from Canal de Isabel II, Comunidad de Madrid, Spain, and from Asazgua. Finally, the Global Symposium only turned into a full success due to the inspiring and knowledgeable contributions of the panelist from all the world's regions who shared their experiences, interacting with a remarkably engaged audience.

Executive Summary

The first Global Symposium on Sustainable Water and Energy Solutions was convened by the United Nations Department for Economic and Social Affairs (UNDESA) in collaboration with members of the Sustainable Water and Energy Solutions Network and hosted by Itaipu Binacional at its headquarters on 13-15 June 2022.

The Global Symposium successfully provided a global platform for all stakeholders to disseminate knowledge, exchange experiences and showcase best practices on integrated approaches. With over 400 participants, including 250 who attended in person, it brought together stakeholders from all the world regions, including representatives of governments, international organizations, businesses, civil society, and academia. The Symposium initiated a truly global dialogue on effective policy, and technical and managerial approaches to energy and water, supporting sustainable development. The discussions at the Symposium brought to the fore several key messages:

- **Sustainable energy and water solutions are key to the attainment of the entire 2030 Agenda for Sustainable Development and the Paris Agreement on climate change.** Without integrated sustainable energy and water programmes and systems, many of our global objectives - such as poverty eradication, climate change and sustainable development - cannot be realized. We must work towards equitable and sustainable use and management of energy and water resources for all in support of human well-being, ecosystem integrity and a robust, inclusive economy.
- **Tackling energy and water issues remains an immense global challenge with wide-ranging consequences for people, prosperity and the planet.** Today, 733 million people lack access to electricity, and about 2.4 billion people live without clean cooking fuels and technologies. At the same time, energy-related greenhouse gas emissions (GHG) contribute significantly to climate change, accounting for over 75% of GHG emissions in many economies. Moreover, 2.2 billion people lack access to safely managed drinking water services, and 4.2 billion people lack safely managed sanitation services. Without access to safe drinking water and sanitation, people cannot enjoy good health, food security and prosperity. Notably, the management and use of energy and water have a big impact on biodiversity, adding another important dimension to the sustainability of integrated approaches. Sustainable energy and water solutions must consider the preservation of natural habitats and aim to avoid negative effects on biodiversity.

- **The discussions demonstrated the broad range of challenges and opportunities regarding the water-energy nexus** covering potential synergies and trade-offs in all aspects of resource management, production and use and its social, economic and environmental impact. Experiences and knowledge shared from a diverse set of countries, including Algeria, Bolivia, Brazil, Ecuador, Ethiopia, Ghana, Guatemala, India, Kenya, Lebanon, Nepal, Oman, Pakistan, Paraguay, the Philippines, Spain, Sudan, Switzerland, Tajikistan, Tunisia, the United Arab Emirates, and the United States of America underlined the complexity of the water-energy nexus, but also revealed the many benefits that integrated approaches can bring, ranging from local communities to cross-country and regional cooperation.

The discussions at the Global Symposium underlined the need to:

- **Promote cross-sectoral synergies** to minimize trade-offs and increase co-benefits for the Sustainable Development Goals (SDGs) while contributing to climate mitigation and adaptation. Policy-making processes should ensure intersectoral linkages in the development and execution of policies and programmes.
- **Strengthen enabling environments** by establishing a long-term vision, coherent, forward-looking policies and regulations, and improving institutional capacities for planning, implementation and monitoring.
- **Catalyze finance and investment** to scale up and accelerate the deployment of solutions through such measures as price reforms, fiscal incentives, and appropriate market-based mechanisms.
- **Invest in innovative solutions**, including the uptake of proven technological solutions and new technologies that hold significant potential such as green hydrogen. Many technologies and business models require consistent support in order to reach the level of maturity and scale required to realize their full potential.
- **Strengthen international cooperation and collaboration** in all stages of planning, implementation, and monitoring of sustainable energy and water solutions building on best practices and processes such as Itaipu Binacional. Promoting effective dialogue across different sectors at all stages helps to identify synergies, improve management of shared natural resources and maximize benefits in support of the SDGs.
- **Enhance knowledge-sharing and capacity building** by identifying, collecting and disseminating best practices, engaging experts and a broad range of stakeholders involved in energy and water solutions. The collection, compatibility and accessibility of data on the energy-water nexus need to be enhanced.

- **Participants noted that the Sustainable Water and Energy Solutions Network contributes significantly towards addressing these needs by providing a global platform for all stakeholders to enhance capacities and signal their strong commitment to integrated approaches on SDG 6 and SDG 7 in supporting the achievement of the SDGs. The Network should be further strengthened and expanded. Specifically, it should:**
 - Publish World Reports on Sustainable Water and Energy in order to facilitate access and sharing of evidence-based knowledge, quality data and objective analysis, drawing also on the information and discussions from the Global Symposium.
 - Further enhance the Global Knowledge Platform as a useful tool for sharing best practices and related information, particularly in the areas of modelling and analytical tools as well as technological innovations. Identifying and describing examples worldwide of best practices should be a priority.
 - Consider, in light of the good experience made in supporting synergistic approaches, the expansion of the Network's scope to incorporate interlinkages to other SDGs highly related to water and energy including climate change (SDG 13), terrestrial ecosystems (SDG 15) and health (SDG 3), among others.
- **The cooperation between UNDESA and Itaipu Binacional has provided a strong backbone for the success of the Sustainable Water and Energy Solutions Network and this cooperation should be continued and enhanced.**
- **In order to maintain and accelerate the momentum created by the Global Symposium on Sustainable Water and Energy Solutions, there is a need for continued engagement of all stakeholders, including the convening of the next edition of the Global Symposium.**
- **Participants expressed their gratitude to Itaipu Binacional for graciously hosting this first Global Symposium, which was excellently organized and implemented. A special thank you is due to the Governments of Brazil and Paraguay for their steadfast support.**

Session Summaries

Session 1: Opening Session



Session Title

Session 1: Opening Session

Overview of event and key messages

The opening session of the symposium served as a high-level introduction to the event's objectives. An informational video presented the ITAIPU's history, management and impact. **Mr. Liu Zhenmin**, United Nations Under-Secretary-General for Economic and Social Affairs, provided welcome remarks via a pre-recorded video, followed by special remarks by **Ms. Paloma Martín Martín** of Canal de Isabel II, Comunidad de Madrid, Spain. Further opening remarks were provided by Itaipu Binacional's **Mr. Manuel Maria Cáceres**, Director General (Paraguay) and **Mr. André Pepitone da Nóbrega**, Director of Finance. Speakers particularly highlighted the strong potential of adopting a nexus approach to water and energy issues to advance the 2030 sustainable development goals.

Speaker Notes

A video presentation on 'Itaipu Binacional and its Sustainable Development – Sustainable Water and Energy Solutions Partnership and Network' summarized the history of Brazilian and Paraguayan cooperation in creating Itaipu Binacional.

Since its completion in the early 1980s, Itaipu Binacional has produced more than 2.8 billion megawatt hours of energy, received awards for its water care initiatives, and implemented many biodiversity and forest management measures in the region.

Mr. Liu Zhenmin, United Nations Under-Secretary-General of Economic and Social Affairs, welcomed participants and stressed the importance of the energy-water nexus for a just, sustainable and equitable future. Referring to the challenges caused by the current global crises, he presented UNDESA's work and called for swift action to address the slow-down in the implementation of SDGs 6 and 7.

Ms. Paloma Martín Martín, President, Canal de Isabel II, Comunidad de Madrid, Spain, highlighted the importance of water and the need to approach water issues in an integrated manner due to extreme climate events. She emphasized that water and energy access determine people's prosperity, and noted that countries need cheap, safe, renewable, and stable energy for their well-being and development.

Mr. Manuel María Cáceres, Director General (Paraguay), Itaipu Binacional, mentioned that Itaipu not only manages one of the biggest hydroelectric plants in the world but also delivers actions on all the 17 SDGs and is a world leader on clean energy. He underlined Itaipu's commitment to regional sustainable development and to promote the implementation of the 2030 Agenda.

Mr. André Pepitone da Nóbrega, Director of Finance (Brazil), Itaipu Binacional, stated that water and energy are closely intertwined on environmental issues. He also stressed that the hydroelectric energy generated by Itaipu in Brazil and Paraguay is one of the cleanest energies of the planet.

Session 2: Sustainable Water and Energy Solutions & Energy Case Studies



Session Title

Session 2: Sustainable Water and Energy Solutions & Energy Case Studies

Overview of event and key messages

This session was moderated by **Mr. Minoru Takada**, Team Leader, Sustainable Energy, UNDESA, and was split into three sub-panels. The first sub-panel addressed methods for fostering international cooperation supporting sustainable water and energy solutions. Speakers discussed this theme from both global and local perspectives, with some presenting high-level recommendations for global energy mixes, capacity development, and scaling investment, and others discussing specific cases of multi-stakeholder projects. The second sub-panel focused on ways to create facilitating environments for sustainable water and energy solutions.

A key theme was the role that effective policy plays in implementing solutions, with panellists observing that policy must be sufficiently flexible to allow differentiated operation under extreme events, and comprehensive enough to avoid sectors working in silo. Hydrogen energy markets and energy self-sufficiency for water management entities were also discussed. The third sub-panel on applying sustainable water and energy solutions was addressed from a wide variety of perspectives across the Global South, with the central theme being region-specific technological solutions.

Speaker Notes

*The moderator, **Mr. Minoru Takada**, UN DESA, spoke about two overarching dimensions of sustainability: “people” and “planet.” The framework of the Sustainable Development Goals provides solutions for the former; for the latter, the world is in the process of creating solutions to reach net zero emissions by 2050. Mr. Takada framed this session as an opportunity to discuss existing experiences and solutions for both dimensions of sustainability in order to consolidate learning in a manner that remains sensitive to the contexts of different societies and localities.*

First sub-panel:

***Mr. Eddie Rich**, CEO, IHA, discussed hydropower’s potential to address multiple development and energy-related needs. He highlighted three “easy wins” in capacity development: pumped storage hydropower, the modernization of current hydropower dams, and the potential for retrofitting non-powered dams. Mr. Rich also emphasized the importance of sustainability — highlighting the IHA’s Hydropower Sustainability Standard — the need to spur faster growth through more investments and for quicker and more responsive regulation.*

***Mr. Ricardo Gorini**, Senior Programme Officer, IRENA, discussed findings from IRENA’s ‘World Energy Transitions Outlook 2022.’ He emphasized the importance of renewables, particularly hydropower, as the main pillar of emissions reduction, along with electrification, increased efficiency, and clean hydrogen. Mr. Gorini then argued that we need a “revolution” in energy investment if we are to scale global efforts within the next decade and that the coordination of efforts must be considered alongside the usefulness of competition.*

Mr. Guillermo Koutodjian, Acting Director of Integration, Access and Energy Security, OLADE, presented a case study of a micro-hydropower plant and linked sustainable development projects established in three north-western Guatemalan communities. He gave an overview of the micro-loans used to fund the project and its successful outcomes in the areas of electricity and internet access, female empowerment, and low-emissions economic development.

Mr. David Krug, Technical Director of Itaipu Binacional, provided an overview of the Itaipu hydroelectric power plant, highlighting Itaipu's commitment to all 17 SDGs and most particularly to SDGs 6 and 7. Discussing global trends in the evolution of the energy mix, Mr. Krug reiterated the need to increase hydropower globally as a “back-up” source for wind and solar. He also advocated for modernizing the regulation of electric sectors in order to compensate for operational flexibility adequately.

Second sub-panel:

Mr. Igor Souza Ribeiro, General Coordinator of Electrical System Performance Monitoring, Ministry of Mines and Energy, Brazil, spoke about environmental and economic opportunities for Brazil within the water and energy nexus, focusing particularly on water security and lessons learned from recent droughts. Speaking about effective policy and regulation, Mr. Ribeiro stressed the importance of policy that allows for differentiated operation under extreme events, and the need for legal instruments which support occasional changes in the use of water given increases in other needs.

Mr. Gustavo Casal, Director of Alternative Energies, Ministry of Mines and Energy, Paraguay, spoke about Paraguay's energy sector in terms of regional partnerships, energy security, energy efficiency, and environmental responsibility. Paraguay aims to both reduce energy demand and diversify the energy mix for supply. In response to recent crises in Paraguay's water systems, Mr. Casal discussed a study currently being carried out to analyse water resource vulnerability based on weather change; based on this study, Paraguay hopes to determine effective adaptation measures.

Mr. Paulo Emilio Valadão de Miranda, President of the Brazilian Hydrogen Association, spoke about the potential for Brazil and Paraguay to use their domestic resources to develop hydrogen energy markets. He highlighted three relevant production methods: electrolysis of water, waste and biomass, and the mining of natural hydrogen within Brazil. He also spoke about the Association's work in facilitating cross-sectorial collaboration on regulations and standards for the opening of hydrogen markets.

Mr. Federico Valles Figueras, Electric Energy Manager, Canal de Isabel II, Madrid, described the close relationship between water use and electricity demand in the urban water cycle, introducing his company as a case study; Canal de Isabel II is a publicly owned company managing the full water cycle for a community of approximately 7 million. It aims to become self-sufficient in energy generation, focusing efforts particularly on small efficiency optimizations and capitalizing on synergies.

Ms. Doris Edem Agbevivi, Energy Analyst, Energy Commission, Ghana, presented the Bui Power Plant as a case study for the water-energy nexus, but explained that developments in both sectors are more commonly achieved through separate initiatives. That water and energy currently work in silo, in a challenging investment climate, presents difficulties for Ghanaian policymakers: Ms. Agbevivi underlined the need for a master plan addressing the broad nexus of water, energy, and food.

Third sub-panel:

Mr. Ricardo Narvaez, Technical Sub-Director, Geological & Energy Research, IIGE, Ecuador, discussed his institute's research on water-energy synergies in Ecuador, focusing particularly on the impacts of seasonality on the power generation capacity of Ecuador's two main hydro basins. Mr. Narvaez also discussed challenges regarding universal energy adoption, water storage, and solar-for-water pumping and presented specific studies of the water-energy nexus in the Galápagos and Cerro Nitón.

Mr. Satish Gautam, Thematic Advisor, AEPC, Nepal, spoke about the potential for micro hydropower in Nepal, contending that small, distributed energy systems could have large social and environmental benefits. Mr. Gautam attributed the historically mixed performance of MHPs in Nepal to reduced installation costs. He concluded by recommending an enabling policy and institutional environment, post-installation support over longer time periods, and an overarching strategic direction for the sector.

Ms. Syham Bentouat, Managing Director, NAFAS International, Oman, presented strategies for more efficient oil wastewater treatment in the Gulf Cooperation Council (GCC) region. Wastewater treatment by conventional methods is highly energy-intensive, but wastewater below a certain salinity can be treated effectively using reed beds, as seen in the Nimr Reed Beds project in Oman. Additional benefits include the creation of new ecosystems and jobs and clean water for irrigation.

Ms. Hazir Farouk Abdelraheem Elhaj, Sudan University of Science and Technology, spoke about challenges Sudan faces in the water and energy sectors; these include uneven water access, daily country-wide energy shortages, and disruptions caused by political instability and the COVID-19 pandemic. Ms. Elhaj concluded by discussing current and emerging barriers to renewable solutions implementation, advocating particularly for stronger policy and regulations.

Mr. Sohel Ahmed, Managing Director of Grameen Shakti, Bangladesh, presented a private sector perspective on sustainable water-energy solutions for rural populations. Mr. Ahmed spoke about how the company's use of solar solutions for irrigation and drinking water could be pursued at scale and provided an overview of the peer-to-peer Solar Grid project, which allows households with a Solar Home System to sell their surplus electricity to other households at an affordable rate.

Q & A

The Q&A for the first sub-panel focused on hydropower as part of a wider energy mix, asking panellists how they balance cost considerations for hydropower versus other kinds of energy. Panellists emphasized the need to consider a portfolio of solutions, adapting solutions to specific national or regional circumstances, and that it is possible to generate energy while protecting the environment.

The Q&A for the second sub-panel opened with current uses of hydrogen and emerging hydrogen markets worldwide. The conversation then turned to solar irrigation investment in Ghana, discussing the policy incentives in place for foreign investors. Finally, panellists discussed investment considerations for public institutions working at the water and energy nexus, and the importance of legal instruments and ensuring competitive consumer costs in encouraging more sustainable water and energy use.

The third sub-panel first focused on questions of scalability, with panellists emphasizing that reaching economies of scale is advantageous because it ensures a sustainable practice becomes business as usual. Panellists also discussed the importance of cross-sector learning, integrating large systems with small ones, and increasing transport efficiency.

Session 3: Sustainable Water and Energy Solutions & Water Case Studies



Session Title

Session 3: Sustainable Water and Energy Solutions & Water Case Studies

Overview of event and key messages

This session, moderated by **Ms. Maria del Carmen Tejera Gimeno**, General Secretary, Canal de Isabel II, Comunidad de Madrid, Spain, addressed the water energy nexus from the perspective of water solutions.

The session started with presentations by global and regional organizations describing energy-water nexus issues, challenges, and the need for sustainable solutions based on modelling and integrated approaches and systems at the global and regional levels. Case studies presented by national/regional organizations and country representatives highlighted different regional challenges and opportunities in the implementation of various integrated approaches and systems. Key themes and synergies throughout this session include the interlinkages of water and energy with other sectors, ecosystems, and societies, and the importance of regional water management, water reuse and efficiency.

Speaker Notes

Ms. Rayen Quiroga, Chief Water and Energy Unit, ECLAC (virtual) presented ECLAC's work on the water-energy nexus in Latin America and the Caribbean. She highlighted the importance of hydropower in the region while also underlining accompanying intersectional impacts, such as on ecosystems and societies, as well as problems of supply.

Ms. Radia Sedaoui, Chief Energy Section, ESCWA presented the challenges and opportunities regarding the water-energy nexus in the MENA region. She underlined the benefits of an interlinked approach, highlighting embedded water in energy and water reuse efficiency while also calling for context-specific technical solutions.

Mr. Peter Burek, Research Scholar, IIASA presented a case study in the Zambezi basin in Africa. He underlined challenges in the development of the water-energy nexus, such as population growth, changing weather and climate conditions, and increased water demand, and projected different implementation scenarios – business as usual, economic, and ecological.

Mr. Miguel Doria, Intergovernmental Hydrological Programme, UNESCO Office of Science for Latin America and the Caribbean (virtual), presented two IHP projects in the region. One creating standardized measurements to evaluate the GHG status of man-made freshwater reservoirs, while the second develops tools for water security contributing to the water-energy-food-ecosystems nexus.

Ms. Paloma Martín, President, Canal de Isabel II, Comunidad de Madrid, Spain, presented the company's model of integrated water resources management in the Madrid region. She underlined the integral water cycle services of supply, sanitation, and regeneration while concluding the model's success on investment efficiency, tender procedure, and organizational advantages.

Mr. Maurício Abijaodi, Director of Water and Sanitation Agency (ANA), Brazil, presented a case study in the strategic water supply region of Paraíba do Sol River. He highlighted the multiple conflicts of use, such as irrigation, human supply, and energy, while also underlining the solution of water use management and monitoring.

Mr. Mohamed Thameur Chaibi, Research Director, National Research Institute for Rural Engineering, Water and Forestry (INRGREF), Tunisia, presented a case study in the region of Kébili. He stressed that while the application of renewable energy in agriculture is crucial, its consequences must not be overlooked, and appropriate use must be ensured.

Mr. Sanoi Boyzoda, Representative of Tajikistan to the EC IFAS, presented the Rogun HPP as a case study for water security in Central Asia. He stressed the region's problem with water scarcity and highlighted the plant's benefits, such as managing the available water resources.

Mr. Claudio Stabile, CEO, Paraná Sanitation Company (SANEPAR) (virtual), presented the company's approach of environmental sanitation. He underlined that the emergency actions taken during the water crisis in the State of Paraná in terms of energy efficiency, renewable energy, and community participation are now helping to address climate change.

Mr. Mohamed Hosni Ghedira, Director, Masdar Institute, UAE, presented a case study on renewable energy water desalination programs in the Gulf region. He underlined that reverse osmosis constitutes the most flexible and reliable desalination technology according to the study, while also highlighting the close interlinkages of water and energy.

Mr. Anshuman, Associate Director, TERI, India, presented two case studies in India, auditing the water use of thermal power plants, and working with farmers to save water. He underlined the possibilities of reducing water consumption, including water reuse and the recycling of wastewater, as well as education and financial incentives.

Mr. Ariel Scheffer, Head of Environmental Management, Itaipu Binacional, Brazil, presented the company's environmental territorial management approach encompassing the whole region. He underlined the positive impacts of nature-based solutions, such as reforestation efforts implemented in partnership with various stakeholders, on biodiversity, water quality and communities.

Mr. Carlos Flores, Head of Environmental Management, Itaipu Binacional, Paraguay, presented the Itaipu Biosphere Reserve, which includes protected areas, a buffer zone, and areas of economic activities. He underlined the work of the multi-sectoral committee representing governments, academia and society on conservation, water safety and educational programs within the reserve.

Mr. Ariel Acosta, Representative, Drinking Water and Sanitation, Public Works and Communications Ministry, Paraguay, presented Paraguay's communitarian model of water and sanitation management. He underlined the dependencies between the drinking water and electricity sectors and highlighted the problem of wastewater treatment.

Ms. Maria del Carmen Tejera Gimeno, General Secretary, CANAL de Isabel II, Comunidad de Madrid, Spain, concluded the session stating the importance of SDGs 6 and 7 and pointing out the interlinkages with other SDGs.

Q & A

The Q&A began with a discussion of the just transition; panellists advocated for integrating gender equality and human rights concepts into water and energy projects. Panellists then received specific questions on their presentations, ranging from topics such as governance and public-private cooperation to examples of good water management models. There were also several questions on the environmental and social impacts of specific technologies such as solar, desalination, and cloud management, which panellists answered in relation to trade-offs, the importance of data management, and the value of cross-sectoral cooperation.

Session 4: Sustainable Water and Energy Solutions - Environmental Interconnections Climate Change



Session Title

Session 4: Sustainable Water and Energy Solutions – Environmental Interconnections Climate Change

Overview of event and key messages

Moderated by **Ms. Edmilce Ugarte**, UN Environment – Paraguay, this session addressed the interrelationship of water and energy with climate change and the policies and measures that are being implemented to mitigate and adapt to climate change. The session included presentations from international organizations and national/regional organizations and country representatives.

Speaker Notes

Mr. Gajanana Hegde, Team Leader, Energy, Regulatory Framework Implementation Unit, UNFCCC, noted that 85% of global carbon emissions come from energy use. He urged the integrated and sustainable management of water for its optimal use and supply, as well as taking care of ecosystems.

Mr. Julián Báez, Director of the Regional Office for the Americas, World Meteorological Organization (WMO) (virtual), highlighted the impact of climate on energy and the role of monitoring climate conditions worldwide. He mentioned the interrelation between rainfall and energy production, which in turn affects supply.

Mr. Peter Burek, Researcher, International Institute for Systems Analysis (IIASA), spoke about the different models that involve the sustainable use of water in industries, agriculture and in households in order to be able to guarantee access to water in the future.

Mr. Pascual Fernández, CEO, Canal de Isabel II, Community of Madrid, Spain, spoke about the importance of territorial cohesion. In this sense, he presented the experiences made regarding the work carried out to guarantee the water cycle and provide the community of Madrid with the vital liquid.

Ms. Nora Páez, Head of the Adaptation Department, Climate Change Directorate, Ministry of the Environment and Sustainable Development, Paraguay, presented the National Climate Change Plan, underlining that coordinating implementation with hydroelectric plants is essential for compliance with public policies. She highlighted the initiatives that ITAIPU has been promoting.

Mrs. María de Lourdes Nunes, Boticario Group Foundation, Brazil, spoke about the connection of nature protection with challenges such as water and energy security, as well as adaptation to Climate Change. She emphasized that it is impossible to talk about the availability of water and energy without focusing on nature conservation and that everything is connected.

Mr. Alex Guerra, Director of the Climate Change Research Institute (ICC), Guatemala, presented the case of how climate change affects Guatemala, where droughts, floods, frosts and landslides are recorded. In Guatemala, the climate impacts the production of sugar cane, one of its main exports. He underlined the importance of working together with indigenous communities.

Q & A

The Q&A segment of this session consisted of questions for specific panellists on their presentations. Panellists discussed the IIASA model's ability to measure carbon levels, the way in which sustainable solutions in the sugar industry can lead to lower production costs, and impact of the Canal de Isabel II's various initiatives on water consumption in Madrid.

Session 5: Sustainable Water and Energy Solutions – Water and Energy Transboundary Cooperation and Environmental Interlinkages



Session Title

Session 5: Sustainable Water and Energy Solutions – Water and Energy Transboundary Cooperation and Environmental Interlinkages

Overview of event and key messages

This session was moderated by **Ms. Maria Antonia Gwynn**, Member of the Governing Council of Itaipu Binacional, and included presentations by international, regional and national organizations alongside country representatives.

It focused on transboundary cooperation in water, biodiversity, land and water ecosystems, and how such cooperation intersects with renewable energy solutions. Key themes discussed by the panellists include the importance of legal instruments and formalized processes for guiding effective cooperation, along with the need for a portfolio of solutions and a diversified energy mix. Several panellists highlighted the need for both states and the private sector to go beyond conventional sustainable development thinking to ensure comprehensive measures are in place to protect, and in some cases rehabilitate, the wider biosphere they operate within.

Speaker Notes

*The moderator, **Ms. Maria Antonia Gwynn**, Member of the Governing Council of Itaipu Binacional, opened the session by noting that, as the global hydrocrisis becomes exacerbated by climate change, the need to maintain equilibrium between multiple uses of water in order to satisfy the needs of multiple states becomes more complex. Ms. Gwynn noted that the objectives of this session were to work towards finding sustainable solutions for a common challenge and maintaining and improving transboundary cooperation.*

***Mr. Carlos Zaldívar**, Deputy Minister of the Ministry of Mines and Energy, Paraguay, discussed Paraguay's aims to both strengthen its energy self-reliance and increase its regional connectivity. He outlined new domestic policy measures and current renewable energy projects, identifying the biggest challenges for Paraguay as diversifying its energy mix and making it more sustainable.*

***Mr. Tom Howes**, Head of Energy and Environmental Division, IEA, spoke about ways in which climate-induced stresses on water systems also impact primary energy manufacturers. Mr. Howes asserted that complex risks such as these should be better considered within policymaking, particularly in the context of recovery and support capacity. He outlined current IEA projections and IEA climate resilience measures, arguing that more renewables and improved climate resilience contributes to multiple policy objectives.*

***Mr. Jose Toron**, Regional Programme Officer, Latin American and the Caribbean, IRENA, spoke about the role renewable technologies, energy efficiency and electrification play in achieving a 1.5-degree scenario.*

He argued that increasing renewables, together with implementing aggressive energy efficiency strategies, presents the most realistic path to halving emissions. Mr. Toron also spoke about specific solutions for decarbonization, particularly for hard-to-decarbonize sectors.

Mr. Mossamba Thioye, Manager and Project Executive, UN Climate Change Global Innovation Hub, UNFCCC, outlined how systems innovation can support sustainable solutions, particularly in the case of shared river basins and other complex management areas. Mr. Thioye argued for the importance of a nexus approach which acts on multiple leverage points and of developing alternative value chains rather than solely relying on smaller, sectoral changes. He concluded by speaking about the role of radical cooperation in creating transformative change.

Ms. Lucia de Strasser, Environmental Affairs Officer, UNECE presented on the 1992 and 1997 UN Water Conventions, legal and institutional instruments for transboundary water cooperation, particularly highlighting their principles of prevention (no harm), reasonable and equitable utilization, and cooperation. She argued that global framework instruments provide crucial targets for measuring progress and discussed a recent UNECE publication on water solutions with transboundary values.

Mr. Luis Carlos García, Director for La Plata Basin and Navigation, Ministry of Foreign Affairs, Paraguay, shared experiences from Paraguay's implementation of SDG 6, focusing on bi- and trilateral agreements between Paraguay and neighboring countries. Mr. García highlighted specific treaties, transborder management mechanisms, and coordinated efforts between Argentina, Brazil and Paraguay to manage water systems – particularly on river navigation during recent droughts.

Ms. Mara Tignino, Faculty of Law and Institute for Environmental Sciences, University of Geneva, Switzerland, shared her perspective on the relationship between water, energy, transboundary cooperation, and international law. She discussed general principles from international law which provide an architecture for water and energy installation in the context of a relationship between neighboring countries, introducing examples of transboundary cooperation in the Senegal basin, South Africa, and Europe.

Mr. Gabriel Eckstein, Director of Energy, Environmental and Natural Resources System Law Program, Texas A&M University, USA, argued that disputes concerning transboundary watercourses are more likely to be resolved if parties focus on process and methods, rather than on substantive rights, referencing Bolivia and Chile's dispute over the Silala River and US-Canada cooperation over the Columbia River.

Mr. Clayton Lino, Biosphere Reserves and Transboundary Issues, Biodiversity – MAB program, UNESCO, focused on the Brazilian Atlantic Forest, a biodiverse area which has been impacted by centuries of unsustainable development. Mr. Lino advocated for improved forest preservation, arguing that a greater focus on sustainability leads to many other benefits. He noted that sustainability depends on effective actions in all parts of construction and maintenance and highlighted a decentralized forest management approach.

Mr. Jimmy Melgarejo, Itaipu Binacional, provided an overview of Itaipu Binacional's history and current objectives in the lead-up to 2030, focusing on Itaipu's efforts in the areas of biodiversity, forest preservation and riverbank restoration, and its growing role as a national information source for conservation.

Mr. Diego Jara, IUCN, suggested that hydropower dam projects can provide an opportunity for states and non-state actors to review standards regarding environmental protection and human rights. He outlined IUCN's perspective regarding SDG 6 and SDG 7 in transboundary contexts: In working to increase access to electricity, the protection of ecosystems and the downstream impacts on other actors should be considered, and forced displacement of communities must be avoided.

Ms. Cristina Cano, Executive Director, UN Global Compact, Paraguay, spoke about the Global Compact's efforts to help the private sector drive SDG actions forward in Paraguay. Ms. Cano outlined UN Global Compact's current focuses on the circular economy, carbon storage, emissions reductions and more significant net zero commitments in Paraguay, emphasizing the need for more commitments from the private sector to ensure the continuation of biosphere reserves.

Session 6: Sustainable Water and Energy Solutions – Social Interlinkages



Session Title

Session 6: Sustainable Water and Energy Solutions – Social Interlinkages

Overview of event and key messages

This session was moderated by **Mr. Izael Pereira da Silva**, Strathmore University, Kenya, and addressed the interlinkage of water and energy with social issues such as poverty, food security, health, education, gender, inclusiveness, equity, and peace. Panellists addressed social interlinkages with a broad spread of approaches from the private and

public sectors, including KPI frameworks for sustainability reporting, human-centred design thinking, community-based mobilization and environmental justice concepts. The problem of pursuing solutions at scale was raised in the session's Q&A, with panellists emphasizing the need for bold, optimistic thinking and for strengthened cross-cultural collaboration to avoid implementing solutions that are maladapted to local contexts.

Speaker Notes

Mr. Jippe Hoogeveen, Senior Land and Water Officer, FAO, discussed the food-water-energy nexus, focusing on crop irrigation due to its proportionally high usage of global water and energy resources. The FAO predicts greater global reliance on crop irrigation for securing farmer livelihoods under increasing climatic uncertainty; Mr. Hoogeveen presented solar-powered irrigation as a potential low-emissions solution, also touching on biofuels.

Ms. Radia Sedaoui, Chief Energy Section, ESCWA, focused on sustainability reporting for enhancing synergies between water and energy sectors in Africa, the Levant and the GCC. She presented KPIs for assessing and enhancing the capacities of business models addressing the nexus, and discussed specific case studies for inclusive, sustainable development in Arab rural communities, in particular a solar irrigation project in Jordan which engaged youth and female entrepreneurs.

Mr. Wilson Nobre, FGV Brazil, spoke about human-centered design and innovation. He argued that we must collectively make shifts in our relationships to materialism, and put a greater focus on dialogues, compassion and empathy, to address the energy transition from a human-centered perspective. He then introduced a case study from the northeast of Brazil which uses solar panels to capture rainwater in local communities.

Ms. Joyce Najm Mendez, Latin American and Caribbean Regional Focal Point, SDG7 Youth Constituency, spoke about the complexities of increasing energy and water access while maintaining a focus on environmental justice. Ms. Mendez then presented youth initiatives on water and energy themes: the Youth for Water and Climate Platform and the Youth Sustainable Energy Hub. She also outlined the SDG7 Youth Constituency's goals for developing further initiatives in the year ahead.

Mr. Samson Tsegaye, Director, Solar Energy Foundation, Ethiopia, spoke about water and energy solutions in Ethiopia, noting that, while hydropower is the country's main energy source, it is not a suitable solution for rural off-grid communities. He presented examples of solar PV projects as alternatives with outsize potential impact for rural communities. Mr. Tsegaye concluded by noting challenges facing sustainable solutions in the country, including frequent policy changes, political instability, and lack of incentive frameworks.

Mr. Miguel Fernandez, Executive Director, ENERGETICA, Bolivia, highlighted the role community-based mobilization plays in advancing energy and clean water access in Bolivia, and in identifying areas with missing services. He noted 3G SHS as a solution for improving energy access in rural communities, and solar pumps and rainwater collection as solutions for water management, and advocated for extrapolating lessons learned in one region to other regions, strengthening public policy, and continuing a civil-society-led push towards renewable technologies.

Q & A

This session's Q&A focused on the challenges of scaling water and energy solutions; panellists were asked to provide reflections on how to create greater participation and how to encourage effective change. Panellists addressed these themes by discussing the possibilities brought by both emerging technologies and nature-based solutions. They also emphasized the need to strengthen cross-cultural participation and to widely embrace the need for change.

Session 7: Sustainable Water and Energy Solutions – Economic Interlinkages



Session Title

Session 7: Sustainable Water and Energy Solutions – Economic Interlinkages

Overview of event and key messages

The moderator of this session was **Ms. Helena Felip**, Ambassador, General Director of Multilateral Policy and Coordinator of the SDG Commission, Ministry of Foreign Affairs, Paraguay. This session addressed the interlinkages between water and energy concerning social issues such as poverty, food security, health, education, gender, inclusion, equity, peace, etc. The session included presentations from international, national and regional organizations and country representatives.

Presentations centred sustainable development themes, with wide recognition by panellists that water and energy resources are core to development. Engagement with these ideas ranged from more general reflections on the challenges and opportunities offered by the energy transition, to sector- or region-specific presentations on topics such as the sugar-cane industry, mini-hydro networks in Pakistan and the Philippines, and the connection between the sugar, ethanol and bioenergy sectors in Brazil.

Speaker Notes

The moderator, **Ms. Helena Felip**, Ministry of Foreign Affairs, Paraguay, reported that the SDG Paraguay Commission is represented by the three powers of the State with the aim of advancing sustainable development. Itaipu Binacional is an important partner of the SDG Commission, and since 2020 it is a full partner to achieve the objectives of SDGs 6 and 7.

Mr. Ricardo Gorini, IRENA Senior Program Officer, presented the challenges and opportunities offered by the energy transition. He stressed that investment in renewable energy means leveraging the economy and brings benefits to society, not only in energy generation, but in all its dimensions. He highlighted the case of ITAIPU as a great example to keep in mind that should be replicated at scale and in other places around the world. The energy transformation will also cause a large increase in employment over the decades.

Ms. Rayen Quiroga, Head of the Water and Energy Unit, ECLAC, emphasized that water and energy resources are fundamental to development and are at the core of sustainability. In Latin America, water quality indicators have worsened, conflicts over water and environmental catastrophes due to climate change have increased. She advocated a strong investment drive to advance the water and energy transition, noting that with an investment of 1.3% of regional GDP for ten years, access to water and electricity can be expanded.

Mr. Izael Pereira Da Silva, Deputy Vice-Chancellor of Strathmore University, Kenya, presented the successful case of creating a Green University network in Kenya, which currently includes 17 universities. The objective is to train professionals with a focus on the green economy, be it a lawyer, an actuary, a university student with a focus on ecological technology, or an ecological businessperson, among other types of professionals.

Mr. Gustavo Paredes, International Advisor, ASAZGUA, Guatemala, focused on the role of sugar cane for the Guatemalan economy. ASAZGUA works with a sustainable development approach that integrates economic, social and environmental aspects. It has created the first private climate change institute. Last year it created an innovation hub. From water and energy, it works to reduce the use of water for sugar cane irrigation. Regarding energy, the sector covers 32% of the country's electricity demand.

Mr. Sherzad Ali Khan, Regional Coordinator, Aga Khan Development Network (AKDN), Pakistan, presented the case of communities in northern Pakistan, in mountainous areas. It is an example of success that improves the livelihoods of the population through the development of microhydroelectric plants. As a typical mountainous rural area, it has a greater dependence on water because it is totally glacial, and water must first melt for use in agriculture.

Ms. Jade Angngalao, Energy Access Specialist, Hydro Empowerment Network (HPNET), Philippines, presented the case of developing mini-hydro networks in indigenous communities in the Philippines, with a strong role for women in management. These mini-hydroelectric plants allow the irrigation of agricultural land, helping agribusiness and food security.

Ms. Renata Camargo, Legal and Sustainability Advisor, UNICA, Brazil, focused on the connection between the sugar, ethanol and bioenergy sectors in Brazil. The agricultural sector of sugar cane is working on reducing water consumption, thanks to the investment in technology and the elimination of the burning of sugar cane. She underlined that the sugar sector has a very close relationship with energy generation in Brazil.

Mr. Eduardo Allende, Governance Officer, United Nations Development Program (UNDP), Paraguay, presented reflections on Paraguay's latest human development report, which provides information on energy and development. The acceleration of energy transition challenges Paraguay to go from an exporting country to one that uses hydropower to promote social development, decent employment and well-being for the population.

Q & A

The Q&A opened with a discussion of legal frameworks protecting indigenous rights to nature in the Philippines, in addition to a government agency which moderates large projects being implemented on indigenous land. Panellists also discussed the importance of teaching a variety of subjects to create better green economy professionals, and gender-specific considerations in community-owned electricity generation.

Session 8: Way Forward and Closing



Session Title

Session 8: Way Forward and Closing

Overview of event and key messages

The moderator, **Mr. Minoru Takada** of UN DESA introduced his colleague **Mr. Martin Niemetz** to present a short draft summary of the Global Symposium on Sustainable Water and Energy Solutions. Mr. Niemetz presented the summary, which contained six key messages as well as suggestions for the way forward. The symposium then concluded with brief talks by the Itaipu Coordinating Directors **Mr. Luiz Felipe Carbonell** and **Mr. Gustavo Ovelar**, who gave their sincere thanks to participants and organizers. Mr. Carbonell noted the symposium's contributions to the global discussion of the water-energy nexus, and Mr. Ovelar underlined Itaipu's ongoing commitment to providing sustainable water-energy solutions. Mr. Takada concluded the session by thanking Itaipu and UN DESA team members; the session ended with the call for further suggestions for the summary to be sent to the organisers.

Speaker Notes

***Mr. Martin Niemetz**, Sustainable Development Expert, UNDESA presented a short draft summary of the Global Symposium, highlighting that it provided a platform to exchange knowledge and solutions. The summary underlined the complexity of the water-energy nexus and deduced six key messages as well as several propositions for the way forward for the network.*

***Mr. Luiz Felipe Carbonell**, Coordination Director of ITAIPU (Brazil), thanked all the international representatives who attended the event and the team of both sides of ITAIPU Binacional that made this event possible. He noted that the Symposium contributed to shaping a global debate on the water-energy nexus, bringing to the fore exemplary cases on better management and solutions. Above all, it demonstrated the commitment of all participants to overcome the current global crises and challenges in resource management.*

***Mr. Gustavo Ovelar**, Coordination Director of ITAIPU (Paraguay), pointed out that it had been an honour for ITAIPU to have organized an event of this magnitude. He emphasized that through the partnership with UNDESA, it was possible to demonstrate the commitment of ITAIPU towards providing the necessary tools for designing policies linked to sustainable solutions on water and energy, which is essential to ITAIPU and its partners.*

***Mr. Minoru Takada**, Team Leader, UN DESA, closed the session by thanking participants and organizers on behalf of UN DESA. Mr. Takada spoke briefly about the challenges posed by the COVID-19 pandemic in organizing the symposium. He ended by recognizing individual staff members from Itaipu Binacional and UN DESA whose hard work made the symposium a reality.*

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