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Netherlands masterplan for decommissioning and re-use

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Contents

01 Foreword	6
02 Executive summary	8
03 Decommissioning: both a challenge and an opportunity for the Netherlands	10
04 A masterplan composed of 10 elements	12
05 Initial priorities	16
05.01 Establish a National Decommissioning Platform	17
05.02 Establish a National Decommissioning Database	20
05.03 Promote Effective and Efficient Regulation	24
05.04 Establish Mechanisms to Share Learnings	26
06 Mid-term objectives	28
06.01 Foster Effective Industry Collaboration	29
06.02 Support Quality, Cost-effective Standardisation	32
06.03 Stimulate Innovative decommissioning	34
06.04 Build on International Best Practices	36
07 Execution levers	38
07.01 Engage All Relevant Stakeholders	39
07.02 Launch a Tailored Communications Plan	41
08 Conclusions and short term priorities	44
09 Acknowledgements	46
10 Glossary of abbreviations and terms	48

Foreword

01

The Netherlands has been a leader in the production of natural gas for the past half century. Oil and gas has traditionally been an important source of revenue, employment and innovation for the country. The latest 'Nationale Energie Verkenning' (NEV) report indicates that gas will continue to play a significant role in the Dutch energy mix for the next 2 decades. Beyond that, as identified in the Focus on Dutch Oil and Gas Report 2016, there remains a vast exploration potential on the Dutch Continental Shelf.

Looking forward, one of the sector's key challenges is the safe and efficient decommissioning of ageing oil and gas infrastructure. Given the maturity of many fields, both onshore and offshore, and current low commodity prices we expect a vast increase in decommissioning activity over the next two decades.

At the same time strong shifts in public sentiment and climate change concerns move the economy towards a renewable future, hence the contribution of the oil and gas industry to the energy mix declines over the next decades. This transition presents an opportunity to re-use existing infrastructure to complement renewable investments before eventual safe and efficient decommissioning. In particular for the Southern North Sea, with relatively shallow water and great potential for renewable investments, we expect potential for a significant wave of decommissioning and re-use activities over the next two decades.

Given the imminence and materiality of Dutch decommissioning, a coordinated response is required. It must embrace government, operators, suppliers and NGOs to ensure that together we are able to deliver world-class, responsible, safe and cost effective approaches to decommissioning at the right time and in the right way. By doing so, we will turn decommissioning into an opportunity bringing significant benefits to the economy and stimulating employment in the Netherlands. This document for consultation summarises an initial 6-week project to define and detail what an industry-wide approach could look like as well as the initial steps to be taken in such an approach. We look forward to discussing, sharing and advancing this thinking with all stakeholders in the Netherlands' decommissioning agenda.

Jan Willem van Hoogstraten, CEO EBN

Decommissioning of Dutch oil and gas assets will be an important topic over the coming 2 decades as a large portion of these assets will reach the end of their economic life in this period. As the economy is moving towards a renewable future, this presents an opportunity to re-use existing infrastructure to support renewable investments before safe and sustainable decommissioning.

The current cost estimates of decommissioning these assets, based on today's environment, amount to ~€6.7 billion, of which the Dutch State contributes approximately ~€5 billion (directly and through EBN). The final cost figure is uncertain as historically estimates have not been accurate predictions of actual costs (with costs for well P&A exceeding estimates by over 50%) and the regulatory landscape may change.

A Netherlands Masterplan for Decommissioning and Re-use has been created with the vision to ensure a safe, efficient and effective Dutch decommissioning market continually reducing costs and minimizing residual footprint. At the same time this vision will foster the emergence of a vibrant and competitive services sector able to export their capabilities to other decommissioning projects.

This Masterplan covers 10 topics to deliver on this target, across 3 blocks of work: the initial priorities, the mid-term objectives and the execution levers.

The initial priorities are the topics that have been prioritised because they are pre-requisites for successful execution of other topics, important and lengthy topics that need to be set in motion early or practical opportunities to create early impact. There are four initial priorities on which the Masterplan will build:

1. Establish a **National Platform** for decommissioning with the goal to create an organisation to facilitate and co-ordinate the Dutch decommissioning agenda
2. Establish a **National Decommissioning Database** to create an integrated view of the Netherlands decommissioning scope and timelines
3. Promote **effective and efficient regulation** in dialogue with regulators to improve clarity, efficiency and effectiveness of regulations
4. Establish mechanisms to **share learnings** where projects learn from one another to achieve continuous improvement in costs and performance

The **mid-term objectives** aim to promote industry behaviours that could improve effectiveness and efficiency of the Netherlands' decommissioning programme. These include:

5. Foster **effective industry collaboration** to co-ordinate work scopes and operations for most effective and efficient execution
6. Support quality, cost-effective **standardisation** to ensure high quality outcomes whilst avoiding unnecessary costs
7. Stimulate innovative **decommissioning** approaches and technologies to create world class decommissioning and re-use outcomes in the Netherlands
8. Build on **international experiences** to reflect the industry's best practices

Finally, the **execution levers** are those elements that ensure effective and transparent delivery, i.e.:

9. Engage all **relevant stakeholders** to ensure maximum buy-in
10. Launch a tailored **communications plan** to ensure each stakeholder is approached most effectively

The next steps to start executing this Masterplan are focused on the initial priorities identified, 1-4.

Decommissioning: both a challenge and an opportunity for the Netherlands

03

In 1959, the discovery of the Groningen field – one of the world’s 10 largest gas fields – positioned the Netherlands as one of Europe’s key players in natural gas. Since the 1960s, roughly 3,800 wells have been drilled in the Netherlands (~2,400 onshore, and ~1,400 offshore) ¹. Today, the Dutch oil and gas sector is estimated to contribute approximately 3-5% ² of the Dutch State budget each year and sustains about 16,000 direct and indirect jobs ³. Within the Dutch economy.

Estimates suggest that a large portion of Dutch oil and gas infrastructure will reach the end of its economic life over the next two decades – a process which is accelerated by recent low oil and gas prices. So far, approximately 2,000 wells (both onshore and offshore) have undergone P&A. In addition, 23 platforms have been removed with ~150 platforms remaining in the Dutch North Sea. Furthermore, 200 km of 3,500 km of pipeline on the Dutch Continental Shelf has been decommissioned.

There is an opportunity to improve the efficiency and effectiveness of decommissioning, reducing unnecessary costs while at the same time enhancing the quality and safety in a sustainable way. Furthermore, effective decommissioning will prevent unnecessary loss of volumes and related value due to early shut-ins, and it will allow full utilization of the

potential that re-use and re-purpose of infrastructure can offer to the energy transition. Finally, it will foster the emergence of a vibrant and competitive services sector which can export their capabilities to other decommissioning projects. In order to create such environment, there needs to be an industry-wide approach to decommissioning which fosters the use of standards, best practices and experience sharing. The Netherlands Masterplan for Decommissioning and Re-use aims to lay out the steps to come to such industry-wide efficient and effective approach.

Current estimates of the cost of decommissioning Dutch oil and gas infrastructure are significant, amounting to ~€6.7 billion ⁴ (of which ~55% is related to offshore). The Dutch State contributes roughly 70% of this amount, ~€5 billion, through EBN and reduced national gas income, which makes decommissioning a topic of national interest. Furthermore, recent international and Dutch experience suggests that these estimates of total costs may significantly increase. Actual costs of decommissioning platforms have consistently exceeded estimates by ~10% while well P&A has shown overruns of over 50% compared to estimates. As a reference, total estimated decommissioning costs amounted to €4.3 billion in 2014, meaning that estimates have already seen a significant increase over the past years.

¹ Source: EBN, *Focus on Dutch Oil and Gas 2016*.

Based on reservations made by operators as per 2016.

² Source: ABN AMRO, *Dutch Gas Special –*

Lower gas production means lower growth

³ Source: EY, *Big things a small country can do*

⁴ Source: EBN, *Focus on Dutch Oil and Gas 2016*

A masterplan composed of 10 elements

04

This report details the outcomes of an initial phase of 6 weeks – based on local experience and international best practice – to shape a Masterplan aiming to ensure the safe, efficient and effective decommissioning of Dutch wells, production facilities and pipelines. Representatives from the Dutch government, operators, contractors, and other stakeholders were engaged in its preparation, and an even broader stakeholder group will be engaged in the months ahead.

Ultimately, the vision and objective for this plan is a safe, efficient and effective Dutch decommissioning market, continually reducing costs and minimising residual footprint. This vision implies that:

- There is a clear view on the Netherlands' decommissioning scope and schedule, enabling stable and predictable activity levels over time and identifying opportunities for joint decommissioning campaigns

- The decommissioning activities will foster the emergence of a vibrant and competitive services sector able to export its capabilities to other North Sea decommissioning projects
- Operators and contractors learn: every project is better than the one before with the aim to reduce costs by 30-35% over time
- The industry works within a clear and consistent set of regulations that support world-class outcomes on safety and sustainability at competitive cost
- The most suitable technologies are applied on Dutch decommissioning projects, and a dedicated innovation agenda addresses Dutch specific challenges

The initial engagement phase identified 10 priorities, contained in 3 blocks of work, for delivering the 2025 Netherlands vision for decommissioning (See Figure 1).

⁵⁾ Compared to current cost realisations



The first block – the initial priorities – consists of four topics on which the Masterplan will build. These are to:

1. Establish a National Platform for decommissioning that can facilitate the execution of the Masterplan in the coming years
2. Establish a National Decommissioning Database to create an understanding of the scope and timing of the decommissioning responsibility in order to improve estimates, support benchmarking and enable collaboration.
3. Promote effective and efficient regulation in dialogue with regulators to improve clarity, efficiency and effectiveness of regulations
4. Establish mechanisms to share learnings – both within the Netherlands and internationally

The second building block – the mid-term objectives – aims to improve effectiveness and efficiency of the Netherlands' decommissioning programme:

5. Foster effective industry collaboration in order to create economies of scale and capture synergies
6. Support high quality, cost-effective standardisation in order to improve delivery efficiency and ensure quality
7. Stimulate innovative decommissioning approaches and technologies, adopting techniques that have the potential to reduce cost and improve safety
8. Build on international experiences and translate them to the Dutch context, ensuring that we learn from others

The third building block – the execution levers – underpins the streams of content; it will ensure effective and transparent delivery of a shared Netherlands decommissioning agenda.

9. Identify and engage relevant stakeholders and understand their views and collaboratively tackle the challenges of decommissioning
10. Launch a tailored communications plan to drive consistent communications to all relevant stakeholders



2001

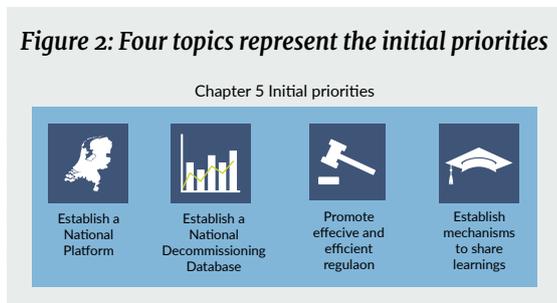
DELFIJL

DE WILDE MAAT

Initial priorities

05

Figure 2: Four topics represent the initial priorities



These topics have been prioritized because they are either:

- Pre-requisites to successfully execute other Masterplan topics
- Important & lengthy activities to be set in motion early
- Practical opportunities to create early impact

05.01 Establish a national decommissioning platform

CONTEXT: The industry and its stakeholders currently address decommissioning issues independently, with ad-hoc coordination of efforts

Each operator and contractor currently has its own approach to decommissioning and therefore plans its efforts relatively independently. While some coordination efforts have started – for example, to define well P&A standards through NOGEPa - these have not yet had the scope nor the pace required to make a fundamental change. There is currently no dedicated decommissioning body in the Netherlands to improve this coordination. In the US, UK and Norway, decommissioning is currently addressed through a range of multi-agency working groups and coordination between different bodies (see Figure 3).

AMBITION: Create an inclusive, coordinated, and professionally governed organisation to facilitate and co-ordinate the Dutch decommissioning agenda

Initial engagements have revealed an emerging appetite around the need for a broad-based and dedicated Netherlands Decommissioning Platform. In principle, there are five archetypes for such a platform:

1. Informal collaboration of existing bodies around a shared agenda
2. Informal collaboration of existing bodies with an active coordinator that commits limited resources to coordinate Masterplan topics
3. A dedicated decommissioning platform, with its own resources and representatives from all stakeholders actively coordinating the decommissioning plan forward
4. A focused government body with the mission to guide the industry to more safe, effective and efficient decommissioning
5. A “DecomCo” – A dedicated decommissioning firm to which all firms contribute their assets post production, and which executes a consolidated programme of work on their behalf

Figure 3: How is decommissioning addressed internationally?

	UK 	Norway 	US 	NL 
State participant	None		None	
Regulator		 Manages comprehensive decom. database		
Licensing authority	 O&G UK and OGA have dedicated decom. working groups			
Industry Association		 Norsk olje&gass		
Communities		Decom not yet a high priority for Norway, being sll focused on recovery and growth		None

Early discussions show clear alignment amongst operators for archetype 3: establish a dedicated National Decommissioning Platform as a means to coordinate the execution of the Masterplan, with EBN as the coordinator with a clear mandate from the government. Such a platform should include broad representation from contractors, operators and government. Furthermore, it should broadly engage other stakeholders and work in harmony with international bodies including those in the UK.

Setting up a separate DecomCo, as per archetype 5, emerged as a potentially interesting alternative to explore in the longer term, but given its complexity, it is not an element of the near-term agenda.

APPROACH: Validate the initial high level scope and objectives and detail the operating model and governance

As shown in Figure 4 on page 20 there are six steps to set up such a National Decommissioning Platform:

1. Agree on the objectives and scope of the National Platform. The initially proposed objectives of a National Platform - as defined in the 6-week project phase - are to coordinate and drive the execution of the Masterplan topics with an initial focus on the national database, regulation and shared learnings. Thereafter, the platform will be the body to co-ordinate the resourcing and execution of subsequent cross-industry work streams.
2. Validate the value add of National Platform versus existing bodies. Before establishing a new platform it should be confirmed that such platform has clear added value compared to existing bodies. The initial project phase has suggested that such a constellation of dedicated resources will add speed and increase impact due to its broader representation and dedicated resources.

3. Define concepts for the National Platform and assess their potential value and viability.

The proposal emerging from the initial phase of the project needs to be further detailed. This detail will include the final structure, which participants will be included and the types and amounts of resources to be committed.

4. Select the preferred model for the National Platform. Key stakeholders will select the final model and agree on resource commitments required for launch. This model will also include agreement on the powers that the National Decommissioning Platform will hold.

5. Set up the governance and legal framework. The final step before launching the National Platform is to set up the governance, legal framework and funding scheme. This means to:

- Define a governance structure and meeting cadence
- Establish legal agreements to setup the National Platform
- Agree on a budget including additional resources and other cost (IT, office space, etc.)
- Define the funding scheme
- Define targets and metrics
- Implement any required IT tools for kick-off

6. Launch and operate the National Platform: using secured resources and funding, the National Platform will be mobilised and begin delivering on its objectives

MILESTONES:

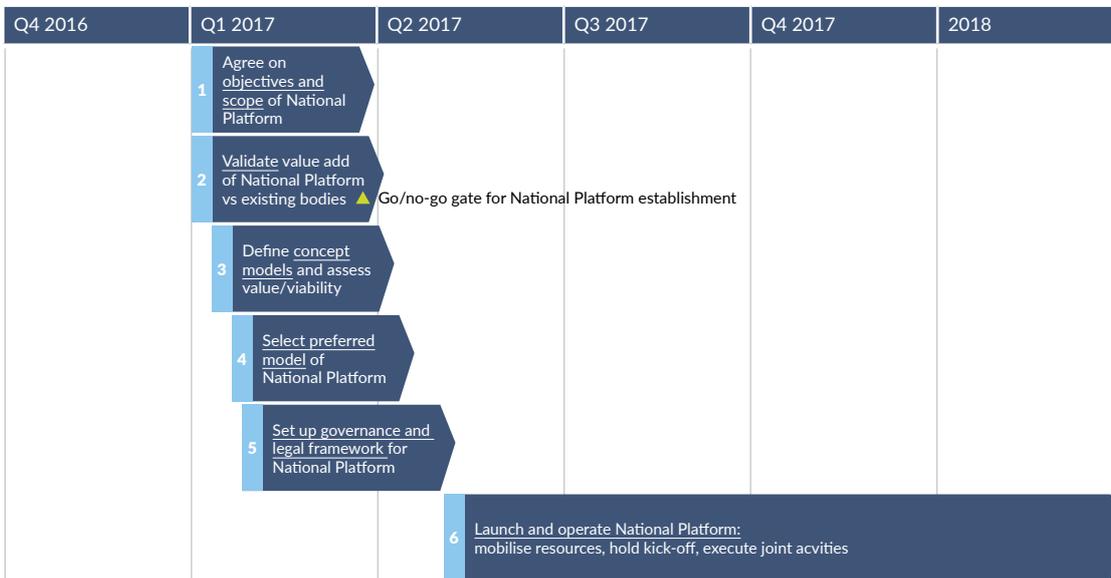
2017 Q1

- All relevant stakeholders have reached agreement on the principles and objectives of a National Platform and jointly decided whether to proceed or not proceed with a National Platform.
- Potential models for a National Platform have been assessed and tested, and a front running model has been selected for detailed design.

2017 Q2

- Detailed design for the National Platform has been completed, including agreement on funding, governance, and membership.
- Legal agreements required to form the National Platform have been finalised and ratified.
- Tools and processes required for running the National Platform have been agreed to and finalised.
- The National Platform has been mobilised, is fully resourced and operational, and is meeting its initial objectives.

Figure 4: Approach to formation of a National Platform



05.02 Establish a national decommissioning database

CONTEXT: Today detailed decommissioning data is available for individual operators. The next step is to build a centralised, standardised data repository providing a view for the next 30 years

There currently is no shared view of the Dutch decommissioning activities that combines asset information, timelines and cost estimates. Each operator has a view on its own assets (and makes estimates to varying levels of accuracy), but this view is confidential and thus not widely shared. Through its joint operating agreements, EBN has a broad view of the full Dutch decommissioning landscape than other industry participants do.

However, to complete a centralized and standardized data repository, EBN will need to gather additional data related to the following elements:

- For offshore installations there is generally good visibility on scope, but a more firm view on timelines and cost estimates has to be developed
- For onshore installations more work is required with key operators to improve visibility on scope
- For offshore pipelines there is generally good visibility on scope of decommissioning, but a more firm view on timelines and cost estimates has to be developed
- For onshore pipelines more work is required with key operators to improve visibility on scope
- For wells there is visibility on the scope through the TNO database. However, further refinement must be done on the well status and on well specific CoP estimates

Once the full dataset becomes available, a further assessment of data integrity will be performed to avoid any variation in data quality, in particular on mature assets with old data files.

AMBITION: An integrated view of the Netherlands' decommissioning scope and timelines

A clear view of decommissioning activities and potential for re-use through a National Database of decommissioning demand could deliver a number of benefits, depending on the choice of data to be collected. There are four potential objectives:

1. To create a view on decommissioning demand over time, which will stimulate contractor investment and allow for supply-demand bottlenecks to be identified
2. To estimate and benchmark decommissioning costs, which would allow for improved budgeting and benchmarking of actual performance
3. To identify opportunities for operator and supplier collaboration by mapping both timing and the specific characteristics of the assets
4. To identify opportunities for re-use and repurpose. The initial phase identified a shared view that a natural starting point would be to create a view on decommissioning demand over time, and in doing so, to identify opportunities for collaboration and reuse.

APPROACH: Agree on objectives, structure and data governance before collecting data and starting quality control

Two elements shape the approach to creating a decommissioning database: the treatment of data confidentiality and data availability - a particular issue for older wells and infrastructure. In order to create a view of decommissioning demand over time, it is key to have CoP data ⁶ per asset and per well. However, several operators consider such data to be confidential. Similarly, detailed cost estimates per asset are considered to be commercially sensitive

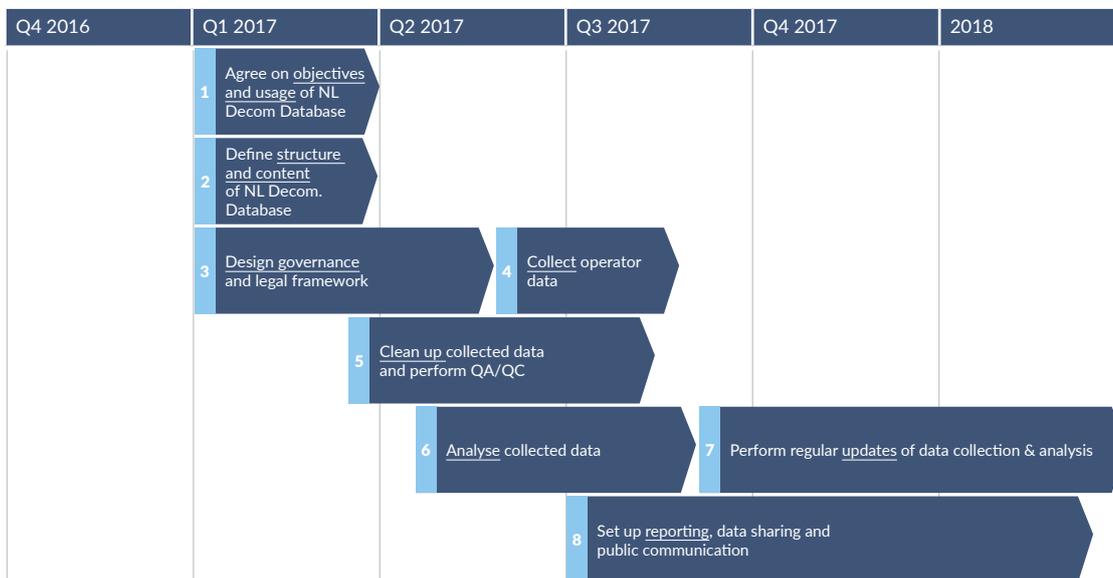
data which cannot be shared directly with others. Therefore, a process needs to be put in place such that no commercially sensitive data will be shared while allowing the database to still serve its purpose. Furthermore - specifically for some older wells and assets - data availability may prove more difficult as not all information will be digitised and available in databases. The approach thus needs to be such that no more data will be gathered than required such that the effort to collect will be optimised.

As a result, the setup of the decommissioning database and processes need to be such that:

- Confidential data will be handled by a trusted party, such as EBN, who will anonymise the data before making it available to others (in line with the process currently followed for the BOON exercise)
- Asset data will be clustered in CoP time periods, i.e. all assets with a CoP date in an interval of 2-5 years will be grouped. This will further anonymise the data making it easier to share
- Assets can be grouped into 'key types' to facilitate data collection, especially for older assets, and to reduce data sensitivity. E.g. facilities could be grouped based on size or weight
- Cost data will only be collected after decommissioning (for benchmarking purposes) while not including pre-decommissioning cost estimates
- The database is in compliance with applicable laws and regulation

⁶ CoP data is used as a proxy from which to estimate the decommissioning date

Figure 5: Approach to setting up the database of Dutch decommissioning demand



Following these data restrictions, eight steps are required to develop a National Decommissioning Database (as laid out in Figure 5):

1. Agree on the objectives and usage. While an initial view has been created in this initial phase, final agreement on the objectives of the database - including who will have access to which part of the data - will need to be reached
2. Define the database structure and required content. The objectives must then be translated into the required data fields and structure. Given the sensitivities regarding confidential data, this means to define and agree on data definitions and required clustering and aggregation for reporting. For example, grouping structures in 4 - 5 size categories and wells into 3 - 4 types of wells, rather than collecting all technical detailed data fields. The relevant clusters will need to be defined and agreed upon with operators and contractors.
3. Design the governance and legal framework. Operators and EBN agree on roles and accountabilities in the data sharing and analysis process, and finalise legal frameworks, funding, formats and tools used
4. Collect operator data. Collect the pre-agreed data from operators using a structured template (with pre-population of data by EBN where applicable). This step can only start after the legal agreements have been finalised.
5. Clean up the collected data and perform QA/QC. EBN and operators agree on quality assurance and control standards (e.g., what is the desired level of accuracy, how is a QA/QC process conducted), prior to a first wave of QA/QC.
6. Analyse the collected data. The cleansed data set will be analysed and synthesised to produce clear reports. Data will be reported anonymously where appropriate, and the setup will be agreed between the legal teams of the operators involved.

7. Perform regular updates of data collection and analysis. Data requests will be embedded into existing annual processes to minimise additional workload on operators, with revised and updated analysis as an input into annual reporting. Operators will have the opportunity to review their own data and update where required.

8. Set up reporting, data sharing and public communication. Three forms of reporting could be pursued: a private access point for operators to view their own information, an anonymised access point for viewing by the larger stakeholder group (e.g. for benchmarking purposes) and annual detailed reporting.

KEY MILESTONES:

2017 Q1

- Operators, contractors and EBN have agreed the initial objectives for the database, and the data fields required to meet this objective
- Relevant grouping of assets and wells defined and agreed upon, such that the objectives can be met while at the same time safeguarding speed and confidentiality
- A database team has been set up, and has identified the gaps between available data (EBN, TNO), and the defined data set. On this basis they have prioritised the data to be collected

2017 Q2

- First batch of data collected
- Legal Framework defined and agreed on for the database. Set of roles and accountabilities for stakeholders and scheme for funding the database defined
- Agreement reached on data definitions, quality standards and a data collection template, and has sent a request for data collection

2017 Q3

- Data collection completed, prioritised data cleaned, and the first wave of QA/QC started
- Data QA/QC and initial analysis completed
- An access point to the aggregated and cleaned data is available to the stakeholders (operators, service companies where relevant), and a report has been published with insights on the 'Decom Netherlands' database

05.03 Promote effective and efficient regulation

AMBITION: A clear, consistent and effective regulatory environment that allows industry to deliver safe, efficient and cost responsible decommissioning and re-use

The regulatory environment will fundamentally impact the efficiency and effectiveness of the Dutch decommissioning agenda. There thus is a need to:

- Promote clear rules and regulations
- Ensure clear guidance on how these rules will be interpreted by regulators
- Ensure that regulations will be applied consistently
- Keep regulations updated in line with technical best practices and innovations

For example, initial engagement has highlighted the importance of well P&A standards and regulation around the limitation period of liabilities. As such, a core element of the Masterplan is to identify areas of regulation that could be strengthened, clarified, or improved to create more effective and efficient outcomes.

Furthermore, the initial phase of work has identified that - in order to further stimulate collaboration on decommissioning - competition law, as well as regulations related to setting up legal structures such as a dedicated 'decommissioning company' would need to be further investigated.

APPROACH: Identify a long-list of potential regulatory topics, prioritise, and engage in structured dialogue with stakeholders and regulators

Five steps have been identified to shape an effective and efficient regulatory environment:

1. Create a long-list of potentially important regulation topics. During the initial phase, a long list of regulatory topics was established, building on three inputs:
 - A comparison of Dutch and international decommissioning regulation
 - Potential regulatory obstacles to Masterplan topics
 - Potential improvements that could better achieve the objectives of current regulation.

This has resulted in an initial list of 20 potential regulatory areas to further investigate in a subsequent detailed phase of work. This list includes clarity around removal requirements of pipelines, regulations for imposing financial security for decommissioning, clarity about the requirements related to well P&A, clarity about timing of decommissioning and the room for operators to collaborate. As a next step, this list should be tested with a broader group of stakeholders. To do this, a team will further engage with stakeholders across government, suppliers, NGOs, and other users of the sea.

2. Assess the potential value and viability of topics to create prioritised list. Once completed, the long list can be prioritised based on their value to the Netherlands and the viability of any changes required. For each topic, the costs and benefits of alternatives will be assessed. This analysis, along with stakeholder feedback, will result in an initial list of priority topics. An initial prioritisation during the project phase resulted in a shortlist of 11 priority areas for review. These include for example creating clarity on well P&A standards as well as creating further clarity on policies for requiring financial security from operators.

3. Understand the stakeholder landscape relevant to each topic. Identify the stakeholders (e.g. SodM, EZ, I&M, NGOs, ILT) who need to be engaged around each topic.
4. Engage in a structured dialogue with regulators and other stakeholders. A structured dialogue between operators, contractors, regulators and other stakeholders will be the basis for promoting effective and efficient regulations. Discussion points may include results of cost benefit analyses, legal analyses for areas in which regulation is unclear, and technical input.
5. Continually review the regulatory developments. Periodically research developments in international regulation, and inform the Dutch discussion.

The timelines as laid out in figure 6 below show the approach to identify a long-list of potential regulatory topics and engage into a structured dialogue with stakeholders and regulators. The Masterplan does not aim to reprioritise those topics that are currently already being worked on.

MILESTONES:

2017 Q1

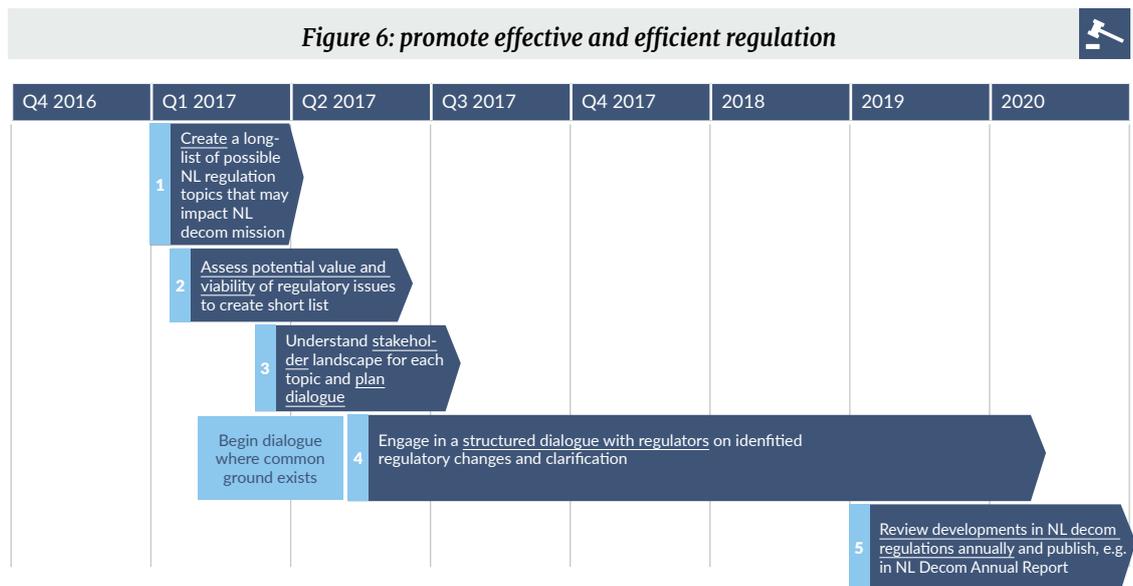
- A long list of potential topics for regulatory improvements or clarifications is created

2017 Q2

- The long list of potential regulatory topics is prioritised based on value viability, and HSSE risk / benefit to create a short list of priority topics to address
- A detailed agenda has been created for structured dialogue with relevant stakeholders for each priority topic

2017 Q3

- A constructive dialogue is in place on priority regulatory topics with regulators, policymakers, and other stakeholders



05.04 Establish mechanisms to share learnings

CONTEXT: Decommissioning in the Netherlands is largely completed on a project by- project basis, with limited sharing within the industry

Decommissioning in the Netherlands today is largely run independently by the different operators and contractors and approached on a project-by-project basis. This means that there is currently limited structural sharing which hinders learning from decommissioning experiences:

- Information is currently mostly shared on an ad hoc basis between operators, either through personal contacts or through conferences, where the sharing of detailed experiences and learnings is generally relatively limited.
- Some formal platforms for industry sharing exist outside the Netherlands, but are still at an early stage
- Within many operators, there is often no dedicated decommissioning team which can lead to a loss of knowledge and expertise as people move on to other projects or companies

AMBITION: Dutch and other North Sea projects learn from one another - operationally, technically and commercially – to achieve continuous improvement in costs and performance

International experience suggests that improved transfer and use of project experience impact decommissioning costs. On average, North Sea operators experience well P&A cost over-runs of ~40- 60% versus initial budgets, whereas operators

in the Gulf of Mexico, with their longer history of decommissioning projects, typically experience 'only' ~10-30% cost over-runs. Building an environment where learnings are shared and stored for future use and benchmarking will accelerate movement up the learning curve and therefore the rate of performance improvement.

The initial phase of work suggests that operators and contractors are, in general, willing to share postproject learnings:

- Learnings could include operational performance benchmarks, 'key issues and learnings', and design schematics
- Southern North Sea projects - including those in UK waters – are of particular relevance (and vice versa), and accessing UK Southern North Sea learnings should be a priority
- Learnings could be shared through an industry platform, which could be integrated with a platform to share international experience
- Operators suggest that personal contact – through meetings and workshops – should be a crucial element of the process

APPROACH: Define objectives and mechanisms with which to share learnings, then detail governance and processes before launching the sharing process

Four steps have been identified to ensure the mechanics are created to share learnings and experiences:

1. Define the objectives, scope and model of shared learning process: the initial phase identified sharing of learnings on organisation setup and technical issues as the key topics. As a next step, this will be validated with operators and contractors.
2. Detail the governance and process: participants, resources and the schedule for shared learning mechanisms will be developed, along with supporting governance, processes and tools (e.g. online platforms/portals). This also includes legal advice to enable sharing amongst operators.
3. Launch a shared learning process: once the governance model has been established, the sharing mechanism will kick off with a series of workshops. The output from these workshops will be synthesised and shared amongst participants.
4. Operate the process and continuously keep sharing learnings: continuously monitor the effectiveness of the mechanism (i.e. does it meet the required objectives) and adjust as required.

MILESTONES:

2017 Q1

- Objectives for shared learnings are agreed to by EBN, NOGEPa and contractors, and published more broadly
- From these objectives, a clear scope is defined (including forums, processes, timing, funding and involved individuals)

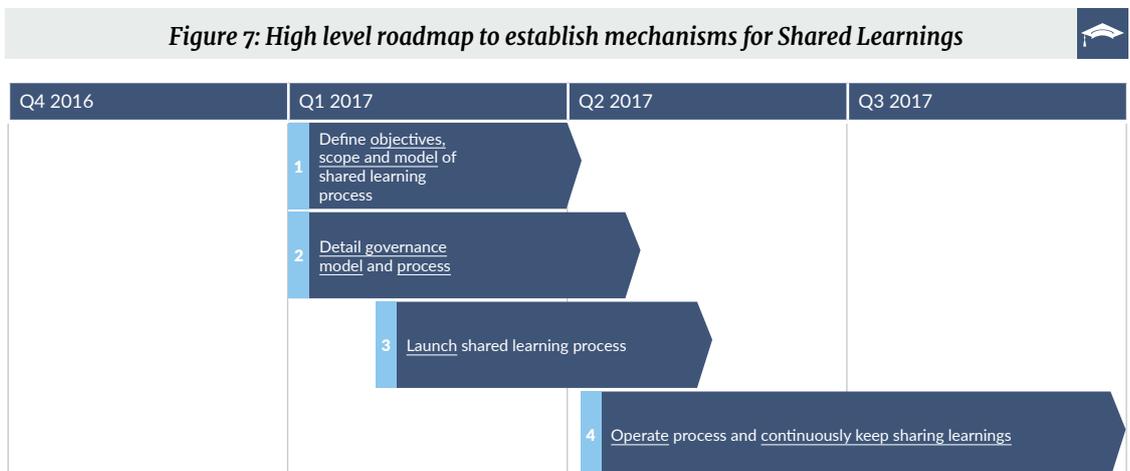
2017 Q2

- A governance structure is agreed and established for a database or online platform, with any required legal agreements signed by all relevant parties
- First learnings shared through (pilot) workshop, e.g. on operator international experience

2017 Q3

- Learnings are consistently shared for every decommissioning project in the Netherlands, and international experiences are continuously accessed and built upon

Figure 7: High level roadmap to establish mechanisms for Shared Learnings



Mid-term objectives

06

Following the initial four priorities that cover the foundation, four additional topics reflect the mid-term objectives of the Masterplan. These topics aim to improve the effectiveness and efficiency of the decommissioning work by establishing structural mechanisms to facilitate industry collaboration, standardisation and innovation as well as fostering continuous learning from international experiences.



06.01 Foster effective industry collaboration

CONTEXT: There is limited collaboration in the Dutch decommissioning industry today

Today, there is limited collaboration between operators to deliver on decommissioning projects in the Netherlands. Furthermore, longer term collaboration between operators and contractors (e.g. through longer term contracts, or transfer of liabilities) is not common at this stage – collaboration is mainly done on a project-by-project basis, both in the Netherlands and abroad. Although discussions and forums on decommissioning are held on a regular basis, there is limited evidence of action to collaborate or to share data. However, collaboration is likely to improve decommissioning results:

- Coordinated project schedules should result in lower mobilisation and demobilisation costs, as well as higher efficiency
- Increased contractor visibility of decommissioning demand will fuel investment potential and efficient completion of a certain pipeline of work
- Collaboration can accelerate the learnings for operators and contractors, supporting continuous improvement in project delivery and cost

AMBITION: Dutch operators and contractors could co-ordinate work scopes and operations where it adds value, to create economies of scale

There is a range of potential operator-, contractor and government-led collaboration models:

Operator-led models

- Two or more operators could coordinate (part of) their projects to create a combined decommissioning timeline, thereby creating economies of scale
- One or more operators could form 'strategic alliances' with one or more contractors (to deliver a bundle of decommissioning work)

Contractor-led models

- Contractors could collaborate to maximise asset utilisation
- Contractors could take over late-life operations and decommissioning as a turnkey solution

Government-led models

- The Government could actively orchestrate operator decommissioning schedules
- A new company (potentially set up by the Government) could deliver all decommissioning responsibilities and take over the assets
- During the initial phase, there was not one specific model that was considered to be most favourable. The models that received the greatest interest were:
 - To create strategic alliances with contractors by providing demand certainty through sharing (aggregated and non-confidential) scope information
 - To set up a new company / joint venture to manage the entire decommissioning process for all (or a selected group of) operators

Further analysis is required to define the benefits and risks of these and potentially other models, and to define the legal boundaries for collaboration.

APPROACH: First define potential collaboration models, then prioritise and select preferred models, before completing detailed design and launch

Five steps have been identified to foster increased industry collaboration (see Figure 9):

1. Identify the sources of value and the objectives.
During the project phase, two main expected sources of value of collaboration were identified: creation of demand certainty for suppliers and improving efficiency by reducing downtime through improved coordination of decommissioning. A broader group of stakeholder needs to

be engaged to further underpin the main value, by both widening the group of operators and, more so, by including contractors in the discussions.

2. Define potentially viable collaboration models.
A number of different collaboration models that are potentially viable in the Dutch context have been identified in the initial phase. These models range from operator-led models to contractor-led models and government-led models. Domestic and international regulatory constraints to collaboration should be investigated to understand whether and which of these models can be pursued in the Netherlands.
3. Prioritise and select the preferred collaboration models. The initial phase identified two models for further detailing: the provision of demand transparency to contractors (which may be developed as part of the decommissioning database), and the creation of a joint venture to take over and manage decommissioning projects. The potential value and feasibility of these models needs to be further underpinned through a series of workshops and quantitative analysis. At the end of this phase, a small number of collaboration mechanisms are selected for detailed design and implementation.
4. Detail the setup. For each mechanism, a final set of collaboration participants, governance and processes, legal and regulatory structures and tools, and performance metrics are defined, in preparation for implementation. Key questions to resolve during this phase include competition barriers to collaboration, the legal structure of any new decommissioning company (where applicable), operator confidentiality boundaries, and the sharing of any value created (or reimbursement for loss by any one participant)

5. Launch and operate. Collaboration mechanisms are launched, and the impact of mechanisms monitored. If collaboration mechanisms are not meeting their performance metrics, an adjustment may be made.

MILESTONES:

2017 Q3

- Potential participants in industry collaboration (operators, contractors, potentially government) have agreed on sources of value, and a set of viable collaboration mechanisms (including identified legal boundaries)

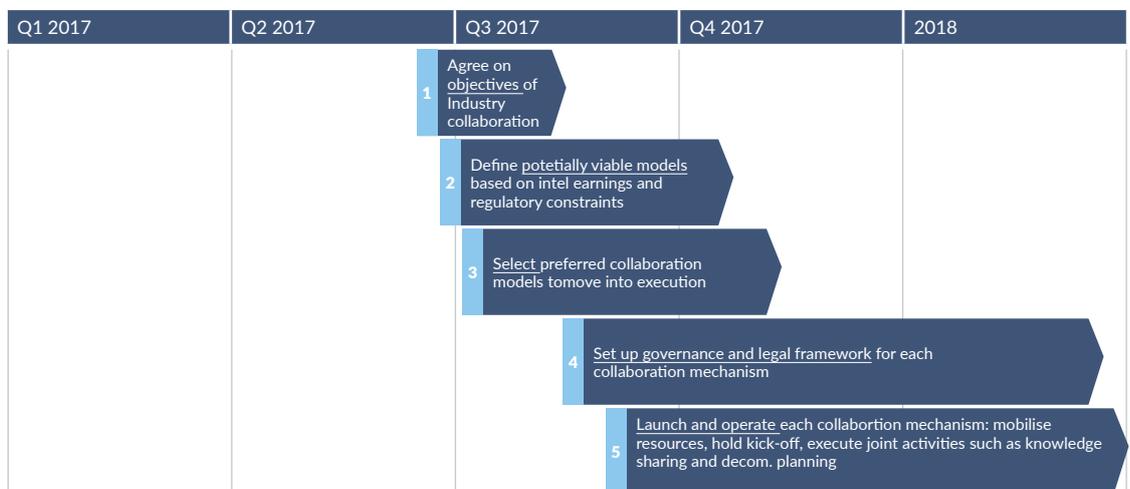
2017 Q4

- The potential value and feasibility of this set of collaboration mechanisms has been assessed, to create a small set of priority mechanisms
- Following workshops, potential participants have agreed on a final set of collaboration mechanisms for set up and launch

2018

- For the final set of collaboration mechanisms, the participants, governance, processes, resources, regulatory and legal bounds, performance metrics and tools are defined
- The final set of collaboration mechanisms are launched, and are delivering their desired outcomes

Figure 9: Key steps to foster industry collaboration



06.02 Support quality, cost-effective standardisation

CONTEXT: Operators and contractors use different approaches, leading to potential inefficiencies and barriers to collaboration

The initial phase revealed that operators and contractors use different company approaches when it comes to execution of decommissioning projects. These differences are often the result of a different interpretation of regulations (e.g. number of plugs, thickness and placement of barriers). Furthermore, some of these differences originate from differences in global guidelines within companies. The use of different approaches may form a barrier to collaboration. Similarly, different approaches may make efficient aggregation of the projects of different operators by contractors more complex.

There are a number of existing projects that aim to develop a more consistent set of practices, including a project by NOGEPa to develop guidelines for well P&A. However, to date these projects have not yet resulted in a broadly accepted set of industry wide practices.

Experience from other geographies indicates that differences in approach account for differences in cost of well decommissioning of up to 4 times. While similar analysis was not (yet) conducted for the Netherlands, a similar range of cost outcomes is likely to exist.

AMBITION: The adoption by operators and contractors of shared, pragmatic standards to ensure effective outcomes whilst avoiding high costs

A move to further standardisation of approach can deliver benefits to all stakeholders, including:

- Improved effectiveness and efficiency where standards represent best practice
- A simplified environment to monitor regulation compliance
- An improved environment for collaboration, with potential benefits for cross-project experience sharing

During the initial phase, the working group identified several areas with potential benefits from standardisation, to be confirmed with broader stakeholder engagement and further addressed in the next phase. These areas include:

- Well P&A- through guidelines for P&A processes
- Preparation phase - through a template decommissioning plan and alignment of contractor models / simulation tools in tendering process
- Lifting and transport - through standard procedures and equipment per type of platform
- Dismantling - through more detailed definitions on what is considered 'clean'

Of these areas, the potential benefit is anticipated to be highest for well P&A as that represents the area with the largest costs.

APPROACH: Identify objectives and standardisation opportunities and then develop sensible, flexible, shared guidelines that evolve with the industry and the regulation

Four steps have been identified to support quality, cost effective standardisation:

1. Identify the most critical and highest value standardisation needs and opportunities:

The initial phase identified an early, high level set of standardisation needs, as described previously, across the decommissioning value chain.

As a next step, standardisation needs should be assessed across three areas: differences between companies, differences between North Sea countries and different interpretation of regulations. Subsequently, these differences should be ranked and prioritised based on value (cost and quality for the Netherlands) and feasibility, to create a prioritised shortlist of topics.

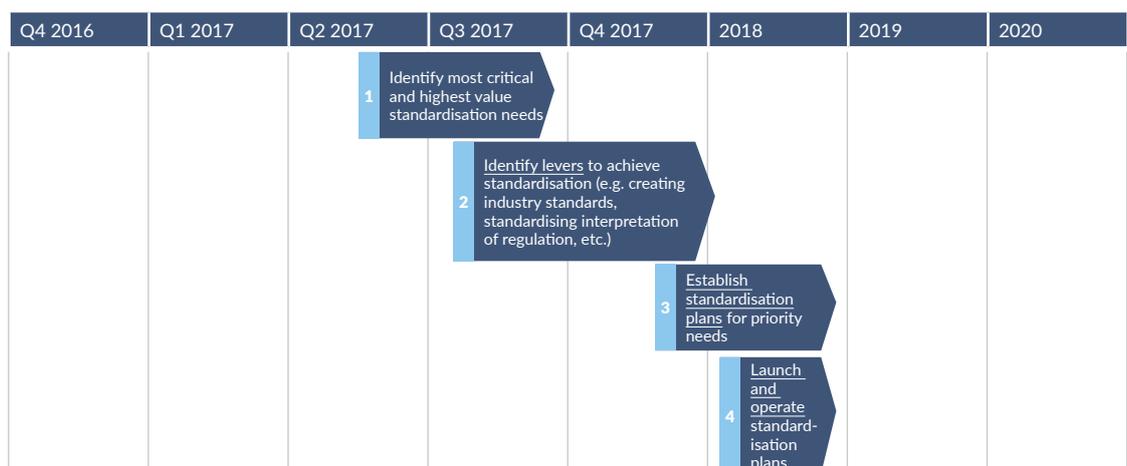
2. Identify the main levers to harmonise and apply common practice: There are several levers to drive standardisation in the identified priority topics:

- Define industry standard approaches and equipment for decommissioning (e.g., similar to NORSOK/CRINE)
- Standardise the interpretation of regulation (in dialogue with the regulator)
- Push for the enforcement of minimum standards by challenging gold-plating while adhering to HSSE rules and regulations
- Agree on standard contracts for decommissioning
- Educate operators on the lack of standardisation (e.g., through shared learnings)

3. Establish standardisation plans for priority needs: Boundary conditions, objectives and scope for each of the priority standardisation topics to be assessed and summarised in a standardisation program.

4. Launch and operate the standardisation plans: For each priority topic, a budget and resources are to be mobilised to address the identified standardisation levers.

Figure 10: Key steps to support quality, cost effective standardisation



MILESTONES:

2017 Q3

- A shortlist is created of the highest priority standardisation needs for Netherlands decommissioning, based on interviews with contractors, operators and regulators.

2017 Q4

- Levers have been identified to drive standardisation in each identified area of standardisation need.

2018

- For each area of identified need, an appropriately resourced program has been launched, with progress and results tracked against the metrics identified in the standardisation program.
- Objectives, scope, resources and partners have been identified for each identified area of standardisation need, and summarised in a standardisation program.

- Alternative removal techniques, which may improve safety, minimize risks and shorten the time (and thereby costs) of the lifting or transport processes
- New ways of re-purposing structures, which could significantly reduce both waste and cost (e.g., carbon capture and storage, geothermal, power to gas, artificial reef construction)
Initial assessment by the workgroup has identified a number of areas where innovation could have the potential to deliver value:
- Well P&A – through alternative plugging materials (e.g., clay / salt / bismuth) and technology (e.g., alternative case milling technologies, rigless abandonment, jack-up barges)
- Re-use of structures (e.g., topsides and flexible pipelines)
- Pipelines – through diverless cutting and mattress removal
- Repurposing (e.g. CCS, geothermal, P2G, reefing)

Most potential is expected to be found in well abandonment (as this is the area with relatively highest cost) and re-use.

06.03 Stimulate innovative decommissioning

AMBITION: The best global innovation could be applied on Dutch projects, with a dedicated agenda to address Netherlands specific technology challenges

New innovation has the potential to deliver both reduced cost and improved quality outcomes. This includes for example:

- Alternative materials (instead of cement plugs) which may both reduce P&A costs, while also improving barrier long term stability

APPROACH: Facilitate innovation and the evolution of good practice in the industry

Four steps have been identified to stimulate and use new innovation:

1. Identify the most critical and highest value innovation needs. This includes identifying technology needs that are 'distinctly Dutch' and high potential current innovations that are used in other regions. The value (quality and cost) and criticality of each element of this list will be assessed to create a prioritised list of innovations.

2. Identify the priority gaps not currently addressed by innovation programs elsewhere. Four areas to review to identify where the prioritised list of innovation needs are not served by current programs:
 - Current international decommissioning plans of operators
 - Technology programs from international forums
 - Relevant Dutch academic research
 - Service company R&D programs
3. Establish an integrated innovation and technology plan and platform for priority needs. For each of the identified gaps, the platform and mechanisms to drive progress – such as industry / academic partnering, JIPs, or innovation consortia – should be defined and candidate projects identified to test the new innovations on.
4. Execute innovation initiatives, and review and refresh plans annually. For each accelerated innovation opportunity, budgets need to be secured as well as resources and necessary approvals to implement in Dutch projects. For areas of innovation need, the integrated innovation plan is launched. Finally, progress against innovation plan metrics are tracked and

published annually, with an annual review conducted of the technology landscape to identify additional opportunities.

MILESTONES:

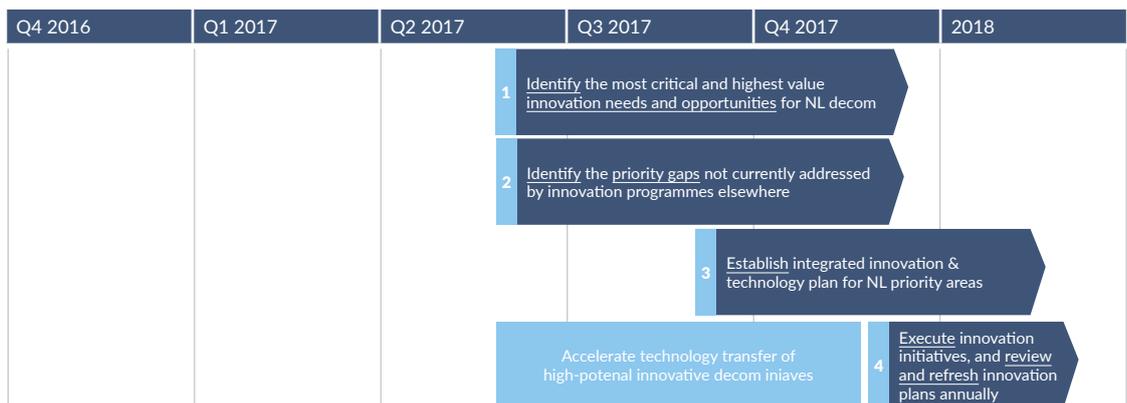
2017 Q4

- A full and prioritised list is created of opportunities to accelerate technology adoption, and ‘distinctly Dutch’ innovation needs.
- A review is completed of current means to foster innovation, to assess where additional efforts are required to push priority innovation needs.

2018

- Measures are detailed to drive priority innovation needs, summarised in an integrated innovation plan.
- Measures are put in action to drive priority innovation needs and accelerate adoption of new technology. Progress is tracked, and an annual review of the innovation landscape is completed.

Figure 11: Key steps to support innovation



06.04 Build on international best practices

CONTEXT: There is an opportunity to leverage and learn from the decommissioning experiences of other nations

Decommissioning is not a unique Dutch challenge, and other regions have valuable and relevant technical, commercial, regulatory and organisational experiences for the Netherlands to draw on:

- The Gulf of Mexico is deeply experienced in decommissioning with over 26,400 wells and 2,000 facilities decommissioned to date. The Gulf of Mexico can be characterised as a mature decommissioning market, albeit one without significantly orchestrated collaboration
- In June 2016 the UK Oil & Gas Authority launched a Decommissioning Strategy report, which will offer a useful comparison point for the impact of a similar set of tools to improve decommissioning

The UK's Southern North Sea faces similar geological and operational challenges to the Netherlands

AMBITION: The Dutch approach to decommissioning draws on international experiences to reflect the industry's best practices

On a one-off basis, capturing international experiences will kick-start the development of Masterplan topics, allowing the Masterplan to adapt what works and reject what does not work, and reducing expenditure of time and resources. On an ongoing basis, capturing international experiences will allow

for the Masterplan to adapt based on the way other countries are heading, and remain at the forefront in terms of best practice. Initial engagement identified that a focus on the Southern North Sea should be the initial priority and that experience may best be shared through both project close-out data, and through direct operator collaboration.

APPROACH: Establish initial Masterplan priorities based on international experience, and execute further topic-specific research as specialised work commences

Four steps have been identified to build and reflect international best practice:

1. Consolidate existing research on international experience. A deep dive on international experiences in the initial phase has generated initial insights into learnings from other regions. These learnings relate to five topics:
 - Finance: Decommissioning costs are underestimated by all operators and vary significantly per operator – partially driven by experience.
 - Capabilities: Both operators and regulators are often behind on building up focused and experienced decommissioning experience
 - Contracting: Service companies are generally sceptical of operator plans / timelines
 - Collaboration: There is limited dedicated partnership and collaboration
 - Re-use: The market has potential but is not effective today

These experiences are used as starting input for the different work streams.

2. Set up a team to conduct deep-dive research which will have the task to focus on feeding the different work streams with further input from international experiences.
3. Conduct further deep dive research and feed this into Masterplan topics. Research is conducted into specific deep dive areas. Findings are presented as inputs into Masterplan topics.
4. Update the international experience fact base. Updates are made to cover learnings from major new international decommissioning projects, regulatory changes, or other structural industry developments and included in the relevant work streams.

MILESTONES:

2017 Q2

- Initial fact base is established based on research done during the project phase

2017 Q4

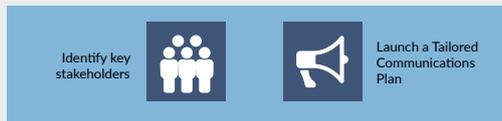
- Initial fact base is further refined by including information from international bodies and operators, and is used for the development of Masterplan topics
- All additional deep dive research is conducted, as input into Masterplan topics



Execution levers

07

Figure 13: Two topics included in execution levers



The final two topics of the Masterplan reflect the execution levers for transparent delivery: stakeholder mapping and communications plan. These topics relate to an effective and transparent delivery of a shared Netherlands decommissioning agenda.

07.01 Engage all relevant stakeholders

AMBITION: Involve all relevant stakeholders to ensure successful implementation of the Masterplan

The Netherlands Masterplan for Decommissioning and Re-use involves a broad set of stakeholders. The initial stakeholder mapping work executed in the project phase revealed four main groups of stakeholders:

- Operators - onshore, offshore and pipeline
- Service Companies - including those providing removal vessels, well servicing companies, and demolition and disposal yards
- Government agencies - including the Ministry of Economic Affairs, and the Ministry of Infrastructure and Environment, Rijkswaterstaat as well as regulators such as SodM, ILT and broader EU regulatory bodies
- Other stakeholders, such as NGOs, the public and broader stakeholder groups (including but not limited to users of the sea such as fisheries, re-use and repurpose customers, investors and partners, research organisations such as TNO)

In the project phase, an initial mapping of these stakeholders has been done to the different topics of the Masterplan. This mapping was performed for all key topics and revealed differences in the stakeholder landscape across each of the topics.

The regulation topic has the most complex stakeholder environment, as for this topic the stakeholder group is relatively broad and stakeholders could have diverse interests. Therefore, this topic should be the focus of stakeholder engagement. Key stakeholders for this topic are, amongst others, the government and regulators, operators, service companies, a variety of NGOs and the broader public.

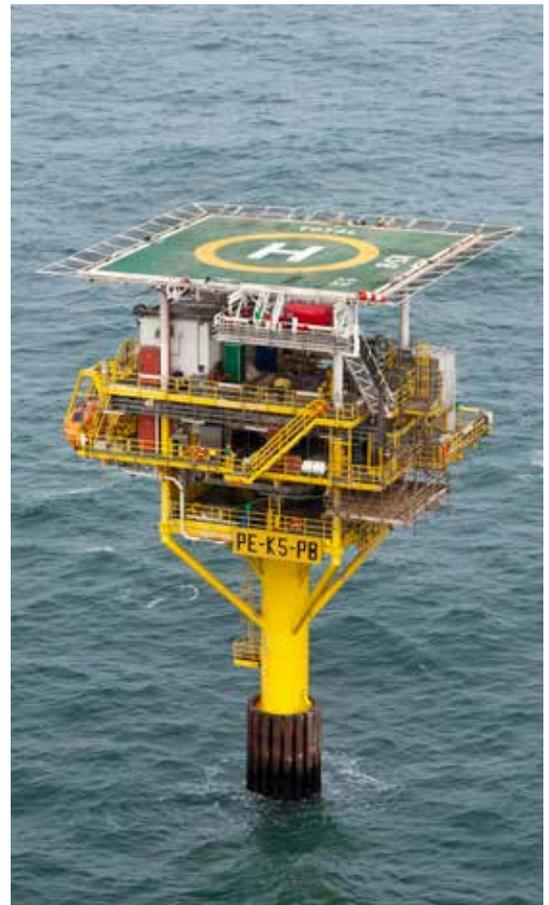


Figure 14: Key stakeholder groups

Operators	Service providers	Government	Other stakeholders
Offshore operators E.g., : • NOGEPA • Centrica • Dana • Engie • NAM • Total • Vermillion • ... • Op's w/out installaons • New entrants	Removal vessels	Ministry of Economic Affairs (EZ) • Ministry • SodM • RVO	EBN
	Well service co's • Drilling rig co's • Well service co's • Oil field services		Public
	Other suppliers - onshore	Ministry of Infrastructure and Environment (I&M) • Ministry • ILT • RWS	NGOs
Onshore operators Pipeline operators • NGT, WGT, NOGAT • Onshore operators	Other suppliers - offshore		Politicians
	Disposal yards	Other Government bodies • NL competition regulator • EU competition regulator • ...	Financial + insurance
			Professional services
Disposal yards	Re-use / repurpose customers Investors and partners Users of the sea (wind, fishing)		
			Int'l Organisations (OGA, etc)
			Researchers (e.g., TNO)
			Certification co's
			Coast Guard

Industry collaboration, shared learnings, standardisation, and innovation topics each have critical stakeholders, but the group is somewhat less diverse and there fore can be targeted more effectively. The key stakeholders for these topics are operators and services companies.

APPROACH: First build a stakeholder map and engagement process, then launch and continuously update

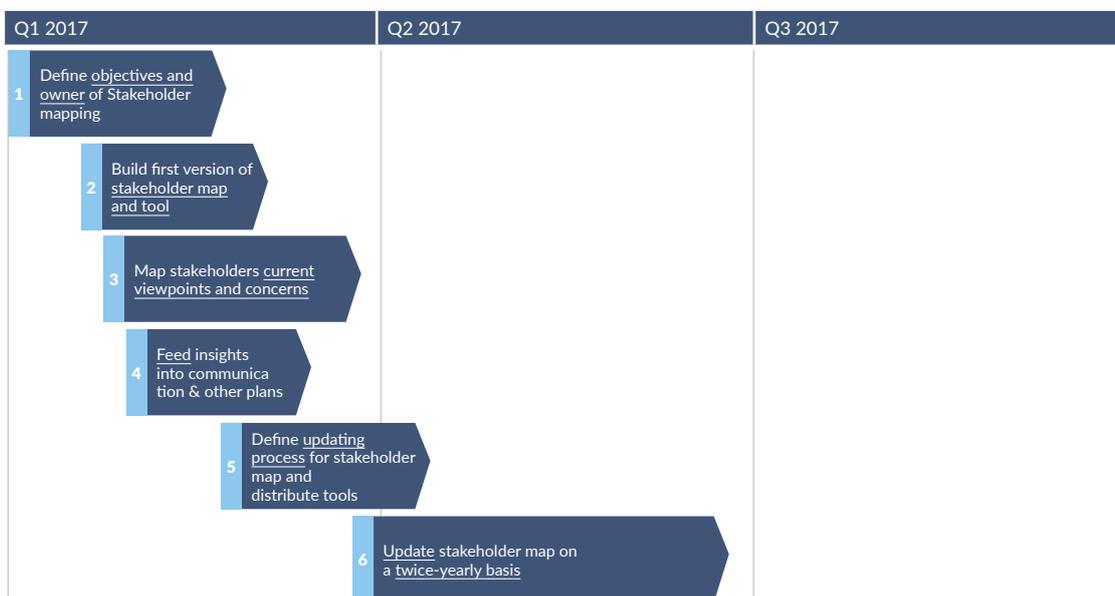
Six steps have been identified to ensure relevant stakeholders are engaged:

1. Define the objectives and owner of the stakeholder mapping. The initial phase identified the objectives of the stakeholder mapping to ensure effective and targeted communications, and involving stakeholders in the Masterplan process. The initial phase also identified a long list of stakeholders that needed to be engaged or informed, and their influence and likely level of support across Masterplan topics, which can be used to detail the communications plan.
2. Build and expand the stakeholder map. The initial phase created a first stakeholder mapping, including stakeholder organisations, positions, names and potential views and influence on Masterplan topics.

This mapping is to be further populated during the execution of the Masterplan with additional stakeholders and views.

3. Map current stakeholder viewpoints and concerns. An initial mapping of the stakeholders has been done, based on expected views and input from interviews. This mapping will need to be updated over the coming months as further interviews will be conducted.
4. Feed the stakeholder mapping inputs into other Masterplan topics. Stakeholder views and concerns, revealed through the interviews, will feed into the Masterplan topics to further sharpen the content and align to the different stakeholder groups, as well as in the communications plan to ensure targeted communication.
5. Define an updating process and distribute tools. An owner is assigned to the stakeholder engagement process, and a 'caretaker' is assigned to each stakeholder in the map. A process is agreed upon to update the stakeholder map, including adding or removing stakeholders, changing stakeholder details, and updating stakeholder status after interactions.
6. Update the stakeholder map on twice yearly basis. Once the stakeholder map is solid and crystallised out, it should be updated on a regular basis to ensure it is kept up to date.

Figure 15: Key steps for stakeholder engagement



MILESTONES:

2017 Q1

- A finalised stakeholder map is created with information from stakeholder interviews, and is used as input into the Masterplan topics and into a communications plan

2017 Q2

- A process has been defined to manage changes to the Stakeholder map
- 'Caretakers' have been assigned to each stakeholder

07.02 Launch a tailored communications plan

CONTEXT: A broad group of stakeholders will need to be kept informed of the Masterplan

The success of such a Masterplan is for a large part dependent on how well the different stakeholders

are aligned. There will be multiple individuals and stakeholder groups who therefore need to be engaged actively. In addition, there are a number of stakeholder groups that will not need to be closely involved but will still need to be informed regularly. To effectively engage and communicate with these stakeholders, a cohesive and tailored communications plan is needed.

AMBITION: A communications plan will be created to ensure stakeholders are continuously informed, engaged and mobilised

well formed stakeholder plan is required for effective delivery of the Masterplan:

- Tailored messages will ensure that the stakeholders that need to be engaged to make the Masterplan successful (e.g., to share learnings, or to drive innovation) are involved in the right way
- Broad communication will ensure the decommissioning agenda receives public attention and support commensurate with its importance

A well constructed communications strategy has two main elements:

- Non-routine communications: public messaging on the key events during the Masterplan – e.g., launch of Masterplan itself, launch of a National Platform or first collaboration models, new innovations, decommissioning of a certain proportion of Netherlands oil and gas infrastructure
- Routine communications: messaging at regular intervals – e.g., annual reporting of progress, results of annual reviews, etc.

APPROACH: First define objectives, scope, audience, and topics of communication plan, before crafting and managing ongoing messaging

Six steps have been identified to launch the communications plan:

1. Define the objectives, scope and audience groups. First step is to define the scope and the target audience, i.e. what is communicated to whom. Key element in the scope related to this Masterplan will also be defining in what name the communication is sent (i.e. EBN, EBN/NOGEPA, others). The stakeholders to be engaged are then classified according to the stakeholder map – a first version of this has been created in the initial phase.
2. Identify the communication topics based on other works streams and create a communication agenda. Based on the agreed objectives and Masterplan topics, an agenda of key routine and non-routine communication ‘moments’ per Master plan topic is built.
3. Define the communication plan (channels, messages, and frequencies), specified for audience groups. The stakeholder map forms the basis to breaking down this integrated agenda into a detailed communication agenda for each target audience. The appropriate communication channels as well as messaging frequency for each stakeholder group are then defined.
4. Mobilise resources, set up communication channels and synthesise messages. A gap analysis is performed to determine whether additional communications channels are required to be set up over and above existing channels. Initial messages for each audience are drafted and routine communication content is built, including a ‘dictionary’ of terms. Resources will be mobilised ahead of this phase, to manage early Masterplan communications.
5. Manage non-routine and routine communication and regularly update audience groups and communication plans. Routine (e.g., annual or other regular processes) communications and non-routine (e.g., special event) communications are created, edited and published. The communications plan is reviewed regularly and updated.
6. Advise and support the Dutch decommissioning work streams on stakeholder engagement activities. Where required tailored messages and approaches are created for specific topics and audiences.

Figure 16: Key steps for transparent communication



MILESTONES:

2017 Q1

- Detailed communication agenda created based on Masterplan topic list and timeline
- Early communications released with high level messages on Netherlands Decommissioning and Re-use Masterplan

2017 Q2

- Detailed communications plan in place, with agenda, channels and communication frequency defined for each target audience
- Resources mobilised to drive communication process

2017 Q3

- Full communication plan rolled out, with all stakeholders receiving transparent and engaging communications at the appropriate times

Conclusions and short term priorities

08

One of the sector's key challenges is the safe and efficient decommissioning of oil and gas infrastructure. Current estimates cost for decommissioning of oil and gas assets in the Netherlands amount to ~€6.7 billion. These current estimates may further increase as history shows that estimates often significantly undershoot actual costs (especially for well P&A). Since the state contributes ~70% of the total costs of decommissioning (either directly or through their ownership of EBN), it contributes at least €5 billion of these costs. There is an opportunity to potentially reduce these decommissioning costs, while at the same time improving the quality and safety of decommissioning in a sustainable way through a coordinated response from the industry. Furthermore, as the economy is moving towards a renewable future, there is an opportunity to re-use existing infrastructure to complement renewable investment before eventual safe and efficient decommissioning. To ensure the most effective and efficient execution on the decommissioning tasks ahead, four priority topics should be further detailed in the coming months:

- A dedicated National Decommissioning Platform should be established, with EBN as the coordinator with a clear mandate from the government

- A National Decommissioning Database is to be established providing an (anonymised) clustered view of the asset base and decommissioning horizon to facilitate planning and collaboration
- Efficient and effective regulation should be promoted to allow industry to deliver safe, efficient and cost responsible decommissioning and re-use
- Mechanisms to share learnings should be set up, both local and internationally

Following the priority topics, four mid-term objectives should be further pursued to ensure the Dutch decommissioning execution is world-class in terms of safety, sustainability and cost efficiency:

- Ensure an environment of industry collaboration to coordinate work scopes and operations for most effective and efficient execution
- Support high quality, cost-effective standardisation of decommissioning to ensure high quality outcomes whilst avoiding high costs
- Stimulate innovative decommissioning approaches and technologies to create world class decommissioning outcomes in the Netherlands
- Build on international experiences to ensure the Dutch decommissioning market reflect the industry's best practices



Individuals from the following organisations provided input, either directly or through structured interviews, during the initial project:



The Netherlands Masterplan for decommissioning and re-use rapport was made possible by the support of several organizations, Wintershall Noordzee B.V. (photo page 1, 15, 23, 28-29, 47), GDF SUEZ E&P Nederland B.V. (photo page 3) and Total E&P Nederland B.V. (photo page 41). EBN would like to thank them for their cooperation.

Glossary of abbreviations and terms

10

ABBREVIATION	MEANING
BOON	'Benchmarking Opex Offshore Netherlands' – a bi-annual benchmarking of the operating costs of offshore gas installations, carried out by EBN together with NOGEPa
CCS	'CO2 Capture and Storage' – technologies to capture and store carbon dioxide before it is released into the atmosphere
CoP	'Cessation of Production' – the date at which production from an oil and gas asset is terminated
CRINE	'Cost Reduction Initiatives for the New Era' – Efforts by the UK petroleum industry to reduce waste and inefficiency in platform construction and operation
Decommissioning	Decommissioning involves different activities for wells, facilities and pipelines. For wells it means P&A (see below). For platforms it means cleaning and making ready before removal (and removal of decks, jackets, and piles). For onshore installations it means cleaning and removal, returning the site to its original state. For pipelines it means cleaning and securing in place (potentially removing where necessary).
Dismantling / salvage	Dismantling/salvage means breaking decks, jackets, plant, facilities and pipeline for subsequent recycling for other purposes
EZ	'Ministerie van Economische Zaken' – the Dutch ministry of Economic Affairs, which includes SodM and is the shareholder of EBN
HSSE	Health, Safety, Security and the Environment
ILT	'Inspectie Leefomgeving en Transport' – a Dutch regulatory body, part of the Ministry for Infrastructure and the Environment
I&M	'Ministerie van Infrastructuur en Milieu' – the Dutch ministry of Infrastructure and Environment, which includes ILT and RWS
IRO	The Association of Dutch Suppliers in the Oil and Gas Industry
MER	'Maximising Economic Recovery' – A strategy by the UK Oil and Gas Authority to maximise production from UK oil and gas resources
NGOs	'Non government organizations' – a non-profit, voluntary citizen's group, typically organised around a common interest
NOGEPa	'Nederlandse Olie en Gas Exploratie en Productie Associatie' – an association that represents businesses with licenses to explore for or produce oil and gas in the Netherlands
NORSOK	'Norsk Sokkels Konkuranseposisjon' – Standards developed by the Norwegian petroleum industry to ensure adequate safety, value adding and cost effectiveness for industry developments and operations
P&A	'Plug and Abandon' – a technique by which a well is made safe and closed permanently after operations are complete, through installation of (cement) plugs, seals and liquids in the well bore, cutting of the casing below seabed or land surface, and returning of the seabed or land surface to its original state
P2G	'Power to Gas' – technologies that convert electrical power to a gas fuel
QA / QC	'Quality Assurance / Quality Control' – the process to assure the quality of data, and ensure it meets its needs
Recovery / reconditioning	Recovery/reconditioning of land means removal of surface water, contaminants, concrete, and contaminated soil, and return of original soil, ready for future use. Reconditioning of decks, jackets (if possible), plant and facilities means preparing these for subsequent re-use
Removal	Removal means taking away of process facilities, steel, decks, jackets, piles (all or part), pipelines (where necessary and appropriate), after they have been cleaned and decommissioned
Re-use	Re-use means the use of decks, jackets, pipelines for their original design (possibly elsewhere)
Re-purpose	Re-purpose means the use of decks, jackets, pipelines, wells for alternative purposes, e.g. CO2 storage, transformer locations for wind farms, power to gas and other renewable or sustainable activities
RWS	'Rijkswaterstaat' – a regulatory body, part of the Minister of Infrastructure and Environment
SODM	'Staatstoezicht op de Mijnen' – a Dutch regulatory body, part of the Ministry of Economic Affairs
TNO	'Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek' – a nonprofit research company in the Netherlands that focuses on applied science

About EBN

EBN B.V. is active in exploration, production, storage and trading of natural gas and oil and is the number one partner for oil and gas companies in the Netherlands. Together with national and international oil and gas companies, EBN invests in the exploration for and production of oil and natural gas, as well as gas storage facilities in the Netherlands. The interest in these activities amounts to between 40% to 50%. EBN also advises the Dutch government on the mining climate and on new opportunities for making use of the Dutch subsurface. National and international oil and gas companies, the licence holders, take the initiative in the area of development, exploration and production of gas and oil. EBN invests, facilitates and shares knowledge. EBN has also interests in offshore gas collection pipelines, onshore underground gas storage and a 40% interest in gas trading company GasTerra B.V. The profits generated by these activities are paid in full to the Dutch State, represented by the Ministry of Economic Affairs, sole shareholder. EBN is headquartered in Utrecht, the Netherlands. Visit www.ebn.nl for more information.





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