S&P Global
Commodity Insights

CI Consulting

Powering the future with EU-MENA interconnections

Unlocking Energy Security and Decarbonization with EU-MENA interconnections.

EMEA Power and Renewables Consulting

May 2025

For the European Union, new cross-border lines with Middle East and North Africa are a powerful enabler for energy transition, enhancing system security and competitiveness

Power grids are the backbone of Europe's energy transition, and the EU is raising the bar

Merchant lines dominate the pipeline of projects, holding **80%** of the announced capacity, but regulated lines are closer to realization

The widespread blackout in Spain on April 28 has accentuated the vulnerabilities in the European Union's (EU) power grid system. It also brought to the fore the criticality of strong interconnected grids in reducing the frequency and severity of such disruptions.

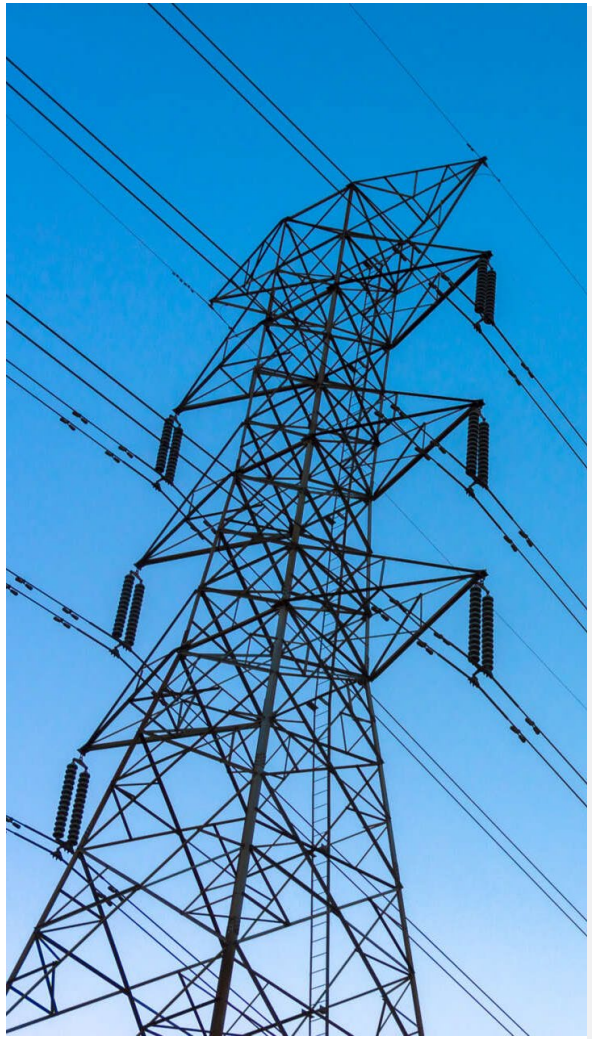
To wit, the EU considers cross-border interconnections as crucial for ensuring energy security and recognizes their strategic importance. They drive competitiveness by closing price gaps between markets, integrating renewables, and boosting grid reliability. Clear targets, such as the 15% interconnection capacity per Member State, underline Europe's ambitions, backed by robust policy frameworks to accelerate grid investments.

Europe's energy future depends on delivering these interconnected grids swiftly and effectively, and project developers, policymakers and utilities need to align infrastructure decisions with these targets.

While the latter mainly aim to strengthen the EU's adequacy and flexibility, merchant lines are driven by market price signals and attractive arbitrage opportunities to export low-cost electricity to meet Europe's rising clean electricity demand (e.g., for green hydrogen). The Mediterranean area holds a uniquely favorable position, contributing to the EU's strategic goals thanks to its abundant low-cost renewable energy resources.

Stakeholders must act now on two parallel fronts: by leveraging TSO expertise to advance regulated interconnectors, and by developing targeted support to unlock the large backlog of merchant projects.

Strategic coordination is our differentiator: We bring cross-sectoral perspectives that align institutional ambitions with practical delivery



Huge opportunities come with **complex challenges**; it is critical to **address them now**

At S&P Global CI Consulting, we combine system-level insights with **commercial and regulatory expertise** to deliver unmatched clarity on cross-border interconnection strategies

To unlock this potential, a series of regulatory, geopolitical and operational challenges must be addressed first. While regulated lines could benefit from the inclusion in National TSO plans and public backing, merchant lines face a more fragmented permitting process and must obtain regulatory exemptions to operate under market-based rules. Moreover, cross-border coordination, cost-sharing and system integration mechanisms remain fragmented and project-specific. Political instability, supply chain constraints and public opposition (particularly in relation to environmental and social concerns) add further uncertainty.

Addressing these barriers is critical to support the EU's long-term energy transition.

What sets us apart is our ability to bridge the gap between energy policy, market dynamics and infrastructure economics, delivering not just technical analysis, but strategic foresight too. We help stakeholders evaluate interconnection opportunities through **cost-benefit assessments**, analyze market and system impacts of specific projects, and navigate regulatory complexities with precision. Our proven track record showcases our ability to lead **integrated, cross-country analyses** across different dimensions and technologies, helping stakeholders identify joint priorities and map out coordinated pathways.

In this White Paper, we leverage our expertise to explore a strategic case for deeper EU-MENA grid integration, framed around system needs. We summarize the key drivers, the EU's evolving policy landscape, current initiatives, opportunities and challenges that must be addressed to turn infrastructure ambition into reality.

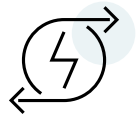
European system needs and targets for interconnections deployment

The EU aims to develop new cross-border power interconnections that enhance energy security, competitiveness, integration of renewables, and grid reliability

To meet its ambitious climate and energy targets, the EU is focused on accelerating the deployment of critical grid infrastructure by modernizing existing grids, expanding interconnectors between Member States and facilitating the exchange of power across zones to balance demand and supply.

The **main purposes** of building new interconnections are addressing different system needs:

Energy security
Interconnectors increase **security of supply** across Europe by providing additional capacity that can be available to neighboring markets, **reducing energy dependency** from external sources.



Competitiveness
Interconnections **enable better power exchanges** and foster price convergence, enhancing competition and **reducing energy prices**.

Renewable integration
Interconnections **facilitate the transfer of clean electricity** from high-generation countries to energy intensive areas, enabling the **integration of increasing renewable** production.

Grid reliability
Interconnections are one of the solutions to **increase the flexibility** of the system, preventing disruptions and **reducing the risk of blackouts**.

The needs of the power system drive measurable targets and recommendations[1], ensuring new interconnectors contribute concretely to the EU's energy transition

Energy security

Member States must enhance their capability of importing electricity under stress (e.g., low domestic RES output, extreme weather, supply shocks) to reduce reliance on fossil fuels.

Target

15% interconnection capacity

Each Member State must reach at least 15% electricity interconnection capacity relative to its installed generation capacity by 2030 (Regulation 2018/1999).

Competitiveness

A well-functioning internal market should lead to competitive electricity prices for all Europeans. Cross-border capacity should support Member States to minimize price differences.

Recommendations

2 €/MWh price differential

Wholesale price differentials should not exceed an indicative threshold of 2€/MWh between Member States or bidding zones. New interconnectors should be prioritized if differentials are higher.

Renewable integration

Renewable electricity transmission across Member States should be enhanced and optimized, reducing clean power curtailment and creating electricity favorable corridors.

30% of RES installed capacity

The nominal transmission capacity of interconnectors in each country should be above 30% of the installed renewable capacity. New interconnectors should be prioritized if this share is lower.

Grid reliability

Cross-border capacity should contribute to covering the peak demand across Member States, enhancing system adequacy and flexibility to respond to extreme conditions.

30% of peak demand

The nominal transmission capacity of interconnectors in each country should be above 30% of their peak load. New interconnectors should be prioritized if this share is lower.

Project developers, policymakers and utilities need to align infrastructure decisions with these targets.
We can help quantify performance against EU benchmarks and support project justification.

1. Recommendations are available in the «Towards a sustainable and integrated Europe" (2017) published by the expert group on electricity interconnection, established by the European Commission in 2016.

Several projects across the continent signify the efforts of the EU and member states towards achieving their climate and energy targets, and following their strategic goals

Baltic Synchronisation Project

The three Baltic states have recently disconnected from the Russian-Belarus power grid and synchronized with the European power grid, realizing an 18-year-long goal. This process has been also enabled by a series of **interconnection realized in 2006-2015** (Estlink 1 and 2, Nordbalt and the LitPol Link), **connecting the Baltics with Finland, Sweden and Poland**, enhancing their **energy independence** and **security of supply**. Further efforts are ongoing to strengthen this cross-border infrastructure (e.g., Harmony Link).

The Viking Link

Since 2024, the UK and Denmark are connected through a 1,400MW undersea cable, the Viking Link, that **increases the adequacy of the UK's island power system** by connecting it to the EU power grid. This connection also **enhances the flexibility** of the UK's power system, reducing the risks of frequency events and ensuring a more stable and reliable supply of electricity, managing the intermittent nature of renewable energy sources.

Kriegers Flak Combined Grid Solution

Germany and Denmark have increased their level of interconnection through the development and commissioning of the World's first **offshore hybrid interconnector** since 2020. Kriegers Flak CGS combines offshore wind farms with cross-border electricity exchange between Denmark (Kriegers Flak) and Germany (Baltic 2), through a 400 MW interconnection, enabling the **integration of additional volumes of renewable electricity**. This example can be replicated in other areas in terms of business model and technical solutions.

Italy-France interconnection

Since 2023, a new 1,200MW HVDC power line increased the exchange capacity between Italy and France up to 4,350MW, **improving the access on the Italian peninsula to the European electricity market**, and enhancing **electricity market integration** in the context of the Single Day-ahead Coupling (SDAC) in the pan European cross zonal day-ahead electricity market.

Reinforcement of EU cross-border capacity has historically been supported by policies providing for new lines and streamlining their development

Energy Union strategy (COM/2015/080)

- Published in February 2015
- The goal of the strategy is to create an energy union to allow **affordable, sustainable, and secure access to energy**
- The energy union has to be developed across five dimensions. One of them is the creation of a **fully integrated internal energy market** based on the build-up of adequate infrastructure to enable free flow of energy through the EU and reduce regulatory barriers

Governance of Energy Union and Climate Action Regulation (2018/1999)

- Came into force in December 2018
- The regulation established a governance mechanism to implement all **measures to meet the EU's objectives and targets** for addressing energy and climate challenges
- It sets a **target for member states of 15% of electricity interconnectivity by 2030**, while also accounting for other indicators such as price differential in the wholesale market and nominal interconnection capacity in relation to peak load and renewable installed capacity

Trans-European Networks for Energy (TEN-E) Regulation (2022/869)

- Came into force in June 2022
- It put in place a **regulatory framework to speed up the development of grid capacity** across the different EU regions
- The regulation has established the **criteria for the eligibility of projects** of common interest and projects of mutual interest for the regional groups

EU Action Plan for Grids (COM/2023/757)

- Published in November 2023
- The plan outlines a **strategic framework to enhance the electricity grid infrastructure** across Europe, addressing the challenges posed by energy transition
- The framework includes accelerating the implementation of PCIs[1], improving long-term grid planning, introducing regulatory incentives, enhancing grid usage, improving access to finance, and strengthening supply chains

Net-Zero Industry Act (NZIA) Regulation (2024/1735)

- Came into force on June 29, 2024
- The regulation aims to **improve manufacturing capacity of clean technologies in the EU** across components, thereby increasing the bloc's competitiveness in the energy transition space and supporting energy resilience
- It sets a **target of at least 40% of EU annual net-zero technology build-up** coming from internal manufacturing capacity by 2030**. Grids are included in the list of net-zero technologies** that are considered in the regulation

Affordable Energy Action Plan (COM/2025/79)

- Presented in February 2025 as part of the Clean Industrial Deal
- The plan aims to **lower energy costs across the EU** through a set of actions, including:
  - **Optimization of investments in new grids**, with network tariffs reflecting the real cost of energy
  - **Faster permits for grids** and new interconnectors for enhanced cross-border trading

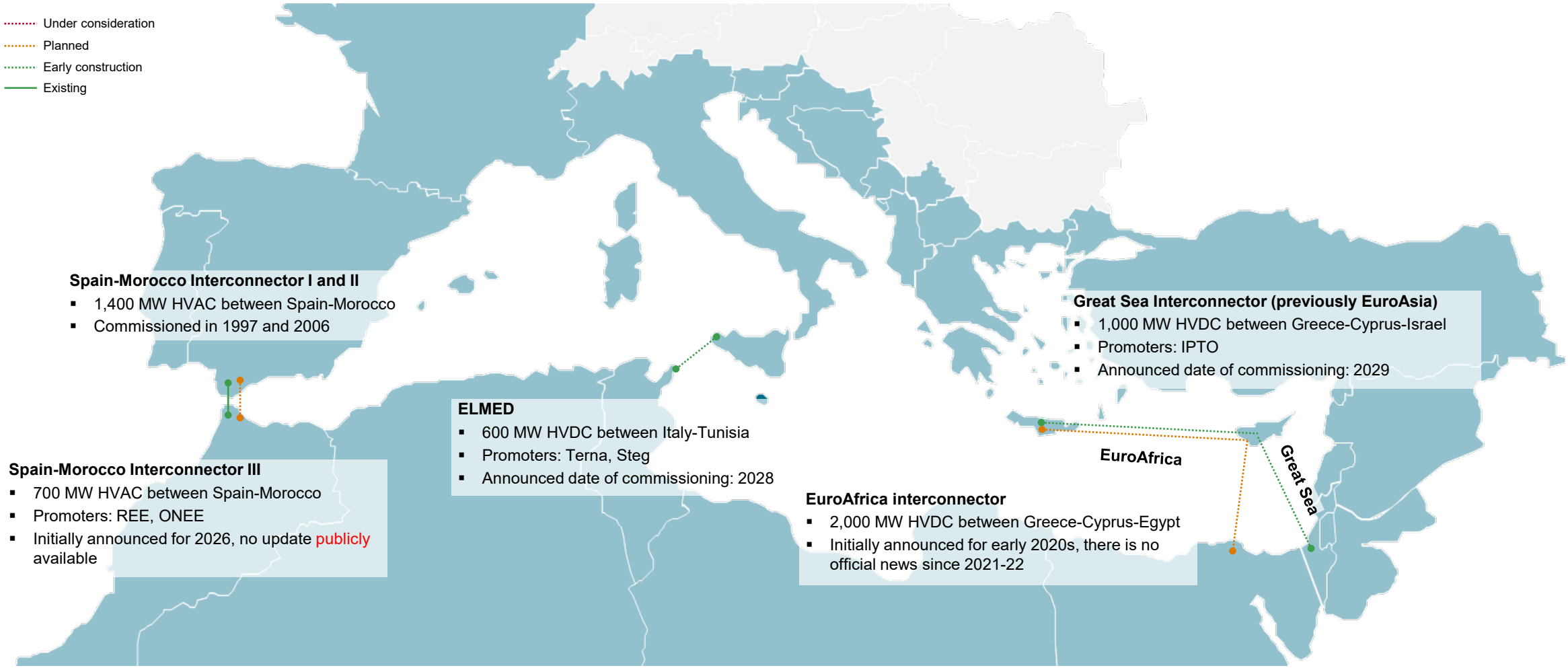
Future developments

Grids manufacturing package. The European Investment Bank will launch a 'Grids manufacturing package' to provide counter-guarantees and other de-risking support to manufacturers of grid components.

1. PCIs: Projects of common interest.

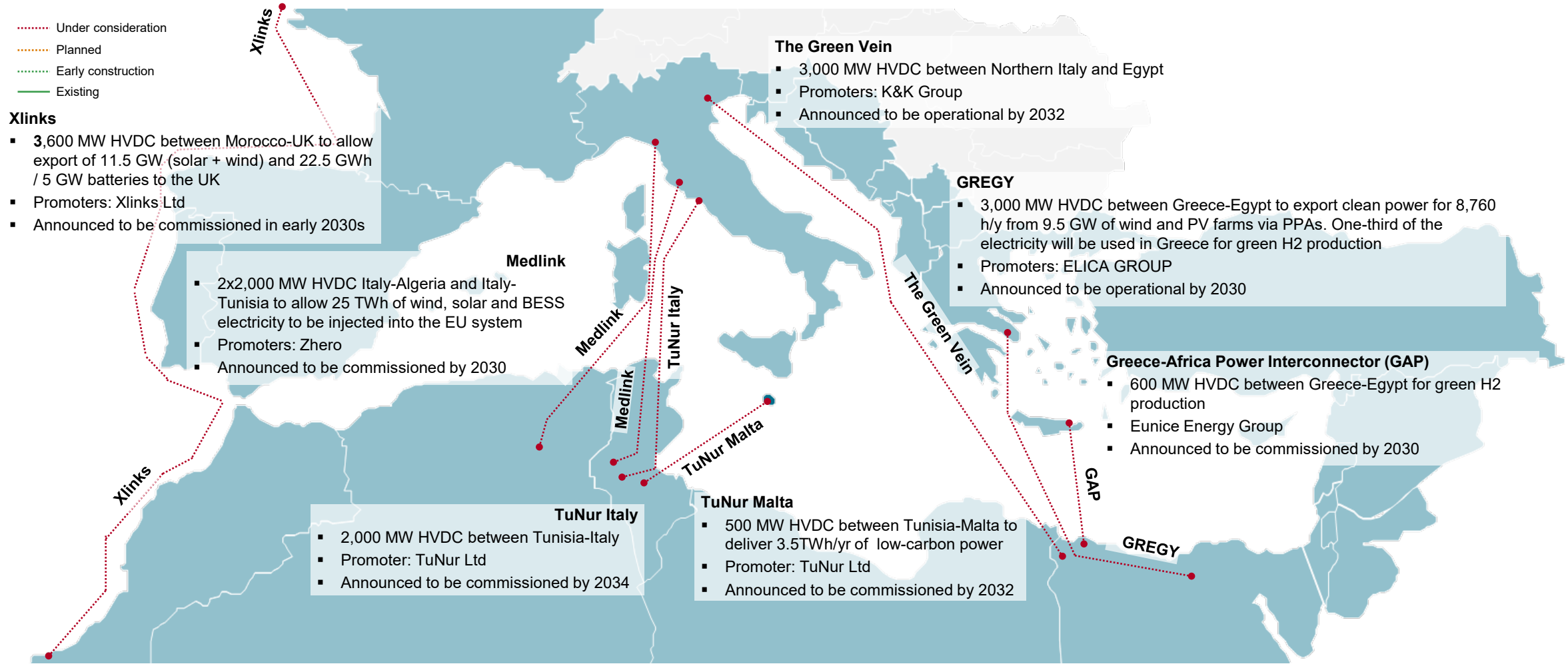
Existing and planned projects between MENA and EU countries

Several TSOs[1] are planning new **regulated** cross-border undersea interconnectors to unlock cheap low-carbon electricity in MENA to enhance EU's system adequacy and balance the grid



Source: S&P Global for existing lines. The commissioning years and the status of the projects are based on ENTSO-E TYNDP 2024 or national TSOs plans.

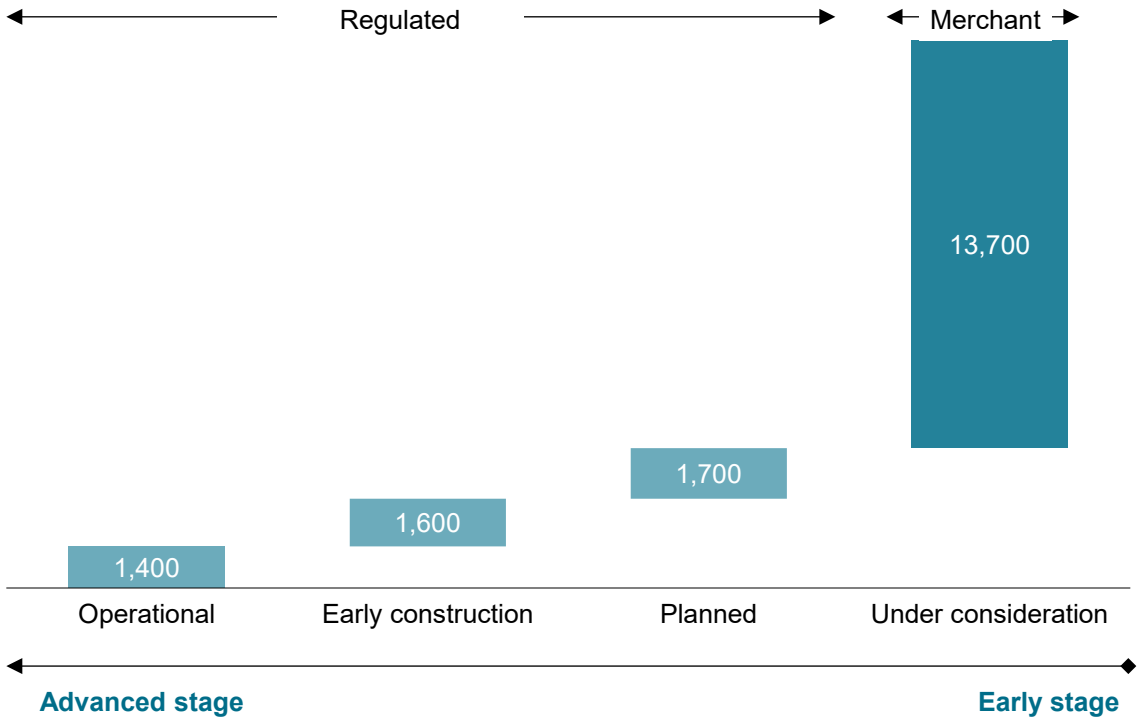
Non-TSO companies are also considering new **merchant** power lines to meet the EU's rising demand (e.g., for H2) with MENA's renewable resources over the long term



Source: The commissioning years and the status of the projects are based on ENTSO-E TYNDP 2024 or national TSOs plans.

Most of the interconnection capacity under development between Europe and MENA relies on merchant business models (13.7 GW of 17.0 GW, or 80%), implying high financial risk

Existing and under development interconnection capacities between MENA and Europe
MW



- As of today, the operational exchange capacity between MENA and European countries is limited and comprises **two lines** (Spain-Morocco) totaling 1,400 MW.
- Among all projects, only a few regulated lines (**Elmed** project between Italy-Tunisia and **Great Sea Interconnection** between Greece-Cyprus-Israel) have reached the construction phase (for a total of 1,600 MW), although still at a preliminary stage.
- The large backlog of merchant projects, which account for almost 14,000 MW, suggests waning interest from non-TSO companies, **although their projects are still in the early stages. These projects carry significant financial risks**, i.e. these do not have the typical guarantees provided to regulated projects, and, hence, could face a range of challenges in achieving final investment decision.

Stakeholders must act now to evaluate and prioritize interconnection corridors that can deliver the greatest system value. We have expertise in supporting this through strategic energy system modeling and scenario analysis.

Source: S&P Global for Operational lines. The commissioning years and the status of the projects are based on ENTSO-E TYNDP 2024 or national TSOs plans.

Regulated lines are mainly driven by system reliability needs, whereas merchant lines are driven by price signals and subject to investor risk appetite

	Ownership	Permitting	Cost recovery model	Risk profile	Market integration
Regulated lines	**Transmission system operators**	**Easier** – Typically backed by ministries and regulators, which improves coordination and timeline predictability	**Regulated tariffs** and congestion rents	**Low** – Costs are covered by regulated tariffs	**Fully integrated** into regulated market operations (implicit capacity auctions)
Merchant lines	**Private investors**, developers, infrastructure funds	**Longer** – Developers must also apply for exemptions from certain EU rules (e.g., third-party access, use-of-revenues, and regulated tariffs) under Article 63 of Regulation (EU) 2019/943	**Congestion rents**, **explicit capacity auctions**, and long-term agreements	**High** – Projects are fully exposed to market risk, price spreads, and utilization risk	**Market-driven** operations; flexibility to respond to market signals

Merchant lines are rapidly gaining momentum owing to continued decline in renewable costs in MENA, triggering strategic opportunities to export abundant low-carbon power to the EU

Declining LCOE	The levelized cost of electricity (LCOE) from solar and wind in North Africa and the Middle East has **sharply declined in recent years**, making the region's renewable electricity increasingly competitive and attractive for private investors to export to European countries.
Private capital availability	There is increased interest from private investors seeking opportunities to **achieve attractive returns by accessing abundant, affordable renewable resources in MENA countries**. Infrastructure funds and energy investors are increasingly interested in long-term, contracted assets that offer exposure to clean energy exports and market spreads, especially in a high-interest rate, high-volatility environment.
Price spreads	Structural differences in electricity prices in Europe, driven by higher carbon costs, fuel prices, and congestion, create **profitable cross-border arbitrage opportunities**, which merchant lines are designed to exploit.
Energy-intensive off-takers	Corporates and utilities in Europe are seeking **long-term access to green electricity to meet decarbonization commitments** (PPAs, green hydrogen production, etc). Merchant interconnectors also provide a dedicated route to import clean power[1] from new regions.
First-mover advantage	Merchant line developers are often vertically-integrated, owning and operating generation facilities in MENA as well. These can, therefore, benefit from early strategic positioning to **monetize the generation surplus where local demand signals are still insufficient**.

Project developers, policymakers, and utilities need to align infrastructure decisions with these market trends. We can help quantify performance against EU benchmarks and support project justification.

1. Most promoters announced that bulk of their announced merchant lines are expected to be connected to renewable energy sources (eventually co-located with storage) developed by the same companies or partners

Challenges to be addressed

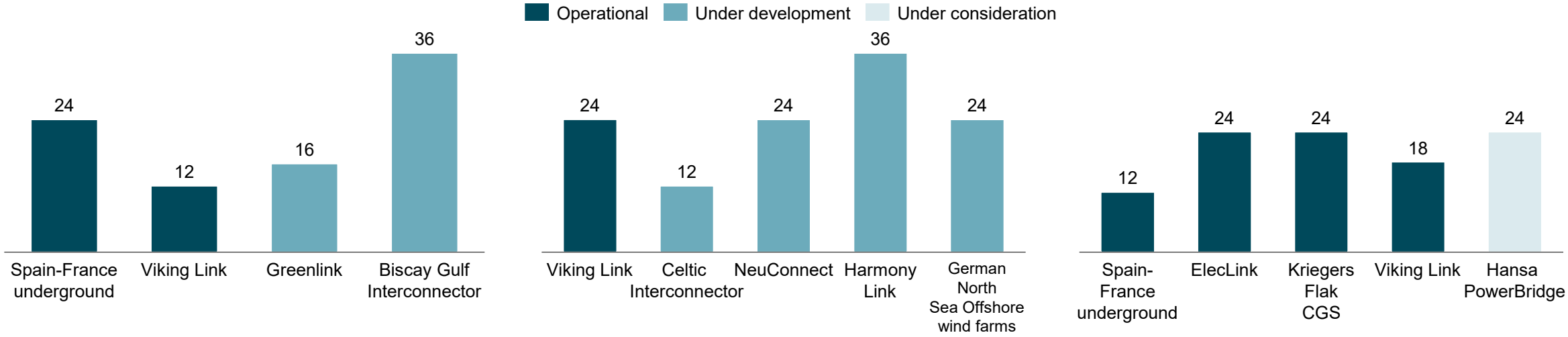
Regulatory, geopolitical and operational challenges must be addressed for enabling power flow through new interconnectors from MENA to EU countries

Key bottlenecks and challenges

Regulatory	**Permitting complexity**	Lengthy and complex permitting processes delay the approval and implementation of projects of common interest (PCIs), hindering the timely development and integration of critical energy infrastructure.
	Financing	High capital expenditure and constrained public resources, along with rising interest rates, limit access to financing for grid operators, creating barriers to necessary infrastructure investments.
Geopolitical	**Geopolitical risks**	Long-distance HVDC cables crossing international borders increase exposure to geopolitical tensions and instability, potentially disrupting long-term supply.
	Local or national opposition	Interconnector projects often face opposition from local communities due to concerns about environmental impact, energy access, and social implications. This can result in project delays or cancellations.
Operational	**Technical requirements and lack of technical knowledge**	Country-specific differences in grid standards and technology can lead to delays and add complexity to project execution (for instance, low-demand zones need to keep backup spinning power in case of outage).
	Limited operational flexibility	Fixed infrastructure limits adaptability to changing market conditions, technological advancements, and varying energy demand.
	Limited export potential	MENA countries are expected to face potential sustained growth rates in terms of domestic power demand. This will limit the power export potential, jeopardizing the economic viability of new merchant lines

Several cross-border interconnections in other EU areas have faced delays owing to complexity of regulations and technical solutions, besides supply-chain bottlenecks

Delays related to the permitting process (left), supply chain congestion (center), and technical complexity (right)
Months



- Lack of standardization requires complex adaptations or even new infrastructure to align the systems.
- Harmonized grid standards and technological coordination across borders can reduce the complexity and delays of projects.

- Procurement of key raw materials has become increasingly difficult, due to increasing demand and geopolitical tensions.
- Strengthening partnerships across the supply chain will be crucial for ensuring timely delivery of grid components.

- Cross-border interconnections face a labyrinth of regulatory approvals at various levels, including local, national, and EU institutions.
- Streamlining the permitting process through harmonized regulations, improved communication, and coordinated efforts can reduce delays.

Delay times are based on S&P research.

In other regions, projects have been halted or cancelled owing to opposition from local and national communities, based on concerns over their environmental and social impact

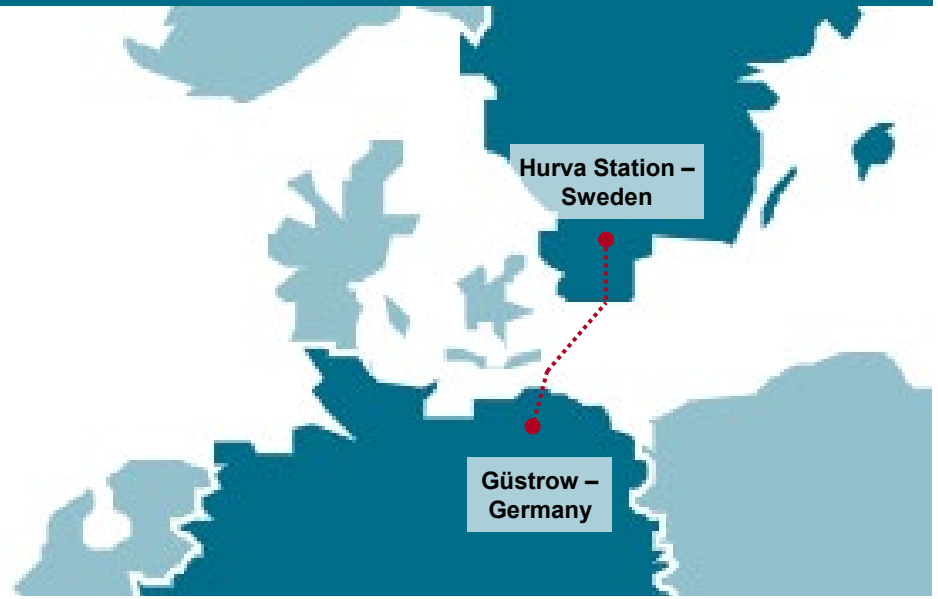
Example: Hansa PowerBridge (Sweden–Germany interconnection)

In June 2024, **the Swedish government rejected an application** to construct the connection due to concerns about inefficiencies in the German market.

The government feared that proceeding with **the project could lead to higher electricity prices** and greater instability in Sweden's electricity market.

However, the decision clarified that **the refusal does not rule out the possibility of establishing a connection between Germany and Sweden in the future**, should market conditions improve.

Project halted due to increasing risks of higher power prices in one country

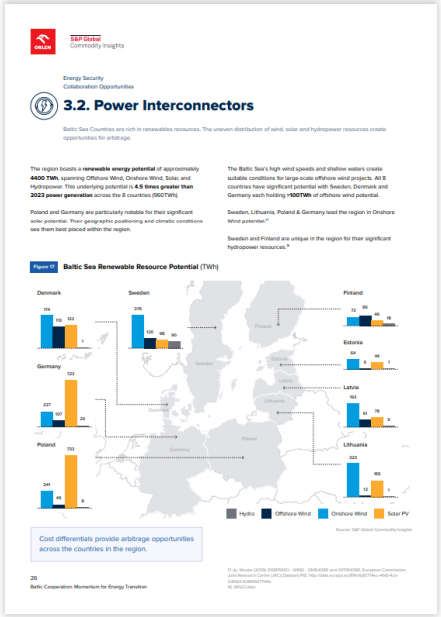


- Interconnection projects may encounter **opposition from local / national communities** due to concerns about environmental and social impact
- These concerns can lead to **significant delays** or even cancellations of critical infrastructure projects
- **Governments play a crucial role** in promoting the development of critical energy infrastructure and protecting local economies

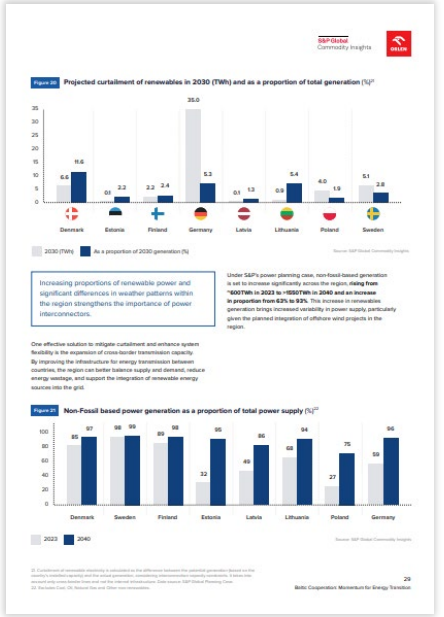
These risks can delay or derail projects. We work with stakeholders to de-risk project development by identifying regulatory gaps and supporting multi-country coordination.

Leveraging our proven expertise in interconnection projects to enhance energy security and drive decarbonization: '*Baltic Cooperation: Momentum for Energy Transition*[1]'

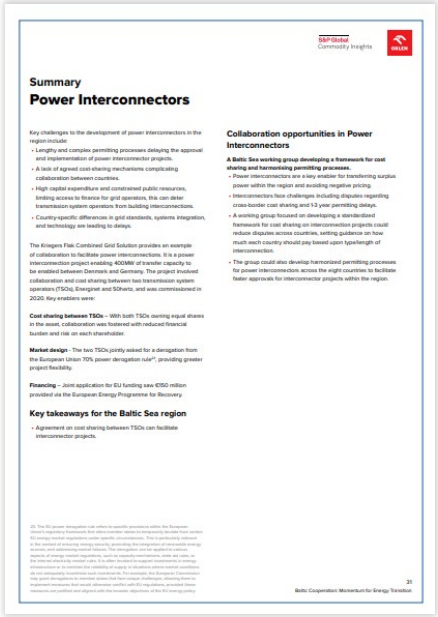
Discover how we supported Orlen in identifying challenges and collaboration opportunities across the Baltic Sea to strengthen energy security and foster decarbonization



Baltic Sea countries are rich in renewable resources. The uneven distribution of wind, solar, and hydropower resources creates opportunities for arbitrage



Additional interconnection capacity would be an enabler for decarbonization and **reduced power curtailment**



Several collaboration opportunities arise to address the challenges related to the development of interconnections in the region

1. The final report is available here.

Connect with our experts to discuss how we can support your decision-making

If you are a **utility, TSO, institution, regulator, investor, or developer**, our team can support you with **tailored, data-driven analysis** and strategic guidance to:

Evaluate specific interconnection corridors

Quantify costs, benefits, and system impacts

Navigate permitting and regulatory complexity

Assess market integration or cross-technology synergies

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