



October 12th, 2022

WHITE PAPER

*"The EU's Energy Arteries at Knifepoint:
Nord Stream Incident – What's Next?"*

White Paper Outline

- Nord Stream Incident Overview
- EU/ Regional Critical Infrastructure Threat Analysis & Situational Outlook
- Turning Point: Seabed Warfare & the Next Vulnerability
- Strategy for the Next Vulnerability

LEAD UP TO INCIDENT

Europe's state of play on September 26th, 2022:

- High energy/ gas price
- High inflation
- War on the continent – Ukraine
- Strong dollar, weak Euro
- Fragmented European leadership, with lack of a unified concise energy strategy
- Societal unrest
- Sweden & Finland applying to join NATO

Nord Stream 1&2:

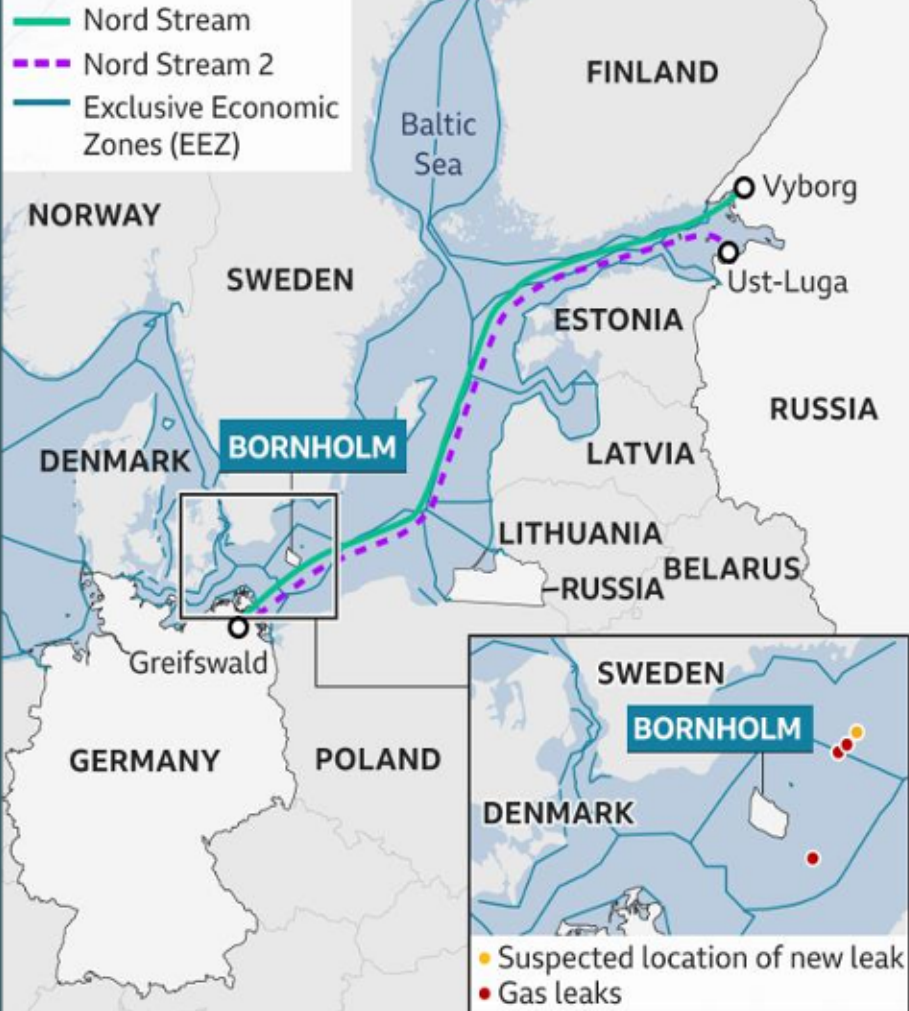
- NS1&2 have been flashpoints in an **escalating energy war** between Europe and Russia, which has damaged major Western economies, triggered **soaring gas prices** and spurred **diversification of energy supplies**.
- Russia **reduced gas supplies** to Europe via NS1 before **suspending gas flows** altogether in Aug 2022, blaming Western sanctions for causing **technical difficulties**. European politicians say that was an **excuse to stop supplying gas**. The new NS2 pipeline had yet to enter commercial operations.

CIA WARNING:

- The U.S. Central Intelligence Agency reportedly **warned Berlin** about **possible attacks on gas pipelines** weeks ago.
- The German government received the CIA tip in the summer, citing unnamed sources, adding that **Berlin assumes a targeted attack on NS1&2**.
- *[CBNC/ Reuters, citing Spiegel]*
- *Despite the CIA warning, security measures either were not stepped up or were insufficient to prevent incident from occurring.*

Nord Stream pipelines from Russia

Leaks detected on both pipelines near Bornholm



Source: Gazprom, MarineTraffic, NAVTEX



INCIDENT OVERVIEW

- Nord Stream 1 (NS1) and Nord Stream 2 (NS2) are a pair of undersea natural gas pipelines that stretch for 1,200 km (754 miles) from the Russian coast near St. Petersburg to north-eastern Germany.

Incident Date:

- Mon Sep 26

Incident:

- On Sep 26, 3 leaks were discovered in the pipelines. 2 powerful blasts registered were in the vicinity of the pipeline leaks. Seismic signals indicated that the leaks were triggered by explosions. On Sep 29, a 4th leak was reported

Leaks:

- Nord Stream 1: 2 Leaks
- Nord Stream 2: 2 Leaks
- Total: 4 (2 of the leaks are in Danish EEZ, while the other 2 are in the Swedish EEZ)
- Leak Duration: approx. 1 week

Depth of leaks:

- Relatively shallow, approx. 50m deep

Pipeline depth:

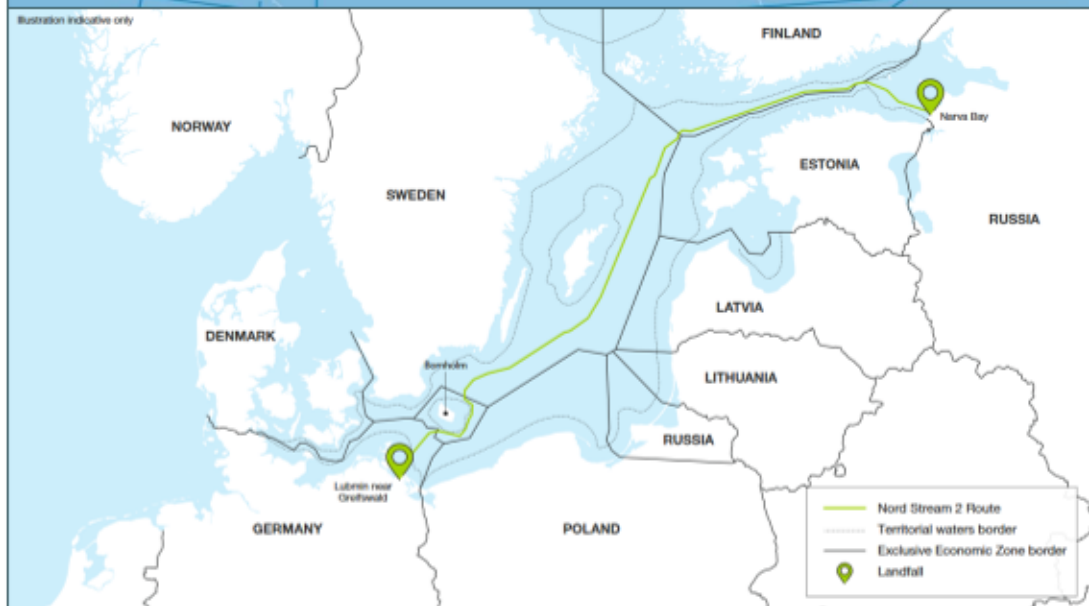
- Majority of the pipeline lies 80m to 100m underwater



NS1&2 Information

The steel pipe itself has a wall of 4.1 cm (1.6 inches) and is coated with steel-reinforced concrete up to 11cm thick. Each section of the pipe weighs 11 tonnes, which goes to 24-25 tonnes after the concrete is applied.

	NS1 Pipeline Began operation in 2011	NS2 Pipeline Construction completed in 2021, never came into operation
Pipelines	2 strands of pipelines	2 strands of pipelines
Length	1,224 km. Vyborg – Lubmin (near Greifswald)	1,230 km. Ust-Luga – Lubmin (near Greifswald)
Annual Capacity	up to 55 bcm of natural gas a year	up to 55 bcm of natural gas a year
Full Daily Capacity	Approx. 167 million cubic meters of gas.	Calculation: 55bcm ÷ 365 = 151mcm [APPROX.]
Maximum pressure	up to 220 bar 3 different design pressure sections (220, 200 and 177.5 bar)	“It will be operated at an inlet pressure of up to 218 bar (g) at a reference elevation of MSL +50m and a minimum outlet pressure of 103 bar (g) at reference elevation.” [Source: NS2 document “Nord Stream 2 Offshore Pipeline Detail Design” (pre-building pipeline)]
Diameter	constant internal diameter of 1,153 millimetres	1,220 mm (48 in)
Volume of gas in pipe at time of leak	?	177 million m3
Pipeline pressure at time of leak	Maximum transmission pressure was 125-145 bar. NS1 pressure down to 40 bar.	105 (or 107) bar (steady gas pressure, not pressure for transit) down to 7 bar



NS1 route. *[ArcticEcon via Nord Stream AG]*

NS1&2 Routes

NS2 route. *[Warsaw Institute]*

INCIDENT ANALYSIS (1 | 2)

EXPLOSIONS:

As the graph shows, explosion 1 is larger than explosion 2, with a single peak in seismic wave. It is estimated to be over 150kg of shaped-charge explosive.

Explosion 2, however, extends for a longer period of time, with 2 (or more) peaks in seismic wave occurring at around the same time, potentially indicating 2 (or more) smaller explosives being detonated simultaneously, creating an impression of a single explosion.

TIMING & SABOTEUR'S PLAN:

Explosion 1 at midnight

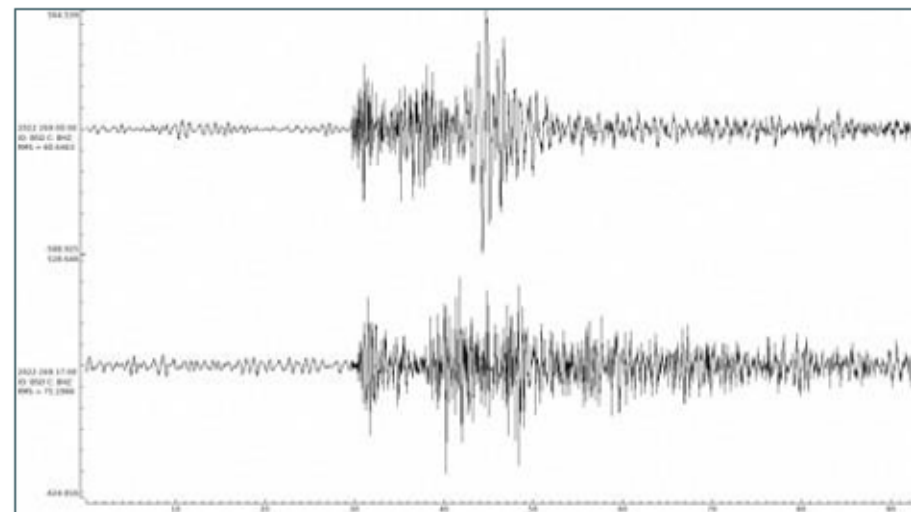
- Low anticipation
- Midnight – Time of lowered awareness

Explosion(s) 2 occurring 17 hours later

- Full awareness due to explosion 1/ post-incident.
- This sends a message: even while EU forces are on full alert, saboteur's capabilities are high and can still comfortably carry out mission.
- Attacker > Defender

A reading from a seismograph on the Danish island of Bornholm shows two spikes, at 12:03 a.m. and 17:00 p.m. GMT, followed by a lower-level "hissing" on the day when the Nord Stream 1 and 2 Baltic gas pipelines sprang leaks one after the other. [German Centre for Georesearch handout via Reuters]

"Sweden's seismologists said the second, bigger explosion "corresponded to more than 100kg of dynamite," adding the blasts were in the water not under the seabed."



INCIDENT ANALYSIS (2 | 2)

WHAT IS SHAPED CHARGE?

Shaped charges are devices in which an explosive load is used to collapse a (usually metal) liner, thereby creating a high velocity jet that is capable of penetrating deep into metal, concrete or other target materials

PENETRATING THE PIPELINE

The steel pipelines are coated with reinforced concrete. The external reinforced concrete, being the softer of the two materials, has the effect of lessening an explosion's impact.

The fact that both materials were destroyed at once indicates that the saboteur has extensive knowledge of this combination of materials to have carried this out successfully.

LIKELY METHODS

- Likely to be unmanned remotely operated underwater vehicles (ROVs)
- Shaped charges
- (Not divers - explosives too heavy)

700m diameter gas leak. The 3 gas leaks on NS1&2 were visible in waters off Denmark with bubbles spreading from 200 to 1,000 metres in diameter, the Danish military said.



POST-INCIDENT REACTIONS

EU:

- The EU has **not named a potential perpetrator** of the **suspected sabotage** or suggested a reason behind it. However, suspicions point towards Russia.
- Significant step up in security measures, surveillance and monitoring of critical infrastructure, particularly energy sector – **recognition of threat**.

USA:

- Characterizes the incident as sabotage. Strongly denies any involvement in the incident.

RUSSIA:

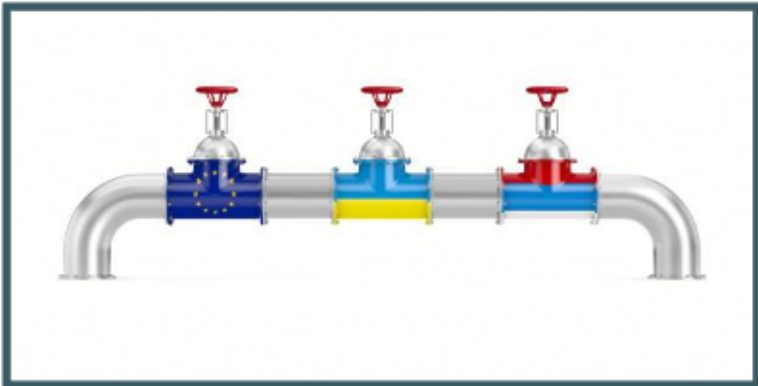
- Dismisses accusations that Russia was to blame for damage.
- Claims incident is “state-sponsored” terrorism.
- President Putin directly **accused the US and its allies** of blowing up the NS pipelines.

CURRENT STATUS OF NS1&2:

- **Unclear** who could be behind the leaks or any sabotage, if proven.
- **Europe’s investigations** are underway.
- Sweden stated it **would not be sharing findings** of the pipeline investigation with Russian authorities or Gazprom.
- Nord Stream AG, operator of NS1, said it was unable to inspect damaged sections of the line due to the **lack of requested necessary permits**. Receiving the necessary permits to carry out an inspection could take over 20 working days.
- Russia could export gas to Europe through **NS2’s pipeline B**, one of the idle NS2 pipelines that was the only of Nord Stream’s 4 lines still capable of working. The single functional line has an annual capacity of 27.5 billion cubic metres.



Geopolitical Implications



- Amid the claims of sabotage, suspicion immediately turned to potential culprits – with **fingers pointed at Russia**, whose pipelines were hit, suggesting a further **weaponisation of energy supplies** to Europe in the midst of the conflict in Ukraine.
- An EU official said the incident had fundamentally **changed the nature of the conflict in Ukraine**, particularly since it comes as Russia moves to **annex four regions in Ukraine** after holding widely denounced “sham” **referendums**. Ukraine’s president countered with an “accelerated” NATO membership application.
- **Internal divisions** are deepening within the EU as countries attempt to lower the price of natural gas while also ensuring they secure enough of it.
- EU countries agreed to impose a **price cap on Russian oil** and other new sanctions after Moscow illegally annexed four regions in Ukraine amid its monthslong war
- EU energy crisis potentially facilitating **new European order**: weakening the traditionally economically strong nations such as Germany, and showing countries such as Italy and Greece to be comparatively resilient
- This incident may see the **US solidifying its hold on the EU**, particularly as the US remains to be a **key energy and security supplier** to the EU
- The incident may be a catalyst for strong further shifts in **geostrategic relationships** and **new alliances**.

THREAT ANALYSIS

	RUSSIA	USA	EU	Ukraine
Capability	<p>Yes</p> <ol style="list-style-type: none"> Russian activities in the Baltic Sea have increased in recent years, routinely operating in the area. (according to Danish military official) Special mission submarines for seabed warfare and espionage Undersea warfare capabilities through GUGI program - work on undersea communications and sensor networks, hydrocarbon exploitation, submarine rescue and investigating wreckage. 	<p>Yes</p> <ol style="list-style-type: none"> Leak area is "fully under the control" of U.S. intelligence agencies (according to Russia) Large NATO presence in area 	<p>Yes</p> <ol style="list-style-type: none"> Incident occurring in local region, easy access for local operations Large NATO presence in area 	<p>No</p> <ol style="list-style-type: none"> Ukraine naval capabilities are limited, and do not access the Baltic region
Intent	<p><u>Hypotheses:</u></p> <ol style="list-style-type: none"> No – loss of NS1&2 = loss of leverage over Europe Yes – severing negotiations with Europe Yes – incident coincided with Baltic Pipe inauguration (Norway to Poland Gas pipeline), potentially sending message to Norway, which has replaced Russia as large supplier of gas to EU Yes – create instability in EU, methods of hybrid warfare Yes – shutting NS1&2 down through "force majeure", rendering Russia's obligations toward European stakeholders void without legally breaking contracts, dodging many penalties in doing so. No – significant financial stake in pipeline Yes – Motive to move gas supply towards NS2, as shown while Russia reduced/ stopped gas through NS1. Current status of NS1&2 shows only pipeline B of NS2 remains intact to deliver gas, which fulfils Russia's motive by forcing gas supply towards NS2, and down to a single point. (NS1 operator claims to be entirely "separate" from NS2 operator. NS1 the latter having Gazprom as its sole shareholder) Other covert motives not available in public domain 	<p><u>Hypotheses:</u></p> <ol style="list-style-type: none"> Yes – financial & socio-political advantage from boosting LNG supply to Europe, enhancing its hold on EU No – lack of need to conduct such a drastic operation/ incident Yes – framing Russia as enemy Yes – no financial stake in pipelines Yes – Biden's speech in Feb 2022, indicating motive and capability to take out NS1&2 Yes – CIA advance warning on NS1&2 being target Other covert motives not available in public domain 	<p><u>Hypotheses:</u></p> <ol style="list-style-type: none"> No – risks aggravating Russia/ Ukraine conflict and proxy energy conflict No – significant financial stake in pipelines No – already in energy crisis, elimination of optionality exacerbates pressure on energy diversification Yes – elimination of Russian gas competition, in favour of Norwegian gas and other energy sources Yes – Baltic EU nations' negative sentiments towards Russia Yes – Poland's long standing stance against Nord Stream Other covert motives not available in public domain 	<p><u>Hypotheses:</u></p> <ol style="list-style-type: none"> Yes – framing Russia as enemy Yes – weakening Russia by eliminating their leverage over EU No – does not want to face EU as enemy at this time Other covert motives not available in public domain
Opportunity	<p>Yes</p> <ul style="list-style-type: none"> Russian navy support ships and submarines recently observed not far from the leaks (according to CNN/ European officials) Lack of pipeline security provided opportunity 	<p>Yes</p> <ul style="list-style-type: none"> Large NATO presence in leak area (according to the Kremlin spokesman Peskov) Lack of pipeline security provided opportunity 	<p>Yes</p> <ul style="list-style-type: none"> Large NATO presence in leak area (according to the Kremlin spokesman Peskov) Lack of pipeline security provided opportunity 	<p>Yes</p> <ul style="list-style-type: none"> Lack of pipeline security provided opportunity

EU's Priorities

PRIORITY	SUCCESS/ FAILURE	REASON	THOUGHTS?
Energy Security	<p>FAILURE</p> <p>Failure to protect energy infrastructure, further weakening EU's energy position</p>	<p>Incident's worsening of existing energy crisis, bringing further volatility to energy prices, adding even more pressure to energy diversification</p>	<ul style="list-style-type: none"> In a time of desperation for gas and energy, how did events lead to so much gas going to waste? What is the economic effect of this? How does this change geostrategic relations? What does this mean for energy companies, costs, end-users and what is the impact on social stability?
Climate Change Goals	<p>FAILURE</p> <p>Loss of approx. 500 million cubic metres of natural gas from NS1&2 leak</p>	<p>Significant environmental damage, greenhouse effect of methane leak. Considered one of the "worst natural gas leaks ever"</p>	<ul style="list-style-type: none"> Pipelines were not in use – why were they containing natural gas and not an inert gas (e.g., nitrogen)? What tools are in place when facing imminent threat? What is the response and how long does it take to activate it? How did events lead to such a direct violation of global climate goals?
Protecting Europe	<p>FAILURE</p> <p>Europe facing "hybrid warfare"</p>	<p>Even with CIA warning over in the summer, incident still occurred.</p> <p>Even after explosion 1 and at a time of high alert, a second explosion was not prevented.</p>	<ul style="list-style-type: none"> What do suspicious and "finger-pointing" mean for the Ukraine crisis? How did the saboteur select locations for NS1&2 explosions (on borders of economic zones)? How do we know if similar explosives are already in place for other seabed infrastructure? Despite advance warnings, why was there no effective reaction & security? How do we know protection offered by federal authorities is enough? Does private sector need to take further pro-active prevention?

Regional Critical Infrastructure SWOT Analysis

Strengths

- Europe filled around 90% of its storage for winter with the help of LNG and diminished consumption because of high prices. Storage levels kept rising even after the NS1 cut off.
- EU leaders have publicly recognized importance of **security strategic infrastructure** of entire EU
- Focus has turned to security of energy infrastructure, with **additional security measures** being applied
- Since no gas has flowed through either of the pipelines, **German** authorities have been quick to reassure people that the leaks will **not affect** its plan to fill **gas storage** tanks in time for winter.
- Europe has lined up all the **alternative gas supplies** it could: shipments of **US LNG** and more pipeline gas from **Norway** and **Azerbaijan**.
- EU nations **diversifying energy sources** (including through using nuclear)
- **Reduction** in energy consumption
- **Management of socio-economic unrest:** governments have approved a raft of measures – **bailouts** for utilities forced to pay exorbitant prices for Russian gas, **cash** for hard-hit households and **tax breaks**.

Weaknesses

- Existing **energy crisis, high gas prices** and **energy insecurity**, lack of unity on energy strategy including for gas price gaps
- **Destabilizing effect** of the incident
- **Loss of security:** Incident highlights **vulnerability of critical infrastructure**, including other marine gas infrastructure
- **Lack of optionality:** multiple leaks mean neither pipeline **will likely deliver any gas** to the EU over the coming winter, irrespective of political developments in the Ukraine war
- Existing high level of **resentment from society** (particularly EU) over energy prices/ energy crisis
- **Inflation** hits record 10% in 19 EU countries using euro, as prices for electricity and natural gas soar
- Looming **recession**
- **Lack of existing alternative/ green energy**, increasing pressure to scale-up green energy
- Increasingly **high visibility** of energy infrastructure, brings awareness to various threatening actors
- **Norway** is Europe's principal **gas supplier** and has nearly 9,000km of pipeline to patrol. Any interruption in its supply could trigger an immediate energy crisis and a rupture in active pipelines would lead to an ecological disaster.
- Reliance on undersea cables

Opportunities

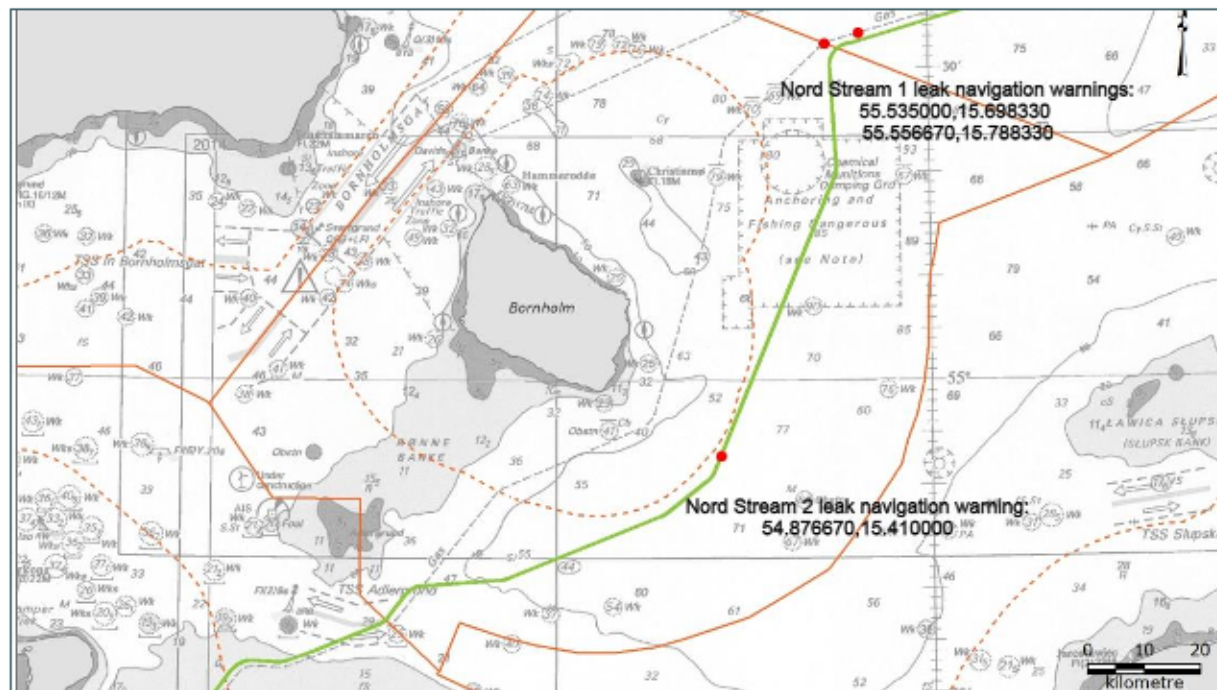
- To **strengthen security controls** for **existing** critical infrastructure/ energy infrastructure, which reduces risk and consequences of potential incidents
- To **build security considerations** into the **design phase/ early phases** of new or expanding critical infrastructure/ energy infrastructure
- To bolster the safety of the **energy transition**
- To **reduce risk and opportunities of escalation** of political tension by preventing further threats to critical infrastructure
- Business opportunities to **develop/ fast-track new ventures** to import energy to EU
- Enriched **consequence mitigation experience** based on NS1&2 incident, better preparation for future incidents
- For EU to set **benchmark standard of security** for critical infrastructure
- Strengthen **safety culture** in critical infrastructure sectors through **security**.

Threats

- Risk of **repeat action** from NS1&2 "saboteur" against other critical infrastructure
- Risk of **"false flag operations"** targeting critical infrastructure
- **Environmental activism** towards hydrocarbon sector
- Incident triggering further **escalation of Russia/ Ukraine** conflict
- Incident triggering further **escalation of tension** between Russia and EU/ Western powers, aggravating the **proxy energy war**
- **Geopolitical uncertainties** in various areas in the region/ East Med/ North Africa
- **Socio-political unrest and instability** from EU societies suffering from energy crisis and increasing living costs
- Increasing **cyber threat/ cyber terrorism**
- Risk of **human error/** poor performance for critical infrastructure due to increased scrutiny and pressure.
- "Threatening" or unusual activities, including **drone activity**.
- **"Saboteur"** potentially sending message **recognizing vulnerability** of infrastructure
- Countries (incl. Germany) keeping **coal plants** in operation, exacerbating climate issue
- Oil & gas **price volatility, uncertainty** in global energy markets
- Disruption to **shipping routes/ sector**

NORD STREAM INCIDENT CONCLUSION

- The sheer scale of the blasts indicate the intentions of the adversary – namely **intentional** and **thorough destruction** of the pipelines, **guaranteed by multiple explosions**, making the challenge of repairs an unprecedented level of difficulty.
- Damaging two seabed gas pipelines under such depth of water constitutes a major event or a “**special naval operation**”.
- Likely to have been a **state actor** and not any other type of organization, since the latter would not have the necessary network/ support to conduct such an operation, nor would it be able to mobilize the network/ support without being noticed.
- The saboteur’s deliberate, innovative and strategic explosions occurred on **border of 2 EEZs**, which **avoided singling out a particular country** or inciting direct conflict, and potentially other circumstances.
- This **unique** and **unprecedented incident** signifies the **turning point** of the nature of international tension/ conflict – the **seabed is now the focus**.



NS1&2 Incident – leak navigational warnings. [Euractiv via Twitter]



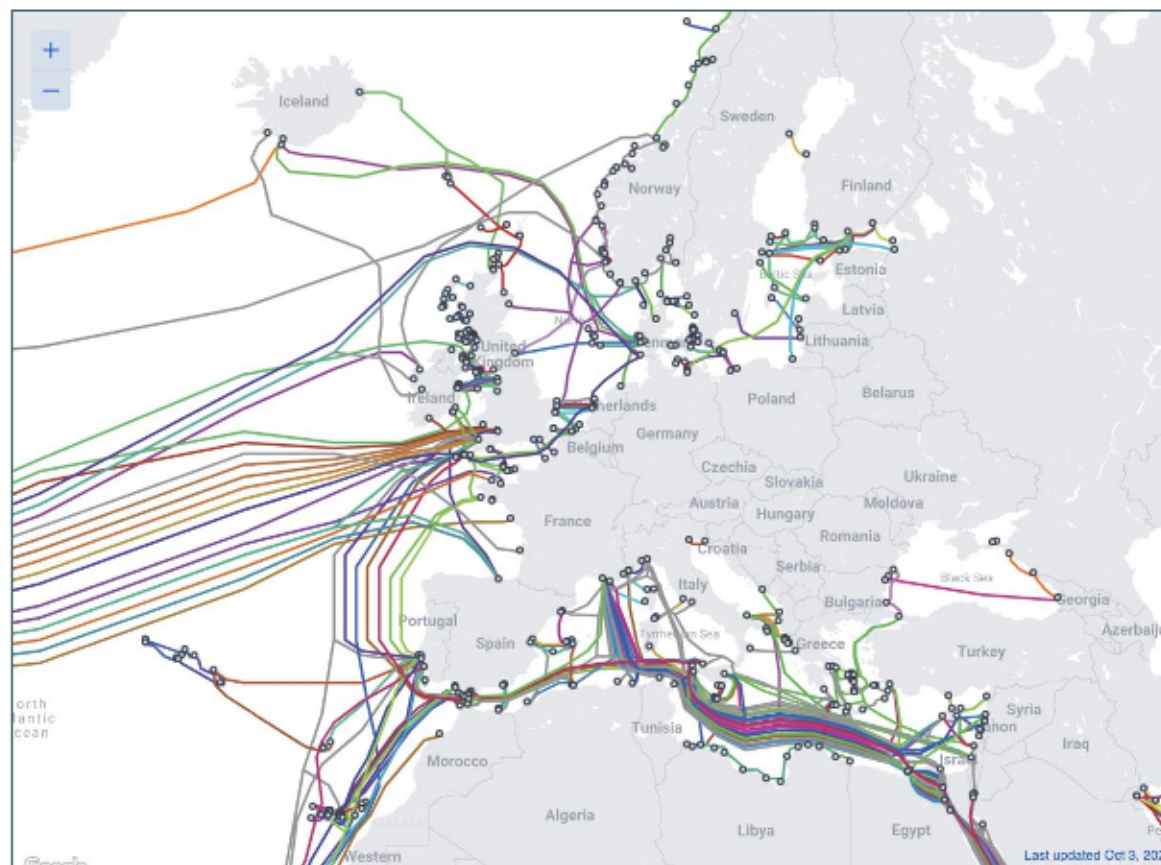
Critical infrastructure

Situational Outlook

- Not only do we need to strengthen the protection of the coastal areas on the North Sea and Baltic Sea, but also ALL major strategic infrastructure supporting the EU's needs, which include **subsea infrastructure** as well as other **regional energy infrastructure** that are **currently operational/ in development** (incl. East Med & North Africa).
- Beyond the fact that the incident is of **maritime nature** and is **already impacting the shipping sector**, the interconnected nature between energy and shipping (e.g., LNG carriers/ tankers – attractive targets) means that maritime activities also need to be **included in security efforts**.
- Western countries are particularly vulnerable in its reliance on **undersea cables**, which carry **90%+ of the world's internet traffic**. If those cables were severed it would trigger a multifaceted crisis, impacting most aspects of modern life. (Whereas Russia's communications infrastructure is more land-based.)

TURNING POINT: *Seabed Warfare*

- The incident shows for the first time that the new landscape for geopolitical friction is the **seabed**.
- This turning point will impact:
 - Strategy and routes for laying pipelines
 - Surveillance & protection of seabed infrastructure
 - The way governments, societies and adversaries view critical infrastructure in methods of “hybrid warfare”.



Submarine Cable Map [submarinecablemap.com]

When peace is uncertain and security is not guaranteed, what does this mean for critical infrastructure?

- Critical infrastructure built and designed to operate during peacetime need to be re-evaluated and bolstered in order to withstand a time of escalated tension, hostility and warfare in closer vicinity.
 - Although governments have deployed a **reactionary step-up in security**, holistic risk management measures are required in order to fully bolster **every aspect of an organization** and their **operations** to facilitate **ongoing and proactive protection from threats**, with the future of maritime security being **seabed surveillance** and **rapid deployment of response**.
 - Although critical infrastructure (as well as the shipping sector) have existing thorough safety systems and take additional security measures, the nature of the current socio-political climate necessitates the **integration of both safety and the step up in security** into a comprehensive and robust **Security & Operations Management System**.
 - **Risk assessments** and **ongoing risk management** must be conducted for strategic facilities, infrastructure and vessels, which must be undertaken by an **experienced partner** with the right tools, capabilities and mentality, in light of the new and **heightened risk landscape**.
 - As long as there is the **capability, opportunity** and **intention**, there is no limit as to what a threatening agent could undertake. Measures can be taken to suppress the threat, particularly through eliminating the “opportunity”, the key one being a step up in **security and risk management**, as well as **crisis preparedness** and **consequence mitigation**.
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DEFENCE STRATEGY

In any operations planning, including laying/ operating of pipelines, the basic ecosystem for maritime seabed security is:



PLANNING

- Total change of strategy for laying new pipelines
- Strategic planning for existing pipelines
- Total change of mentality regarding seabed security



TECHNOLOGY

- Detection/ sensors
- Surveillance
- Physical hardening



EXPERTISE & SERVICES

- Strategic planning
- Surveillance & monitoring
- Pro-active protection
- Training



READINESS & RESPONSE FROM STATE RESPONDERS

- Naval forces
- Coastguard
- Response & Repair teams



SECURITY & OPERATIONS MANAGEMENT SYSTEM

- Co-ordinating & connecting moving parts/ stakeholders
- Holistically addresses the security dimension that exists in **every aspect** of an organization, its operations and its personnel



THE NEXT VULNERABILITY

The entire web of critical infrastructure spanning across the region, including:

Undersea critical infrastructure

- Telecommunications cables/ cross-regional transmission network
- Other regional seabed oil & gas pipelines
- Seabridges, tunnels
- Submarine power cables

Critical/ strategic infrastructure

- Oil and gas infrastructure/ energy assets, including LNG terminals/ FSRUs/ nuclear power plants
- Ports, bridges
- Cyber attack on all mentioned critical infrastructure
- Underwater transportation/ tunnels, railways
- Offshore projects/ wind turbines

Vessels

- Shipping industry, particularly LNG vessels
- Disruption to shipping routes

SCENARIO:

Sea-bottom naval mine placed and detonated under LNG bunkering location, causing an explosion that breaks vessel horizontally in half.

Or attacks disguised as accidents.

Diaplous' Expertise & Services

- **Seabed Surveillance & Security** – specialized experience accumulated from:
 - Hellenic Naval Academy / Strategy Operations - Hellenic Naval War College / US Navy Seals and SOF Schools / NATO Operations/ NATO Special Forces Training / Anti-submarine Warfare College USA
 - Expertise in Explosive Ordnance Disposal (EOD)
 - Hellenic Navy, expertise in commanding Special Forces Units, Fast Attack Craft Squadrons. Former position held as Commanding Officer of the Hellenic Navy Seals
 - Senior positions formerly held at: Military Counterintelligence of the Hellenic National Defence General Staff, Director Chief in Resources & Personnel Directorate of the Hellenic Ministry of Defence

- **Risk Management & Crisis Management**
- **Holistic, integrated Security & Operations Management Systems**
- **Security Vulnerability Assessments**
- **Intelligence Analysis & Strategic Planning**
- **Training Capabilities**
- **Access to Technology**



THANK
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