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Securizing Offshore Wind Energy cables – Threats and challenges

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Context and objectives

- Security challenges related to wind trubines have been highly documented in terms of physical resistance to natural risks.
- The Gowest project contribution focuses more on the ones produced by human conscious or unconscious activity.
- Exploratory studies conducted have developed a global approach.
- We propose two shifts :
  - Focusing on the most vulnerable devices, in terms of exposition to human activities' impacts.
  - Addressing the relevant regulations in the French context.

Offshore wind turbines documented security threats

Threat Dimension	Nature of Activity	Primary Actors	Potential Impacts	Primary Geographic Hotspots
Accidents & Multi-use	Collisions, anchor drag, **radar clutter**	Commercial vessels, fishing fleets	Physical damage, air defense blind spots, financial loss	North Sea, South China Sea
Blue Crime	Copper theft, smuggling, piracy, ransomware	Organized crime, "Conti" group, pirates	Revenue loss, service disruption, supply chain risk	Gulf of Guinea, SE Asia
Non-State Actors	Terrorism, sabotage, direct action protests	Extremist groups (e.g., Abu Sayyaf), activists	Structural destruction, political instability, project delays	Philippines, North Sea
Inter-State/Grey Zone	Espionage, sabotage, cyber spillover	State militaries (Russia, China), state proxies	Strategic coercion, national energy insecurity, loss of control	Baltic Sea, South China Sea

Literature Review. Main sources:

BUEGER, Christian et EDMUNDS, Timothy. Maritime security and the wind: Threats and risks to offshore renewable energy infrastructure. *Ocean Yearbook Online*, 2024, vol. 38, no 1, p. 433-458.

DU, Zunfeng, LIU, Zhiyu, ZHOU, Qingji, *et al.* Research on process safety of offshore wind turbines installation: A theoretical model and empirical evidence. *Process Safety and Environmental Protection*, 2024, vol. 181, p. 493-501.

Specific threats to submarine power cables and regulations at stake

Submarine power cables are physical entities vulnerable to accidents, sabotage, or economic warfare.

1. Accidental Impacts

- Tearing by a trawl net: regulations governing fishing zones and channels
- Tearing by an anchor: anchoring regulations
- Sedimentary displacements during storms: meteorological monitoring

2. Physical Sabotage of Submarine Cables

- Use of a cutting dredge: monitoring of vessels at anchor
- Use of a hydraulic cutter with an ROV: monitoring of onboard equipment
- Use of explosive charges: monitoring of vessels at anchor
- Cyberattacks: securing interconnections

3. Economic Takeover

- Bankruptcy of critical companies: regulations as Operators of Vital Importance (OIVs)
- Limitation of cable reserves and repair kits stored onshore for repairs: regulations governing company stockpiles

Challenges

From a risk assessment prspective, trawling and anchoring accidents remain by far the most frequent.

Primary energy infrasturcture (nuclear power plants, hydroelectric dam) is obviously the most exposed to the risk of sabotage.

However, neglecting this risk, or the risk of economic takeover of equipment deemed of secondary strategic importance, can be detrimental in a hybrid warfare context.

IVANOV, Glib et POITA, Yurii. Ensuring the Security of Onshore and Offshore Wind Farms in the Context of War or Terrorism. *Sustainable Marine Structures*, 2025, p. 45-62.

The issues we intend to document concern the coordination of civil security (Interior), military security (Defense] and economic security (State holdings)

Cette action est soutenue par NExT et par l'Etat au titre du Plan d'investissement France 2030.