GETTING THE TWIN TRANSITIONS RIGHT

PhD. Armando Jiménez San Vicente
Alamo Solutions LLC

The objective of these sessions is to foster a structured discussion on actionable solutions and policy recommendations aimed at bridging the digital and energy divide in the Pan-Atlantic region.

In the previous working session, we examined the inseparable nexus between energy systems and Artificial Intelligence (AI), as well as its implications for local communities and economic development. The central conclusion was that no digital revolution—whether driven by AI, data centers, or advanced computing infrastructures—can occur without a sufficient, reliable, and scalable energy supply.

The Twin Transition Challenge

This working session addresses a critical challenge within the electricity–digital nexus. The core objective is to manage the rapid expansion of electricity demand without undermining the goals of the energy transition. These two interdependent objectives are inherently tension-laden, as the growth of digital infrastructure risks compromising climate targets.

According to the International Energy Agency (IEA), digitalization—particularly through data centers, AI systems, and computational infrastructure—will significantly increase electricity demand (IEA, 2024; Jones, 2018). The IEA estimates that electricity consumption from data centers alone could double by 2030 (IEA, 2024). This expansion is expected to exert upward pressure on both energy intensity and greenhouse gas emissions (Jenkins et al., 2023; Patterson et al., 2021).

The concept of the twin transition was formalized by the European Commission in the aftermath of the COVID-19 crisis and has since guided European policy priorities and funding allocations. It seeks to align decarbonization strategies with digital transformation, particularly through the expansion of AI capabilities and data infrastructure. The overarching objective is to develop a robust digital ecosystem for citizens, institutions, and firms. However, despite substantial financial commitments, empirical outcomes remain mixed and uneven across member states.

The European Approach

The European approach, led by the European Commission, aims to reconcile energy transformation and digitalization through an integrated policy framework often referred to as Twin Transition Integration. On one hand, it advances energy transformation through the European Green Deal, which targets climate neutrality by 2050 via decarbonization, biodiversity protection, and sustainable industrial development (European Commission, 2020). On the other hand, it promotes a digital strategy centered on AI development, advanced digital infrastructure, and the expansion of a data-driven economy (European Commission, 2021).

Substantial public funding has been directed toward green innovation, digital infrastructure, and industrial transformation through instruments such as the Recovery and Resilience Facility. Despite these efforts, significant challenges persist. Evidence suggests that aligning increasing electricity

demand with sustainability objectives remains highly complex (Saleh & Hosam, 2024), particularly given the energy intensity of AI and data center operations.

A critical limitation is that the continuous, high-load electricity demand required by AI systems cannot be reliably met through intermittent renewable sources alone. This constraint reintroduces fossil fuels into the energy mix, thereby undermining emissions reduction targets. Nuclear energy has re-emerged as a potential alternative after decades of decommissioning across Europe (World Nuclear Association, 2026), although it remains politically contested.

The Draghi Report on European competitiveness (European Commission, 2024) identifies structural dependencies that constrain the twin transition, including reliance on external energy supplies, semiconductors, and critical raw materials. These dependencies raise concerns about the feasibility of achieving both digital leadership and energy sovereignty (Cefaratti-Bertin, 2024). Simultaneously, ambitious decarbonization policies have reshaped European industrial sectors (European Commission, 2021), in some cases eroding global competitiveness (Jenkins et al., 2023). The long-term objective remains the development of a resilient energy system with a diversified energy mix capable of supporting large-scale AI deployment.

What Does “Getting It Right” Mean in Practice at the EU

For the European Union, “getting it right” entails a coordinated set of policy actions designed to align digital expansion with clean and reliable energy supply:

a) Policy integration across member states through the coordination of energy, industrial, and digital strategies.
b) Large-scale infrastructure investment in renewable energy systems, smart electricity grids, and digital networks.
c) Technological innovation to accelerate the provision of reliable, affordable, and low-carbon electricity.
d) Energy security through diversification of supply sources and reduced external dependence.

These policy priorities are supported by extensive governance mechanisms, including National Energy and Climate Plans (NECPs), which align national strategies with EU-wide targets, and the Digital Decade Policy Programme (2030), which establishes benchmarks for AI adoption, connectivity, and digital skills development.

However, the scale of financial resources, institutional capacity, and policy coordination required for this model limits its replicability in the South Atlantic region and, to some extent, across the broader North Atlantic.

The North American Approach

In the United States, the institutional foundation of the twin transition is embedded in major legislative frameworks, including the Inflation Reduction Act (2022), the CHIPS and Science Act (2022), and the Infrastructure Investment and Jobs Act (2021). Collectively, these policies support a strategy aimed at achieving digital, technological, and economic sovereignty.

The U.S. approach differs from the European model in its emphasis on market mechanisms, fiscal incentives, and industrial policy rather than regulatory harmonization. During the Biden

administration, a subsidy-driven model was implemented to simultaneously support decarbonization and digital expansion, albeit with less integrated policy coordination than in the European Union.

More recently, shifts in political leadership have led to a partial reorientation toward traditional energy sources, although the underlying legislative framework remains in place. The rapid increase in electricity demand associated with AI and data centers has also renewed interest in nuclear energy as a stable, low-carbon baseload power source.

Overall, the U.S. model prioritizes economic competitiveness and technological leadership, relying on market-based instruments to drive the transition. While both the United States and the European Union pursue similar objectives—namely renewable energy expansion and digital infrastructure development—their policy approaches diverge significantly in terms of governance and implementation (Jenkins et al., 2023).

The Latin American and African Approach

In Latin America and Africa, the twin transition is primarily framed within a development-oriented paradigm focused on social inclusion and economic transformation (CEPAL, 2022). It is viewed as a mechanism to reduce structural inequalities and bridge the technological gap with advanced economies (Bárcena et al., 2020).

However, digital expansion remains constrained by persistent deficiencies in energy access and infrastructure reliability (Sovacool, 2016). In this context, policy priorities emphasize equity, access, and development rather than industrial or technological sovereignty. At the same time, the region's abundant renewable energy resources present significant opportunities, particularly in the context of growing global demand for low-cost, low-carbon electricity.

Structural constraints remain substantial, including infrastructure gaps (Sánchez Molina et al., 2022), limited fiscal capacity, and fragmented policy environments. These challenges are further exacerbated by technological disparities and uneven regional integration.

While mobile-based digital services are expanding rapidly—particularly in Africa—energy access remains a critical bottleneck. With over 600 million people lacking access to electricity, the expansion of energy-intensive digital infrastructure raises concerns regarding social equity and potential distributional conflicts.

Despite these limitations, the Pan-Atlantic region exhibits significant complementarities that could generate mutual benefits if effectively coordinated.

What Will a Pan-Atlantic Twin Transition Require?

A Pan-Atlantic approach will require a sophisticated governance architecture grounded in international cooperation, geoeconomic alignment, and institutional coordination. This necessitates the active engagement of policymakers across the region in the development of a shared strategic vision.

Governments must recognize both the opportunities and risks associated with technological transformation. Public authorities, private sector actors, and civil society organizations must

collaborate to establish a coherent and coordinated policy framework. This forum may serve as an initial platform for such engagement.

Institutional capacity and governance mechanisms are critical. Unlike the European Union, the Pan-Atlantic region lacks supranational institutions capable of enforcing compliance, which complicates coordination efforts. The absence of binding legal frameworks represents a significant barrier to effective integration.

Geopolitical tensions may further hinder cooperation. However, a shared strategic vision supported by multilevel governance structures could mitigate these challenges. Addressing disparities in development, resources, and institutional capacity will require sustained cooperation and targeted policy interventions.

Significant financial resources and innovative financing mechanisms will be necessary to support infrastructure development across both energy and digital domains. A credible and coherent strategy could attract investment from global financial institutions.

The key inputs for balancing electricity demand with regional supply include institutional coordination, policy alignment, and a commitment to a just and equitable transition. As emphasized by Jenkins et al. (2023), such socio-technical transformations require robust governance, capable institutions, and sustained social legitimacy.

A Pan-Atlantic Approach

Artificial intelligence has effectively transformed electricity into a strategic input for digital power. Within this context, the Pan-Atlantic region presents unique opportunities for coordinated development.

A convergence-based strategy could enable the region to emerge as a global hub for AI infrastructure. Data centers—the physical backbone of AI systems—can be strategically located across the region, leveraging diverse and complementary energy resources.

The availability of relatively low-cost electricity, land, and water constitutes a significant comparative advantage for hyperscale data center deployment. Furthermore, there is considerable potential for enhanced grid interconnectivity across the region.

As AI infrastructure becomes increasingly sensitive to location-specific factors, it is likely to concentrate in regions that offer affordable, reliable, and low-carbon electricity. Several areas within the Pan-Atlantic region are well positioned to meet these conditions.

References

Bárcena, A., Cimoli, M., & Pérez, R. (2020). *The climate emergency and the development crisis in Latin America and the Caribbean*. CEPAL.

Cefaratti-Bertin, C. (2024, February 12). Renewable energy goals are unattainable by 2050. Baylor University. https://news.web.baylor.edu/news/story/2024/renewable-energy-goals-are-unattainable-2050

CEPAL. (2022). *Digital transformation and energy transition in Latin America*.

European Commission. (2020). *A European Green Deal*. https://eur-lex.europa.eu

European Commission. (2021). *Digital Decade Policy Programme 2030*.

European Commission. (2024). *The future of European competitiveness (Draghi Report)*.

International Energy Agency (IEA). (2024). *Electricity Market Report*. https://www.iea.org/reports/electricity-market-report-2024

Jenkins, J. D., Mayfield, E., Larson, E., & Pacala, S. (2023). Climate policy and industrial strategy in the United States. *Energy Policy, 171*, 113246. https://doi.org/10.1016/j.enpol.2022.113246

Jones, N. (2018). How to stop data centres from gobbling up the world's electricity. *Nature, 561*(7722), 163–166. https://doi.org/10.1038/d41586-018-06610-y

Patterson, D., Gonzalez, J., Le, Q., Liang, C., Munguia, L., Rothchild, D., So, D., Texier, M., & Dean, J. (2021). Carbon emissions and large neural network training. *Joule, 5*(9), 1–23. https://doi.org/10.1016/j.joule.2021.09.004

Sánchez Molina, P., et al. (2022). Energy transition pathways in Latin America. *Renewable and Sustainable Energy Reviews, 162*, 112425. https://doi.org/10.1016/j.rser.2022.112425

Sorrell, S., et al. (2020). Energy rebound effects. *Energy Policy, 135*, 111011. https://doi.org/10.1016/j.enpol.2019.111011

Sovacool, B. K. (2016). How long will it take? Conceptualizing the temporal dynamics of energy transitions. *Energy Research & Social Science, 13*, 202–215. https://doi.org/10.1016/j.erss.2015.12.020

U.S. Government. (2021). *Infrastructure Investment and Jobs Act*.

U.S. Government. (2022). *CHIPS and Science Act*.

U.S. Government. (2022). *Inflation Reduction Act*.

World Nuclear Association. (2026). *Dismantling nuclear facilities*. https://world-nuclear.org