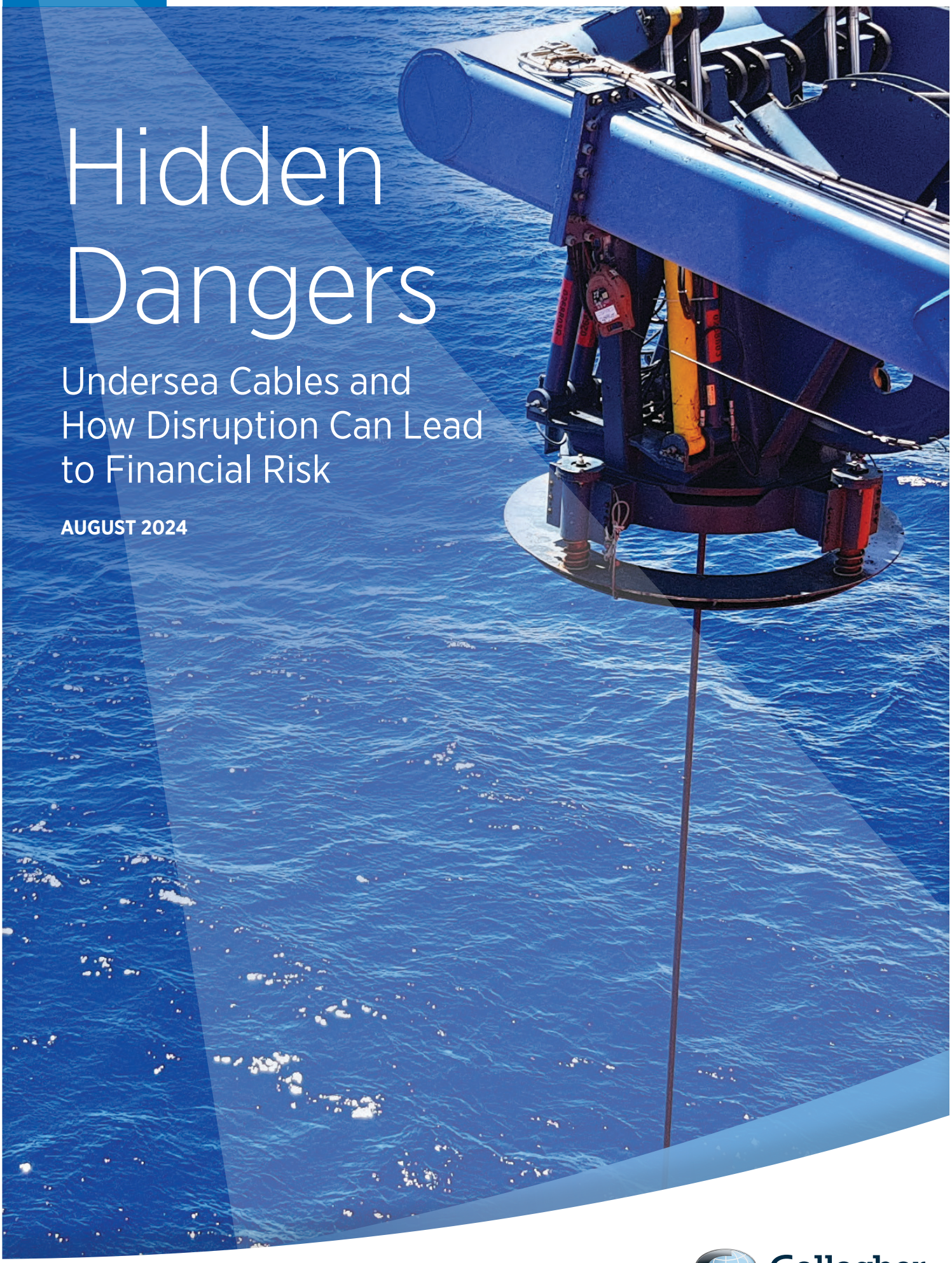


Hidden Dangers

Undersea Cables and How Disruption Can Lead to Financial Risk

AUGUST 2024

Gallagher

Key Insights

1. Widespread economic and social reliance on critical subsea infrastructure is a growing source of vulnerability, as undersea cables and gas pipelines are vital enablers of business activities and energy security.

2. Submarine cables and gas pipelines are facing emerging threats due to a more challenging geopolitical landscape and the increased risk of sabotage.

3. Identifying potential threats to undersea assets — and your dependence on them — is vital, as damage could have deeply harmful effects for business profitability, especially given the long lead times for carrying out repairs.

4. The consequences of damage to undersea cables are relatively little known but can incur costs of billions of dollars, with the greatest risk occurring in areas that rely on a single subsea cable or handful of interconnectors.

5. Measures to mitigate risk need to be taken at both the company level and within multilateral international frameworks, and businesses should factor in damage to submarine cable networks when carrying out scenario analysis and horizon scans.

6. On October 18, 2024, the Critical Entities Resilience (CER) Directive will come into place throughout the EU, with a focus on coordinated response to threats impacting vital infrastructure.

Undersea Cables are Economically Vital — But Vulnerable

Underwater infrastructure, the foundation of the Blue Economy, consists of:

Submarine telecommunication cables
99% of the world's intercontinental internet traffic depends on these fiber-optic cables.[4] Major tech companies like Meta, Google, and Microsoft have made substantial investments in building and maintaining undersea cable networks.

Subsea electricity interconnectors
Underwater cables connect offshore wind turbines and onshore electrical grids, enabling the growth of the renewable energy sector. Subsea electricity interconnectors are vital for connecting one country's power grid to another's, facilitating cross-border power exchange. The UK's 190-kilometer subsea electricity superhighway[5] and Denmark's Viking Link[6] are examples of major investments in facilitating cross-border energy sharing.

Subsea pipelines
Underwater pipelines play a crucial role in meeting the world's energy demands by transporting trillions of cubic meters of natural gas and oil every year.

Subsea mining equipment
Specialized pipes, pumps, and other machinery enable the extraction of resources from the seabed, unlocking new economic avenues.

Business and society have become increasingly reliant on critical subsea infrastructure, creating a growing source of vulnerability.

Undersea cables are the hidden — but increasingly vital — enablers of the essential business activities that most people take for granted. Everyday items such as emails, videocalls, data transmission, and money transfers all rely on the services provided by the undersea cables that traverse the floors of the world's seas and great oceans.

Hidden from view beneath the sea, these cables are a critical global infrastructure component, powering global business by facilitating the transactions that form the backbone of international finance and communications.

Submarine communication cables — also referred to as subsea cables — have emerged as one of the essential drivers of the modern digital economy, responsible for almost all global digital communications. Among other things, subsea telecommunication cables are responsible for transmitting 99% of intercontinental internet traffic.[1]

Without these cables, the ocean-borne Blue Economy — and business as we know it — would not be possible. A vast network of underwater infrastructure with thousands of miles of submarine cables, pipelines, and other critical infrastructure are vital for the flow of data, energy, and resources across country borders and between continents.

As well as channeling data, submarine cables enable the transmission of electricity generated from offshore wind farms, tidal energy facilities, and other marine renewables, reducing reliance on fossil fuels and supporting the transition to net zero.[2] As economies move forward on this journey, subsea superconductors[3] will better manage the inevitable fluctuations from more weather-dependent sources of energy, including wind and solar.

99% of the world's intercontinental internet traffic depends on undesea fiber-optic cables.[4]

Undersea Infrastructure Powers Innovation and Growth

The existing criticality of undersea infrastructure is set to be reinforced by the development of new facilities.

The established undersea infrastructure is not going to remain static. As the services provided by the global digital economy continue to expand and interconnect, the infrastructure required to support this growth will also expand, contributing to economic development at multiple levels.

Many projects are already under way to further boost the existing network. Google's Equiano cable, for instance, aims to enhance digital connectivity between Europe and several West African countries. The first phase of the project, connecting South Africa with Portugal, was completed in March 2023.[7] The explosion of AI is one factor behind such investment; large language models (LLMs) require substantial data capabilities to stay operational, and subsea cables offer high bandwidths (upwards of 300 to 400 terabytes per second) with low lag time.

Meanwhile, global tech giants are in a race to set up data centers across the globe to support the growth in cloud services and cater to the growing demand for edge computing, the Internet of Things (IoT), and GenAI. While the concept of underwater data centers is still in its infancy, it is likely to gain traction as a way of meeting future needs, while reducing carbon footprint and boosting security.[8]

This all means that businesses' profitability and capacity to innovate are going to become increasingly dependent on subsea infrastructure.

> "As our world becomes more interconnected and the demand for data continues to surge, a significant number of undersea cables are currently under development. In the places where the subsea cables are fewer in number, any damage to those cables can cause a massive setback to the country's economy."
>
> ***— Adam Carrier, Head of Consulting at AnotherDay, A Gallagher Company****

> "Interconnectors play a significant role in boosting a country's energy security and the wider net-zero transition by moving surplus renewable electricity from where it is produced to where it is needed."

*AnotherDay, a Gallagher Company, is a specialist consultancy firm working with insurers on strategic risk advisory encompassing cyber threats, geopolitical intricacies, and climate change implications. The AnotherDay team work in conjunction with Gallagher's core insurance broking businesses as a complementary risk management and consulting service for clients.

Heightening Energy Security

From an energy perspective, countries are transitioning away from fossil fuels, such as coal and gas, to renewable sources, such as offshore wind and solar. High-voltage undersea cables — interconnectors — play a significant role in boosting a country's energy security and the wider net-zero transition by moving surplus renewable electricity from where it is produced to where it is needed.

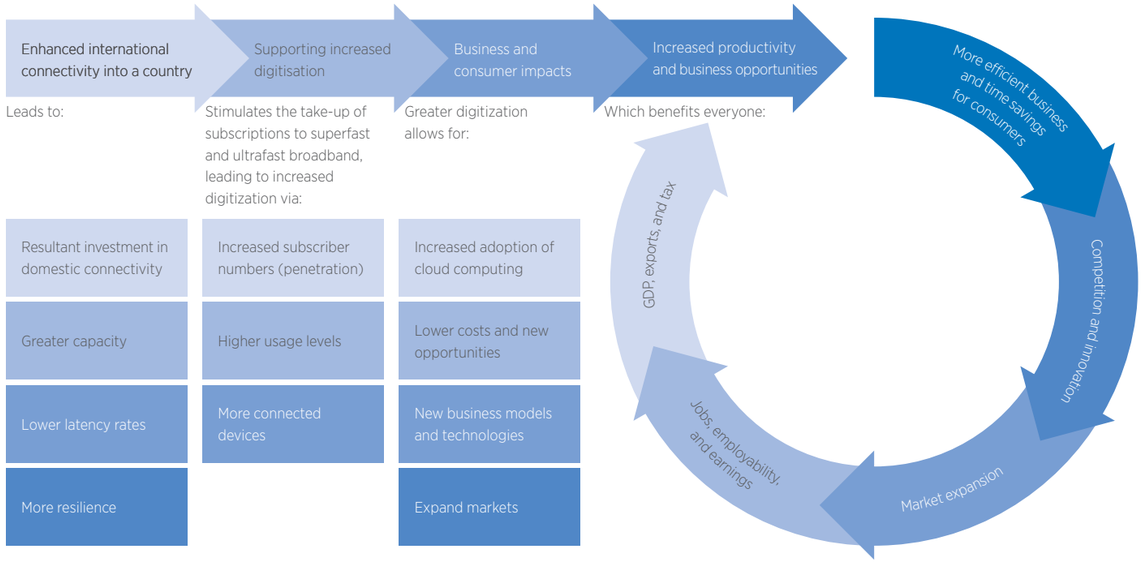
The "GREGY interconnector" is a 1,373-kilometer subsea electricity cable due to come online in 2029–30.[10] It will carry 3,000 MW of electricity, with the potential to power up to 450,000 households, and will run from northern Egypt directly to Attica in Greece.

A similar project in Australia, planned for implementation in 2027, aims to send renewable energy to Singapore via a submarine cable system travelling 4,600 kilometers.[1]

The GREGY interconnection is a subsea electricity cable that will link Greece and Egypt by 2029–30.

Spotlight

Economic Impact of Subsea Cables' International Connectivity



Source: Economic Impact of International Connectivity and Data Centre Development in Scotland. Deloitte. September 21, 2018.[12]

Subsea Cables and Interconnectors: Big Numbers

1.3M

kilometers covered by the global submarine cable network, supporting over USD10 trillion in economic activity annually.[13]

15.5K

miles is the length of the Asia-Africa-Europe-1 internet cable, connecting Hong Kong to France and providing internet access for multiple countries.[16]

10%

rise in broadband penetration could lift GDP growth rates by 1.2 percentage points across 66 developed countries, according to a World Bank study.[14]

24.2K

miles of submarine fiber-optic cable by SEA-ME-WE 3 is currently the longest in operation, connecting Europe, the Middle East, and India.[17]

USD32.9B

growth expectation of the submarine power cables market by 2032, driven by the need for efficient power transmission from renewable sources like offshore wind farms.[15]

2.3K

kilometers of submarine fiber-optic cable installed by India in August 2020 links Chennai with the Andaman and Nicobar Islands, more than doubling the country's data capabilities.[18]

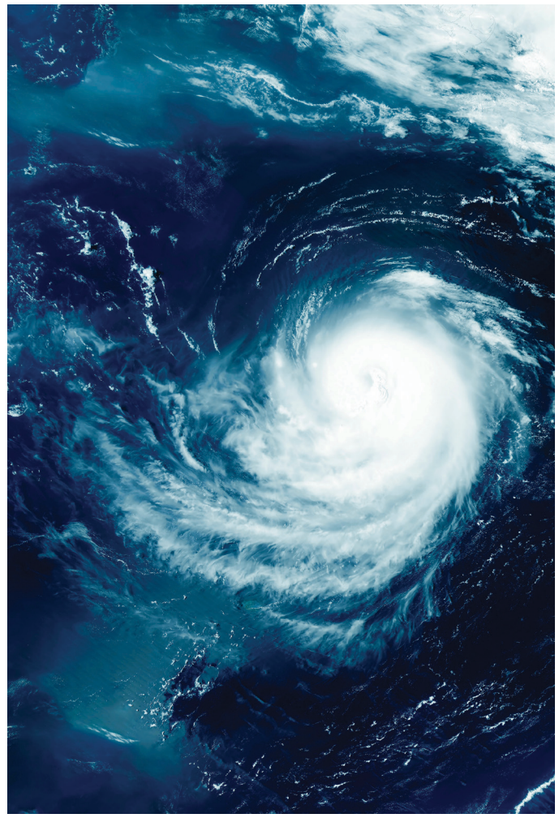
46K

kilometers will connect Europe, Africa, and the Middle East when 2Africa is completed towards late 2024.[19]
Built in partnership between China Mobile International, Meta, MTN GlobalConnect, Orange, STC, Telecom Egypt, Vodafone, and WIOCC, with a forecast USD26.2 to USD36.9 billion economic impact within two to three years of starting operation.[20]

Threats to Undersea Infrastructure

Damage to undersea assets could have profound economic impacts, especially given the long lead times for carrying out repairs. Identifying potential threats is vital.

The importance of undersea cables and other infrastructure in the operation of the global economy means that any disruption to this infrastructure could have serious ramifications in terms of business functionality and profits. There are three key potential threat sources to consider: accidental damage, natural hazards, and sabotage/cyber attack.



Accidental Damage

Subsea cables can be inadvertently damaged in a number of ways: by fishing trawlers or ships dropping anchor, for example, or as a consequence of coastal development, port construction, and dredging activities disturbing the seabed and thus damaging submarine infrastructure. In February 2024, for instance, a trawler anchor cut three cables in the Red Sea.[21] Reports suggest that over 70% of cable faults stem from unintentional damage.[22]

Damaged subsea cables rely on specialist equipment and services to get them up and running again, but the global availability of such services is limited, which can cause delays and additional cost when fixing damaged sections of cabling.[23] In 2023, four of Vietnam's five subsea cables went down due to fishing, shipping, and technical failure, seriously impacting the country's internet speed. With nearby repair ships already tied up working on other cable fixes, the affected wires were not restored for six months.[24]

Natural Hazards

Underwater infrastructure can also be exposed to natural disasters such as earthquakes, volcanoes, tsunamis, and storms, even when laid beneath the seabed. This is a concern for infrastructure in and around the Gulf of Mexico, given that the National Oceanic and Atmospheric Administration (NOAA) has forecast an 'extraordinary' 2024 hurricane season.[25]

Submarine cable routes often cross tectonic plate boundaries. Earthquakes can trigger undersea landslides, creating turbidity currents that flow over long distances, potentially breaking multiple cables in sequence. In December 2006, a powerful earthquake near Southern Taiwan damaged nine underwater cables, causing upheaval for financial markets, banking services, airline bookings, and general communication in countries including China, Hong Kong, India, Singapore, Taiwan, Japan, and the Philippines. It took 11 repair ships almost 50 days to restore connections.[26]

Spotlight

Sabotage and Cyber-attack

Despite being difficult to access, underwater cables and pipelines are relatively easy to locate as companies make their whereabouts public so as to aid navigation and minimize accidents. This makes them vulnerable to sabotage. Attacks on underwater cables are an increasing concern amid ongoing geopolitical tensions, with real potential to cause major damage and disruption.[27]

The threats are real. In September 2022, the Nord Stream gas pipeline exploded in the Baltic Sea,[28] while in March this year, cables under the Red Sea were attacked — reportedly cut by Yemen's Houthi rebels.[29]

National and international detection capabilities will remain key to protecting critical infrastructure in an increasingly uncertain geopolitical landscape. The best defense involves proactively identifying potential threats, not just relying on preventive measures, thinks Adam Carrier.

"The use of advanced sensors, including acoustic-based sensing, satellite monitoring, drones, and submarines are becoming more prevalent in stopping sabotage and detecting threats," he explains.

Sabotage is not just physical. In April 2022, the US federal government revealed that it had thwarted a cyberattack on an underwater cable linking Hawaii and the Pacific Region.[30]

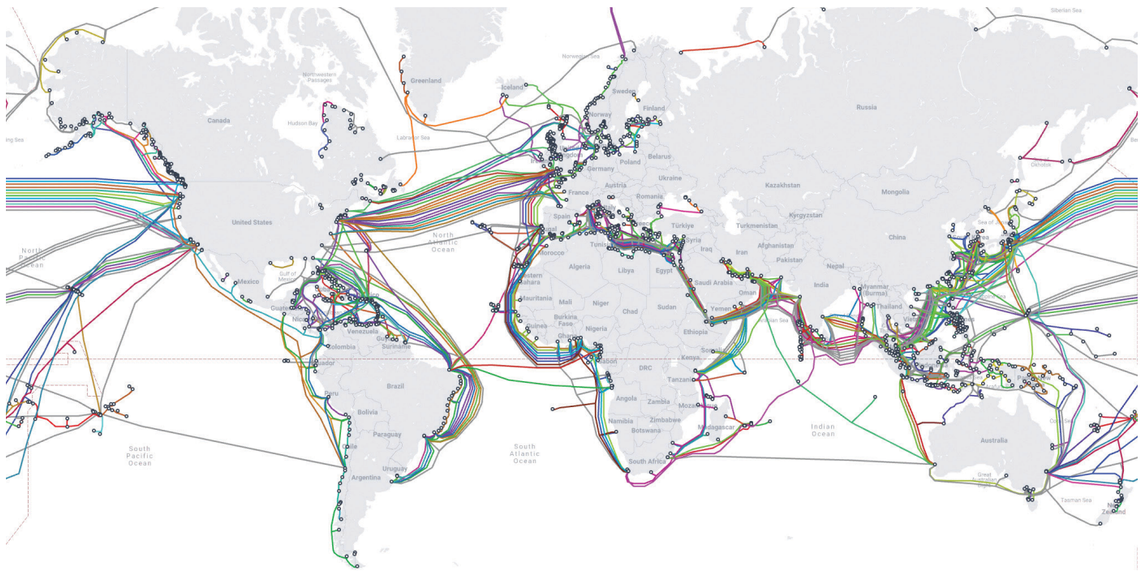
While it was land-based in nature, the attack on Colonial Pipeline in 2021 demonstrates the potential disruption to gas pipelines.

"Malicious actors may also choose to target control stations to hack the system, as launching an underwater attack on subsea cables is a more sophisticated endeavor," says Carrier.

"From a cyber risk perspective, there are concerns that the data flowing through cables could be tapped and exploited for data breaches and ransomware attacks. Having fit-for-purpose cyber insurance is crucial to prevent these issues from affecting companies that depend on subsea cables."

"The ransomware attack on Colonial Pipeline that caused such disruption in 2021 is a reminder of the potential disruption to submarine energy pipelines. In April 2022, the US government thwarted an attack on an underwater cable linking Hawaii and the Pacific region."

Global Underwater Cable Map



Source: Submarinecablemap.com[31]

The Financial Impact of Damage to Cable Networks

The consequences of damage to undersea cables are relatively little known, but they incur costs of billions of dollars.

Where an item of subsea infrastructure is not backed up by alternative routings, damage to an internet or energy pipeline can cause substantial disruption, resulting in internet outages or even energy blackouts. Consequently, areas of the world that rely on a single subsea cable or a handful of interconnectors are most vulnerable to disruption.

In January 2022, for instance, an 827-kilometer fiber-optic cable connecting the South Pacific nation of Tonga to the rest of the world was damaged during the eruption of a volcano.

A 2G wireless connection was established on the main island, but the service was patchy. In the end, it took a month to carry out the necessary repairs to the damaged cable and reconnect the island's population of 107,000 to the internet.[32]

In March 2024, the disruption of undersea cables in 12 African countries caused substantial economic losses, with Nigeria alone estimated to have lost billions of naira in just four days.[33]

Adam Carrier thinks there is a lack of awareness about the risks related to subsea cable disruptions. "One of the significant risks that insurers are worried about is the outage of a cloud services provider like AWS, Google, or Microsoft Azure, which could result in billions of dollars' worth of damage."

Protecting Critical Infrastructure in Europe

On October 18, 2024, the EU resilience of critical entities (CER) Directive will come into force across Europe. The directive was shaped in the aftermath of the 2022 Nord Stream pipeline attack. It follows the adoption, on June 25, 2024, of a blueprint to coordinate a response at an EU level to disruptions to critical infrastructure, which will have significant cross-border relevance.

The regulation aims to reduce vulnerabilities and strengthen the resilience of critical entities, with an onus on member states to carry out risk assessments and identify vital infrastructure that provides essential services. This includes subsea cables and other blue economy infrastructure.

"Citizens and businesses rely on the functioning of pipelines, power stations, and transport hubs," commented Annelies Verlinden, Belgian Minister of Home Affairs, in a statement. "When these and other critical infrastructures are at risk, the EU needs a playbook on how to respond quickly and effectively."

"Multilateral support will be key for subsea cable operations to navigate the ongoing geopolitical crisis. Global bodies need to provide a stable environment for the expansion of subsea cables and other critical underwater infrastructure."

— Adam Carrier, Head of Consulting at AnotherDay, A Gallagher Company

Consequences of Damage to Fiber-Optic Cables

- Businesses may suffer financial losses due to disrupted operations, missed opportunities, and decreased productivity.
- Extended outages can harm a company's reputation and erode customer trust.
- Companies relying on global supply chains may face delays in shipments and communication with suppliers.
- Low internet connectivity can lead to downtime for online services, affecting customer experience and revenue.

"Businesses outside of the very largest users are unlikely to be able to invest in their defensive measures, increasing the importance of robust business continuity planning, as well as diversification of supply where possible."

— Max Richardson, Consultant, Crisis & Security Strategy at AnotherDay, A Gallagher Company

Protecting Critical Subsea Infrastructure

Measures to mitigate risk need to be taken at both the company level and within multilateral international frameworks.

The Blue Economy continues to grow rapidly, fueled by the ubiquity of data in the digital age. In particular, the explosion of generative AI has seen a significant uptick in demand for infrastructure supporting computational resources and cloud capacity, including data centers and fiber-optics.

Meanwhile, the transition to net zero and the ongoing drive to achieve energy security are driving the development of submarine energy cables.

Around the world, governments are taking steps to boost the resilience of blue economy infrastructure through policy, legislation, and granting new powers to critical entities.

The European Commission's Critical Entities Resilience (CER) Directive, for instance, creates a framework to ensure vital infrastructure is able to prevent, resist, absorb, and recover from disruptive events. It is focused on three key priority areas: preparedness, response, and international cooperation.

Businesses should factor in damage to submarine cable networks when carrying out scenario analysis and horizon scans, particularly if they have facilities or tier one suppliers in locations that are heavily reliant on just one or two subsea cables.

This involves understanding how disruption could impact energy supply and/or internet service and what contingencies might be in place, such as access to backup generators.

Risk mitigation techniques, such as diversifying internet routes and monitoring cable health, can safeguard installations and increase confidence across the value chain.

Submarine infrastructure is the backbone of global energy and communication systems, making it increasingly essential to ensure that this infrastructure is resilient to current and future threats. A company's continued profitability could depend on getting this right.

Frameworks to Protect Underwater Infrastructure

- In 1958, the International Cable Protection Committee (ICPC) was formed to ensure the reliability and resilience of submarine cable networks worldwide. Today, the organization has more than 215 members from over 70 countries. The committee aims to mitigate the risks of natural and human damage to cables by recommending best practices for industry and governments and holding an annual international plenary session.[34]
- In June 2023, NATO launched the Maritime Centre for the Security of Critical Underwater Infrastructure for protecting undersea pipelines and cables. In the same month, NATO General Secretary Jens Stoltenberg also attended the Foreign Affairs Council of the European Union to discuss the protection of critical undersea infrastructure amid global political unrest.[35]
- In 2023, the Quad Leaders' Summit — involving Australia, India, Japan, and the US — committed to strengthen cable systems in the Indo-Pacific and improve the region's connectivity. It intends to achieve this through the development of resilient infrastructure and by utilizing the Quad countries' world-class expertise in manufacturing, delivering, and maintaining cable infrastructure.[36]
- In 2022, France installed deep-sea drones and robots to secure its subsea cables after the suspected sabotage of the Nord Stream gas pipeline in the Baltic Sea.[37]
- The UK is currently building a royal navy ship to protect 'critical' undersea cables.[38]

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