

Re-use & decommissioning hand-out

Innovation & collaboration

2020

Preface: Jacqueline Vaessen



General Manager Nexstep

“Innovation and collaboration are key to facing the challenge of decommissioning and repurposing our infrastructure”

We are facing a formidable task. A substantial infrastructure for the production and transportation of oil and gas has been built up in the Netherlands over the past decades, however, a large proportion of the oil and gas fields is approaching the end of its economic life.

This hand-out provides insight into the expected oil and gas infrastructure that will be taken out of production in the Netherlands in the coming ten years and offers a glimpse of what has been done so far on the repurposing of the infrastructure.

Nexstep facilitates, stimulates and accelerates the agenda for the re-use and decommissioning of oil and gas infrastructure in the Netherlands. The total cost of decommissioning infrastructure was estimated in 2017 at 7 billion euro; Nexstep's aim is to reduce these costs by 30%.

One of the key assignments for Nexstep in 2018 was to develop a dedicated innovation agenda that ensures safe decommissioning, adds efficiency, minimises the impact on the environment and reduces costs. Innovation can also help to preserve crucial infrastructure to accelerate the energy transition. The Nexstep team has developed “The Road to 30%” that contains five roadmaps and aims to reduce costs by 30%.

There was a lot of decommissioning activity in 2019, which shows that the industry is taking its responsibility by removing infrastructure when it no longer delivers any value. The pictures in this hand-out will give you an impression of some of the major decommissioning projects that have been carried out in 2019. They show the enormous task we are facing.

Part of the oil and gas infrastructure could be used to accelerate the energy transition. At the end of 2018, Nexstep and TNO launched a pilot project to determine the feasibility of offshore hydrogen production. Based on the results of this study we are now working on a project to place a 1 MW electrolyser on Neptune Energy's Q13a-A platform, the so-called PosHYdon project. Last March, our graduate intern Dennie Kleijweg presented a model to determine possible re-use for the offshore platforms. We now have a good overview of the possibilities, but also of the challenges that the timeline proposes. We estimate that approximately 10% of the platforms in the Dutch part of the North Sea are suitable for re-use.

Each year the collection of data is improved and becomes more accurate. Compared to last year's report, there have been some changes in the forecasted decommissioning activity. By collecting and analysing the data, we want to provide more insight into the extensive job we're facing in the coming years.

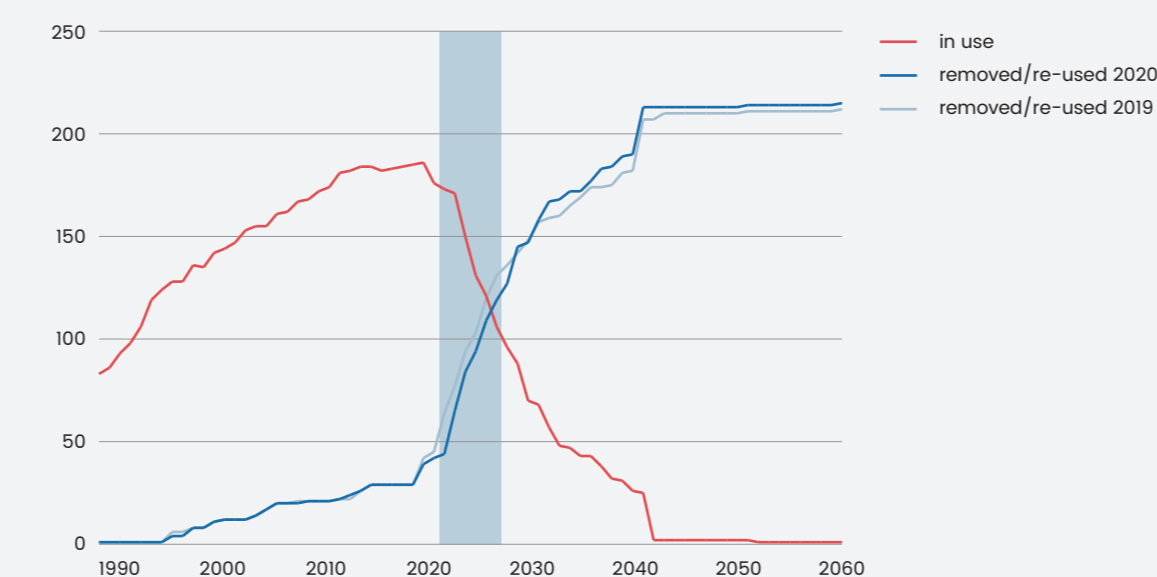
The subtitle of the report is “Innovation and collaboration”. Nexstep has been operational for a little over two years now, and we consider those two words to be key to facing the challenge of decommissioning and repurposing our infrastructure. Collaboration does not stop at our borders; therefore, we have a structured dialogue with our neighbours around the North Sea. We meet with partner organisations in the UK, Norway and Denmark on a regular basis to discuss the same challenges we're facing (although in different time frames). We exchange best practices and collaborate to work on future challenges.

For more information, I would like to refer to our third Re-use & Decommissioning report. This report can be found at www.nexstep.nl.

Key figures

The figure below shows the expected availability of the oil- and gas infrastructure for the re-use and decommissioning of installations in the Dutch North Sea. Compared to last year's report a slight deferral can be seen in the forecasted removal of offshore installations. In the next decade 60% of the current installations are forecasted to be decommissioned and the remaining 40% in the decade thereafter. In this forecast neither re-use nor repurposing of the offshore installations has been accounted for.

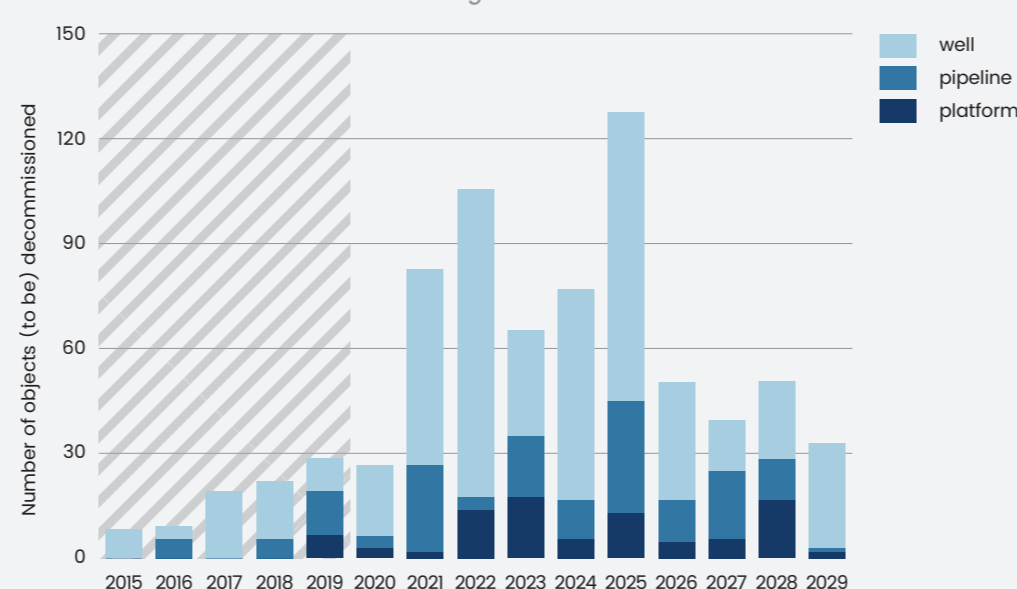
Number of installed and removed offshore installations



The second figure presents a complete view of all offshore decommissioning. It illustrates that activities are picking up and are expected to peak over the period 2021-2025.

In the Re-use & Decommissioning report you will find more detailed graphs with specifics for offshore installations, wells and pipelines.

Realised and forecasted decommissioning – offshore infrastructure

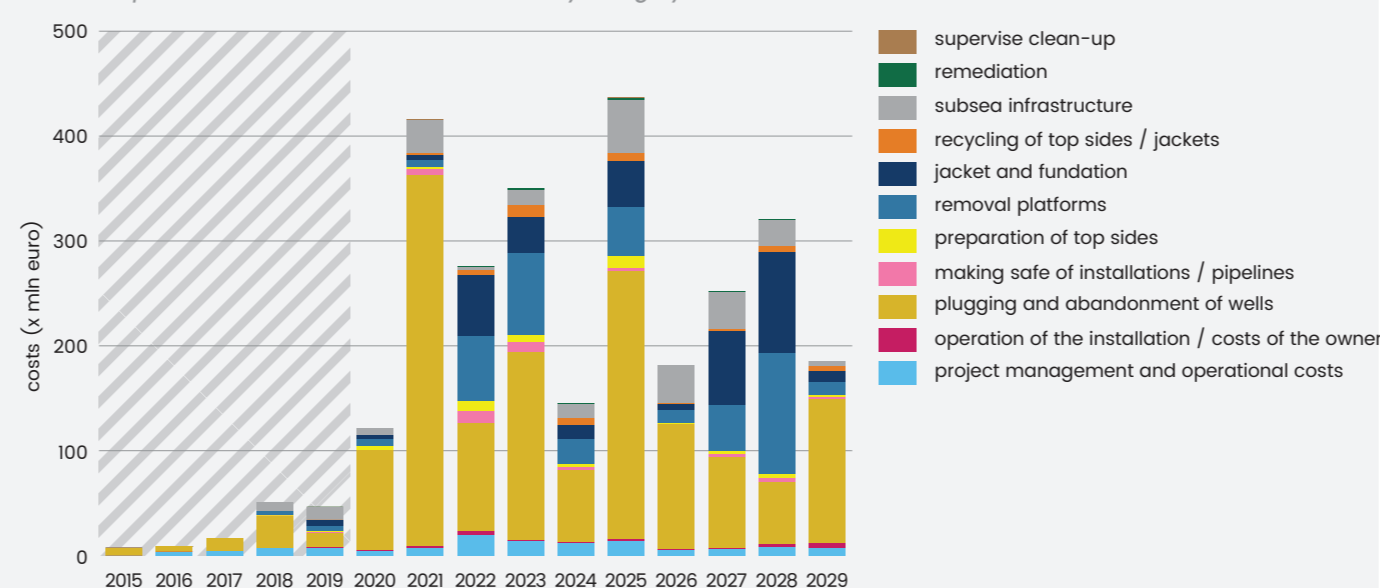


The third figure illustrates the total forecasted decommissioning cost for offshore infrastructure, which over the next decade amounts to some 2.6 billion euro.

This year, the decommissioning activity will be low but for the years thereafter between 150 and 450 million euro is forecasted to be spent per annum on decommissioning.

Well decommissioning is taking up the largest part (46%) of the total decommissioning cost.

Annual expected costs of offshore infrastructure by category



A perspective: Maarten Camps



Secretary General of the Ministry of Economic Affairs and Climate Policy

As Secretary General of the Ministry of Economic Affairs and Climate Policy (MEAC) Maarten Camps follows Nexstep's progress with great interest. In this interview we ask Maarten Camps some questions on how he looks at the past and the future.

What do you consider the added value of Nexstep?

Nexstep has made oil and gas companies aware of the need for collaboration in decommissioning. In addition, I think it is very important that Nexstep remains committed to identifying possibilities for re-using the infrastructure that is no longer used for gas or oil extraction. My colleagues at MEAC and I are very pleased with the cooperation between MEAC and Nexstep. We're all on the same page. For example, the technical briefing in the House of Representatives had been well coordinated, highlighting what we wanted to highlight and conveying a coherent message.

“It is very important that Nexstep remains committed to identifying possibilities for re-using the infrastructure that is no longer used for gas extraction.”

What did you find the most surprising result of Nexstep last year?

What I find most surprising is that a pilot project is in preparation to produce hydrogen on a production platform. This indicates that developments are moving fast, even in a sector such as the oil and gas industry that is typically considered traditional by the public. I also find the inclusion of Industry Standard 45 for decommissioning of wells and boreholes in the Mining Regulation a specific result that stands out. However, I would not call that “surprising”, because it is part of the objectives for which Nexstep was created: decommissioning as efficiently as possible through cooperation, not only between companies, but also with the government.

How do you see Nexstep's role in the future?

The Dutch State contributes approximately 70% of the costs of decommissioning through the participation of EBN and the tax regulations, but on the other hand, Dutch society has also benefited from the same 70% from the revenues generated by oil & gas extraction. That does not occur in any other industry. Therefore, I am convinced that Nexstep's aim to reduce costs by 30% is beneficial to the industry, the government and the general public. I follow the progress in the Road to 30% with great enthusiasm.

The coming years will become even more important for the energy transition. More infrastructure will be decommissioned. Actual choices will have to be made between removing or re-using the existing oil and gas infrastructure. It is important that Nexstep properly maps out whether, where and when this infrastructure can still be used in the context of the energy transition.

With historically low prices and the corona crisis hitting the industry hard, how do you view the task of meeting the decommissioning challenge in the coming years?

The oil and gas sector is going through tough times, which have worsened due to the corona crisis. We must try to prevent the decommissioning of infrastructure too early, so that it will not be lost for both gas extraction and re-use in the context of the energy transition. That is why a bill to amend the Mining Act, includes a proposal to improve the investment allowance for investments in oil and gas extraction. The bill also provides further rules for the removal or re-use of the infrastructure. In addition, the obligations for mining companies to provide financial guarantees for the costs of decommissioning are structured and tightened.

Continue reading on www.nexstep.nl

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Example decommissioning & re-use

GZI

NAM



Facility
Gas processing facility (desulphurisation unit)
Steel weight: 18,000 ton
Concrete weight: 90,000 ton
Waste and other stream: 10,000 ton

Project summary
The Gas Zuivering Installatie (GZI) in Emmen was built in 1986 and was installed to process all the sour gas produced in the Emmen region. With the depletion of gas production from the Emmen fields, it was not profitable to keep using GZI. Hence, it was decided to close the production in 2018. Sour gas production from Gasselternijveen (GSV) and the Emmen fields (EMM-8 and EMM-11) was also ceased together with the closure of the GZI. The EMM-8, 11 and GSV-1 are the so-called satellite locations and were part of this decom project.

The GZI and satellite locations were cleaned between late 2017 and October 2018. The facility decommissioning began October 2018 and was concluded in December 2019. The building and concrete removal scope started as of March 2020 and will continue until October 2020. This will conclude GZI decommissioning.

GZI is being used as our first Energy Hub. The whole location with a footprint of circa 45 hectare shall be equipped as a solar park, green hydrogen generation facility and biogas facility.

- The contractor HSE assessment and demolition techniques must be thought about carefully in the front end of the project. The main contractors involved were:
- VSM Sloopwerken (demolition contractor for piping and mechanical components)
 - Meuva B.V. (demolition contractor for removal of civil infrastructure)
 - SGS Search (project management company for piping and mechanical components)

Example decommissioning offshore

L10-C/D/G

Neptune Energy



Platform	Wells
3 satellite platforms	L10-C: 6 wells
Topsides approximately 550 tons each	L10-D: 5 wells
Jackets approximately 600 tons each (including pile sections)	L10-G: 1 well

Project summary
The three satellite platforms L10-C, L10-D and L10-G were installed in the 70's and the 80's in block L10 of the Dutch North Sea in approximately 26 meters of water. After several decades of gas production, the platforms reached the end of their economic lives and production was permanently ceased in 2016. After abandonment of the pipelines, cleaning of the topsides, decommissioning of the wells and execution of preparatory construction works, the platforms were left in cold suspension (lighthouse mode).

The heavy-lift contractor was provided with a 2-year flexible window for removal. The platforms were ultimately removed in March/April 2020 by Boskalis, with their heavy-lift vessel Bokalift 1. Currently the platforms are being dismantled at Hoondert, an onshore demolition & disposal contractor in Vlissingen.

Clustering the removal of three similar type platforms in a combined campaign leads to synergies.

Decommissioning in practice

There was a lot of decommissioning activity in 2019. Here is an impression of some of the major decommissioning projects that have been carried out.



Road to 30%

Nexstep's innovation agenda is called The Road to 30%. It consists of five roadmaps which contribute to Nexstep's goal to reduce costs of decommissioning oil- and gas infrastructure by 30% and preserve infrastructure which is crucial to accelerate the energy transition. More information can be found in our Re-use & Decommissioning report 2020 at www.nexstep.nl.



Road to joint execution

The Nexstep wells committee have studied the feasibility of developing a joint execution campaign to decommission Mud Line Suspension wells in the Dutch sector of the North Sea. This study has shown that coordination and collaboration across assets and operators leads to efficiency gains and cost reduction.

Road to rigless abandonment

Decommissioning of wells accounts for the largest part of the decommissioning costs. There is an expected peak in offshore well decommissioning around 2024. In 2019, Nexstep started to investigate alternative decommissioning methods. Nexstep's goal is to have rigless well decommissioning available by 2023.

Road to heavy lift standard

Optimising the entire removal process of topsides and jackets is only possible in cooperation with the service industry. Nexstep has taken the initiative to organise several workshops with representatives from the heavy lift contractors.

Road to value protection pipelines

The current Mining Act states that an offshore pipeline can be decommissioned in-situ, unless the Ministry of Economic Affairs and Climate Policy (MEAC) determines that it must be removed. The pipeline committee has been working on a framework for the operators. It provides a roadmap and guideline for the operator to determine whether a pipeline can be decommissioned in-situ or needs to be removed.

Road to Re-use and Repurpose

Nexstep's Re-use & Re-purpose (R&R) committee conducts dedicated studies to investigate different possibilities for repurposing infrastructure. The four most promising options are: electrification of platforms (not really a repurpose option in itself, but a prerequisite to make repurposing possible), offshore storage of CO₂, hydrogen production and geothermal operation in onshore wells.