ABU DHABI
SUSTAINABILITY WEEK

ADSW REPORT:
PERSPECTIVES ON GLOBAL INTERCONNECTIVITY

Hosted by

MASDAR

Jasim Husain Thabet, Group Chief Executive Officer and Managing Director of TAQA, and Deputy Chairman of Masdar

FOREWORD

Since COP28, the energy sector has been at the heart of global climate discussions, with transmission infrastructure including interconnectors emerging as an important enabler to achieving net-zero goals and commitments, such as tripling of global renewables capacity by 2030.

> While renewable energy capacity is expanding rapidly, grid bottlenecks are posing a risk of slowing the energy transition.

This issue took center stage at Abu Dhabi Sustainability Week 2025, where a key takeaway was the widening gap between the deployment of renewables and the expansion of transmission infrastructure, leading to inefficiencies that are slowing progress.

"There is no transition without transmission."

As solar and wind power become dominant, a more interconnected system will be essential. Alongside battery storage, efficient conventional generation, and demand response, the flexibility and resilience enabled by interconnections will form the backbone of the 2050 energy system we are moving towards.

Utility companies recognize the urgency of action. At New York Climate Week 2024, the Utilities for Net Zero Alliance (UNEZA), comprising over 50 global members and of which TAQA is a founding co-chair, pledged to match every dollar invested in renewables with a dollar for grid infrastructure, including interconnections.

There is no transition without transmission. A sustainable energy future depends on collective action to build resilient, interconnected grids capable of meeting evolving global energy demands.

Mohamed Jameel Al Ramahi, Chief Executive Officer, Masdar

FOREWORD

This report explores the pivotal role that energy interconnectors play in accelerating the transformation of global energy systems, a key focus at Abu Dhabi Sustainability Week (ADSW) 2025.

Investments in global energy infrastructure are a force multiplier, with the World Bank having shown that every dollar invested in energy infrastructure can yield economic returns up to four-fold. Though the scale of investment needed is substantial – over $3 trillion by 2030 – meeting global renewable energy targets will require the development of interconnected grids to support this transformation.

The opportunity is clear, but it has yet to fully be seized, and the key stakeholders who came together for the ADSW Dialogue on The Power of Global Energy Interconnectivity are critical to realizing this vision. Policymakers instrumental in dismantling regulatory barriers need to work with the private sector to modernize grid infrastructure, and financial institutions must help unlock the capital necessary to make these infrastructure projects a reality.

> "The importance of electricity interconnectivity cannot be overstated. It is a critical tool in enhancing energy efficiency, improving system resilience, and strengthening global energy security."

The importance of electricity interconnectivity cannot be overstated. It is a critical tool in enhancing energy efficiency, improving system resilience, and strengthening global energy security. Without maximizing interconnections, the world cannot meet its goal of tripling renewable energy capacity. To this end, ADSW 2025 witnessed the signing of a landmark trilateral agreement between the UAE, Albania, and Italy to develop cross-border electricity interconnectors.

Yet projects like this are only a start. Through leveraging the key insights and actionable recommendations from this report, ADSW will continue to serve as a platform to advance global energy interconnectivity and as a guide for further collaboration to build a sustainable, interconnected energy future.

INTRODUCTION

Global interconnectors are poised to play a pivotal role in the energy systems transformation, essential for achieving ambitious electrification targets worldwide. This report summarizes the outcomes from a recent roundtable event at Abu Dhabi Sustainability Week 2025, where industry leaders, policymakers, innovators, and investors convened to discuss the current challenges to scaling global interconnectivity and to outline potential actions that different stakeholders can take to accelerate growth.

The report is divided into two main sections:

1. The Case for Scaling of Global Interconnections

- **Importance and benefits:** This section highlights the significance and advantages of global interconnectivity, emphasizing how it can drive sustainable energy solutions.
- **Interconnectivity technology and global growth:** It delves into the technological advancements and innovations that are shaping interconnector projects and provides a comprehensive overview of interconnection projects around the world, showcasing successful initiatives and emerging trends.
- **Challenges:** It concludes with a summary of the key challenges that need to be addressed to scale interconnections effectively.

2. Way Forward

- **Action themes:** This section summarizes the three key action themes discussed at ADSW, which are designed to propel interconnectivity forward.
- **Industry examples:** It includes best practices and case studies of how other industries have overcome similar challenges, offering valuable insights and strategies for success.

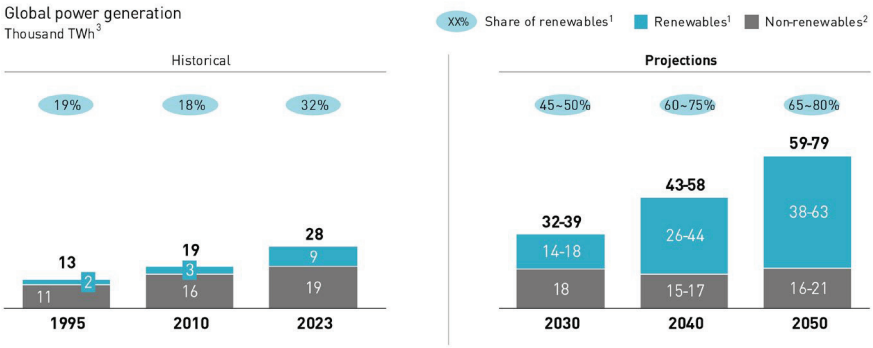
1. THE CASE FOR SCALING OF GLOBAL INTERCONNECTIONS

The energy systems transformation is accelerating the demand for electricity as our economies become more electrified and new sources of demand emerge.

By 2050, electricity consumption could nearly triple, even as total energy consumption grows by only ~20 percent over the same period[1]. This surge in electricity demand is driven by both traditional sectors (e.g., automotive and buildings) and "newer sectors" (e.g., data centers and green hydrogen).

Renewables are scaling up to meet this challenge, with deployment expected to accelerate following the COP28 agreement to triple renewables capacity[2] by 2030. Renewables are projected to make up the bulk of the future power mix, providing ~45–50 percent of generation by 2030 and ~65–80 percent by 2050. However, the transition to a renewables-dominated energy system faces several challenges, including supply chain issues, slow permitting processes in some regions, and the intermittency of renewable energy sources, which impact grids operations.

Interconnectors are used to transfer electricity between separate electricity grids across countries or regions or connect offshore renewable generation farms to multiple grids—often referred to as hybrid interconnectors. These interconnectors enable efficient transmission of power from energy sources of high amenity value to where they are required. Unlike typical transmission lines, which mainly transfer electricity within a single grid or country, interconnectors specifically enable cross-border electricity trading, multi-grid integration, and enhanced grid reliability by balancing supply and demand across regions and connecting areas with diverse and complementary energy mixes.



1. Includes solar, wind, hydro, biomass, BECCS, geothermal and hydrogen-fired gas turbines
2. Includes oil, gas and coal plants, nuclear
3. Excludes generation from storage (pumped hydro, batteries, LDES)

Source: McKinsey Energy Solutions' Global Energy Perspectives 2024 (*supply perspective*). Ranges in the graph are based on three scenarios. SE (Slow Evolution): local decision-making focused on (domestic) energy affordability and supply security, relegating sustainability to a secondary priority. This fragmented response to decarbonization leads to a decrease in prior low-carbon investments. CT (Continued Momentum): nations' focus on sustainability is balanced by other factors, including affordability and security of energy supply, with some emerging economies mostly prioritizing affordability and security of supply over sustainability. ST (Sustainable Transformation): charts a pathway to decarbonization based on current global economic conditions and technology maturity and viability. Here, nations intensify their commitment to sustainability, with increasing global coordination to alleviate bottlenecks.

[1] McKinsey & Company, "Global Energy Perspective 2024", September 2024

[2] BoombergNEF, "Unlocking Investment to Triple Renewables by 2030", September 24, 2024

Markus Hottenrott, Managing Director and Chief Investment Officer, Morgan Stanley Infrastructure Partners (MSIP)

Globally, interconnectors are expected to bring several benefits to the energy systems transformation, and support the global growth in renewables, namely:

1 **Mitigating intermittent generation profiles from renewables** by providing "flexible" capacity[3] through linking locations with complementary renewable energy profiles (such as Spain and Germany). Interconnections are considered a key form of flexible capacity, alongside dispatchable generation and storage, with research showing that, for most countries, the growth of flexible capacity will need to outpace overall demand by approximately 2-3 times in order to support the transition to cleaner grids.

2 **Enabling cost reduction and economic efficiency of energy systems**, by enabling energy trading and optimization of flows across borders, energy interconnectivity can lower costs and unlock new energy markets.

3 **Unlocking land for renewable development**, given the bottlenecks for land availability in densely populated countries (e.g., Singapore, Japan). Interconnections can link countries with more land for renewables to those with less space.

4 **Enhancing grid reliability and performance:** Many power grids worldwide were built decades ago, and modernization is urgently needed. Cross-border interconnections can significantly improve grid stability and create a resilient grid. For example, a 244-km HVDC link connecting Mallorca with the Spanish mainland was built to reduce the need for costly local generation and prevent operational issues and potential damage to the converter station and transmission network due to low short-circuit power.[5]

Francesco La Camera, Director General, International Renewable Energy Agency (IRENA)

Participants in the ADSW Dialogue, The Power of Global Energy Interconnectivity

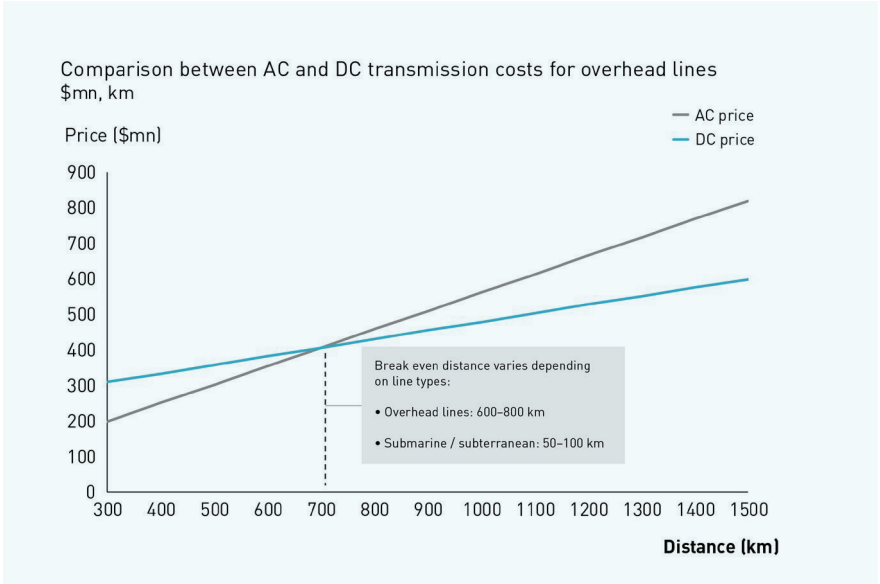
[3] Flexible capacity includes dispatchable generation assets running at low utilization, interconnections, and storage. Interconnections refer to physical connections with other power systems, measured in megawatts representing the maximum amount of electricity that can be imported. Definition based on McKinsey Global Institute report, "The Hard Stuff", August 2024
[4] McKinsey Global Institute, "The Hard Stuff", August 2024
[5] PACWorld, "Enhanced Grid Reliability & Resilience – Wide-Area PAC (WAPAC) case studies", March 2022

Plenary session of the ADSW Dialogue, The Power of Global Energy Interconnectivity

Interconnectivity technology and global growth

The core technology that will enable the expansion of global interconnectivity—High Voltage Direct Current (HVDC)—is considered relatively mature. HVDC technology is used for long distance transmission lines, as it offers significant advantages over traditional High Voltage Alternating Current (HVAC) lines for this use case. HVDC is more efficient than HVAC for lengths longer than 600km through overhead lines and for submarine lines over 50km. It is more cost-effective, with 30-40 percent less energy loss and roughly 30 percent less material required (e.g., HVDC systems requir 2 conductors compared to 3 for AC). Additionally, HVDC can transmit power over longer distances without technical limitations (especially underground), unlike HVAC, which faces stability issues under overload. Moreover, HVDC can go underwater or underground, circumventing the persistent challenge of resident approval common in traditional transmission. Finally, HVDC can connect two AC systems (e.g., microgrids) without need for synchronization, facilitating links between regions or countries with varying electrical parameters.

Given the robust technological backdrop, several countries already rely on grid interconnectivity to meet varying power load profiles efficiently — France, for instance, located at the crossroads of several



Source: McKinsey analysis; lit. search; EIA, "Assessing HVDC Transmission for Impacts of Non-Dispatchable Generation", 2018

Jasim Husain Thabet, Group Chief Executive Officer and Managing Director of TAQA, and Deputy Chairman of Masdar

European countries, already has over 55 cross-border connections[6].

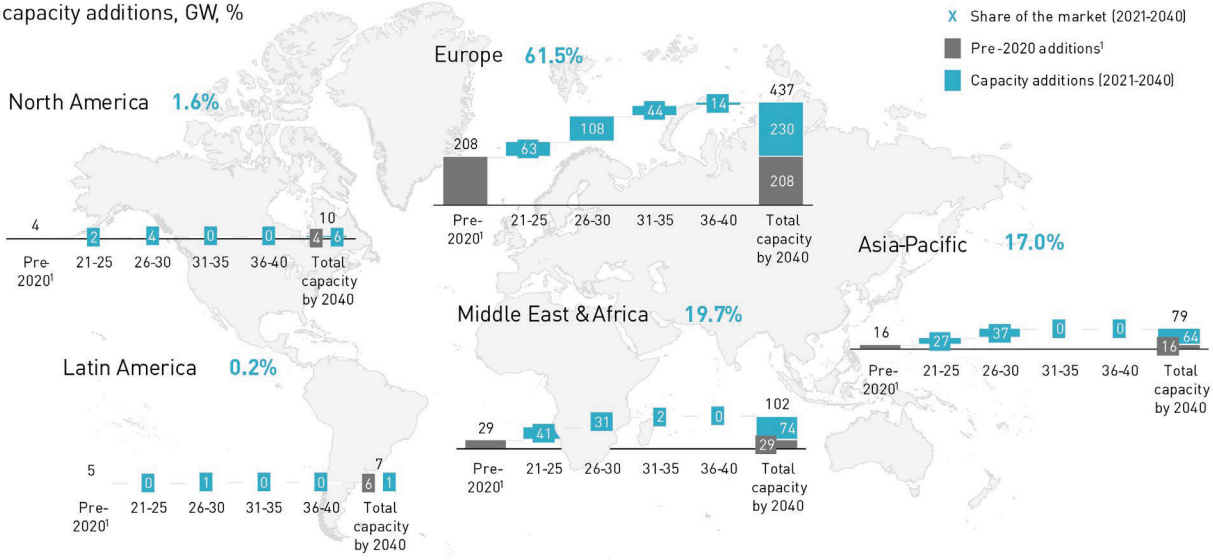
In general, interconnection projects are expected to accelerate globally (with capacity of interconnections expected to increase by 140 percent between 2020 and 2040), however there are regional discrepancies. Europe is the most established global interconnection market (with ~75 percent[7] of current global installed capacity) and has the largest plans for interconnection capacity growth aiming to double its capacity (adding ~230 GW by 2040). It represents ~62 percent of announced interconnections capacity additions from 2021 until 2040 and is the only region with projects planned beyond 2035. The European Union has set a target for member states to have interconnections enabling at least 15 percent of electricity produced to be transported within the EU[8].

Other regions are beginning to accelerate plans for interconnections. In Asia Pacific, efforts to integrate energy networks across Australia, China, Singapore, Laos and India have led to significant growth in planned projects, with an estimation for interconnection capacity to grow almost five-fold by 2030 compared to pre-2020 levels (although still low compared to other regions). In the Middle East & North Africa, the planned growth of interconnector capacity is projected to more than triple by 2030 compared to pre-2020 levels[9]. There are active discussions around high-voltage direct current (HVDC) and grid interconnections through projects such as the Saudi-Egypt link and Morocco-UK connection (Xlinks). Additionally, at ADSW in January 2025, Italy, Albania and the United Arab Emirates signed an agreement to develop a subsea interconnection to transport renewable energy across the Adriatic Sea.

Dr. Nikolas Meitanis, Executive Director, Strategy & Corporate Development, Masdar

Cumulative interconnections power transfer additions by geography & expected year of operation

2021-2040 capacity additions, GW, %



1.Pre-2020 figures include interconnectivity projects data from 1950 up to 2020 (inclusive)
2.NOTE: Analysis may be incomprehensive given due to missing data points (i.e., some projects do not mention the expected year of operation nor clarify the capacity additions)
Source: Globaldata - Interconnection Projects Database, as of April 2020; McKinsey analysis

[6] France RTE, "Interconnections supporting an integrated European power system", accessed February 6, 2025
[7] Capacity as of end of 2024, based on project announcements as of GlobalData - Interconnection Projects Database, February 2025
[8] McKinsey Global Institute, "The Hard Stuff", August 2024
[9] Based on project announcements as of GlobalData - Interconnection Projects Database, retrieved on February 6, 2025, and McKinsey analysis

Challenges ahead

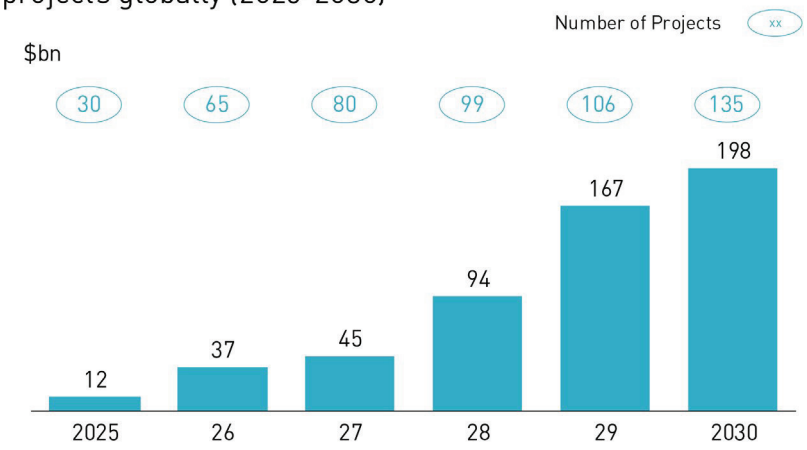
Despite this growth, unlocking the full potential of global interconnectivity requires addressing challenges that demand strong cooperation and collaboration of all stakeholders.

REGULATORY AND GOVERNANCE CHALLENGES

Interconnectivity projects face significant regulatory and governance hurdles, including complex permitting and licensing processes, absence of clear and transparent regulations, difficulties in securing government support and navigating geopolitical forces that impact international collaboration and project stability.

Tackling these challenges will be key to scaling interconnectors, with potential lessons to be learned from reforms in Germany to facilitate buildout of renewables. Since 2022, the country applied aggressive permitting reforms for renewables, resulting in accelerated buildout growth of +95 percent in 2022-2023 compared to the average growth rate of +3 percent p.a. in 2015-2022.[10]

Cumulative planned costs for interconnection projects globally (2025-2030)[1]



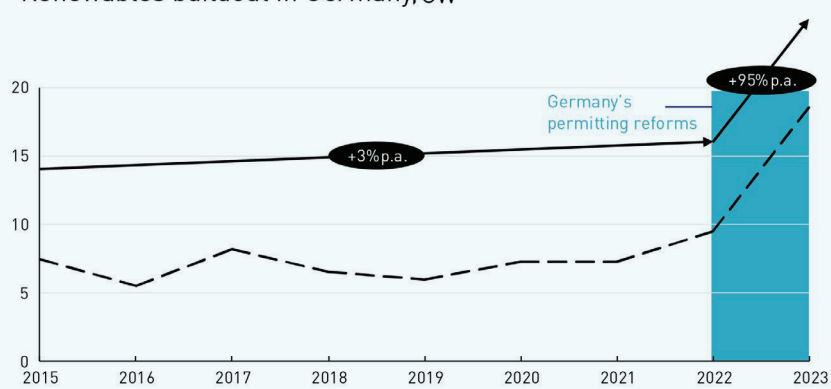
1. Includes only projects for which the cost has been publicized

Source: GlobalData - Interconnection Projects Database, retrieved on February 6, 2025

GEOPOLITICAL UNCERTAINTY

An uncertain geopolitical environment underscores the potential risks and challenges to building out global interconnectors. Issues such as energy security and trade can be potential "deal breakers" for new projects. International organizations can play a crucial role in facilitating interconnector development by helping establish diplomatic frameworks, managing risks proactively, and supporting the strategic alignment necessary for international cooperation on such projects.

Renewables buildout in Germany, GW



Source: Bloomberg, "The Secret Behind Germany's Record Renewables Buildout", August 27, 2024

Gregory Manuel, Head of Climate and Energy Commercialization, Google X

[10] Bloomberg, "The Secret Behind Germany's Record Renewables Buildout", August 27, 2024

Jens Nielsen, Founder and CEO, World Climate Foundation

HE Dr. Peter Holicza, Deputy State Secretary for European Union Affairs and International Relations, Ministry of Energy, Hungary

Dr. Tajeddine Seif, Chairman, K&K Group

FINANCIAL AND ECONOMIC CONSIDERATIONS

Interconnection projects announced globally so far and planned to be operationalby 2030 are estimated to cost at least ~$198 billion. Building interconnections involves complexities related to project financing and insurance. Key steps include securing offtake agreements, strengthening public-private partnerships to bridge funding gaps, ensuring economic frameworks support large-scale infrastructure investments. Additionally, creating value for investors is crucial to attract and sustain long-term investment, requiring improved business cases.

TECHNOLOGICAL, SUPPLY CHAIN, AND HUMAN CAPITAL CONSIDERATIONS

Addressing supply chain resource constraints is essential to ensure the timely availability of necessary materials. Additionally, enhanced efforts to developing a skilled workforce are critical considering the short timeline and the concurrence of development projects. Finally, advancing technological capabilities, such as deep-sea project execution and AI-driven grid optimization, is a strong enabler for project feasibility and future growth in global interconnectivity. As one participant in the closed-door breakout sessions of the ADSW Dialogue said, “25 years ago people had to make intuitive non-quantitative judgements about things and hope for the best. Happily, now it's not the case. AI and data are bringing a new level of efficiency and optimization”.

2.
WAY FORWARD:
KEY ACTION THEMES

Regulatory clarity and long-term demand signals

Long-term demand signals and a clear vision for transmission interconnection maps are essential for unlocking growth in interconnectors. For example, the EU plays a critical role in providing these signals for interconnectors from regions like North Africa and the Gulf. Such signals are essential for fostering long-term partnerships between developers and the supply chain. Furthermore, establishing a coherent regulatory framework is crucial to provide the right signals to the market, encouraging investment and development in interconnection infrastructure. A robust framework makes it easier to attract the necessary capital and expertise to develop these interconnections.

During the roundtable discussions, the group explored the different roles each stakeholder could play across the value chain in establishing long-term demand signals. Creating such a supportive environment can help attract investment commitments and send clearer price signals, which are necessary to support the business case for large projects like interconnections.

As a case example, the European Electricity Market Reform, effective from 2024, was designed to enhance energy security, affordability, and sustainability while providing long-term investment signals. The reform improves access to Power Purchase Agreements (PPAs) through market-backed guarantees and potential auction mandates, ensuring clearer long-term price signals for renewable developers. Additionally, capacity mechanisms—previously used temporarily—are now permanent, requiring member states to assess flexibility needs and redesign mechanisms in alignment with CO_2 reduction targets. By ensuring revenue stability through PPAs and mandating long-term capacity planning, the reform sends strong investment signals that renewables, flexible generation, and energy storage will play an increasingly central role in Europe's future electricity system.

Illustrative value chain of long-term demand signals for interconnection projects

Regulators and Policy Makers	Transmission System Operators	Infrastructure Developers	Component (HVDC) Manufacturers	Raw Materials Suppliers
Define and implement remuneration schemes that mandate and incentivize increases in renewable energy adoption, and build out of interconnection projects	Respond to regulatory mandates by planning and approving new interconnection projects, which require significant investment in upgraded and new transmission capabilities	Address the increase in approved interconnection projects by developing and constructing the required infrastructure, which in turn increases demand for specialized high-voltage components	Ramp up production capabilities and innovate in HVDC technologies to meet the growing demand from infrastructure projects, enhancing efficiency and reducing losses in long distance transmission	Boost extraction and processing of critical raw materials (e.g., copper and aluminum), driven by heightened demand from component manufacturers for high-quality materials needed in HVDC and other infrastructure components

Source: Based on group discussions at ADSW

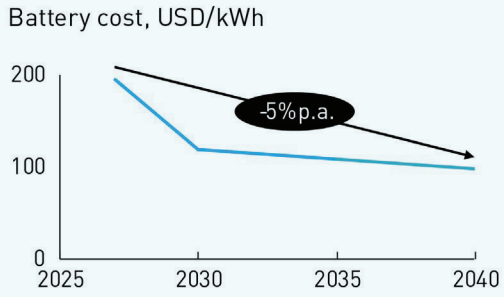
Collaboration on standardization and technology development

Standardization and interoperability between systems are crucial for streamlining project timelines and reducing costs. By aligning policies and demand, suppliers can potentially build capacity more effectively and meet future needs. Standardization helps create a common framework that facilitates smoother integration of various components and systems, ultimately leading to more efficient project execution.

Moreover, shortening project execution times can make procurement significantly cheaper and easier. With standardized systems in place, the complexities associated with customization and integration are minimized, leading to faster project completion. Throughout the conversations held at ADSW, the group explored the idea of establishing a potential cross-country working group initiative to co-define project standards for interconnections. This would not only reduce costs but also enhance the overall efficiency of the supply chain, making it more responsive to market demands and future requirements.

For example, standardization significantly reduced battery costs globally, with recent research indicating that automotive battery pack costs fell 11 percent YoY from 2000 to 2022 ($2000/kWh to $150/kWh). Forecasts anticipate a continuous decrease by 5 percent p.a. until 2040, which means ~50 percent decrease already by 2030[11].

Automotive battery pack costs fell 11% YoY from 2000 to 2022. Forecasts anticipate a further ~50% decrease by 2030



Source: McKinsey Battery Cost Model, August 2024

Additionally, enhancing collaboration on data sharing is essential for exchanging lessons and insights. For example, Google's work in Chile using AI for efficient grid management demonstrates the potential of leveraging advanced technologies to optimize grid performance and reliability. By sharing data and best practices, interconnectivity technology can mature quickly, and stakeholders can collectively improve their approaches and outcomes.

Moreover, the importance of data sharing among original equipment manufacturers (OEMs) and stakeholders cannot be overstated. By learning from existing data and collaboratively developing new mechanisms, the industry can drive innovation and efficiency, ultimately enhancing the effectiveness of interconnectivity projects. The cross-country working group initiative suggested for standardization of procedures could also serve as a forum to share innovation and technology best practices, bound to data privacy restrictions.

The Long Duration Energy Storage (LDES) Council[12] was established at COP26 to advance the development of energy storage technologies and facilitate the exchange of best practices. Energy storage systems enhance grid stability, manage peak demand, provide backup power during outages, and reduce energy costs by storing excess energy during low demand and discharging it when demand is high. By fostering collaboration among industry leaders and policymakers, the Council aims to enhance grid stability and support the integration of renewable energy sources through innovative storage solutions.

Lord Adair Turner, Chair, Energy Transitions Commission

[11] McKinsey Battery Cost Model, August 2024
[12] LDES Council, "Long Duration Energy Storage Council", accessed February 6, 2025

Financial mechanisms to unlock capital

Reducing the high cost of capital for cross-border interconnector projects is essential, especially when compared to the costs for typical grid infrastructure projects. During our discussions, it was emphasized that "the cost of capital is significantly higher; you know multiple percentage points for cross-border interconnector projects than for typical grid infrastructure".

This requires aligning regulations and increasing price transparency to create a more favorable investment climate. Leveraging green finance can also support affordability, making these projects more financially viable. Additionally, expanding the use of insurance mechanisms to mitigate risks is crucial for ensuring greater resilience and investor confidence. More specifically, insurance mechanisms could help mitigate risks such as political and regulatory, as well financial and investment risk. This is done through offering guarantees against expropriation and breach of contract, harmonizing legal frameworks, protection against currency inconvertibility and transfer restrictions, providing loan guarantees, and enforcing EPC risk-sharing agreements[13]. By addressing these financial challenges, it becomes possible to lower capital costs, attract more investment, and promote the development of critical interconnector infrastructure.

A break-out group focused on regulatory and policy frameworks during the ADSW Dialogue, The Power of Global Energy Interconnectivity

As a case example, the World Bank Group's Multilateral Investment Guarantee Agency (MIGA) issued guarantees of $9 million to support investments in interconnection projects powered by ARC Power Rwanda Ltd., which will help mitigate the risk of contract breaches for up to eight years[14]. Additionally, MIGA's insurance in various projects in the West African Power Pool (WAPP)[15] and Central Asia[16] ensured loss prevention due to political instability and enabled cross-border electricity trade while stabilizing the currency flow for investors.

Martin Pibworth, CCO and Board Member, SSE

John Defterios, Visiting Professor of Business, NYU Abu Dhabi

[13] MIGA, World Bank Group "Investment Guarantee Guide", July 2015
[14] MIGA Press-Release, "MIGA Supports Rwanda's First Interconnected Grid Project", June 13, 2024
[15] World Bank Group, "Western and Central Africa - First Phase of the West African Power Pool (WAPP) Fourth Adaptable Program Loan (APL4) - Côte d'Ivoire, Sierra Leone, Liberia, and Guinea Power System Re-development Project", June 04, 2024
[16] World Bank Group, "Central Asia South Asia Electricity Transmission and Trade Project (CASA-1000)", January 31, 2025

HE Dr. Nawal Al Hosany, Permanent Representative of the UAE to IRENA

Other examples of similar insuring mechanisms are the European Investment Bank (EIB) financing the Celtic Interconnector[17] between France and Ireland, and the involvement of SACE to support the North Sea Link (UK-Norway interconnector) by providing export credit guarantees[18]. Involving such insurance mechanisms helps encourage private investment, reduces political and regulatory risk, and supports the enhancement of energy security and market stability.

Similarly, the Green Grids Initiative (GGI), in collaboration with The Utilities for Net Zero Alliance (UNEZA), is working to reduce capital costs for interconnectors by mobilizing Multilateral Development Banks (MDBs) and implementing financial strategies to de-risk investments. GGI focuses on expanding concessional finance, leveraging blended finance models, and improving regulatory frameworks to lower the cost of capital, particularly for High Voltage Direct Current (HVDC) interconnections, which require significant upfront investment[19].

James Humfrey, CEO, Xlinks First

[17] EIB, "Celtic Interconnector", November 28, 2022
[18] SACE, "SACE and SIMEST with BNP for Prysmian and National Grid: $519 million for the North Sea Link Project", December 16, 2016
[19] Green Grids Initiative, Report "Which grids are green?", November 2024

Mike Dunleavy, Governor of Alaska

Resolve development stage funding challenges

Addressing funding challenges in the development stage is particularly important, especially given the scarcity and high cost of development capital in the early project stages. This phase often faces significant financial hurdles that can impede progress. A variety of financial mechanisms and institutional supports such as the European Investment Bank (EIB), play key roles in optimizing construction project capital costs, making projects more financially viable and attractive to investors.

Public-private partnerships and derisking mechanisms also help enable greater capital deployment in the initial stages. These partnerships can pool resources and share risks, thereby enhancing the feasibility of early-stage projects. Effective derisking strategies can attract more investment and support.

A pertinent example is the Empire Wind project in the United States, comprising two phases with a combined capacity of over 2,000 MW. The project secured long-term Offshore Wind Renewable Energy Certificate (OREC) purchase agreements with the New York State Energy Research and Development Authority (NYSERDA), providing a stable revenue stream and enhancing financial viability. Despite challenges such as global inflation and supply chain disruptions, the project achieved financial close on a debt financing package of over $3 billion for its first phase, Empire Wind 1, in late 2024. This success underscores the importance of securing stable revenue agreements and robust financial structuring in overcoming development stage funding challenges[20].

In Europe, the Marguerite Fund serves as a notable example of a specialized investment fund addressing development stage funding challenges. Established in 2010 by the European Investment Bank and several EU member states, the fund focuses on investments in renewables, energy, and transport infrastructure. It has played a pivotal role in financing early-stage projects, thereby reducing financial risks and attracting private investment. For instance, the fund invested in the Butendiek Offshore Wind Farm in Germany, a 288 MW project that faced high early-stage capital costs and development risks. The Marguerite Fund's involvement provided essential equity financing, optimizing capital costs and enhancing the project's financial viability[21].

Particularly in emerging markets, developing financing measures and attractive business models is essential to enable private capital to support governments. Emphasizing the role of multilateral banks and institutions in supporting grid investments in the emerging economies can significantly boost these efforts. One of the participants noted during our discussions that "for countries in the Global South in particular, where the reality is we have limited fiscal space to move around investments in renewable energy transition in our economy, it's always a question of access to sustainable capital or sustainable high-quality debt which allows us to build our economies and transition".

As a case example, Morocco was able to secure a $750 million package of development finance that attracted private investment and helped the domestic Moroccan banking sector understand solar energy technology. By meeting the initial financial needs, it became possible for Morocco to attract more investments and become solar-power generator for the entire Maghreb region[22].

[20] New York State Energy Research and Development Authority (NYSERDA), "Empire Wind Project Achieves Financial Close on $3 Billion Debt Financing", December 2024
[21] Marguerite, "Marguerite acquires stake in the Butendiek offshore wind farm", 2013
[22] McKinsey Interview, "Blended finance: Unlocking renewable energy's promise", December 15, 2022

CONCLUSION: TURNING COMMITMENTS INTO ACTION

Global interconnectivity stands at a critical juncture in the broader energy systems transformation.

Underinvestment in grid infrastructure has created bottlenecks just as emerging power requirements from AI-driven data centers and ongoing electrification place unprecedented demands on existing networks. Political considerations cannot be overlooked, as citizens in some regions (e.g., Norway) question cross-border power trade if it raises local prices. Geopolitical factors add complexity to creating a truly integrated global energy market. Even in one of the most coordinated international markets, the European Union, uncoordinated national plans often fail to optimize the EU's abundant but unevenly distributed renewable resources.

However, there are steps we can and should undertake immediately.

> Global interconnectivity is not merely a lofty aspiration; it is a necessity.

The findings outlined in this report underscore three key imperatives. First, long-term regulatory clarity is essential to create the stable demand signals needed for ambitious infrastructure. Clear frameworks mitigate project risk and encourage vital investment, especially in nascent interconnection projects. Second, standardization and technology development can streamline project timelines, reduce operational complexities, and drive cost efficiencies. Third, innovative financial mechanisms are crucial for lowering capital costs and derisking early-stage ventures.

If these measures are properly implemented, the potential upside is significant. Enhanced interconnectivity mitigates the intermittency of renewables, enabling cleaner and more stable energy supply. It fosters efficiency through cross-border trade, lowers system costs, and bolsters energy security across regions. Moreover, interconnections can stimulate economic growth and job creation, as new transmission corridors and renewable energy projects attract further industrial development.

Industry leaders, policymakers, investors, and innovators all share responsibility for delivering on this promise. Collaboration and transparent dialogue will be indispensable to ensure that policy, technological breakthroughs, and financing models align. Masdar, through Abu Dhabi Sustainability Week, has committed to providing a dedicated forum to advance these discussions. ADSW connects the world's innovators at the "Nexus of Next," fostering a new spirit of collective intelligence and action across people, energy, data, finance, trade, and natural ecosystems.

A break-out group focused on finance and investment strategies during the ADSW Dialogue, The Power of Global Energy Interconnectivity

Global interconnectivity is not merely a lofty aspiration; it is a necessity. While the pace of change will differ by region, the overarching direction is clear. By addressing regulatory, technological, and financial barriers in unison, it is within the power of the broader energy community to foster a truly integrated market. Doing so will deliver lasting environmental, economic, and social benefits. The opportunity to reshape our collective energy future is at hand – and by working together, we can seize it.

ADSW DIALOGUE ATTENDEE LIST

Lord Adair Turner
Chair, Energy Transitions Commission

Dr. Afif Al Yafei
CEO, TAQA Transmission

Ahmed Ali Al-Ebrahim
Chief Executive Officer, GCC Interconnection Authority

Bernard Dagher
Chief Strategy & Growth Officer – MEA, Grid Solutions, GE Vernova

Christopher Thiele
Managing Director, Co-Head of EMEA Energy, Power & Renewables Investment Banking, JP Morgan

Dietmar Siersdorfer
Managing Director, Siemens Energy

Francesco La Camera
Director General, International Renewable Energy Agency (IRENA)

Gregory Manuel
Head of Climate and Energy Commercialization, Google X

Guillaume Lucci
President and CEO, Prime Infrastructure Capital, Inc.

Helmut von Struve
CEO, Siemens Middle East

James Humfrey
CEO, Xlinks First

James Janoskey
Managing Director, Co-Head Global Energy, Power, Renewables and Mining Group, JP Morgan

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Group Chief Executive Officer and Managing Director of TAQA, and Deputy Chairman of Masdar

Jens Nielsen
Founder and CEO, World Climate Foundation

Karina Litvack
Non-Executive Director, Terna S.p.A.

Mark Wilson
Board Member, Blackrock

Markus Hottenrott
Managing Director and Chief Investment Officer, Morgan Stanley Infrastructure Partners (MSIP)

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Chief Commercial Officer and Board Member, SSE

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Chairman & Chief Executive Officer, Liebreich Associates

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Governor of Alaska

Mohamed Jameel Al Ramahi
Chief Executive Officer, Masdar

Nicola Melchiotti
Group Chief Executive Officer, CESI

Dr. Nikolas Meitanis
Executive Director, Strategy & Corporate Development, Masdar

HE Dr. Peter Holicza
Deputy State Secretary for European Union Affairs and International Relations, Ministry of Energy, Hungary

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Chief Commercial Officer, EMROD

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Middle East Business Director - Transmission Division, Prysmian Group

Dr. Tajeddine Seif
Chairman, K&K Group

Tarik Hamane
Director General, ONEE (National Office of Electricity and Potable Water)

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Zoe Knight
Managing Director, Senior ESG Advisor, HSBC

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About Abu Dhabi Sustainability Week

Abu Dhabi Sustainability Week (ADSW) is a global platform supported by the UAE and its clean energy leader, Masdar, to address the world's most pressing sustainability challenges through crucial conversations accelerating responsible development and fostering inclusive economic, social and environmental progress.

For more than 15 years, ADSW has convened decision-makers from governments, the private sector and civil society to advance the global sustainability agenda through dialogue, cross-sector collaboration and impactful solutions. Throughout the year, ADSW conversations and initiatives facilitate the knowledge sharing, innovation and collective action that will ensure a sustainable world for future generations.

About Masdar

Masdar (Abu Dhabi Future Energy Company) is one of the world's fastest-growing renewable energy companies. As a global clean energy leader, Masdar is advancing the development and deployment of solar, wind, geothermal, battery storage and green hydrogen technologies to accelerate the energy transformation and help the world meet its net-zero ambitions. Established in 2006, Masdar has developed and invested in projects in over 40 countries with a combined capacity of 51 gigawatts (GW), providing affordable clean energy access to those who need it most and helping to power a more sustainable future.

Masdar is jointly owned by TAQA, ADNOC, and Mubadala, and is targeting a renewable energy portfolio capacity of 100GW by 2030 while aiming to be a leading producer of green hydrogen by the same year.

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