

Ensuring Europe's Energy Security: Green Hydrogen and the Role of Boundary Spanners

Executive Summary

The war in Ukraine has revealed significant vulnerabilities in Europe's energy system, highlighting its dependence on Russian fossil fuels and the urgent need to diversify energy sources. Green hydrogen emerges as a key solution, offering a clean and sustainable option to power sectors such as transportation, heavy industry, and energy storage.

The implementation of green hydrogen technologies requires transnational collaboration, substantial investment, and effective coordination between public and private sectors. Boundary spanners, operating at the interface between organizations, play a crucial role in facilitating strategic alliances. This document explores the potential of green hydrogen to address Europe's energy crisis, emphasizing the importance of boundary spanners and examining specific cases such as Chile and Denmark, leaders in renewable energy.

Introduction

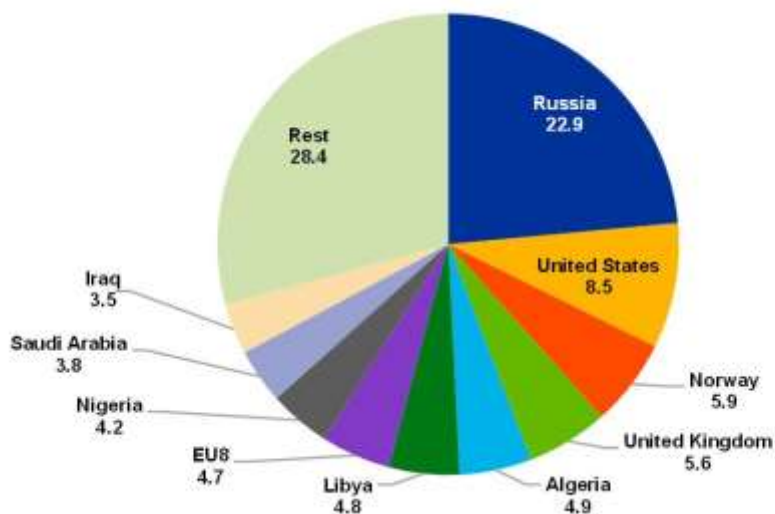


Chart of Energy imports by source country (percentages) Sources: Eurostat and ECB calculations

The Russian invasion of Ukraine has caused humanitarian devastation and triggered a global energy crisis, severely impacting Europe. Energy prices have reached historic highs, affecting households, industries, and national economies. This crisis underscores the need to diversify energy sources to ensure Europe's energy security while meeting global climate commitments.

Green hydrogen offers a viable and sustainable solution. This fuel, produced through electrolysis powered by renewable energy, generates no carbon emissions and has the potential to revolutionize industries and transportation. However, its implementation faces challenges such as high initial costs, limited infrastructure, and organizational barriers.

In this context, boundary spanners play a key role, acting as intermediaries to facilitate public-private partnerships (PPPs) and connect governments, businesses, and researchers to mobilize resources and overcome collaboration barriers. This document examines how these dynamics can be leveraged to accelerate the energy transition, with Chile and Denmark as key case studies.

The Role of Boundary Spanners

Boundary spanners operate at the interface between public and private organizations to facilitate complex collaborations. Their importance lies in their ability to overcome organizational, cultural, and trust barriers, creating the conditions needed to implement high-impact transnational projects, such as those involving green hydrogen.

Key Functions of Boundary Spanners

1. Connecting Stakeholders:
 - Identifying and linking key actors across sectors, such as scientists, investors, and policymakers.
 - Bridging the gap between political priorities and technical capacities, ensuring clear and achievable goals.
2. Facilitating Public-Private Partnerships (PPPs):
 - Managing relationships within PPPs, designing collaborative structures that optimize resources and mitigate risks.
 - Promoting knowledge exchange between public and private sectors to accelerate the implementation of innovative solutions.
3. Reducing Organizational Distances:
 - Autonomy: Facilitating agreements that respect organizational independence while maximizing shared benefits.
 - Culture: Mitigating differences in organizational approaches and values across sectors.
 - Caution: Building trust between new or untested partners to ensure strong, lasting commitments.

Quantum Dimension: A Private Company Driving Strategic Alliances

Quantum Dimension is a private company that acts as a project consultancy, specializing in connecting Europe and Latin America through the facilitation of strategic partnerships in key areas such as education, science and technology, sustainable business, and renewable energy.

The company's mission is to build bridges that enable knowledge exchange, resource sharing, and investment between these regions, contributing to economic, social, and scientific development through innovative projects.

Focusing on renewable energy, Quantum Dimension promotes green hydrogen initiatives, positioning itself as a boundary spanner that connects key stakeholders to implement sustainable technological solutions.

Green Hydrogen: An Opportunity for the Energy Transition

Green hydrogen is a clean energy source produced through electrolysis powered by renewable electricity such as solar or wind.

Advantages of Green Hydrogen

1. Zero Emissions: Generates no greenhouse gases during production or use.
2. Versatility: Useful for transportation, industrial processes, and energy storage.
3. Sustainability: Leverages renewable energy to reduce reliance on fossil fuels.

Challenges to Consider

1. High Costs: Electrolysis remains more expensive than traditional methods.
2. Limited Infrastructure: Requires specific networks for transport and storage.
3. Water Demand: Ensuring sustainable access to pure water is essential.

Chile and Denmark: A Strategic Alliance for Green Hydrogen

Chile: A Solar Energy Leader



Chile boasts one of the highest solar radiation levels in the world in the Atacama Desert, positioning it as a leader in low-cost green hydrogen production with significant export potential.

- **Developing Infrastructure:** Renewable energy projects dedicated to hydrogen production for export.
- **Global Competitiveness:** Low production costs and clear strategies for 2030.

Denmark: A Wind Energy Pioneer



Denmark leads globally in wind energy generation.

- **Technological Expertise:** Companies such as Vestas and Ørsted are global references in the sector.
- **Hydrogen Integration:** Pilot projects leveraging wind energy surpluses to produce green hydrogen.

Chile-Denmark Collaboration

A partnership between these countries could include:

1. **Technology Transfer:** Denmark shares its wind energy expertise while Chile maximizes its solar potential.
2. **Shared Production:** Chile produces hydrogen for export using Denmark's logistical infrastructure.
3. **Facilitation by Boundary Spanners:** Boundary spanners connect key stakeholders to ensure the partnership's success.

Recommendations

1. Strengthen the Role of Boundary Spanners:
 - Develop Transnational Platforms: Structured platforms should facilitate collaboration between public, private, and academic sectors, particularly in renewable energy technologies. Boundary spanners must play a central role in coordinating investment, technology transfer, and research.
 - Provide Public and Private Incentives: Governments should design policies to support boundary spanners, enabling the implementation of green hydrogen projects and other renewable technologies through tax incentives and access to research funds.
2. Foster Transnational Alliances in Renewable Energy:
 - Europe-Latin America Collaboration: Strengthen transatlantic energy partnerships to reduce dependence on fossil fuels, promoting cooperation between countries like Chile and Denmark.
 - Integrate Energy Infrastructure: Regional energy infrastructure (including hydrogen and renewable networks) should be prioritized to enable efficient distribution of Chilean green hydrogen to Europe via Denmark.
3. Promote Investment in Green Hydrogen:
 - Establish Global and European Energy Transition Funds: Create funding mechanisms to prioritize green hydrogen projects, supported by public and private contributions.
 - Diversify Investment Sources: Encourage international private funds to invest in transnational green hydrogen projects through fiscal incentives and investment guarantees.
4. Develop Effective and Coordinated Regulatory Frameworks:
 - Strengthen European Policies for Hydrogen: Develop clear regulations for the production and trade of green hydrogen to align with global climate commitments.
 - Harmonize Regulations Across Regions: Establish international agreements to create a global green hydrogen market facilitated by boundary spanners.
5. Boost Education and Training in Clean Technologies:
 - Educational and Technical Exchange Programs: Foster knowledge sharing between Europe and Latin America, strengthening local capabilities and accelerating the adoption of clean technologies.

Conclusion

The energy crisis triggered by the invasion of Ukraine highlights the urgent need to diversify energy sources. Green hydrogen represents a promising solution, but its implementation requires international cooperation, clear regulatory frameworks, and the support of boundary spanners.

Chile and Denmark, with their renewable energy strengths, offer a model for leading the global energy transition. Their strategic collaboration could strengthen Europe's energy security, reduce reliance on fossil fuels, and contribute to a more sustainable future.

Strategic alliances between Europe and Latin America, supported by boundary spanners, will be crucial to ensuring the success of the energy transition. International cooperation, investment in clean technologies, and the creation of a global green hydrogen market are essential steps toward a safer, more sustainable, and equitable energy future.

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