



Nord Stream
The new gas supply route for Europe

Section 10

**Environmental considerations for
decommissioning**

10 Environmental considerations for decommissioning

The Nord Stream pipeline project is designed for a service lifetime of 50 years. The prospects for the period thereafter are uncertain at this point. The technical life of the pipeline may be extended by closely monitoring degrading mechanisms, such as corrosion and anode consumption, and conducting additional 'fit-for-purpose' assessments. However, after the service lifetime of the pipelines has come to an end, the system will be decommissioned (see also Chapter 3.9).

The decommissioning programme for the Nord Stream pipelines has not been fully developed because technological advances over the lifetime of the pipelines and future regulations must be taken into account. Decommissioning will be carried out in accordance with prevailing international and national legislation and regulations at the time of decommissioning. From an environmental point of view, the aim is to reduce the impacts of decommissioning to minimum.

10.1 The legal framework of decommissioning

Several international conventions and guidelines address the decommissioning process for offshore installations. The primary conventions are:

- United Nations Convention on the Law of the Sea (UNCLOS)
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention)
- Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention).

Article 60(3) of United Nations Convention on the Law of the Sea (UNCLOS) (1982) states that

“Any installations or structures which are abandoned or disused shall be removed to ensure safety of navigation, taking into account any generally accepted international standards established in this regard by the competent international organization. Such removal shall also have due regard to fishing, the protection of the marine environment and the rights and duties of other States. Appropriate publicity shall be given to the depth, position and dimensions of any installations or structures not entirely removed.” /313/

Based on UNCLOS Article 60(3), the International Maritime Organisation (IMO) established in 1989 guidelines and standards for the removal of offshore installations and structures on the continental shelf and in the exclusive economic zone /471/. The first general removal requirement is that

“Abandoned or disused offshore installations or structures on any continental shelf or in any exclusive economic zone are required to be removed, except where non-removal or partial removal is consistent with the following guidelines and standards.”

The guidelines state that decisions regarding the removal of installations should be taken on a case-by-case basis, according to the evaluation of criteria listed in IMO resolution.

The London Convention took steps to protect the marine environment and prevent pollution of the sea by dumping of wastes and other matter /472/. The London Protocol in 1996 further modernised the convention /472/.

Finland is among the 15 European countries that have signed and ratified the Convention for the Protection of the marine Environment of the North-East Atlantic (OSPAR Convention) /473/. OSPAR Decision 98/3 establishes binding requirements for the disposal of disused offshore oil and gas installations.

10.1.1 Decommissioning of pipelines

There is no Finnish national legislation with respect to decommissioning of gas pipelines; nor are pipelines included in UNCLOS, IMO Guidelines and Standards, or the London Convention. Pipelines are not covered by the OSPAR Convention, but practice shows that governments intend to apply the OSPAR Convention more widely, including pipelines.

The United Kingdom (UK) has established guidelines regarding pipelines. The UK guidelines illustrate some likely considerations for decommissioning /474, 475/.

The UK guidelines state that as a general approach, pipeline decommissioning on the UK continental shelf must take into account the following:

- The potential reuse of the pipeline should be considered before decommissioning, also together with other existing projects (such as hydrocarbon storage). If reuse is considered viable, suitable and sufficient maintenance of the pipeline must be detailed.
- All feasible decommissioning options should be considered and a comparative assessment made.
- Any removal or partial removal of a pipeline should be performed in a way that avoids significant adverse effects on the marine environment.
- Any decision that a pipeline may be left in place should consider the likely deterioration of the material involved and its present and possible future effect on the marine environment.
- Account should be taken of other uses of the sea.

The UK guidelines note that decisions will always be taken in light of individual circumstances.

If it is proposed that a pipeline will be left on the seabed, either wholly or in part, for natural degradation (referred to as ‘in situ decommissioning’), the UK guidelines state that a decommissioning programme should be supported by a suitable study that addresses the degree of past and likely future burial/exposure of the pipeline and any potential effect on the marine environment and other uses of the sea. The study should include the survey history of the pipeline with appropriate data to confirm the current status of the pipeline, including the extent and depth of burial, trenching, spanning and exposure.

According to the UK guidelines, determination of any potential effect on the marine environment at the time of decommissioning should be based upon scientific evidence. The factors to be taken into account should include the effect on water quality and geological and hydrographical characteristics, the presence of endangered or threatened species, existing habitat types, local fishery resources, and the potential for pollution or contamination of the site by residual products from, or deterioration of, the pipeline.

As a general guide, the following pipelines may be candidates for in situ decommissioning:

- Those which are adequately buried or trenched and which are not subject to development of spans and are likely to remain so.
- Those which were not buried or trenched at installation but are likely to self-bury over a sufficient length within a reasonable time and remain so buried.
- Those where burial or trenching of the exposed sections is undertaken to a sufficient depth and it is likely to be permanent.
- Those which are not trenched or buried but which nevertheless may still be candidates for leaving in place (e.g., trunk lines).
- Those which due to structural damage or deterioration or other causes cannot be recovered safely and efficiently.

The above reference to the UK guidelines serves an illustration of general principles to be applied concerning the decommissioning of the Nord Stream pipelines. There are also other similar decommissioning guidelines, for example guidelines for decommissioning of pipelines in Australian waters ^{/476/}. It is foreseen that additional international or national guidelines specifying further options for decommissioning will be developed before the end of the lifetime of the Nord Stream pipelines.

10.2 Future options and possible impacts from decommissioning

At the time when the Nord Stream pipelines are decommissioned, the technological options and preferred methods for decommissioning of offshore pipelines will most likely be different from current practice. In general, knowledge with respect to the environmental impact of various decommissioning strategies will be more extensive in future due to widespread decommissioning activities in the North Sea in the coming 50 years.

Full environmental surveys of the planned decommissioning activities must be implemented according to regulations at the time of decommissioning. Mitigation measures for decommissioning will be conducted according to legislative requirements, available technology and the status of the environment and potential environmental impacts.

The current practice for decommissioning pipelines is either to remove the pipeline or to leave it in place on the seabed /474/. Prior to decommissioning, the potential reuse of the pipelines should be considered.

In the United Kingdom (UK), 14 approved decommissioning programmes have concerned pipelines /477/. In 10 of them, pipelines have been (or will be) left wholly or partially in place on the seabed. Pipelines have (or will be) removed wholly or partially in 7 decommissioning programmes. Reuse of pipelines is approved decommissioning option in 2 programmes.

10.2.1 Leaving the offshore pipelines in place

At the end of the operations phase, the pipelines can be left in place. Regular monitoring surveys during the lifetime of the Nord Stream pipelines will have provided sufficient information on the pipelines to allow a reliable prediction of their future behaviour. At the time of decommissioning, it should be ensured that the pipelines do not pose a threat to fishery, shipping or the environment. Determination of potential effects should be based on scientific evidence.

Pipelines to be left on the seabed should be those that are already trenched or buried or those that are likely to self-bury. Large-diameter pipelines tend to become buried over time. The risk of spanning is also lower for pipelines of larger diameter. Spanning, which poses a hazard to fishery, occurs when sediment is washed away from under the pipeline /478/.

Pipelines left on the seabed without any preservation measures would slowly corrode. The dissolution of steel is probably not harmful in seawater /478/. However, corroding, irregular pipelines would pose a hazard to fishery activities, e.g., a risk of becoming entangled with equipment. Therefore, to avoid corrosion the offshore pipelines must be cleaned and filled with water that has been treated with corrosion inhibitors /479/. Following implementation of these measures, surveys to check the status of the pipelines would be necessary every five years. The corrosion inhibitor must be replaced approximately every 10-20 years.

Replacement of the corrosion inhibitor would require periodic discharges of treated water from the pipelines. These impacts would be comparable to the discharge of hydro-test water.

The costs and responsibilities associated with leaving the pipelines in place on the seabed, filled with corrosion inhibitors, and monitoring them regularly would be borne by the operator or national or international regulators, depending on which party owns the pipeline and has taken on responsibilities at that stage. The responsibility for pipelines after abandonment is currently under debate in relation to some pipeline projects.

10.2.2 Removing or partially removing the pipelines

An alternative for decommissioning is to remove all or part of the pipelines. Removing the entire pipeline system requires different operations for sections that are exposed and for those that are buried or trenched into the seabed. In the Finnish sector, the Nord Stream pipelines will not be buried or trenched but laid on top of the seabed and on gravel supports.

Removal of exposed sections of the pipelines is technically feasible. The guideline for smaller pipelines is to remove them entirely ^{/476/}. However, it should be noted that there is no experience removing pipes the size of the Nord Stream pipelines (48 inches in diameter). Removing a pipeline is an extensive operation involving significant offshore work, with divers to cut the pipe, offshore crane vessels to lift the pipe sections, and support vessels and transport barges to transport the pipe sections to land. In addition, the safe and environmentally appropriate treatment of the removed pipes and other waste must be ensured. Appropriate recycling of the pipeline material should be considered.

At the present time, it can be concluded that partial or total removal of the pipelines would have temporary impacts similar to activities required for installation. In addition, waste management of pipe sections (2,400 km of pipes) will have some environmental impacts.

No clear conclusion on the decommissioning activities and their impacts can be drawn at this point in time, as the decision depends on the technical, legislative and economic aspects of decommissioning approximately 50 years hence. However, any decommissioning activities of the pipelines should be performed in a manner that avoids any significant adverse effects upon the marine environment