European MSP Platform

Conflict fiche 2: Cables / pipelines and commercial fisheries / shipping

Cables and pipelines connect countries across borders and sea basins, transporting electricity, oil, gas or telecommunication. Connecting countries and continents through complex networks, they are fundamental to the national and global economy. Especially electricity cables form increasingly complex networks as they also include offshore wind farm connectors. Commercial fishing and shipping occur throughout sea space, with fishing comprising many different techniques. Although the sectors can mostly occupy the same space, there are instances when they do come into conflict, for example when fishing involves bottom trawling or new pipelines prohibit access to fishing grounds. Some of the issues are related to vessels generally and not only fishing vessels.

This fiche sets out what maritime spatial planners can do to prevent or mitigate these conflicts.

1. Description of the sectors

1.1 Cables and pipelines

In all sea basins, countries are connected by numerous submarine cables, comprising telecommunication cables (Figure 1) and electricity cables. Electricity cables also transport energy between offshore wind farms and from offshore wind farms to the mainland. Regional Seas, such as the North Sea, also contain pipelines (see Figure 2) which transport oil or gas between countries or from platforms to the coast.

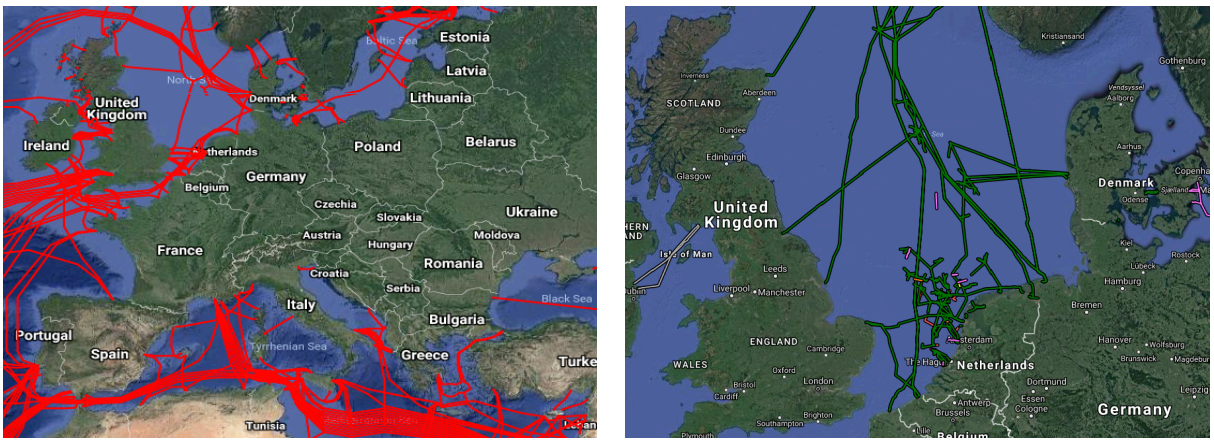

Figure 1: On the left: Cables in Europe (EMODnet). On the right: Pipelines in the North Sea

In the EU, most Member States did not have a framework to determine the location of cables and pipelines. Owners had a lot of freedom to determine the most optimal route. Furthermore, not all old cables have been decommissioned, which means larger areas of seabed are covered by functioning and non-function cables.

Laying cables and pipelines is very expensive, with the exact costs depending on the type. For offshore wind farms, for example, the costs of an electricity cable connecting turbines to the shore amount to around €1 million per kilometre[1]. Those responsible for the grid therefore prefer the shortest and therefore cheapest routes.

Cables can be laid in different ways, depending not least on legislation. Some cables are buried at a depth of a metre, but others just lie on the sea floor[2]. Pipelines are carefully laid down in a trench which is dug by a special machine. Rocks can then be dumped around it to protect the pipeline. One of the problems for cables is that their location can shift and that buried cables can work their way free, as a result of moving sand for example. Cables that were once considered safe from subsea activities may therefore become partially or totally unburied.

Subsea cables and pipelines are often the only route between two points, for example between an offshore wind farm and a land connection point. Disruption means that energy can no longer be transported and is therefore lost, resulting in severe financial damage[3]. For pipelines the effects can be even more serious, as damage to pipelines can also cause serious environmental impacts.

The repair of cables and pipelines is very costly[4]. Special vessels are necessary, and a certain area has to be closed down temporarily for other uses. Although new technologies for repairing cables and pipelines make the work faster and cheaper, results will not always be perfect. For example, where cable repair has been carried out, although every effort is made to have it fall back flat on the sea floor, it can sometimes end with a bit of cable standing proud of the seabed.

To limit the chance of a break or disruption, subsea cables have strong protection layers, and pipelines are protected with several coatings. Pipelines are constructed to reduce the potential damage to the environment in the case of a leak.

The cables and pipelines sectors are highly diverse. The pipelines are mainly owned by consortia of private oil and gas companies, telecom cables by public limited companies (e.g. British Telecom) and electricity cables by publicly owned Transmission System Operators (TSOs), who on a pan-European level are represented by NSTSO-E, or in some cases by offshore wind farm owners. All sub-sectors have strong political influence or ties, and projects run into the millions or even billions of Euro.

[1] European Subsea Cable Association (2017)
[2] KIS-ORCA (2018)
[3] Anderson (2017)
[4] Drew & Hopper (2009)

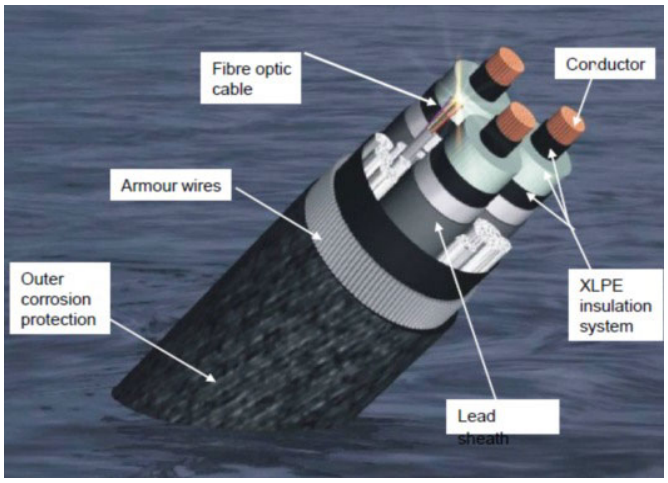

Figure 2: Cable protection[5]

1.1. Commercial fisheries / shipping as related to cables and pipes

Commercial fisheries

Fishing traditions go back hundreds of years, and historically, fishers were not bound by administrative borders. This still applies to some degree, so for example, many Dutch vessels fish in UK waters and vice versa, although restrictions do apply with respect to territorial waters.

Commercial fisheries represent an important economic sector for coastal regions and communities in many EU countries[6]. Gross profit and net profit margins have improved over recent years, possibly due to healthier stocks[7] and aided by more efficient vessels and fishing methods. More industrial methods are becoming common in the entire value chain, and new techniques are constantly being introduced to increase the overall catch while decreasing bycatch.

Commercial fishing is really a form of hunting. Although the exact patterns depend on the type of fish, fishers mostly look for shoals which move between different food-rich areas. Fishing vessels therefore move in unpredictable ways and unlike other vessels making use of shipping lanes. Fishers also need to make sure they use their time fishing efficiently as fuel and time is expensive. Costs are a major issue for fishers, especially small-scale coastal fishers whose profit margins have shrunk considerably in the wake of regulation and decreasing stocks.

The most common fishing method is bottom trawling, which is used to catch the majority of commercial species such as cod, haddock, plaice, sole and whiting. Different intensities of bottom trawling occur in different sea areas (Figure 2); with high intensity areas often overlapping with cable and pipeline locations. The traditional way of trawling in the North Sea was beam trawling, but in recent years the use of otter board trawling has increased. Bottom trawling is also the method most likely to cause serious damage to cables and pipelines.

[5] European Subsea Cable Association (2017)
[6] Altvater et al. (2018)
[7] European Commission (2018)

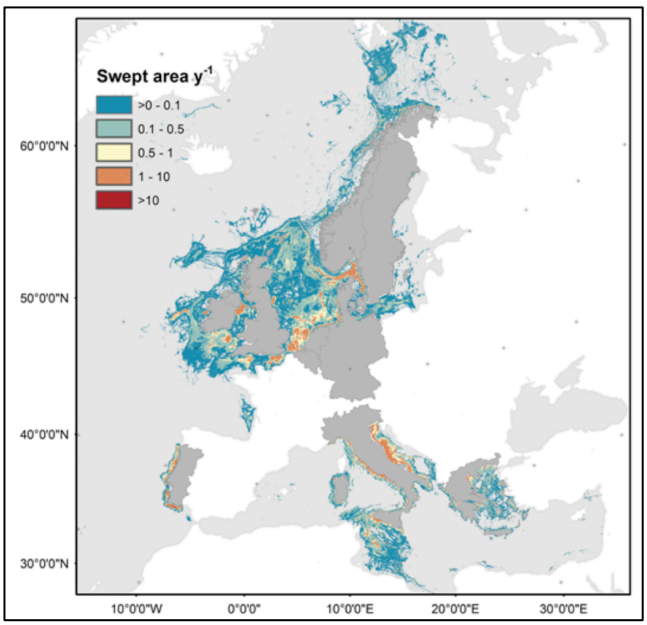

Figure 3: Bottom Trawling Intensity[8]

Shipping

Ships, be it fishery vessels, or cargo and passenger ships, have the freedom to sail through European seas without limitations. However, in areas which are heavily sailed, or used by other sea uses (such as offshore wind farms), countries and the International Maritime Organisation (IMO) can designate shipping related measures for cargo ships, such as shipping routes (in different forms), harbour access routes and safe anchoring areas. The routes are well signalled and maintained to guarantee a safe and fast voyage for ships. Ships are allowed to sail outside of these routes, but this affects their responsibility and insurance in case of an accident. Therefore, the majority of cargo ships uses these highly recommended routes, although there can be good reasons to deviate from them, not least in the case of technical problems, weather etc. Shipping does not normally interfere with cables and pipelines, but there can be cases where conflicts occur. New cables and pipelines sometimes also have to be laid across shipping routes.

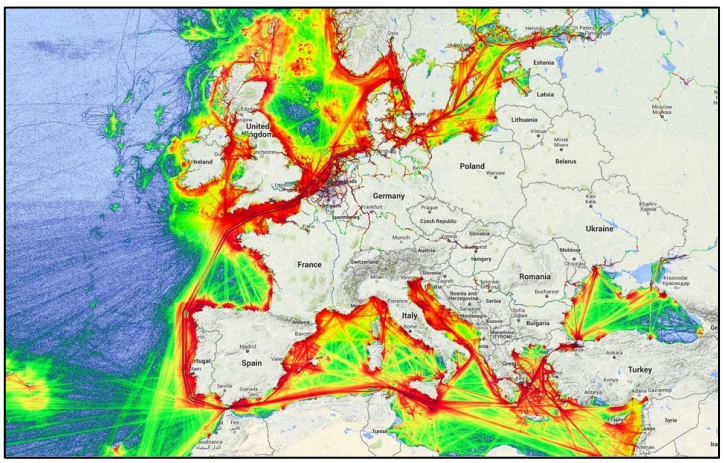

Figure 4: Intensity of shipping in the Europe[9]

[8] Eigaard *et al.* (2017)

2. Conflict description

2.1 Conflicting elements

From the perspective of the cables and pipelines sector, the conflict with fishing and occasionally shipping is mostly related to vessels generally and accidental damage to cables and pipelines by anchors and fishing gear[10]. Shipping can sometimes be affected when cables and pipelines are laid. From the perspective of the fisheries sector, the conflict with cables and pipelines is mostly one of spatial restriction. Specifically, the following conflicting elements can be identified:

- **Fishing vessels hooking a cable/pipeline**[11]

Damage to cables or pipelines can occur from pulling fishing gear over them, or from fishing gear getting stuck underneath. The first case usually affects a longer stretch of cable or pipeline and can cause cables or pipelines to be moved or dragged along, in the worst case leading to breakages. The second is quite rare but can also cause the cable or pipeline to break.

- **Vessels stranding on a cable/pipeline**

This is a relatively rare occurrence as it would involve a vessel sinking onto a cable, e.g. after having been involved in a collision. A direct hit like this affects the outer protective layers of the cable or pipeline, but it tends to be a localised impact.

- **Anchors being dropped on the cable/pipeline**

Anchors being dropped directly onto a cable or pipeline can also cause localised damage. Further damage can occur if the anchor is moved and hooks the cable or pipeline. As above, this is an issue for vessels generally and not just fishing vessels.

- **Spatial restrictions to fisheries**

Fishers cannot cross cables and pipelines while trawling. They either need to lift their gear to cross a particular cable or pipeline (which is expensive in terms of lost catch and time-consuming) or find alternative fishing grounds or routes to fishing grounds.

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[9] Reddit (2016)
[10] Drew & Hopper (2009)
[11] Carter *et al*. (2009)

2.2 Spatial context

Trawling mostly happens in sea areas with a depth of up to 100 metres[12]. These can be found both offshore and close to the coast. The scale of the problem is also influenced by the nature of the sea floor and whether it is possible to bury cables.

Currently, over a third of all cable damage is caused by fishing activity. Many cables have at some point been damaged by trawling gear; the same applies to pipelines. This is because of changes in the shape and weight of trawl shoes, as well as the steady increase of the average horse power of beam trawls. A potential hit with a cable or pipeline can cause a loss of gear, fishing time and catch for the fishers themselves, as well as cause potential accidents. In areas with substantial fishing activity, pipeline and cable owners and fishers have therefore been concerned with finding solutions to this problem for some time.

Story 1: How innovative fishing gear led to new damage to subsea cables (United Kingdom)

Traditional beam trawls consist of a steal beam with sliders (shoes) attached on each side of it. The net and tickler chains are positioned behind the beam. The sliders are dragged along the sea bed, sometimes digging into the sand or substrate to a certain depth. If a cable is buried in the seabed to a depth below the trawl slider penetration area, the cable will not be damaged. It may also be that the sliders hover over the cables. In a small number of cases, this goes wrong: the gear gets hooked and the cable can be cut.

Figure 5: A traditional beam trawl[13]

In 2009, new wing-type gear was installed on some bottom trawls active in the North Sea, called the sumwing or pulsewing[14] [15]. This gear replaces the steel beam and sliders. Such a wing no longer touches the seabed as it is lifted by drag supported by a front extension (the nose).

[12] Ibid
[13] Hot Frog (2016)
[14] Hintzen & Machiels (2014)
[15] The sumwing technique is often combined with pulse trawling, a controversial form of trawling that is currently prohibited in the EU (see e.g. https://britishseafishing.co.uk/pulse-trawling/, accessed 7 January 2019d)

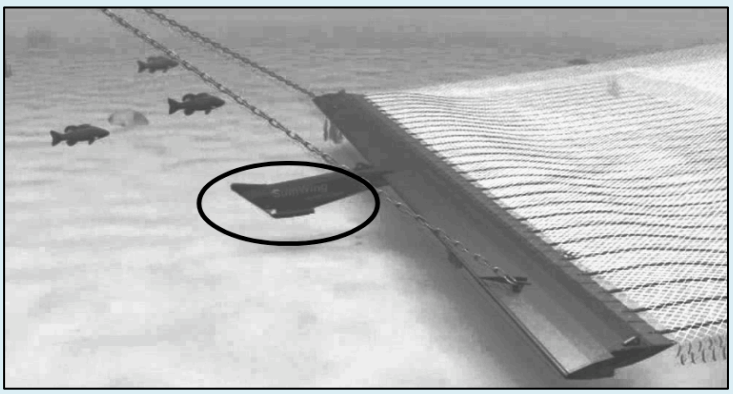

Figure 6: Innovative sumwing on the bottom trawl[16]

However, the developers of this innovative fishing method did not consider the possibility of damaging subsea cables. In fact, more cables were damaged as a result of the new wing-type gear. The new gear did not cut the cables directly, but mainly damaged their insulation. Because of this, seawater was able to directly get to the metallic core of the cable, causing a short circuit. Older cables, where the insulation layer has already been affected by years of wear, have the potential to be extra vulnerable to a potential hit from the sum wing.

3. Drivers of conflict

EU policy is supporting the development of a transnational electricity grid, leading to an increase in the number of electricity cables crossing the seas. More electricity cables connecting to the mainland will also result from the growth of offshore wind farming, itself driven by EU and national renewable energy targets. Furthermore, new telecommunication cables as well as new gas pipeline corridors have been developed as a result of the digital and energy union.

In terms of the sectors concerned, the offshore cable sector currently enjoys strong political and financial support because it can stimulate the development of an offshore grid, thus further increasing the use of renewables. Cable owners thus have more financial resources. Nevertheless, the fishery sector also tends to have a strong voice among the general public and also politically in some countries, although the economic importance of the fisheries sector varies between countries. The historical importance of fishery in some countries tends to lend fishers strong emotional power in the MSP process.

[16] Ibid

4. Solutions

Fishers do not damage cables and pipelines on purpose and are even at a disadvantage if they do. Solutions are often found by the sectors talking to each other to raise awareness and by changing the design of fishing gear. MSP can provide added value by strengthening communication between the two sectors. Even where it is unable to deliver concrete planning solutions, it could contribute to greater mutual understanding as part of the planning process.

Generally, both sectors are keen to develop their own solutions without strong government involvement or the involvement of maritime spatial planners. However, some MSP practices have already been established that could prevent this conflict from occurring. Conflict mitigation is not an option in this case as minor damage to cables or fishing gear is still damage; the difference is thus between spatial or non-spatial solutions.

4.1 Spatial solutions

Solution 1: Develop corridors for cables and pipelines as part of an offshore grid plan

In Germany, an offshore grid plan has been developed that specifies corridors for cables and pipelines. The goal of this plan is to bundle cables and pipelines as much as possible by means of parallel routing (see Figure 7). Cable developers, which can be semi-governmental agencies, are now required to use the corridors designated in the plan. Bundling cables and pipelines in corridors decreases the chance of fishers hitting them; and it can also help to foster cross-boundary grid connections and interconnections between offshore wind farms. Also, because the plan was developed by a single authority, it has been easier to communicate the location of the cables to fishermen. Fishers are not excluded from these corridors. In developing them, planners took into account existing and approved uses and rights of use as well as the concerns of shipping and fisheries[17].

Solution 2: Use MSP to co-design suitable cable routes

Co-designing cable routes or corridors is useful for both sides as it raises awareness of each other's needs. Efforts could be made to design cable routes (e.g. those connecting offshore wind farms to the mainland) in such a way that trawling is restricted as little as possible. It already helps if fishers do not need to lift their gear as often as they would without the use of planned corridors.

[17] BSH (2017), *see also https://www.bsh.de/EN/TOPICS/Offshore/Sectoral-planning/Spatial-offshore-grid-plan/Spatial-offshore-grid-plan_node.html*

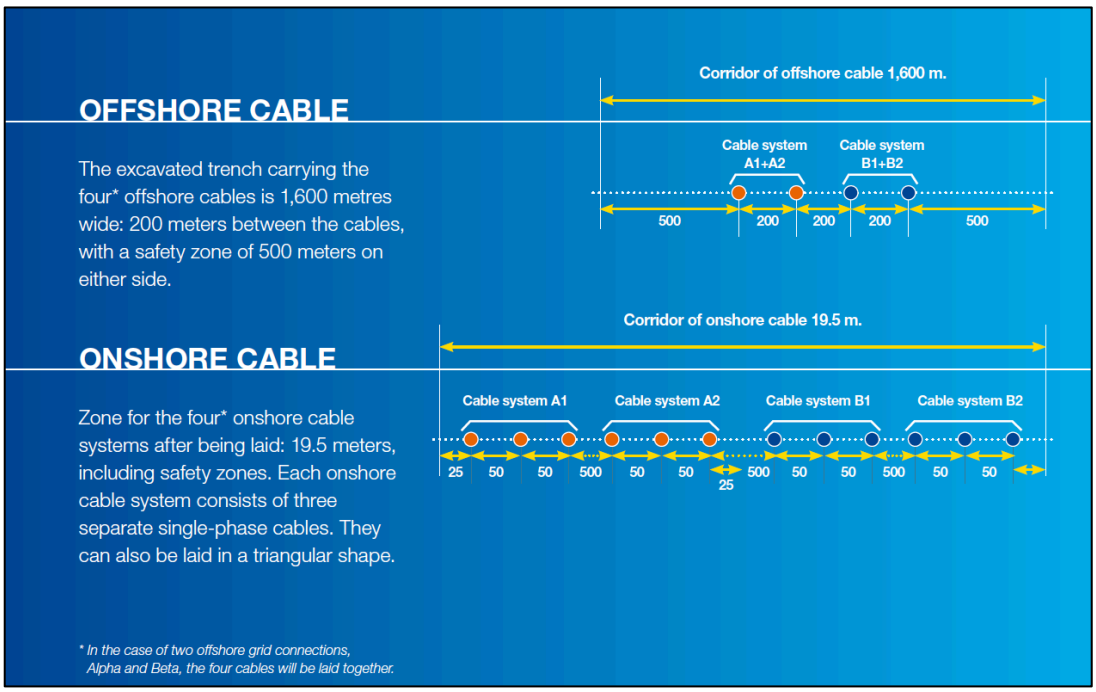

Figure 7: Schematic drawing of a corridor for offshore cables[18]

Solution 3: Develop no-anchor zones in well-specified areas

Another major cause of damage to cables is the anchors of fishing vessels. In areas with many cables, one option could be to develop no anchor zones. This, however, would require appropriate legislation to allow such a designation to be made. Another option would be to come to a voluntary agreement on no anchor zones.

Solution 4: Develop no trawl zones alongside cables and pipelines

A spatial option is to plan for no trawling zones in specific areas. Under Danish legislation for example, all cables and pipelines are protected by a 200m safety zone on each side of a subsea cable. Anchoring, trawling and extraction among other activities are restricted. If MSP legislation does not allow for this directly, MPAs or safety zones within or around offshore wind farms could be used instead. Other fishing activities might still be allowed in no-trawl zones as their main purpose is to avoid the potential impact of trawling on cables. Alternatives for fishers could be provided.

Solution 5: Require cables and pipelines to cross shipping lanes by the shortest route possible

To minimise the chance that cables and pipelines are hit by shipping traffic, the German MSP[19] and the more recent offshore grid development plan[20] stipulate that priority areas for shipping should

[18] Tennet (2017)
[19] BSH (2009)
[20] BSH (2017)

be crossed by the shortest route possible. This means that preferably, new cables and pipelines should be designed with a 90-degree angle relative to existing shipping routes. The German MSP authority expects an increasing number of cables to be developed the coming years because of newly built interconnectors and offshore wind farms in the EEZ, hence it is important to minimize potential future conflicts at this early stage. Having 90-degree angles also has a positive impact on shipping. Using the shortest route to cross a shipping lane decreases the time spend on the laying, operation, maintenance and dismantling of pipelines and submarine cables and thereby reduces negative effects on shipping traffic.

The principle of the shortest route is reasonably easy to implement for electricity or data cables. For pipelines it is more difficult because of the technical specifications of pipelines (e.g. bend radius, pressure conditions). Therefore, in the German plan, when laying new pipelines, the principle of crossing priority areas for shipping by the shortest route possible must still be adhered to, but there is an exception for situations where this is technically unfeasible.

4.2 Non-spatial solutions

Story 2: Improving communication and information for solving the problem

"For many years cable companies have taken steps to contact fishermen and inform them about the locations of their cables. They have distributed charts, booklets and other items. In some areas a two-way dialogue has grown, with fishermen telling companies where the most heavily fished areas lie, so that these areas may be avoided when cable routes are planned, and so that routes affording better cable burial can be found. In most areas such dialogue is informal, but in some places more formal cable/fishing committees have been established. Seabed users may have their differences, but there is general agreement that the seabed will be better managed if there are good communications among interested parties." (Drew & Hopper, 2009:54).

An important tool to solve the conflict between cables and pipelines and fishing are information systems designed to provide relevant information to fishers. One example from the North Sea is the Kingfisher Information Service, which was developed in cooperation with the KIS-ORCA project[21]. The service provides information to fishers regarding the seabed and subsea structures, including cables and pipelines. It advises fishers to exercise caution when fishing in the vicinity of subsea cables and renewable energy structures. For subsea cables, awareness flyers have been developed. Also, subsea cable and wind farm updates are produced annually and are available to fishermen free of change in a format they use. Kingfisher advises fishers to exercise caution when fishing in the vicinity of subsea cables and renewable energy structures. As a hit with a cable can potentially cause accidents, it is advised that after a hit, the fishing gear is lowered to the sea bed, and if stuck, left there.

[21] See www.kis-orca.eu

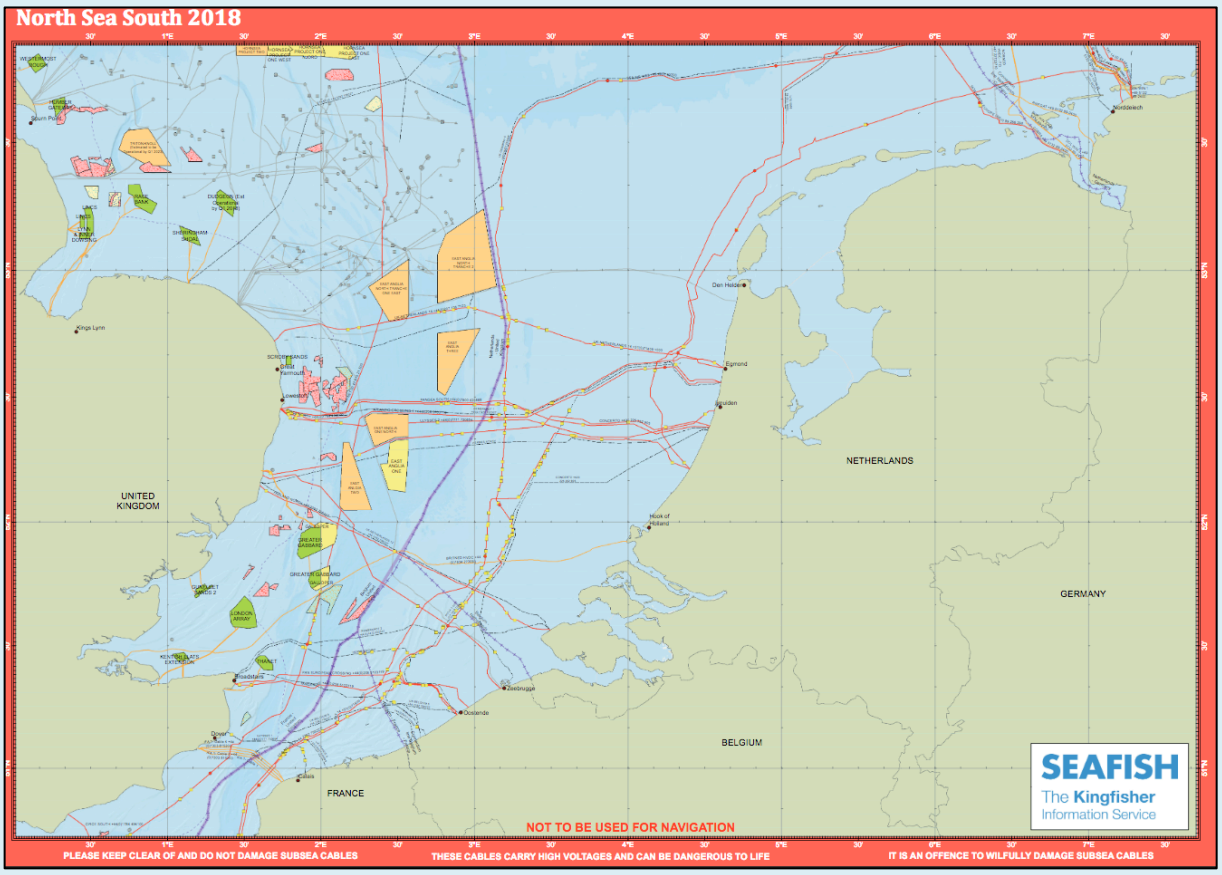

Figure 8: Example of an awareness chart for the Southern North Sea[22]

Story 3: A new subsea energy interconnector through fishing grounds in the Adriatic (Italy-Slovenia)

Due to growing energy use in Italy and Slovenia and congestion in the existing interconnector, plans have been made to build a new subsea interconnector cable between the two countries. The cable will cross Italian and Slovenian territorial waters, and will involve the Veneto Region, the Friuli-Venezia Giulia Region and possibly the Istria Region in Croatia. The area is also used by mainly small-scale fishery, which is particularly intense along the Veneto Region coasts. There is medium to low intensity bottom trawling and there are large fields of commercial bivalve mussels (***Callista clione***, ***Chamelea gallina***). The waters close to the landing site of the cable on the Italian-Slovenian border are also used for mussel farming.

At this stage, there is no acute conflict because the cable is still at the planning stage. However, if the cable takes the proposed route without any accompanying measures, conflicts with fisheries can arise and trawling and fishing activity could damage the cable.

[22] KIS-ORCA (2018)

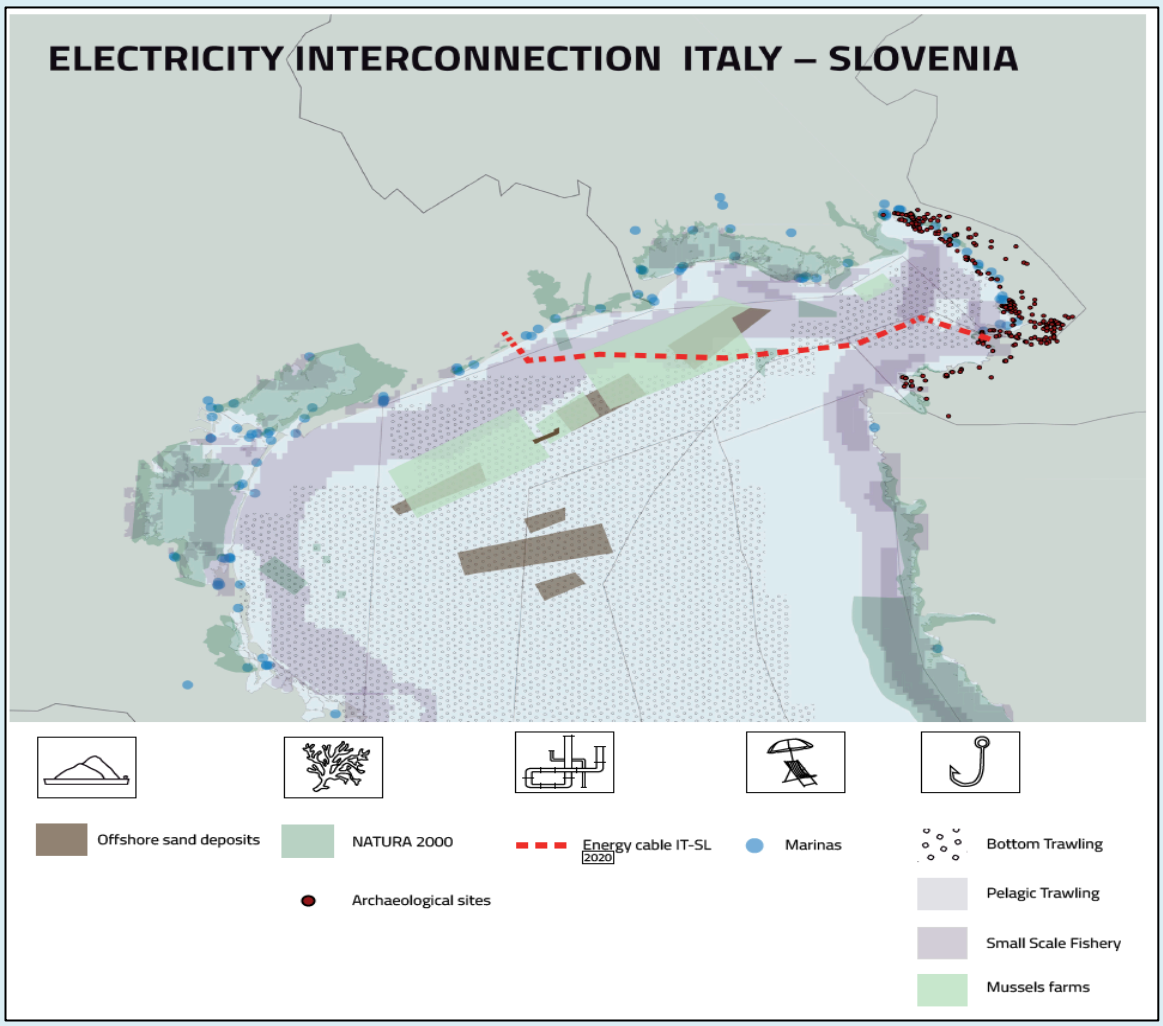

Figure 9: Discussion map of ADRIPLAN project on electricity connection Italy-Slovenia[23]

Slovenia and Italy are in the early phases of Maritime Spatial Planning, so no implemented MSP currently exists in the area. However, a transnational MSP exercise has been done within the ADRIPLAN project[24]. In the project the conflict was discussed with different stakeholders in the region. As a result, the ADRIPLAN researchers proposed to modify the position of the cable close to the Croatian–Slovenian border, in order to limit interference with fishing routes and minimize impacts on Natura 2000 sites. The suggestion was made to bury the cable to limit possible damage from trawling activities and anchorage. It was also suggested to move the land-sea connection in the eastern part of the project to reduce conflicts with mussel farming and with underwater archaeological sites (see Figure 10).

[23] Terna (2017)
[24] Barbanti *et al*. (2015)

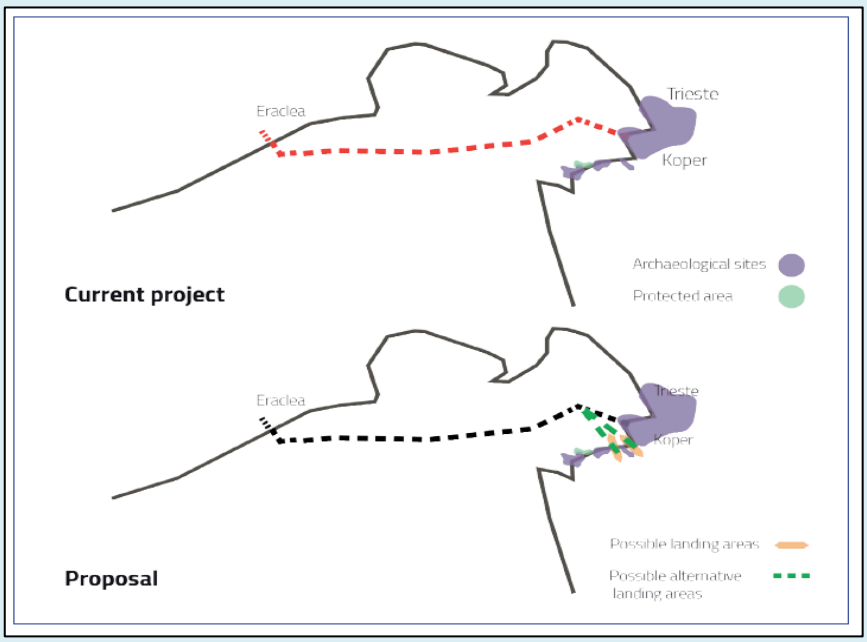

Figure 10: Proposed changes to the cable route as part of the ADRIPLAN project[25]

Solution 6: Require cable and pipeline companies to use appropriate burial methods

Laying subsea cables and pipelines unprotected on the sea bed creates unacceptable risks to fishing vessels and their crews in particular when bottom trawling. Many countries have therefore developed legislation that obliges cable and pipeline owners to use burial methods appropriate to the location. Where seabed substrates are unsuitable for burying cables and pipelines, methods such as armouring, mattressing or rock dumping can be used to secure and make cables and pipelines safe. Any of these methods should be used line with best engineering practices and to standards that minimise marine environmental impacts or disruption to commercial inshore fishing activities[26]. In the UK, where offshore wind farm developers are responsible for establishing their own offshore grid connection, the recommendation is to follow the Fisheries Liaison for Offshore Wind and Wave recommendations (a cooperation between many British maritime authorities). In other countries with (semi)governmental transmission system operators (TSO), these are required to follow national legislation. In Germany, legislation requires a minimum burial depth of 1,5m[27].

In Germany, when selecting the burial depth of submarine cables for the transport of power generated in the EEZ, developers are required to pay special attention to the interests of shipping and fisheries[28]. This means that in "priority areas for shipping" and zones which are heavily fished, cables need to be buried deeper in the sea bottom floor than in other areas to avoid potential

[25] Barbanti *et al.* (2015)
[26] NECRIFG (2018)
[27] BSH (2017)
[28] BSH (2009)

damage by anchoring or trawl nets. Deeper burial depths and other techniques can also help cables to stay in place. However, all of this leads to greater structural engineering costs. As more material must be moved during excavation, there is also an increased risk of negative effects on the environment and of potential disruptions to shipping. The German MSP therefore recommends developers to look for an optimal balance between the burial depth and costs in these shipping and fishing zones.

5. Outlook: Future trends and developments in the sectors (with a view to the likelihood of conflicts arising in the future)

5.1 Future trends in the cables sector

Two opposing trends can be observed, with different impacts on marine space. In the near future, the number of cables criss-crossing sea basins is likely to increase due to offshore renewables and the development of international power grids. More telecommunications cables and pipelines may also be deployed to meet future ICT and energy needs. However, it is not certain whether this trend will continue. Europe is setting out to create an additional direct current grid structure for the future HVDC underground cables, which can safely transport high power loads over long distances with minimal losses. In line with greater transport efficiency, fewer cables will be needed, allowing narrower trenches and therefore using less space.

If the idea of a European supergrid gains traction, a more coherent approach with more international links will result. This could lead to grid plans being developed for neighboring sea areas which would then link up. This would lead to corridors and thereby also increase clarity for fishermen.

5.2 Future trends in the fisheries /shipping sector

More environmentally friendly fishing practices may mean less bottom trawling as this has major environmental impacts. Further environmental protection regulation and overfishing might lead to lower catches in some seas. There is also a fundamental shift within the industry, with fewer persons entering the profession and an overall reduction in the size of the fleet. Any reduction in bottom trawl fishing should potentially lessen the threat to damages of cables and pipelines[29].

A separate trend it the improvement of ICT and communication tools which can be used by the fishing industry. The tools can provide more insight on where the fish actually is and what kind of fish it is. Also mapping devices and sensors could incorporated on vessels could depict a more accurate position of current cables and pipelines.

[29] Carter *et al*. (2009)

As the size and numbers of merchant vessels have increased, so has the risk of damage to submarine cables[30]. For the fisheries sector the number of vessels is decreasing, but the size increasing. For the shipping sector as a whole as well the number of ships, and the size of the ships will increase in Europe.

[30] Ibid.

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