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OTC OFFSHORE TECHNOLOGY CENTER

SAKARYA GAS FIELD DEVELOPMENT PROJECT – ENHANCEMENT OF SUBSEA PRODUCTION CAPACITY AND FLOATING PRODUCTION UNIT

Chapter 7.5 - Decommissioning

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Table of Contents

7.0 IMPACT ASSESSMENT AND MITIGATION

7.5 Decommissioning

It is foreseen that the Project will remain in operation for 25-40 years. The operating period depends on natural gas production in the Sakarya gas field and may extend following new explorations. Phase 3, which involves addition of approximately 44 additional wells and processing the extracted gas using a new Floating Production Unit (FPU) is in planning stage.

As of the date of this ESIA, it is not possible to predict what technology will be available in 25-40 years, moreover it is likely that all the infrastructures or part of these, once in disuse, will be abandoned on site or destined for new use.

Because of the uncertainty concerning this phase of the Project (for both decommissioning strategy and technological approach), this chapter is limited to some general considerations on the impacts of decommissioning. In particular, below is reported a brief overview of the approaches to decommissioning of pipelines (SURF), subsea production system (SPS), export gas pipeline and Floating Production Unit (FPU) recommended in the guidelines of the main relevant international conventions/organizations and an overview on the approaches in some countries that own oil and gas offshore fields. Some general considerations are also reported on the typical potential impacts that could be associated with pipeline decommissioning; finally, a few recommendations on the basis of best practices and international guidelines are provided.

Guidelines and Approach for the Decommissioning of Offshore Structures

Türkiye is member state of the **International Maritime Organization** (IMO) and it was also member of the IMO Council for the 2022-2023 biennium. Türkiye has been re-elected to the IMO Council for the 2024-2025 biennium, which establishes international maritime safety and environmental standards.

IMO establishes the minimum standards to be applied in the phase of decommissioning of offshore installations. IMO standards do not make a specific distinction between non-linear and linear installations (pipeline).

The IMO's decommissioning guidelines, as outlined under UNCLOS, emphasize that pipelines and structures may remain **in situ** if:

- They are reusable for other functions;
- Removal poses risks to navigation, safety, or environmental sustainability;
- Complete removal incurs unsustainable costs or risks for personnel or for the marine environment.

OSPAR Convention is the tool which concerns 15 countries of the eastern Atlantic coast, and the European Union. It concerns the cooperation for the protection of the marine environment. The OSPAR Convention does not concern Türkiye ord the Black Sea, however it can be taken as an example of international best practices. With regard to linear structures (such as pipelines), the need to evaluate the removal is highlighted in the OSPAR, if it can be achieved avoiding significant negative effects on the marine environment. The in situ abandonment of pipelines, especially if large and / or buried, is generally the best solution in the OSPAR area (Ekins et al., 2006).

The **International Financial Corporation (IFC)** has published a series of documents with guidelines for the development of all phases of offshore mining activities (IFC, 2014), including decommissioning. The IFC guidelines specify that also for pipelines, like non-linear installations, a detailed Decommissioning Plan must be

prepared, which analyzes the different options available. According to the IFC regulations, the decommissioning plan must present the details on the implementation of the decommissioning and the development of a monitoring and maintenance plan for the decommissioned structures, to prevent risks, including chemical contamination or hazards to navigation.

Adherence to **Hong Kong Convention for Safe Recycling of Ships (2025)** ensures environmentally sound recycling. Operators are encouraged to either recycle vessels at authorized yards or repurpose them, minimizing environmental harm.

Most European countries practice abandoning pipelines once their use is over. In the United Kingdom, the decision on the best decommissioning option should be made after having evaluated the characteristics of the site. The main indications are the following:

- The possibility of reusing pipelines for other activities should be considered;
- Any removal, even if partial, must avoid negative impacts on the environment;
- It is necessary to take into account any other uses of the area.

In general, in the UK, the pipeline that have the following characteristics are suitable for abandonment in situ:

- Adequately buried and/or entrenched;
- Not buried but it is expected that they remain in stable conditions or that they tend to be buried over time;
- Subject to exceptional and/or unpredictable conditions due for example to structural damage or severe deterioration that prevent them from being recovered safely and without damage to the environment.

In Norway, as a general rule, the offshore pipelines can be left in place when they do not create obstacles or safety risks.

In summary, it can be stated that although most of the international guidelines and standards do not apply directly to the offshore pipelines, it is a consolidated practice to evaluate the situation "case by case" according to some main guidelines:

- For pipelines buried under the seabed, especially if they are medium and large in size, a remediation process is generally carried out - for example by cleaning and making them safe from any risks (e.g. chemical contamination or danger to navigation) - and they are then abandoned in situ;
- For the pipelines that emerge from the seabed, the possible options of removal (partial or total), of sinking (natural or forced) in the sediment, or the possible need for a covering intervention or mechanical protection are taken into consideration.

In particular, most conventions and national laws allow abandonment on site if this ensures a lower environmental impact than removal and does not pose a risk to other uses of the sea.

Approach for the FPU Decommissioning

When the FPU reaches the end of its operational life, several options will be evaluated, depending on its condition, regulatory requirements, and environmental considerations at the time.

The FPU is disconnected from subsea pipelines, risers, and moorings. Subsea wells and pipelines may need to be plugged and abandoned (P&A) according to regulatory requirements.

When an FPU is no longer needed, it may be decommissioned and dismantled, reused, repurposed, or even sunk to create an artificial reef. The decision depends on economic, environmental, and regulatory factors. Operators typically choose the option that ensures compliance with environmental laws, reduces costs, and aligns with industry best practices.

Dismantling and Recycling: The FPU is towed to a shipyard or recycling facility, where it is dismantled. Steel and other components are salvaged and recycled to minimize environmental impact, following guidelines such as the Hong Kong Convention for the safe recycling of ships.

Reuse or Repurposing: If the FPU is still in good condition, it can be refurbished and redeployed at a new oil or gas field. It can be converted into a storage unit or accommodation vessel.

Artificial Reef Programs: In some cases, vessels are deliberately sunk to create artificial reefs, which promote marine biodiversity. This option requires cleaning the vessel to remove pollutants and ensuring compliance with environmental regulations like the London Convention on the Prevention of Marine Pollution by Dumping.

Cold Stacking: FPU would be taken out of service and anchored at a designated location (e.g., a "graveyard anchorage"). If future use is uncertain, it remains in cold lay-up, with essential systems shut down and minimal maintenance. It would require ongoing monitoring to ensure they don’t pose a hazard to navigation or the environment.

Potential impacts

The decommissioning will be planned and managed as a whole involving all phases of the SGFD.

Project component associated with **onshore decommissioning activities** is the onshore section of the export gas pipeline.

Once the onshore pipeline is shut down, it will be removed from the site along with the pig receiver and connections and the rehabilitation operations will commence. If needed, the site grading will be completed, taking into account the surface drainage during operations. The ground surface will be covered according to appropriate vegetation selection (compatible with the soil, climate and flora of the region) after the rehabilitation operations are completed.

In this case, the following impact factors are expected:

- Emission of dust and particulate matter
- Emission of gaseous pollutants and/or greenhouse gases
- Emission of aerial noise and vibrations
- Removal of soil
- Demand for workforce
- Demand for goods, materials and services
- Increase and modification of traffic onshore

- Emission of light
- Demand for freshwater
- Minor leakage of contaminants into water
- Demand for waste disposal/recycling services

Project components associated with **offshore decommissioning activities** are SURF, SPS, export gas pipeline and the FPU.

In case a part or all the pipeline and SPS will be removed process will mostly involve activities similar in nature to those required for construction of the Pipeline; seabed intervention works, lifting pipeline and SPS components from the seabed, recycling and disposal; logistics support offshore and onshore.

In this case, the following main impact factors are expected:

- Handling and resuspension of sediments
- Emission of underwater noise
- Presence of working and moving vessels
- Emission of gaseous pollutants and/or greenhouse gases
- Emission of light
- Minor leakage of contaminants into water
- Possible introduction of alien species
- Demand for waste disposal/recycling services
- Demand for workforce
- Demand for goods, materials and services
- Increase and modification of traffic offshore and onshore

In case pipes and SPS components are left on the seabed, process will involve filling, cleaning the pipeline with water, sealing at it ends, monitoring surveys following completion of works.

In this case, the following main impact factors are expected:

- Emission of underwater noise
- Presence of working and moving vessels
- Emission of gaseous pollutants and/or greenhouse gases
- Minor leakage of contaminants into water
- Demand for workforce
- Demand for goods, materials and services

- Increase and modification of traffic onshore and onshore.

Recommendations

On the base of the abovementioned guidelines, best practices and potential impacts, a Decommissioning Plan for each component will be prepared, according to the technology available, legislation and GIIP at the time, in consultation with the relevant regulatory authorities.

The Plan should define the decommissioning strategy. The following items should be considered in the Plans:

Onshore Sections of the Pipeline - Decommissioning Plan

- The pipeline will be dug out.
- Components will be evaluated for re-use, recycling or disposal.
- The onshore reinstatement plan will be prepared to restore the area as much as possible to its original condition.
- Any impacts on soil and groundwater conditions from the pipeline will be investigated and required remedial actions will be undertaken.
- Consult with stakeholders (landowners, government authorities, and other directly affected parties), and secure regulatory approvals.

Offshore SPS, SURF, Export Gas Pipeline and FPU Decommissioning Plan

- Take into account potential new roles/use of the pipeline and the FPU;
- Consult with stakeholders (fisheries, government authorities, and other directly affected parties), and secure regulatory approvals;
- Indicate the procedures for making the components safe (for example cleaning and mitigation of the risks associated with chemical contamination);
- According to the main national conventions/guidelines and national legislation assess the opportunity and impact of the abandonment in situ of the pipeline or part of it;
- According to the main national conventions/guidelines and national legislation assess the opportunity and impact of the reuse of the FPU;
- Determine post-abandonment / decommissioning / reuse responsibilities;
- Include monitoring and maintenance plan for the decommissioned structures.
- Other components will be evaluated for removal and transportation to be dismantled / recycled onshore.