



Geopolitical Risk Index | Case Studies | 2025

The geopolitics of the **ENERGY INFRASTRUCTURE**

A comprehensive overview of emerging opportunities, strategic challenges, and critical dilemmas reshaping the world's energy landscape

In today's global landscape, energy is not only an economic asset, but a crucial instrument of geopolitical power. Energy infrastructures have central role in the international dynamics, and their strategic importance has been highlighted by recent events, particularly the war in Ukraine, which accelerated the reconfiguration of global energy relationships.

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From steam to storage: A journey through energy systems

A bit of history

1770s - First Industrial Revolution



The rise of **coal** and the **steam engine** led to the creation of the first major infrastructures: mines, railways, and industrial boilers.

1880s - Second Industrial Revolution



The emergence of **electricity** and oil marked a turning point. Infrastructure diversified: thermal power plants, early dams, urban electrical grids, oil refineries, and pipelines emerged

1970s - Oils shocks



The **oil shocks of 1973 and 1979** triggered global awareness. Hence, from the **1980s**, technological diversification accelerated and in the 2000s, there was a boom of unconventional hydrocarbons.

Energy infrastructure typology



Production infrastructures



Transport infrastructures



Storage infrastructures



Distribution infrastructures



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More than pipes and wires: Infrastructure as a driver of energy sovereignty

Infrastructure and national sovereignty

A nation's ability to act independently depends on its **control over domestic energy systems**: not just its ability to produce energy, but to **transport, store, and distribute it safely and autonomously**.

Infrastructure as a geopolitical tool

Beyond sovereignty, **owning energy transit routes** (pipelines, terminals, transmission corridors) gives countries **leverage over others**.

Path dependency and structural energy mix

Each country's energy mix reflects past choices and investments. Once infrastructure is built, it **locks in dependence** on certain fuels or suppliers, making **rapid transition extremely difficult**, even in moments of crisis.

No transition without deep transformation

The energy transition is not just about switching sources : it requires a structural shift in how energy is distributed, stored, and managed. Renewable energy systems are intermittent, decentralized, and require adaptive, smart grids. Without redesigning infrastructure, the transition remains a theoretical ambition rather than a practical reality.



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The power players: Who shapes global energy?

States

Producers

- Control fossil fuel output and export infrastructure.
- Influence prices and supply routes.



Consumers

- Drive demand and infrastructure investment.
- Focus on diversification and security.



Transit

- Host key pipelines.
- Gain leverage but face regional vulnerabilities.



Multinational Corporations (MNCs)

IOCs (International Oil Companies): Private global firms, profit driven and usually aligned with home-state interests.



NOCs (National Oil Companies): State-owned firms, execute national strategies and control key production/export systems.



Renewables/Nuclear Firms: Lead the energy transition, exposed to supply chain and tech-related risks.



International Organizations

Organizations that coordinate production, set technical standards, and support regional integration.





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Four giants, four agendas: Mapping the global energy divide



European Union

Energy transformation accelerated by ukraine war:

- Russian gas dependency cut from 40% to 10%;
- Shift to LNG and renewables.

REPowerEU (€300 bn): strategy launched in 2022, aimed at ensuring energy independence and stability through:

- Energy savings;
- Diversification (USA, Qatar, Algeria, etc.);
- Clean tech & renewables.

Boost in physical and **digital security of infrastructure** (SCADA, drones, NATO-G7 cooperation).



United States

Initiatives to **challenge China's** Belt Road Initiative (BRI) by strengthening energy and infrastructures ties across EU, Asia, Latin America and Africa.

- **Partnership for Global Infrastructure and Investments** (PGII): \$600 bn to finance sustainable energy infrastructures globally;
- Building strategic alliances through **LNG exports**.

Internal contradiction:

- Fragmented climate policy;
- 2025 Paris Agreement withdrawal.



Russia

Damaged by EU sanctions after the invasion of Ukraine:

- Moved **from a Eurocentric model to an Asia-oriented one**, building new pipelines and Arctic LNG terminals.

China as new dominant buyer:

- Shifted **from being a strategic supplier to a subordinate partner** as China holds greater bargaining power than EU.



China

Since over 80% of China's oil imports pass through the **Strait of Malacca**, China:

- Invested in onshore pipelines;
- Increased its military presence in the strait.

Belt Road Initiative (BRI):

- In 2024, 35% of BRI investments were allocated to energy-related projects;
- China is a global leader in the production and control of components and materials crucial for the green energy transition.



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Chokepoints, cyber threats, and competition: The 3 geopolitical threats to energy security

1

Resource Nationalism and Great Power competition

- As global tension increases, countries are looking to secure their access to energy and reduce dependence on other countries
- Great Powers have been competing to secure access to critical raw inputs for energy infrastructure (e.g. cobalt, graphite, lithium, etc.)

2

Disruption of key chokepoints and transit states

- The energy trade relies on key choke points and infrastructure corridors for the distribution of oil, natural gas and other energy commodities
- Many of these passage points are located in areas subject to high geopolitical volatility (e.g. Strait of Hormuz, Ukraine) or other forms of instability (e.g. Red Sea, Suez Canal)

3

Cybersecurity

- Digital systems controlling energy infrastructure are subject to significant cybersecurity risks due to their complexity and reliance on legacy systems
- Energy infrastructure has come under attack by both private actors (e.g. Colonial Pipeline hack) and state-sponsored actors (e.g. Stuxnet, 2016 Ukrainian Blackouts)



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When politics meet pipelines: Business risks in a volatile world



Investment Risk

Definition: Political instability due to legal unpredictability and weak property rights & Conflict-driven exits forced divestments from hostile territories

Examples: (1) Venezuela's Expropriation of ExxonMobil and ConocoPhillips Assets & (2) Argentina's Nationalization of YPF



Supply Chain Vulnerabilities

Definition: Transport disruptions due to global chokepoints and infrastructure attacks

Examples: (1) Ever Given Suez Canal blockage → shipping delays and cost surges & (2) Saudi Aramco drone attacks → global oil price spikes

Market Access Barriers



Definition: Sanctions and embargoes may lead to sudden loss of key markets and partners

Example: GE & China-Australia trade rift → Coal export bans (BHP, Rio Tinto)

Regulatory Uncertainty



Definition: Dynamic compliance pressures driven by rapid legal and policy changes

Example: EU sanctions and Green Deal → higher costs for European firms

Tech Dependency & Cyber Threats



Definition: Rising cyberattacks on energy infrastructure & Vulnerabilities from tech reliance on rival powers

Example: 2021 Colonial Pipeline attack → fuel shortages, system outages



Strategic business responses to geopolitical risk

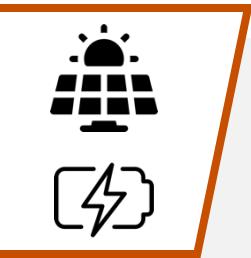
Risk Mitigation Strategies – Business Perspective



Geographic & Asset Diversification

Examples:

- Business shift to stable jurisdictions (Norway, Canada, Australia)
- LNG terminal expansions in Europe post-Russia crisis



Investment in Renewables & Energy Storage

Examples:

- Tesla, LG Chem, IKEA, Google Energy infrastructure investments to reduce fossil fuel dependency and boost energy resilience



Technological Resilience

Examples:

- Strengthening cybersecurity
- Reducing reliance on politically sensitive tech sources



Conclusion

In the global energy landscape, navigating geopolitical tensions requires proactive, multi-dimensional strategies to sustain competitiveness and operational stability



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The investment and geopolitics behind Nord Stream 2

Characteristic, investment rationale and geopolitics of Nord Stream 2

Infrastructure characteristic: NS2 is a twin pipeline to NS1, doubling direct gas supply from Russia to Germany (110 bcm/year).

Investment rationale: support Germany's energy transition (Energiewende), ensure energy security and meet Europe's projected gas demand

Geopolitical impact: However, since it was launched after Crimea annexation (2014), raising different geopolitical concerns from the beginning. That's why it was strongly opposed by the US, Poland, Baltic States, and Ukraine, who warned of increased dependency and weakened EU unity.

Nord Stream pipelines from Russia

- Nord Stream
- Nord Stream 2





How NS2 caused global tensions and strategic disruption

What was the problem?



(Conflicting interests + Overlooked potential risks)

Conflicting interests

Russia (Gazprom): wanted to bypass Ukraine, raise its geopolitical power over EU, secure revenues

Germany: wanted cheap “bridge fuel” for its energy shift

Ukraine: feared to loss transit revenue, in addition Ukraine believed that NS2 would have increased the probabilities of Russian invasion

CEE states: safeguard regional security and promote energy diversification

USA: opposed NS2 to limit Russian influence and support LNG exports

Identified risks

Rising EU dependency on Russia, increasing vulnerability to political manipulation

Destabilization of transit countries like Ukraine: By bypassing traditional routes, the pipeline threatened Ukraine's economic stability and removed a key deterrent against Russia

Tensions among Western allies: The project fueled divisions within NATO and the EU, undermining trust between Germany and Eastern European countries, as well as with the US

NS2 was highly exposed to regulatory changes, sanctions, and even acts of sabotage (risks that ultimately materialized)



Nord Stream 2: From strategic asset to geopolitical casualty

Escalation and collapse



Economic Fallout

- Europe entered a severe energy crisis with record-high gas prices and surging inflation.
- Energy-intensive industries faced production cuts and cost-driven slowdowns.
- The EU was forced to quickly shift to alternative suppliers (U.S. and Norway)

Strategic Response

- The EU launched REPowerEU pushing toward diversification
- Germany and other states rapidly built LNG terminals
- The EU mandated energy demand reductions

Key Lessons

- ① **Energy is geopolitical:** Dependence on adversarial states creates strategic risk.
- ② **Resilience over short-term efficiency.**
- ③ **Diversification is vital:** Relying on one cheap supplier is economically and strategically dangerous.
- ④ **Infrastructure must be protected:** Critical assets need physical security and contingency plans.



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Siemens power megaproject: Project scope & actors



Geopolitical trigger

- Egypt's post-revolution electricity crisis left ~20–25 % of peak demand unmet
- Undermining social stability and government legitimacy.



Strategic entry point

- Siemens, seeking growth beyond saturated EU markets, secured a €8 bn contract to deliver 14.4 GW of new gas-and-wind capacity in 27.5 months – the largest order in its history
- High efficiency



Security-led framing

- Cairo cast the project as a national-security mission to end black-outs before summer 2015
- Siemens matched this agenda with modular plant design, export-credit finance and grid studies



Aligned coalition of stakeholders

- Presidency & Ministry of Electricity, Siemens, local EPC partners Orascom & Elsewedy, plus a 30-bank ECA syndicate synchronised goals of political legitimacy, industrial recovery and revenue growth



Siemens power megaproject: Risk, mitigation and outcome

Risk landscape: regime instability, Sinai gas-pipeline sabotage, 2016 pound float, subsidy-linked unrest and EU scrutiny of carbon intensity.

Risk-mitigation architecture: Euro-denominated milestones, sovereign guarantees, dual-fuel turbines and a nine-year service contract – efficiency narrative backed by gas savings ≈ US \$1.3 bn per year.

Risk materialisation: sabotage rerouted; FX shock absorber – subsidy reforms caused only minor delays.

Outcome: Project finished six months early; black-outs ceased; reserve margin reached 10 GW; fuel savings ≈ 3 % of GDP:

- Siemens exported the “Egypt playbook” to new markets
- Enhanced German influence & local skills

Actionable lessons for multinationals

1

Crisis timing unlocks leverage in negotiations

2

Bundle technology with turnkey finance to reduce political resistance

3

Embed local partners & skills transfer for legitimacy and logistics

4

Pre-structure contracts (FX-proof payments, sovereign guarantees) to absorb macro shocks

5

Secure long-term service agreements to convert rapid-delivery discounts into durable revenue streams



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