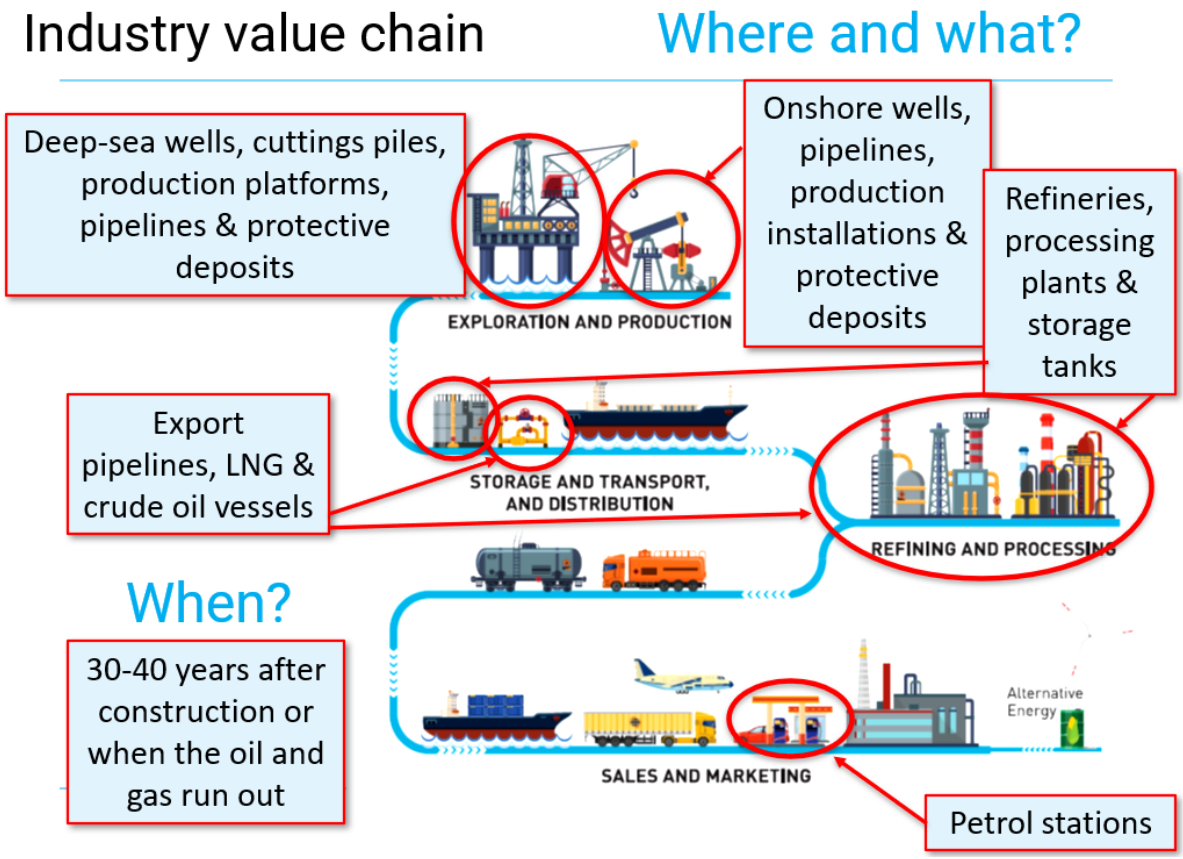
Delivery of the Regional Training on
Regional Training on Foundation Course on Site Decommissioning and Remediation
Online training 07-09 December 2021
13:30 CET; 07:30 Bogota; 15:30 Baghdad

Training Summary and Documentation



Contents

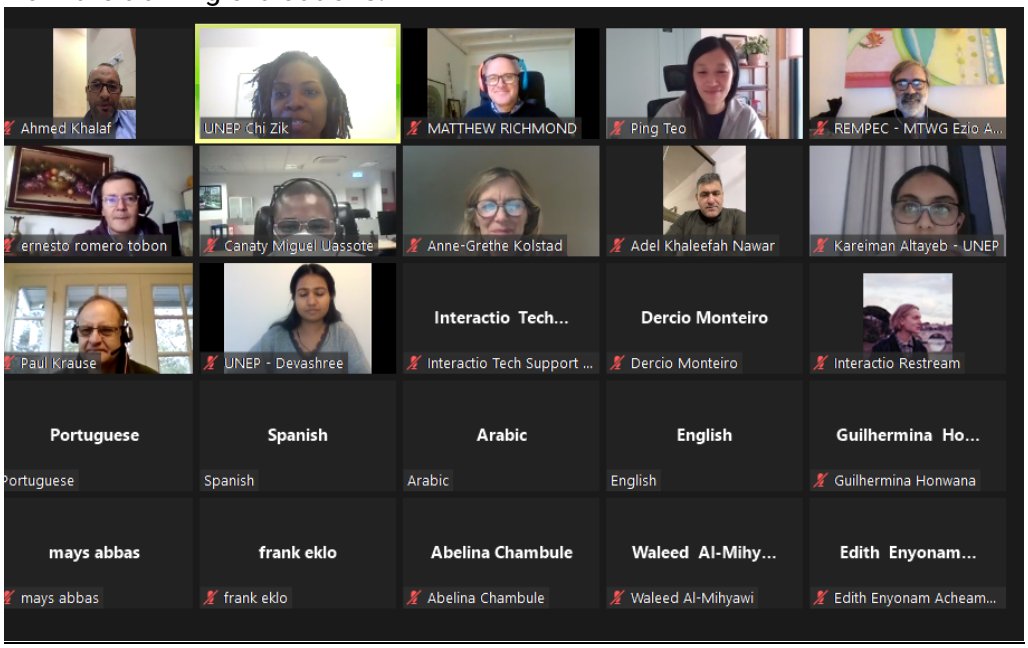
Background

The UN Environment Programme (UNEP) and the Government of Norway's Oil for Development (OfD) have a collaboration, which aims at strengthening environmental management capacities in the oil and gas sector. In this regard, UNEP organized a Regional Training focused on Site Decommissioning and Remediation to enhance understanding of the key environmental issues, impacts, and procedures associated with the decommissioning of oil and gas infrastructure.

Due to the current global COVID-19 pandemic which have led to travel restrictions, and with the safety and well-being of participants as the highest priority, the training was delivered online to participants who met the pre-training preparation requirements.

Although there were simultaneous interpretations from English to Arabic, Portuguese and Spanish, presentations in the training were recorded in English and the link shared with participants to enable other participants who could not join to access the training when feasible.

This training report summarizes key points from discussions and participants' feedback from the training evaluations.



Training Course

The 3-day online training focused on the first phases in the decommissioning of oil fields, both onshore and offshore, and the related environmental considerations. It discussed the roles and responsibilities under national and international legal frameworks as well as financing, challenges, and steps to sustainable decommissioning. Participating countries included: Mozambique, Colombia, Ghana and Iraq.

The training objectives were as follows:

1. Develop basic knowledge on, and understand the role of, decommissioning in the oil and gas value chain.

2. Become familiar with challenges, opportunities and appreciate the differences between offshore and onshore decommissioning in selected countries.
3. Understand the risks, as well as the costs and technological challenges related to offshore and onshore decommissioning.
4. Appreciate environmental issues/concerns associated with decommissioning and remediation of oil and gas installations.
5. Become familiar with environmental regulatory and legal frameworks and institutions associated with decommissioning of oil and gas infrastructure, including institutional roles and responsibilities, financing and constraints.

The training was targeted at designated government officials with direct responsibilities related to regulation, monitoring and/or implementation of environmental legislations/policies in the oil and gas sector; as well as representatives from industry, civil societies and academia with roles related to environmental regulation, advisory or management in the oil and gas sector.

A total of 25 participants (10 women, 15 men) attended the training who were mainly senior technical officers from national government institutions including the Ministry of Land, Environment and Sustainable Development, Ministry of Oil, Ministry of Health and Environment, Environmental Protection Agency and National Institute of Petroleum.

The online training also included Q & A sessions with contributions from several participants (see Annex 1). Presentations and other training materials (see Annex 3 and 4) were shared with participants few days prior to and during the training. The training also included group work exercises that supported participants in understanding and identifying key information needed to be provided to regulators in a Decommissioning Plan as well as the stakeholders in the decommissioning process (see Annex 5). Participants also had the opportunity to develop Action plans per country which identified priority challenges, current efforts and steps required to address these challenges as well as the responsible or relevant institutions to implement them (see Annex 6).

Discussion Highlights

Throughout the training, participants raised questions/comments relating to the different modules, which have been captured through an online shared google doc (see Annex 1 for questions, comments and answers). Some of the key issues can be summarized as follows:

a. Develop/Review/Update National regulatory and legislative framework to provide clear guidelines to be followed in decommissioning process

- One common issue raised by all country teams was the absence of guidelines to be followed in the decommissioning process. For example, guidelines on how to deal with orphaned wells, security mechanisms, plugging and abandonment, etc. were either lacking or inadequately provided for in the legislative framework in these countries.
- Having a legislation/regulation that covers the decommissioning process (e.g. dismantling) is important as it is basis for enforcement and compliance. Areas such

as risk assessments, waste management, or compliance monitoring strategies such as permits were highlighted as some of the key areas that should be covered by the national regulatory and legislative framework to ensure sustainable decommissioning.

- Participants highlighted the need for clear responsibilities and processes to be followed by operators as well as regulators. For example, Iraq identified the need to develop a guideline where permitting processes for approval of decommissioning plan is defined and highlighted that no clear legislation on decommissioning exists. Mozambique identified the need to develop a HSE regulation which includes monitoring of the areas for any adverse environmental impact after decommissioning.
- There should also be a set standard for decommissioned fields which should be used when inspecting or monitoring a decommissioned location. The legislative/regulatory framework should identify which institution(s) is/are responsible for monitoring and the monitoring periods/sequence as was seen in the California case study presented where monitoring was done in the first year and two other times in the fifth and tenth year.
- The possibility of having an independent regulatory body specifically for HSE for all sectors that is separate from government was raised, especially in the case of Iraq where majority of the assets are government owned.

b. Challenges in cost and choosing the right option for sustainable decommissioning

- Another challenge common across country teams is in relation to cost bearing of decommissioning. Ghana for example highlighted the need. Participants showed great interest in understanding how regulators can ensure operators have the financial capacity to cover decommissioning cost and sustainably decommission assets onshore and offshore, especially as there is some difficulty in ascertaining the exact cost of decommissioning a field in the beginning (due to inflation and other economic reasons).
- Regarding this, different security mechanisms were discussed, and the Norwegian experience was shared where a decommissioning fund is usually set up. The appropriate mechanism will depend on their countries' context.
- Further, participants highlighted the need to review government contracts with operators and in some cases e.g. Ghana, for IOCs to set up reclamation bonds for future decommissioning activities.

c. Strengthening institutional capacity especially in terms of compliance monitoring and coordination between relevant institutions and stakeholder's consultation

- The need to strengthen institutional capacity, involvement of relevant stakeholders and inter-sectoral coordination was emphasized. This will provide different perspectives which when coordinated will support relevant institutions to work efficiently and effectively especially in compliance monitoring.
- Participants emphasized the challenge of limited knowledge and awareness of laws or guidelines to support proper monitoring of decommissioned fields and assets to ensure protection of the environment. Regulators will need to be vigilant especially as not all companies will follow international or industry best practices.

- Countries can consider requiring the operator to include stakeholder engagement information, i.e. how they engaged/plan to engage, in their proposed decommissioning decision
- They emphasized how trainings such as this has helped build their knowledge on decommissioning e.g. key information to ensure is included in decommissioning plans submitted by operators. IOGP also highlighted the available resources on their website to support sustainable decommissioning.

Modules – Main Highlights

Day 1.

Module 1. Introduction: Decommissioning in the oil and gas value chain, steps, challenges and obligations – offshore and onshore fields

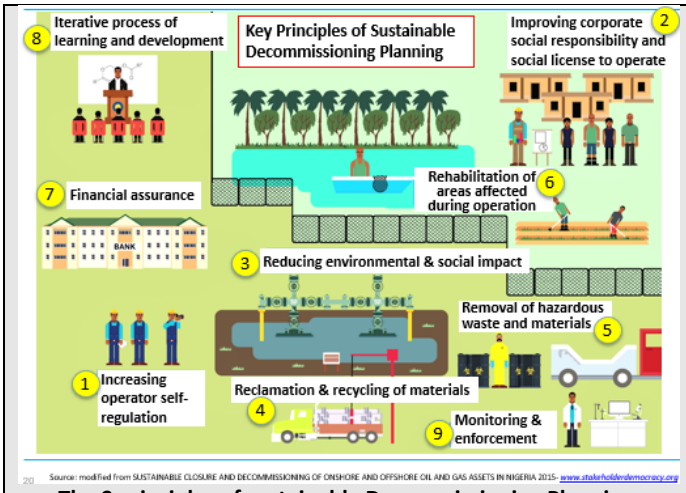
Scope and Summary

Using the Brent Spar case study as an introduction to the topic, this module aimed to provide participants with a clear understanding of the meaning, importance, and key steps in sustainable decommissioning of oil and gas fields as well as challenges, opportunities and obligations related to it. Examples from various countries including Ghana, Colombia, Mozambique, Iraq and Tanzania were used to provide clarity on the subject matter and highlight the role of the government regulators in decommissioning process.

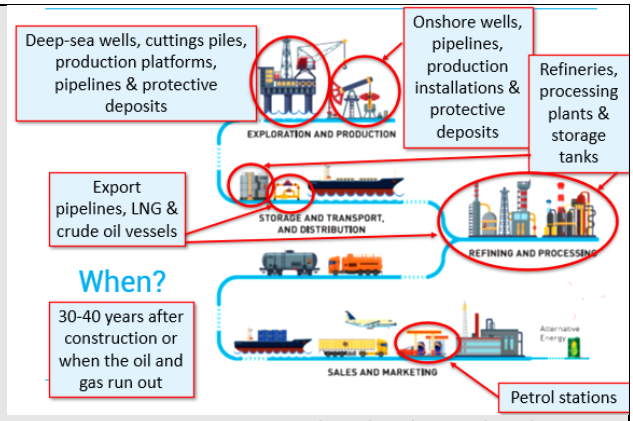
Presenter :
Matthew Richmond, UNEP

Some key conclusions from this module include:

- Two types of oil & gas infrastructure requiring decommissioning are abandoned (or orphan) structures and those related to expired oil or gas fields, or that have reached the end of their working life
- Decommissioning is the process whereby abandoned (or exhausted) oil/gas fields are made safe and land/sea are reclaimed as much as possible to original state, to be used for other purposes
- Decommissioning is relevant to all parts of the oil and gas value chain, from exploration to production and sales
- There are 9 guiding principles that should be articulated as minimum standards by ESIA departments and regulators of decommissioning
- In most countries, operators of oil or gas installations/pipelines are responsible for decommissioning infrastructure, but in some countries the government plays a major role
- In most countries, operators of oil or gas installations or pipelines are required to decommission infrastructure at the end of a field's economic life as it is the law
- Many African countries have legal framework provisions/laws; if not, guidance is taken from other countries' regulations and international best practice. It is important to note that each country is unique, water depth, technology in use, local skills, sensitivity of the environment, and mindful of the existing contracts and licences.

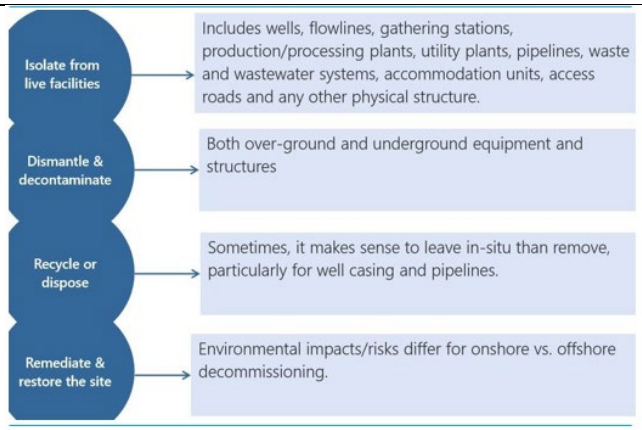


The 9 principles of sustainable Decommissioning Planning



Decommissioning in the oil and gas value chain

Brent Spar case study



Meaning of Decommissioning

Module 2. General decommissioning process- regulations, overview of process, options and decisions, stakeholders

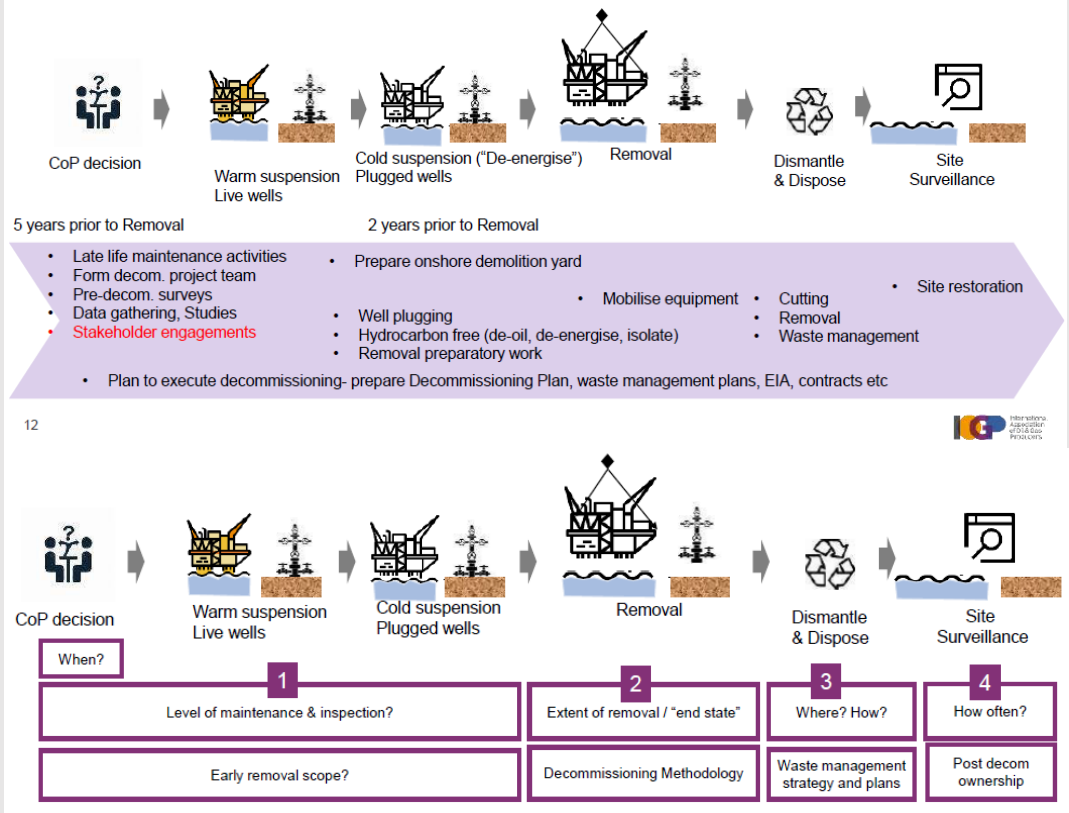
Scope and Summary

This module provided an overview of the decommissioning process. It provided participants with an understanding of how decommissioning is regulated at international, regional, and national level as well as the stakeholders in the decommissioning process, and importance of early engagement. It highlighted the general scope of work for onshore and offshore decommissioning, from early project planning, late life asset maintenance, onshore yard preparation, wells plug and abandonment to cutting, removal, waste management and site surveillance post decommissioning.

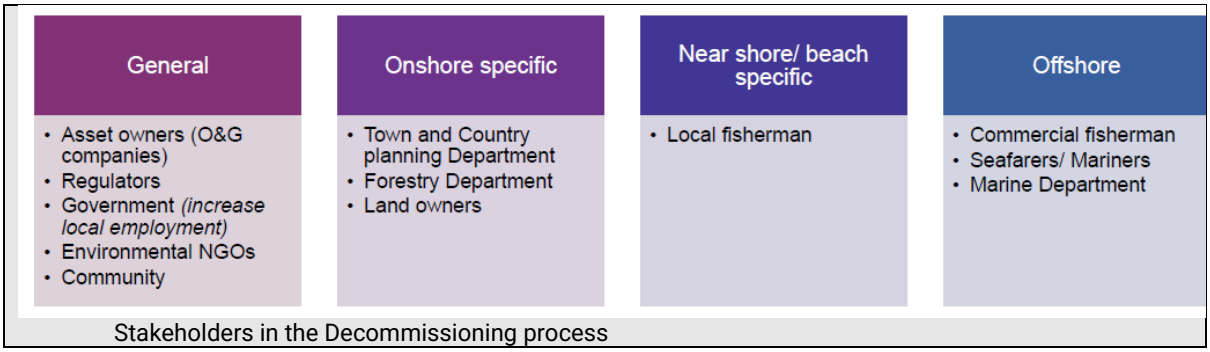
Presenter:
Ping Teo, IOGP

Some key conclusions include:

- Where options are available, decisions are made considering multiple criteria- e.g. safety, environment, technical feasibility/costs, socio-economic impact etc.
- Depending on project complexity, early planning is critical to a successful outcome. It is Important for all to estimate timing of cessation of production to ensure sufficient planning period
  - Early planning is key
  - Ensure sufficient funds available
  - Agree decision making process with stakeholders
  - Align stakeholder's view
  - Allow time for data gathering
  - Understand constraint –e.g. waste management capacity
  - Assess opportunities
- Plan for risk-based assets inspection and maintenance
- Technology has advanced significantly allowing for safer and faster removal.
- At the decommissioned site, the asset are left in an agreed final state with the Regulators



Overview of Decommissioning process and key decisions



Stakeholders in the Decommissioning process

Module 3. Typical decommissioning scope of work for onshore facilities

Scope and Summary

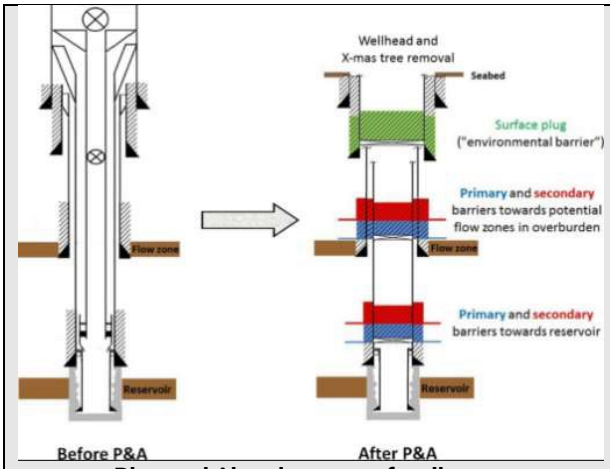
This module described the typical scope of work for onshore facilities, from wells Plug & Abandon, pit abandonment & land restoration, pre-decom assessment and surveys, DDI (De-oil, de-energize and isolate), to dismantling and demolition, waste management, and land restoration. It highlighted the purpose and importance of plugging wells properly and reviewed the steps in an onshore decommissioning project.

Presenter :
Harvey Johnstone, IOGP

Some key conclusions from this lesson include:

- For decommissioning projects, a review of lessons learned, post project appraisals and other lessons captured should be conducted during project set-up
- Complete and thorough assessment should be carried out as early in the project as possible (site visit mandatory)
- The phases of a decommissioning project are as follows:
    - Pre-Decommissioning Assessment
    - Project Planning
    - DDI
    - Hazardous Material Abatement
    - Dismantlement/Equipment Removal
    - Demolition
    - Waste/Scrap Management
- Proper front-end loading is essential for successful planning and execution of a decommissioning project, just as it is with any project
- DDI (De-oil, De-energize & Isolate) is carried out during Shutdown of Site Operations, however DDI is more exacting when preparing to decommission/demolish

- It is important to perform a thorough waste characterization program (WCP) and select an approved waste transportation and disposal contractor bearing in mind the types/quantities of wastes from WCP
- Value realized by re-deploying (re-use) asset equipment which requires dismantling should be weighed against the safety aspects of conducting the dismantling
- Seek re-use options for other demolition debris, such as clean concrete and brick rubble for road base or aggregate
- Waste generated from the decommissioning project that does not have value for re-use or salvage must be disposed at an approved facility.
- For restoration, determine regulatory site closure requirements during the planning stage



Plug and Abandonment of well

Example of before and after Restoration of decommission project

Module 4. Typical decommissioning scope of work for offshore facilities

Scope and Summary

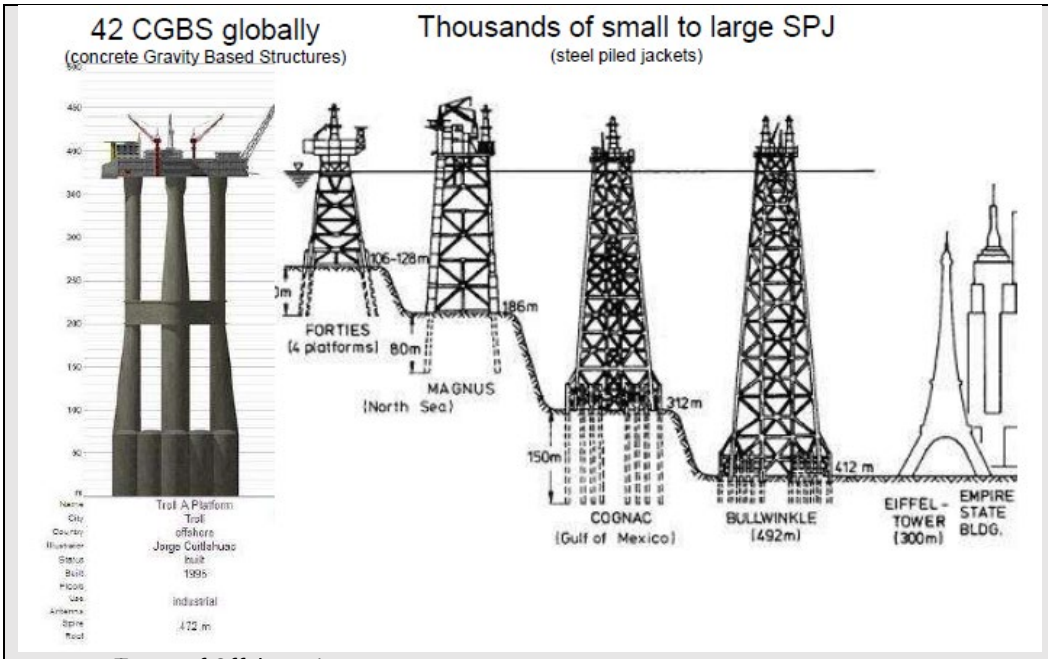
Using case studies, this module highlighted the challenges, opportunities and rationale of decisions in offshore decommissioning. It focused on the typical scope of work for offshore facilities, identified the types of oil and gas facilities used offshore and discussed the typical solutions for decommissioning these facilities.

Presenter :
Ping Teo, IOGP

Some key conclusions from this lesson include:

- Questions to be considered in the decision process include: what are the potential challenges and opportunities? Who needs to be engaged? When should the decommissioning planning start? What are the risks to people and environment? How should the asset be decommissioned? What needs to be maintained and inspected?

- Regulations and national policies can enable these opportunities; support evidence-based science and technologies; policies and regulations that are risk-based and allow considerations of developing science and technologies.
- new offshore structures to consider decommissioning in its design including for the wind industry
- maintain overview of decommissioning costs estimates, ensure sufficient funds
- prepare the supply chains needed to execute the work, potential for efficient campaigns
- develop decommissioning science and technologies for site surveys, data collection and execution
- Some organizations such as IOGP, OGUK, the National Decommissioning Centre, NextStep, etc. are developing decommissioning guidance, and/ or leading the decommissioning Science and Technologies



Types of Offshore Assets

Day 2.

Module 5. Environmental and social considerations during decommissioning

Scope and Summary

This module aimed at enhancing participants' understanding of the key principles in sustainable decommissioning of oil and gas fields, the environmental impact and issues related to decommissioning & ESIAs as well as best practices, risk management and how to incorporate best practice tools (such as BPEO, MCDA, BAT, etc.).

Using both onshore and offshore examples, it discussed the tools to determine the best decommissioning option. It also used an Italian offshore case study to highlight

environmental considerations in, and existing national and international guidelines and legal framework related to, decommissioning operations.

Presenters:
Matthew Richmond, UNEP
Ezio Amato, ISPRA-SNPA, PEMPEC MTWG
Paul Krause, Ramboll

Some key conclusions from this module include:

- Most of the material from decommissioning can be re-cycled. However, the biggest challenge is finding the appropriate balance between environmental performance and technical & economical availability
- Some of the tools commonly used by the industry for managing environmental impacts in decommissioning include Multi Criteria Decision Analysis (MCDA), Comparative Assessment (CA) and Best Available Techniques (BAT)
- Decommissioning costs can be very high, especially for large and complex offshore infrastructure, but the expertise and innovation is growing rapidly
- Governments play an important role to ensure companies are always capable of meeting their decommissioning liabilities
- In the UK, Government expects owners of offshore installations, connected wells, and pipelines to have adequate financial planning arrangements in place to meet decommissioning liabilities. Parties who own an installation at time of decommissioning remains owners of any residues/remains after decommissioning. Residual liability remains with owners in perpetuity, and continued contact will be required as part of close out report and OPRED must be notified of any changes to company structure/domicile.

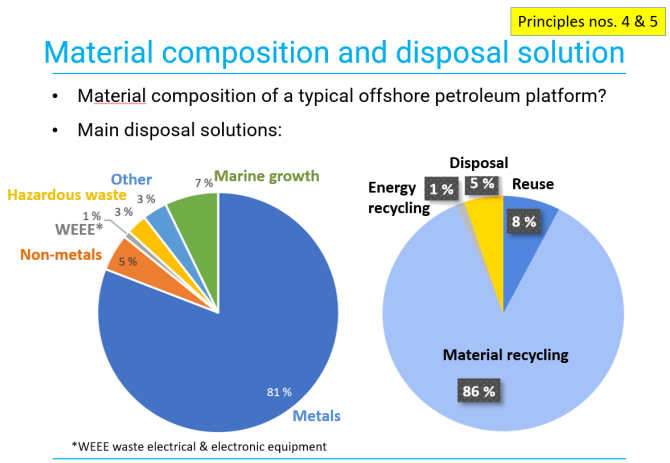
On national and international regulations and environmental considerations in decommissioning offshore operations:

- Decommissioning projects, must take place in total safety, must respect the marine ecosystems, maritime navigation, not forgetting social impact (labour for instance) and financial duties on companies
- Current international and regional regulatory frameworks are in favour of a complete removal at the end of the useful life of offshore oil & gas platforms, pipelines and other ancillary offshore infrastructure provided that maritime shipping, fishing and environmental protection are taken into account
- In Italy, for example, offshore facilities that are not to be removed may be reused for scientific, environmental monitoring and various other purposes, including in the renewable energy field. Activities to be carried out at any offshore installation must be submitted by operators to a National Committee with a report treating «major hazards» and a risks assessment

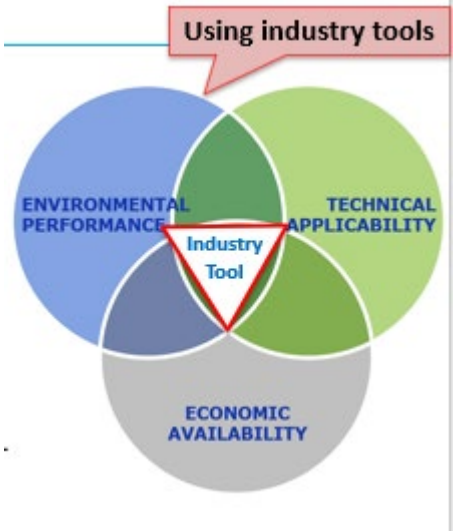
On tools to determine best decommissioning option:

- It is important to be able to justify the decommissioning option that provides the greatest benefits and lowest impacts. Several tools can assist in your determination
    - Impact Assessment such as EIA, SIA, ESHIA

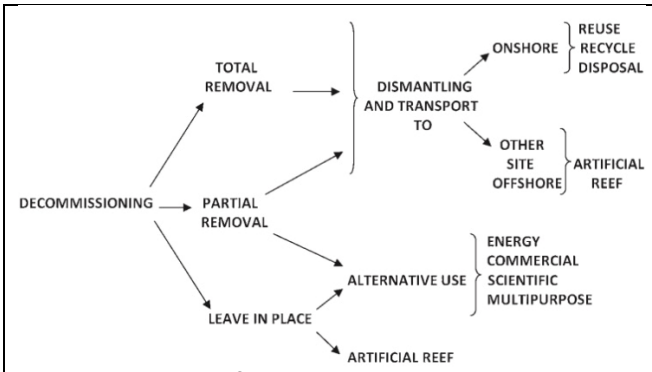
  - Human Health and Ecological Risk Assessment (HHERA)
  - Multi-Criteria Decision Analysis (MCDA) such as Comparative Assessment (CA), Net Environmental Benefit Analysis (NEBA), Best Practical Environmental Option (BPEO)
- NEBA is based on quantitative science – qualitative ranking of decommissioning options in the context of environmental benefits of each option; the CA on the other hand, is a very common tool based on opinion on which is going to be the better option. NEBA focuses mainly on the environment and doesn't take into account aspects such as the cost. The NEBA analyses usually informs the CA or BPEO and provides more justification because it has a scientific backing
- CA takes into account different aspects safety, risks, environment, cost and what can be done with them and ranks them. Often times, a "leave-in-place" option may be suggested as the best option and not a total removal.
- HHERA focuses on Specific aspects of the project e.g. toxic chemicals which will impact both people and environment- what type of NORM will be problematic or pose cancer risk or what will happen to the marine mammals, fish, birds, etc.



Pie-charts showing the proportions of different materials in offshore platforms and their disposal options



Application of industry tools to identify best option for decommissioning process



Overview of Onshore Decommissioning process

A picture of Decommissioned project in Santa Barbara California 2005

Module 6. Assessments, Site Clean-up & Reporting

Scope and Summary

This module discussed the assessments required in the decommissioning process, highlighting the importance of stakeholder consultation and environmental appraisals. Further, it highlighted the importance of scoping reports as well as closure reporting.

Presenter :
Matthew Richmond, UNEP

Some key conclusions from this module include:

- Decommissioning needs to be considered well before the infrastructure needs to be decommissioned. It varies between countries, but often a Decommissioning Plan is supported by an ESIA
- ESIA for oil and gas projects should include and identify the further need for BAT assessments. ESIA might state that all costs are to be covered by the developer and may require that a fund be established (e.g. escrow account), specifically to pay for the decommissioning costs. However, costs are usually not going to be known 30 years in advance, nor are impacts.
- Best practice: decommissioning requires a standalone ESIA/EIA.
- Comparative Assessment (CA) Best Available Techniques (BAT) and other TOOLS (see Module 5) are used by the industry to help select the best decommissioning option by comparing each on a basis of complexity, safety, economics and impact to the environment.
- Some environmental/social impacts associated with decommissioning include:
    - Discharges to sea: sewage, food waste, ballast water, treated bilge
    - Gaseous emissions: from vessels & equipment
    - Underwater noise: from vessel operations, dynamic positioning system, cutting methods
    - Physical disturbance to seabed: suspended sediment, local smothering, rock dump
    - Waste and NORM*: waxy deposits, oily sludges or NORM scale need to be handled
    - Odors, noise and disturbance from onshore waste facilities to local residents
    - Metals: trace amounts from sacrificial anodes (e.g. Zn, Al) might enter sediment
- After decommissioning, site remediation is usually the next step, to ensure sites are not hazardous to people nearby or the natural environment, including the water table
- Marking of Remains and Safety Zones can be a complex procedure, especially in the deep sea

Guide to preparing the Decommissioning Plan

Table of Contents – Example 2

1 Executive Summary
2 Description of Items to be decommissioned
2.1 Surface Facilities –Topsides and Jacket
2.2 Subsea Installations & Stabilisation Features
2.3 Pipeline and Flowlines
2.4 Wells
2.5 Drill Cuttings
2.6 Inventory Estimates
3 Removal and Disposal Methods
3.1 Topsides
3.2 Jacket
3.3 Subsea Installations & Stabilisation Features
3.4 Pipelines/Flowlines/Umbilicals
3.5 Wells
3.6 Drill Cuttings
3.7 Waste Streams
4 Environmental Impact Assessment
4.1 Environmental Sensitivities
4.2 Potential Environmental Impacts and their Management (Summary)
5 Interested Party Consultations
6 Programme Management
6.1 Project Management and Verification
6.2 Post-Decommissioning Debris Clearance & Verification
6.3 Schedule
6.4 Costs
6.5 Close Out
6.6 Post-Decommissioning Monitoring & Evaluation
6.7 Management of Residual Liability
7 Supporting Documents
8 Partner Letter of Support
9 Expert Verification Statement

Example of Scoping Report for Decommissioning EIA

Sample Table of Content of a submitted Decommissioning plan

EIA Stage	Description
Scoping	Allows the study to establish the key issues, data requirements, and impacts to be addressed in the EIA and the framework or boundary of the study.
Consideration of alternatives	Demonstrates that other feasible approaches, including alternative project options, scales, processes, layouts, and operating conditions have been fully considered.
Description of project actions	Provides clarification of the purpose of the project and an understanding of its various characteristics, including stages of development, location and processes.
Description of environmental baseline	Establishes the current state of the environment on the basis of data from literature and field surveys and may involve discussions with the authorities and other stakeholders.
Identification of key impacts and prediction of significance	Seeks to identify the nature and magnitude of identified change in the environment as a result of project activities and assesses the relative significance of the predicted impacts.
Impact mitigation and monitoring	Outlines the measures that will be employed to avoid, reduce, remedy or compensate for any significant impacts. Mitigation measures will be developed into a project environmental management plan. Aspects of the project which may give rise to significant impact which cannot be mitigated to an acceptable or tolerable level of impact may need to be redesigned. This stage will feed back into project development activities.
Presentation of the Environmental Appraisal	Reporting of the EIA process through production of an EA that clearly outlines the above processes. The EA provides a means to communicate the environmental considerations and environmental management plans associated with the project to the public and stakeholders.
Monitoring	Project impacts will be monitored during the projects activities and following cessation of any operations to verify that impact predictions are consistent with the subsequent outcomes.

Key stages of the EIA process for decommissioning

Group work exercise

Scope and Summary

Based on the country context, participants were required to discuss and select one 'complete' asset which they will focus on to develop a table of content highlighting key information to be included in the Decommissioning Plan to be submitted by operators.

The objectives of these exercises were to support participants to understand and identify key information needed to be provided to Regulators in a Decommissioning Plan as well as stakeholders in the decommissioning process.[1]

Presenter :
Chidinma Zik-Ikeorha, UNEP

Exercise: Decommissioning Plan (60mins)

Aims:

- Understand and identify key information needed to be provided to the Regulators in the form of a Decommissioning Plan
- Identify the stakeholders in the decommissioning process

Background:

A Decommissioning Plan is typically submitted by the Operator to the Regulator for approval. **Participants are required to work in country teams in the breakout rooms and document outputs from discussions on Google doc using this link**

A. **Based on your country context, discuss within your group, and list the different types of oil and gas assets operating in your country that will eventually require to be decommissioned**

Instructions for Group work exercise

Sample of Offshore asset- an oil and gas production platform with associated deep-sea wells, connector and export pipelines

Sample of Onshore asset gas processing plant with production wells, connector and export pipelines

B. Select one of the 'complete' assets from your country which you will focus on to complete the exercises below.

Note: A single complete asset unit comprises of

- *an offshore platform, its wells and connected pipelines*
- *an onshore gas processing plant comprising of the plant itself and its wells and connected pipelines*
- *a refinery and its connected pipelines*
- *a group of onshore wells and its connected pipelines*

Using the table below:

i. Develop a Table of Content for your Decommissioning Plan for an asset/ field that is to be decommissioned in your country representing the key information (max. 8) required to be submitted for information or approval. Consider the whole decommissioning process up to monitoring requirements and final waste management.

ii. Discuss and explain why it is important to include each heading in your Table of Contents.

iii. List the governmental departments/ external stakeholders required to review each content heading?

Country, Asset, Location	Decommissioning Plan Table of Content:	Why is it important to include each heading below?	Who are the stakeholders that need to review this information
	1.		
	1.1.		
	2.		
	2.1		
	Etc.		

C. **When should this Decommissioning Plan be submitted?** (5mins)

D. Select a rapporteur within your group to present your Country group

Instructions for Group work exercise

[1] Submissions of each country team can be found in Annex 5 and feedback from experts can be found in Annex 6.

Day 3.

Module 7. Environmental regulatory and legal frameworks and institutions associated with decommissioning

Scope and Summary

Using the Norwegian experience, this module aimed at highlighting the environmental regulatory and legal frameworks at national and international level as well as institutions associated with decommissioning. It discussed the tasks and responsibilities in decommissioning activities including permits, audits, monitoring, inspections.

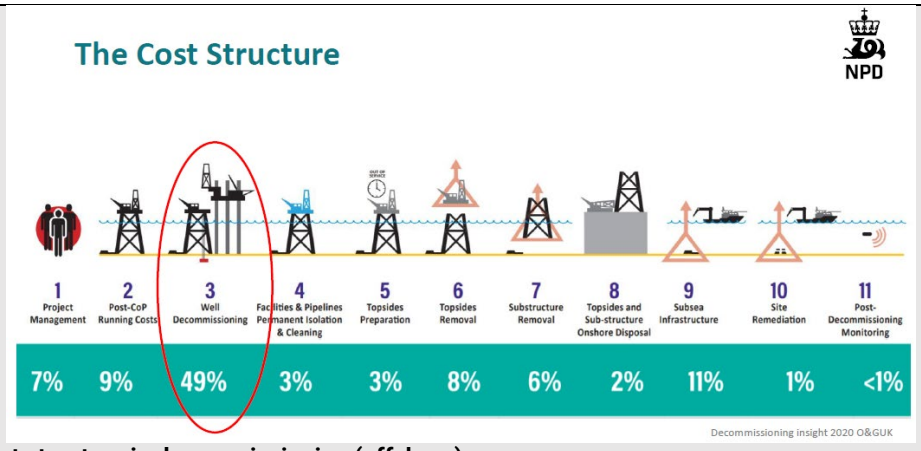
Further, it highlighted some key considerations as well as checklists to ensure sustainable decommissioning. It discussed the security mechanisms used in Norway and the challenges they have encountered.

Presenters :
Anne-Grethe Kolstad, NEA
Svein Svilosen, NPD

Summary points highlighted in this module are below:

- International legal framework is the basis for national policy. For example, OSPAR Decision 98/3 2000/3 prohibits disposal at sea for offshore installations (but some exemptions) and applies in Norway. has put an end to discharge of cuttings contaminated with oilbased fluids, Today, only cuttings drilled out with WBM can be discharged. Some related international conventions include: OSPAR convention, IMO Guidelines on the Removal of offshore installations and structures 1989, Hong Kong Convention, Basel Convention., etc.
- The EIA process is mandatory and the environmental authorities put efforts particularly in the scoping phase (in order to In Norway, the EIA process involves mainly Scoping (where the NEA emphasizes the environmental issues and possible mitigation measures that are expected to be addressed by the EIA) and the EIA report. Decommissioning shall be described in the plans for new field developments Clear policy (on removal, recycling and remediation) provides predictability for the licensees
- The Environmental Authority has legal tools for stipulating conditions on polluting activities closer to the operational start than the EIA process , which enables them to stipulate quite detailed provisions on discharges and emissions
- The Norwegian regulations are not prescriptive with regard to technical solutions, but state clearly the responsibility of the licensee
- Established system for enforcement of regulations
- Important questions to consider include when to start planning the decommissioning, regulations, laws and international conventions that apply, who is responsible for monitoring of the decommissioning stage, cooperation between governmental institutions

- It is important to regulate properly the facilities where offshore structures are landed, demolished and recycled as these waste management processes have large potential for pollution and also safety risks.
- Checklists include legal requirements, technical feasibility, HSE, Cost and economics, resource management, timing of decommissioning, reuse of installation, politics, public concern and reputation, environment and other users of the sea
- Begin planning the decommissioning at the development stage with detailed planning 5-2 years before shutdown and secure financing
- Regulators should ensure funding exists for proper decommissioning. Some security mechanisms include parent guarantee, third party guarantee, insurance and decommissioning trust fund.
- When choosing a decommissioning fund, it is important to know when to start the fund, who manages it, the kind of risk profile, etc.
- Some challenges associated with decommissioning include: how is decommissioning financed, what is the government's responsibility, what happens if companies don't fulfil their obligations, what does the national legal framework or contract provide for decommissioning, what happens if a well starts to leak after 50 years since it was decommissioned, etc.?



Cost structure in decommissioning (offshore)

Results of Participant Assessments

Prior to and after the training, UNEP carried out a baseline and final knowledge assessment[2] using a set of "exam" questions (22 questions in total), which was one way of evaluating improvements in knowledge attained as a result of the online training. The set of questions was based primarily on the technical presentations delivered during the online training session. Responses were in multiple choice or responses.

[2] Due to the time constraints as the training was delivered online, the training was divided into two parts – for Part I, participants were required to take the baseline knowledge assessment before the training as a prerequisite to attending Part II of the training. The final knowledge assessment was taken online on the final day of the training.

It should be noted that this type of written assessment only provides a partial assessment of knowledge of individual participants to help in the evaluation of additional knowledge gained from training, through group work discussions and direct interactions with their peers and training experts from the workshop. Hence, it is important to view these assessments in conjunction with their own personal evaluation of the training and whether the training met their learning needs (discussed further below).

Of the total number of participants (25), 15 were able to complete both the baseline and final assessments, as others were unable to due to previous engagements. Participants who took both the baseline and final assessments registered a 20% average improvement in their knowledge of chemicals and hazardous waste management in the oil and gas sector. Of the 15[3] people who completed the baseline assessment, the average score was 54%. Of the 18 people who completed the final assessment, the average score was 74%.

Results of the Training Evaluations

UNEP provided the opportunity for participants to evaluate the training based on their own expectations and learning needs. 17 participants in total completed the evaluation.[4]

The majority of participants gave scores of 4/5 or 5/5 for meeting the set of learning objectives outlined by the training. Participants were also asked to rate the extent to which individual sessions (1-9) met their individual learning needs (score range of 1= not met to 5=fully met). Most participants scored each Lesson 4/5 or 5/5.

When asked to rate their experience of the online training platform (and internet connectivity), 24% of participants rated the training as 'excellent', while 59% rated the training 'highly satisfactory', and 18% rated the training as 'satisfactory'. When asked to rate their knowledge after this training 59% indicated they had gained significant new knowledge about the topic while 35% indicated they gained some new knowledge about the topic. When asked to rate their overall satisfaction with the training, 31% of participants rated the training as 'excellent', while 56% rated the training as 'highly satisfactory' and 12% as 'satisfactory'.

Participants appreciated the participatory/interactive training approach including the group work exercises which they highlighted was very useful. Some participants wished to have a more extended training to have more time for discussions, as well as additional face-to-face training.

Participants also gave feedback to be considered for future improvement of webinar trainings. Some of the feedback comments included highlighting the online training as very useful, additional time to be allocated for the Question and Answer session, as well as need for better internet connectivity (see Table 3).

When asked the ways in which the knowledge received from this training will be applied 81% indicated they would 'share training materials with other colleagues', 63% indicated

[3] Due to the late receipt of nominations, only 15 persons completed the baseline knowledge assessment as part of pre-training preparations. It is important to note that an increased number (25) were able to participate in the online training.

[4] Participants were allowed to take complete the training evaluation as well as the final knowledge assessment either at the end of the presentations on the final day of the training by the end of the training week.

‘organizing a follow up meeting to share knowledge and training materials with other colleagues who could not attend’, 38% indicated they will apply it in ‘reviewing decommissioning plan submitted by operators’, 56% indicated ‘ developing/reviewing checklists for EIA scoping report especially for decommissioning’ and 50% indicated through reviewing/updating/further finalizing existing checklists and/or guidelines and procedure for implementing regulations related to decommissioning.

Future considerations for improvement include:

- greater time allocation for Question and Answer/comment session or possibility of extension of training days to provide more time for discussion
- possibility of convening participants from same country in one location to foster better concentration on training and avoid external interference
- possibility of creating ‘multi-country’ teams to participate in the group work exercise instead of per ‘country’ as this may encourage peer-to-peer learning and better output

For further details of evaluation results, consult Annex 2.

Annex I. Participants' Questions/Contributions and Experts' Responses

Participant Name/Institution	Questions/Comments	Responses from Experts
Dercio - National petroleum institute	My question is regarding the fund, based on our legislation, why is the cost of the decommissioning deductible from the operator	It depends on the agreement with the government. These agreements and plans must be defined at the beginning and there's no uniform plan around the world.
Ernetso	¿toda estructura petrolera con el tiempo se deteriora?, por lo tanto siempre ¿deben ser siempre desmanteladas, sin importar razones de la empresa? Every oil structure deteriorates over time? Therefore, should they always be dismantled, regardless of company reasons?	All structures are designed to have certain life, depending on the material made of.
Ahmed Khalaf	What are the equipment used in the oilfields to know the radiation level in these fields?	Ping: NORM = Naturally Occurring Radioactive Material can accumulate in pipelines but does not exist in all countries. It's a known issue for example, in Thailand. It is very much reservoir dependent. My country- Brunei has been lucky that we have not found NORMs in our wells over our 90 years of operation Ezio: It depends on the biogeochemistry of the site, in the Mediterranean Sea NORM are found in the formation waters collected along with the hydrocarbons Waleed: in Iraq there is specialized institution for radioactive sources which is responsible to monitor radiation, in any case it will be deal with this case according to specific mechanism

Noor Saadi	Is the decommissioning plan part of the environmental and social impact report, or is it a separate document from it?	A decommissioning Plan is usually a separate document required by different regulators. However, a decommissioning plan can contain many elements which will also be useful in an ESHIA
Ahmed Khalaf	How are the risk assessment operations conducted while lifting the offshore platforms	I will briefly mention that there are many tools to weigh in the risks related to the operation whether it was economic, social etc. Matt: Decommissioning could take up to years to complete the process, it could take times like the time needed to construct. It's a slow methodical process and takes time. It's important to understand the waste management constraints in your country. In Brunei the liquid waste system will not be able to take in the flushed wastes so you need to weigh in such factors.
Husam	how to deal with remains of the assets after decommissioning, like pipelines and metal scraps?	Some are recycled and reused. For example, Steel is a commodity and there could be recycled and converted to something new.
Chi:	How can you regulate to ensure risk assessments are done?	Ping: My experience in Brunei and NZ, usually you require an environmental and risk assessment studies and plans submitted to the regulators and the operator needs to show that a comprehensive risk assessment and safety assessment were conducted and to show. Harvey: When it comes to decommissioning assessment, you should understand the capacity

		constraints and you should plan properly to avoid costly routes.
Husam	What kind of tests are done to ensure that the remains are not polluted?	Ping: Depending on what is remaining on site- reefed structures are typically only clean structural steel. Pipelines- you can collect data from the pipelines and do lab assessments on what is the content of the pipelines
Waleed	What are PCBs resources in the oil activities ?	Anne: Isolation Oils (in Electric Equipment) before the 80's (one example) Harvey: Generally, they don't come from oil itself but from the electric equipment.
Husam	If the well is exhausted and not profitable any more, so what are the hazards of leaving it without decommissioning? and what are the kinds of inter zonal flows that can occur?	Harvey: In this case the well is being abandoned and capping it only, over time the plug can be loose, or erosion could occur in the area and the oil can flow to the surface. When you drill a well there are different pores, If you don't plug that oil you might seep/leak through. An example of the importance of proper plugging and monitoring is the recent oil spill in Nigeria where the well wasn't properly plugged.
		In terms of responsibility, until the oil is fully abandoned the operator is responsible The responsibility is always the owners until the regulator decides otherwise. In the US there are a number of orphaned wells with different rules than today's regulators.

Ahmed	Is the abandoned well equipment radiologically checked before using it again?	Yes, like Christmas trees are usually checked
Waleed:	In Iraq all waste and fluid pits are being evaluated and tested, if hazardous materials were found we decide what to do, my question was about high density polyethene, so do we need to remove it since it is really expensive	It depends on the regulators and location, so you need to comply with the regulators, and you don't want to leave such legacy waste. You mentioned treating the materials, but for the sake of waste management
Chi	When there's a gap of legislation, are companies required to follow international law or best practices?	Depends on the funding requirements, but responsible companies will follow best practices and follow best standards. Matt: When dealing with international oil majors, and small companies, you don't know what you will get and not all companies will follow best practices, so the regulators need to closely engage with and monitor the companies and their activities.
Day 2		
Ahmed	-What does Matt mean by balance between environment performance and the industrial efficiency -Can we conduct a risk assessment before starting operation and afterwards	-It means finding the most appropriate in the specific location, so the that specific location has fisheries and freshwater or environmentally sensitive we need to find the accepted balance - Risk management should be done beforehand and that will guide the decision
	quien determina ese equilibrio? (who determines the balance?)	The company will submit and the regulator will advise and ask for more information In some countries, operators need to agree on the weights with regulators - Whether it's air emissions,

		terrorism, local infrastructure, so these elements have different weights. Paul: These weightings are not the same for operators, so the regulators need to think about the country. As a country regulator, you might regulate the environment more the safety, for example. Anne: to the company will come with these conclusions and we, the regulators may challenge the conclusions of the operators. Ping: Let the operator write everything down and explain how they came to these conclusions
Noor	Is it possible to explain MCDA	All the tools have the same principles Paul: it takes into account different aspects of the project so it's a broad tools
Husam	In NEBA, what is the type of the quantitative data for a decommissioning project?	Paul: Some of the NEBA's data might use fish population, or production and sediment quantity and quality. Ping: Generally, you can use energy consumption and carbon footprint Paul: We use also GHG as a quantitative data
	??	From a regulatory point of view, you should have a standard and you need to do a recheck on the location. Operators should have an emergency plan.

	Does the operator use the tools or the regulators?	It depends on the regulator and its requirements, in the US for example there are no specific tool but you need to explain your choices. So you need to evaluate if you need to use the tool or leave it out.
	¿porque la calidad del aire resulta relevante en el medio marino en la determinación del desmantelamiento? (Why is air quality relevant in the marine environment in determining decommissioning?)	The air quality will be impacted when you take out the platform but it will recover fast in the marine environment, so it's important to have this data.
Husam	What are the key elements of site monitoring after decommissioning?	Some of the site monitoring characteristics are to identify the type of living organisms in the site or if there are any residuals, so you are sure you are not creating new problems. Anne: Norway has only offshore production fields, Site monitoring is chemical analysis of the marine sediments and on the bentic fauna. Today, the requirement is for the operator to undertake monitoring (2 times) until six years after the production ceased, but we are considering if there are reasons to extend the monitoring period Ping: the requirements for monitoring are different and you want to have a timeline and We need also to agree on who is responsible on the Paul: In California we do the monitoring for the first year and we did it after five years and one after 10 years

	Is it possible to depend on the Environmental and Social Impact Report as an assessment tool? Is that sufficient?	??
	¿qué tan importante es la relación entre los países para determinar la política de desmantelamiento? How important is the relationship between countries in determining rollback policy?	??
	Es necesario el desarrollo de capacidades científicas, y esto tiene un gran costo en el medio marino, ¿cómo se logra en el contexto de proyectos de hidrocarburos? The development of scientific capacities is necessary, and this has a great cost in the marine environment, how is it achieved in the context of hydrocarbon projects?	??
	Còmo es el comportamiento de los NORM en el medio marino, ¿se acumula en el lecho?	The radioactive materials (NORMs) accumulate in sediments and its concentration is very low. Internationally there are no regulations covering the radioactivity for decommissioning, so we are trying to convince the world that any alpha radiation should be considered and we should be careful about it because of their grave impact.
Husam	What is the criteria to verify that the decommissioned installations are treated properly, e.g. for empty chemical barrels, how to verify that the treatment was good and the barrels are clear and can be reused?	Matt: There are a lot of procedures for tanks and pipes and closed units, there are standard practices to avoid explosion of gases for examples. Anne: There are waste facilities where they receive scrap metals, in our case they need to get a permit. We require reports and inspections and it's strictly regulated.

Waleed	what are the legal guarantees to urge companies to decommissioning especially with high cost? to prevent them for abandoning and not properly plugging?	Different countries require that you have deposited a certain amount, so you have a financial guarantee. If not you may get your license suspended, so you need a harmony between the government and the operators to avoid future issues. The regulator needs to set a stop work order, so it's up to the country to set these rules, if the operator continues to break the laws it means they are not responsible.
Ahmed	I've worked in the governmental sector in the EIA, the operations have stopped many times for the decommissioning, so is there any need to carry the use the ESIA or EIA to stop these operations from having	Ping: decom is an obligation not an option, so this is the language we use and the responsibility is not released until it's done. Paul: I want to add that the impact assessment should identify the mitigation measures to reduce the impacts to the max, so the impact and post mitigation measures should go together. Matt: The challenge in Iraq is that most of the companies are owned by the government. So, when the state is the operator it can be a problem. Ping: it's the same case in Malaysia where the government are asset owners and in Brunei- 51% owner Anne: You may need a strong environmental Authority
Oscar	In the event that there is a transfer of exploitation rights, either as a result of commercial transactions or due to the	??

	expiration of contracts, how is environmental sanitation managed, recovery of affected areas, among others ...?	
	Are there any best practices associated with compensation measures, both in biotic and social impacts that cannot be mitigated?	There's mitigation hierarchy, so we have to look into the different components and there are many guidelines for the best governmental practices
Day 3		
Waleed	When can you begin looking at decommissioning? The right time to start?	Ping: Five years is too soon, but it depends on the complexity of the plant. You want to decide early with the government about the right time to start the process. But if it is a very large and complex field, you would want to start one year before. You can add Stakeholder management plan (summarised into the Decom Plan), and also Safety considerations. Anne: I think it is important that a system is place to follow and regulate the waste stream (e.g. scrap metals, chemicals, oil residues) from the demolition sites. And site remediation can be among the requirements the regulator stipulates.

	Abelina: According to the regulation in Mozambique the plan should be submitted two years before starting the operation	Ping: Mozambique having explained in Decom plan, the section about the studies is very important but the payment documents should be considered as well. For Mozambique, other than cost info, you can consider asking the Operator to include Stakeholder engagement information (how they have engaged/ plan to engage the various stakeholders) in their proposed decommissioning decision
	??	Anne: Are stakeholders involved in the plan? Ping: The level of the details you include depends on the documented data you have. A reminder that decommissioning decision-making tools usually consider all criteria- and can be BPEO (Best Practicable Environmental Option), CA (Comparative Assessment), NEBA, etc. Ping: It's important to engage the legal partners early on the process to understand the legal stake if the operators didn't follow the rules. Inclusion of baseline information (for offshore-can include seabed survey, benthic sampling, coral info.) can also be part of a more detailed EIA- on the proposed decommissioning methodology
Canaty	Which details regarding decommissioning must be included in the Field Development Plan?	It depends on the size of the field as new fields have different designs, we have 93 fields and it varies a lot. The details in the beginning can be limited and the cost picture is hard to estimate in the old fields as well. Matt: So what happens in the area, did you leave the concrete jackets behind?

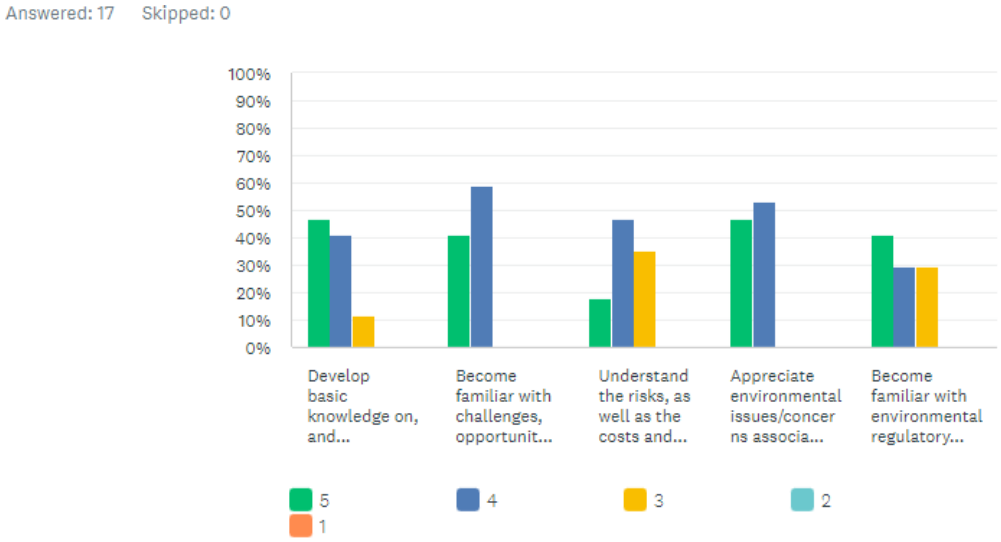
		That project has different options to be considered life dumping it. The main kind of thinking is to leave as little as possible. There should be an environmental impact assessment. As part of the field development plan, you should look at the cost of decommissioning and add it to a life-cycle cost field, and you need to consider it in profit/loss study. The ultimate goal as operators, having incentives to delay the process is concerning.
Husam	if it is possible, give us clarification on timing of decommissioning	As authorities, we have different aspects and views from companies. Basically, the companies might have to continue production under negative incentives, and the goal is to maximize the profitability, and we can't allow them to operate in these circumstances.
	Por lo enseñado, el NPD transmite las preocupaciones ambientales al operador, ¿ustedes consultan internamente a la autoridad ambiental o esta interactúa directamente en el proceso de desmantelamiento?	We work with petrol safety authority which works in this aspect of the operation
	Is the decommissioning process related to the price of crude oil. That is, you can extend the decommissioning plan until the Companies can assume those costs thanks to the oil price market??	The decommissioning plan will not be based on the market, and you handle it in a certain time. So it doesn't usually affect it, but what can affect it is the price of co2, because in Europe the price is becoming more expensive which may make it end earlier.

Noor	If there is no clear law for decommissioning , how can we compel companies to comply?	Ensure it is in the regulations, not in the agreement, they are not subjected to negotiations. Chi: it is something for the countries to cover while looking at the gaps in their law. Hence the need to ensure a lawyer is engaged in this aspect.
Ping	Does the NEA and petroleum directorate manage the decommissioning plan and how the help reviewing it ? Chi: Is the environmental authority involved in this process or does the petrol work by its own	Anne: The environment agency is not involved in this process. Svein: The ministry works in this plan and with them, but there should be more collaboration between the different authorities.

Annex 2. Detailed results of Participants' Training Evaluations

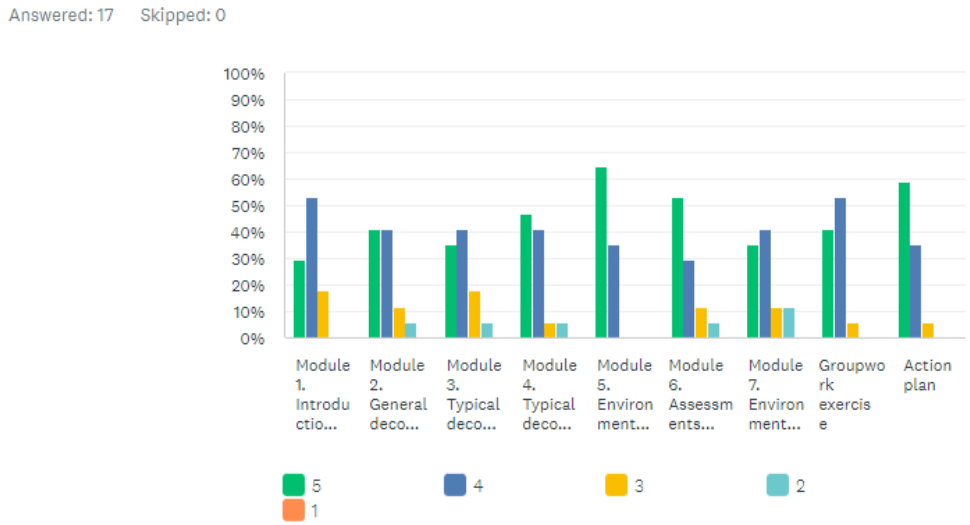
The majority of participants gave scores of 4/5 or 5/5 for meeting the set of learning objectives outlined by the training.

Table 1. Participant Rating of Learning Objectives Met (score range of 1= not met to 5=fully met)



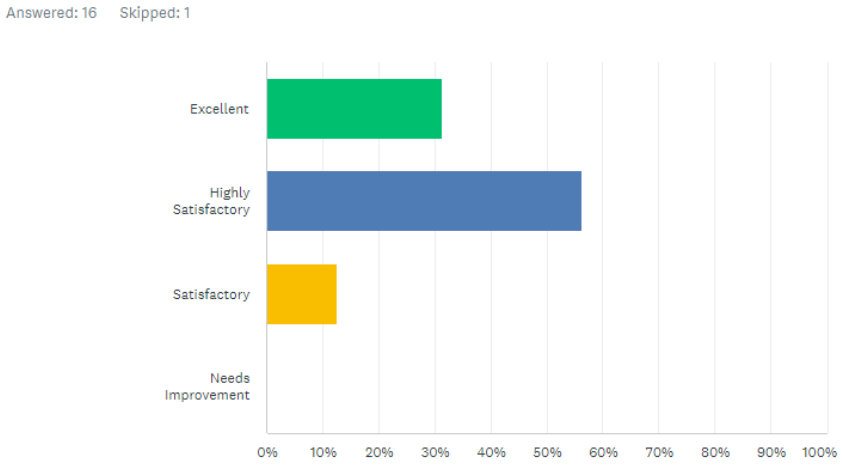
Participants were also asked to rate the extent to which individual Sessions (1-9) met their individual learning needs (score range of 1= not met to 5=fully met). Most participants scored each Module 4/5 or 5/5 (Table 2).

Table 2. Participant Rating of each Module against their learning needs



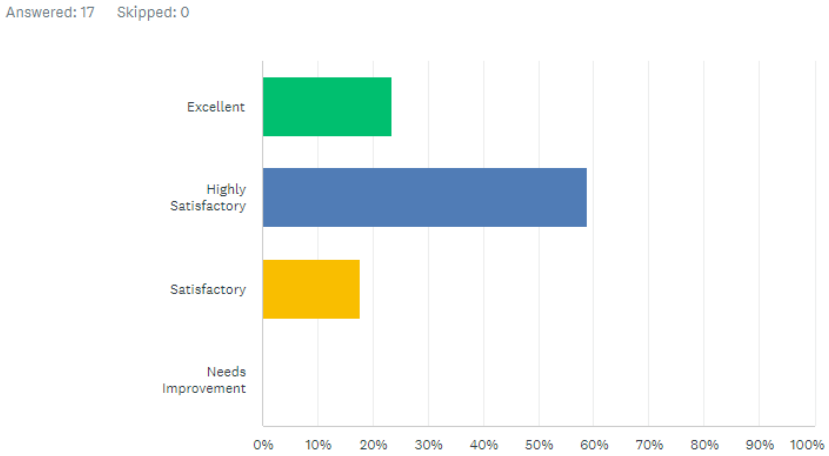
When asked to rate their overall satisfaction with the training, 50% of participants rated the training as 'excellent', while 45% rated the training as 'highly satisfactory' and 5% as 'satisfactory'.

Figure 3. Participants' overall rating of training



Participants were also asked to rate their experience with the online training platform (and internet connectivity), 24% of participants rated the training as 'excellent', while 59% rated the training 'highly satisfactory' and 18% rated the training as 'satisfactory'.

Figure 4. Participant Rating of online platform used to deliver training



When asked to rate how their knowledge after the training 59% of participants indicated that they 'gained significant new knowledge about the topic', while 35% indicated they 'gained some new knowledge' and 6% indicated they were 'unsure'.

Figure 5. Participants' evaluation of their knowledge after training delivery

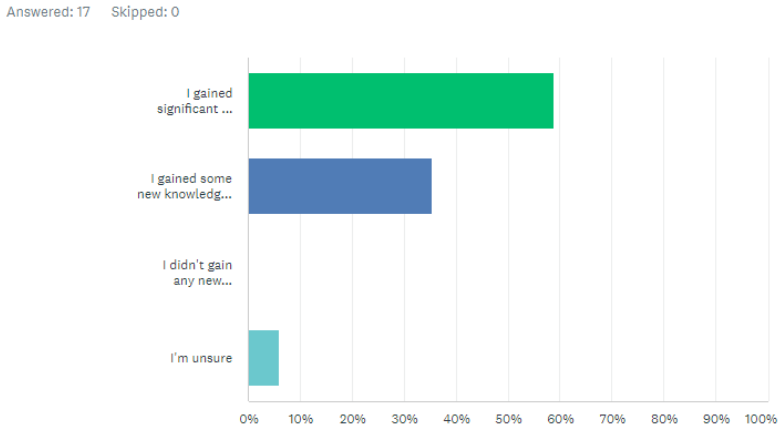


Figure 6. Participants' application of knowledge gained from training

Sharing training materials with other colleagues	13
Organizing a follow up meeting to share knowledge and training materials with other colleagues who could not attend this training	10
Review of decommissioning plan submitted by operators	6
Developing/reviewing checklists for EIA scoping report especially for decommissioning	9
Review / Updating / further finalizing existing checklists and/or guidelines and procedures for implementing regulations related to decommissioning	8

Table 3. Participants' feedback on the training

What did you like about the training? Which part of the training was most useful to you?	• Learn about the responsibilities of different sectors and what requirements should be done • The methodology used, allowing attendees to be actively participate in the training • The case studies and group exercises • The interaction and coordination among the expertise's when giving opinion or clarification • The opportunity to share with colleagues from different countries, and identify our common goals and challenges. • Environmental Impact assessment aspects • The training was great , and I was interested in the decommissioning scope off- shore and on share • The training was great, and I was interested in the decommissioning scope off-shore and onshore • All the training aspects were very useful, and specially the decommissioning scope of work for onshore facilities.

	• The workshop items were rich in information, and the assessment and site cleaning and reporting were the most useful. • The part of remediation after decommissioning process • Developing a decommissioning plan • entender que en el desmantelamiento hay varias dimensiones que se deben tener en cuenta, teniendo en cuenta el ecosistema • All sessions were fruitful and increased my knowledge of this topic
Which session or part of the workshop did you find least useful, and why?	• The course was useful in all aspects • some case studies, because did not bring clear lessons learned • I think all of them where useful, nonetheless, due to my profession (lawyer), there were many technical aspects that weren't easy to follow up. • All the aspects were useful. • The workshop was useful. • The part of laws and determines associated with decommissioning processes • No recuerdo en particular, creo que todo el curso me fue útil. • All sessions were fruitful and increased my knowledge of this subject, so there was no useless or less useful session Others responded 'all were useful' or 'none'
What challenges, if any, did you encounter with online training?	• Online always have lack in time for discussion between the trainers themselves and with the experts • No challenges at all • time constrain/ time management, the office in Mozambique closes at 5pm maximum, after that it was difficulty to follow the training • Collaborative work wasn't easy online. • Poor network connection • Internet was weak, and some problem with understanding • The great challenge was the weak internet service, that made it a little difficult to understand, also there is a difficulty in understanding and discussions, because of no face to face contact. • The bad internet service, the length of the sessions. • Weak network connection • Little distractions from work • To strengthen all the legal framework concerning offshore activities in Colombia. It is an early industry but with this guidance we move toward the right way to bring that legal security. Others responded 'none' or 'they were satisfied' with the training
What do you think could be improved?	• Increase knowledge and experience in this field • No additional inputs • Give a bit more of time between days to be able to read and prepare better the "homework" • I can't imagine what's better than this • Time and duration of sessions

	• Sharing the training documents with the participants earlier with sufficient time. • Making the time for the workshop less than now, slowing the speed of slides transition. • Translation • Group work with other countries will bring different ideas and knowledge to participants. • tal vez darle un poco más de énfasis a las malas experiencias • In my opinion, it is better to hold the workshop face to face and for a longer period • Dynamic with the participants is a challenge but it was well organized. Maybe more interactive presentations, less words • More case studies

Annex 3. Training Programme

Time (CET)	Activity
Pre-training preparations (Individual time requirement: 2 hours maximum) Nominated participants are asked to: (i) fill in the Training Needs Assessment online survey, using this link (ii) undertake an online baseline knowledge assessment, using this link (iii) watch 1 lecture video which provides an initial overview of decommissioning of oil and gas fields and best environmental practices, using this link **Completion of pre-training assignments is also a requirement for obtaining a UNEP Training Course Completion Certificate**	
Day 1, 07 December (4.5 hours total)	
13:20	Participants log in
13:30 (30mins)	Welcome Introductions, Logistics, Course overview and Expected outcomes

14:00 (45 mins)	**Module 1. Introduction: Decommissioning in the oil and gas value chain, steps, challenges and obligations – offshore and onshore fields** *Matthew Richmond, UNEP* Q & A/Discussions
14:45 (15 mins)	Coffee/Tea Break
15:00 (45 mins)	**Module 2. General decommissioning process- regulations, overview of process, options and decisions, stakeholders** *IOGP- Ping Teo* Q & A / Discussion
15:45 (45 mins)	**Module 3. Typical decommissioning scope of work for onshore facilities** *IOGP- Harvey Johnstone* Q & A / Discussion
16:30 (15 min)	Coffee / tea break
16:45 (45 mins)	**Module 4. Typical decommissioning scope of work for offshore facilities** *IOGP- Ping Teo* Q & A / Discussion
17:30 (15 mins)	Country Team Reflections End of Day
Day 2, 08 December (5.25 hours)	
13:15 (15 mins)	Participants log-in
13:30 (15 mins)	Recap of Day 1

13:45 (1.5 hrs)	**Module 5. Environmental and social considerations during decommissioning** *Matthew Richmond, UNEP (25mins)* 5.1. Environmental considerations in decommissioning operations offshore - Country Case study (Italy) *Ezio Amato, REMPEC (12mins)* 5.2. Industry case examples to minimize environmental impacts during decommissioning process (tools used in evaluating options towards preventing/mitigating environmental impacts) *IOGP (12mins)- Paul Krause, Ramboll* Q & A / Discussion
15:15 (15 min)	**Coffee/tea break**
15:30 (1 hr)	**Module 6. Assessments, Site Clean-up & Reporting** *Matthew Richmond, UNEP (30mins)* Q & A / Discussion
16:30 (45 min)	**Groupwork on Environmental Considerations for Decommissioning Plan**
17:15 (30 mins)	Group work presentations
Day 3, 09 December (4 hours + 1 hour for closing)	
13:15 (15 mins)	Participants log-in
13:30 (15 mins)	Recap of Day 2
13:45 (1.5 hr)	**Module 7. Environmental regulatory and legal frameworks and institutions associated with decommissioning** *Anne-Grethe Kolstad, NEA* *Norwegian experience* *Svilosen Svein Arne, NPD* *Q&A/Discussions*
15:15 (30 min)	**Country Team Reflections & Action Planning**

15:45 (15 min)	**Coffee/ Tea break**
16:00 (45 min)	**Action Planning Presentations**
16:45 (45 min)	Closing Remarks Final Knowledge Assessment Training Course Evaluations
End of Training	

Annex 4. List of Participants

N.	Country	Name	Institution	Gender	Email
1	Mozambique	Maria Arminda Abrão Mlauze	Director of Marine Pollution Prevention and Combate Services. Ministerio da Terra e Ambiente - DINAB/DLA	F	
2		Nazário Bangalane	Head of Projects and Development, INP	M	
3		Dércio Monteriro	Head of Fiscalization and Safety, INP	M	
4		Canaty Uassote	Chemical Engineer, INP		
5		Guilhermina Honwana			
6		Claudio Novel			
7		Abelina Chambule			

8	Ghana	Lawrence Kotoe		M	
9		Nana Yaa Appiah		F	
10		Edith Enyonam Acheampong	EPA	F	
11	Iraq	Waleed Ali Hussein		M	
12		Husam Abdulmuttaleb Hashim		M	
13		Esraa Abd Hussein		F	
14		Mays Abbas Kadhim		F	
15		Jinan Abdulhussein Frayyih		F	
16		Noor Saadi			
17		Adel Khaleefah Nawar	Ministry of Environment		
18		Samar Yousif issa Alkhano			
19		Ruqaya Fouad Al Kafage			
20		Ahmed Khalaf Khames	Ministry of Oil		
21	Colombia	Ernesto Romero Tobon	Ministry of Environment and	M	

22		Magdalit Holguin Santa	Sustainable Development	F	
23		Astrid Reyes			
24		Carlos Eduardo Pineda Lopez	Lawyer, Hydrocarbons Office		
25		Oscar Ivan Suarez Murcia	Petroleum Engineer, Hydrocarbons Office.	M	

Resource Persons

Name	Institution	Contact
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Svein Arne Svilosen	Norwegian Petroleum Directorate	
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Annex 5. Group Work – Environmental Considerations in a Decommissioning Plan

GHANA

Country, Asset, Location	Decommissioning Plan Table of Content	Why is it important to include each heading below?	Who are the stakeholders that need to review this information
Ghana, offshore platform, Saltpond	1. Introduction Background Information	This gives an overview of installations being decommissioned.	EPA, Petroleum Commission, Ghana Maritime Authority, Nuclear Regulation Authority.
	2 Executive Summary	A summary of the objective, scope, plan, location, and field layout of the installation to be decommissioned and brief project description	EPA, Petroleum Commission, Ghana Maritime Authority, Nuclear Regulation Authority.

	3. Policy, Legal and Institutional Framework	It presents the various policies, legal and institutional framework relevant to the proposed decommissioning activity	EPA, Petroleum Commission, Ghana Maritime Authority, Nuclear Regulation Authority, Ministry of Energy
	4. Description of items to be decommissioned	This informs the regulator of the components of the platform and subsea installations to be decommissioned. Here the operator could explain the items they intend to leave on the seabed, why and how they intend to do so.	EPA , Petroleum Commission, Ghana Maritime Authority
	5. Inventory of materials	This gives information on mostly inventory of materials on the topside. These include but not limited to chemicals, disposables, fuels, obsolete materials, and hazardous waste.	EPA, Nuclear Regulation Authority
	6. Removal and Disposal Options 7. Selected Removal and Disposal option	This section explains all the removal and disposal alternatives and options available considering the industry tools like BAT. In most cases, this section is discussed under section 6 above. Here the selected option is discussed, and the advantages and disadvantages are clearly laid out and giving justification to why this option was chosen over the others.	EPA, Petroleum Commission, Ghana Maritime Authority
	8. Wells	This section gives information on the type and number of wells to be decommissioned. Whether water/gas injector wells or oil producing wells. These will determine how the plugging and abandonment should be done.	EPA, Petroleum Commission, Nuclear Regulation Authority
	9. Drill Cuttings	These depend on the platforms being decommissioned. You will	EPA, Ministry of Energy

		usually find drill cuttings on drill rigs and not FPSO's	
	10. Environmental Appraisal	This section shows environmental monitoring done to appraise the current state of the project area against the baseline.	EPA
	11. Interested Party Consultations	This section consists of consultations with stakeholders of the proposed decommissioning. This often involves the community reps, fishermen council, local authorities (municipal/district assembly) etc.	EPA, district assembly, petroleum commission, ministry of energy
	12. Costs	This is to indicate the costs that will be involved in implementing the decommissioning activity and the availability of funds to finance its implementation	EPA, Petroleum Commission, Ministry of Energy

COLOMBIA

Country, Asset, Location	**Decommissioning Plan Table of Content:**	**Why is it important to include each heading below?**	**Who are the stakeholders that need to review this information**
Colombia, Chuchupa Field, Plataforma fija offshore, profundidad agua 50 mts.	**1. Resumen ejecutivo. Localización de la infraestructura, breve descripción social, tipo de infraestructura. (máximo 1 página)**	**Permite tener una visión del proyecto: Qué va a realizar, por que lo va a realizar, cuando lo va a realizar, quien lo va a realizar, cómo lo va a realizar, responsabilidad de quien lo va a realizar y de quienes hacen el seguimiento y cuanto cuesta.**	**Autoridades locales, Autoridad ambiental, Autoridad sectorial, Población que puede verse afectada por el desarrollo de la actividad de desmantelamiento. En el caso de Colombia si existen comunidades indígenas o étnicas, estas deben ser consultadas.**
	2. Marco general de las acciones a realizar		

	Presentación del objetivo general, descripción de las actividades a realizar, definición de la infraestructura a remover.		
	3. Levantamiento de línea base (inventario existente, tanto a nivel técnico como a nivel ambiental) **3.1 Descripción de la infraestructura existente (medidas, distancias, materiales, etc)** **3.2 línea base actual ambiental. Una fotografía del momento previo al desmantelamiento y un análisis del estado antes del proyecto y cómo se espera esa nueva transición ambiental o si la misma no se modifica.** **3.3 Contingencias que hayan sucedido durante la operación del proyecto.** **3.3 Conclusión que determina técnica y ambiental cuál es la infraestructura a remover.**	**Permite conocer las razones que determinan la infraestructura a remover o la que va a quedar en el sitio, además establece la necesidad de realizar acciones para corregir daños que hayan sucedido en el pasado (no evidenciados en el momento de su ocurrencia) de tal forma que no se generen impactos acumulativos.**	
	4. Removal and disposal methods **4.1 1st the well is plugged with cement and barriers to abandon the production well** **4.2 removed the conductor casing and pipework** **4.3 to decommissioning the platform, it must generate less than 10kg per month of wasting**		

	material when cleaning the topside facilities before lifting them **4.4 waste management, material generated are managed in the Davidi warehouse** **4.5 items decommissioned are transported to Ballena Station, the nearshore base, for dismantling to reuse** **4.6 pipelines are left in situ subsea to avoid additional risks**		
	5. Manejo ambiental **Medidas requeridas para mitigar los impactos durante la fase de desmantelamiento.** **Medidas de corrección de los impactos que se generarían durante el desmantelamiento.** **Medidas de intervención, relacionadas a partir de un análisis de riesgo en el momento que se haya establecido algún accidente o contingencia no prevista.**		
	6. Seguridad **6.1 Procesos** **6.2 laboral**		
	7. Costos y responsabilidades asociadas (pólizas, etc)		

	8. Program management **8.1 detailed inspection for the authority to evaluate the environmental restauration** **8.2 close up the community agreements.**		

MOZAMBIQUE

Country, Asset, Location	**Decommissioning Plan Table of Content:**	**Why is it important to include each heading below?**	**Who are the stakeholders that need to review this information**
Country: Mozambique **Asset:** 23 Production Wells, Associated Flow lines, Manifolds, Trunklines, Central Processing Facility, and Export Gas Pipeline (MSP). **Location:** Inhambane Province	**1. Executive Summary**	**To describe the summary of the project.**	• **Relevant Government entities (Regulators, local government, etc)** • **Local Communities** • **Civil societe** • **NGO's**
	2. Introduction	**To give an overview of the plan content, the purpose of the document and scope**	
	3. Description of items to be decommissioned	**To identify and describe in detail all assets to be decommissioned**	

	3.1 Production Wells **3.2 Flow lines** **3.3 Manifolds** **3.4 Trunklines** **3.5 Central Processing Facility** **3.6 Export Gas Pipeline (MSP)**		
	4. Inventory of materials	**To elaborate the list of materials to be decommissioned and assess the hazards associated with each in order to select the method of removal and final disposal.**	
	5. Removal and disposal options	**To describe the possible removal methods according to the best available practices**	
	6. Post decommissioning monitoring and maintenance	**To verify if the decommissioning process went as planned and it doesn't create any environmental and social issues, in order to improve current and future management of outputs, outcomes and impacts**	
	7. Supporting studies	**To gather further information relevant to be considered during the decommissioning process. E.g. When the asset is close to an environmental sensitive area**	

Country, Asset, Location	Decommissioning Plan Table of Content:	Why is it important to include each heading below?	Who are the stakeholders that need to review this information
Iraq, Naft Khana oil field, onshore, Diyala Governorate	**1. Executive summary** **1.1 project justifications** **1.2 goals and objectives** **1.3 outcomes** **1.3.1 social revenue** **1.3.2 environmental revenue** **1.3.3 economic revenue**	**It includes a detailed study of the reasons for taking the decision to decommissioning from an economic point of view, as well as social and environmental considerations** It also includes the expected project outcomes and the expected benefits in terms of social, environmental and economic terms with identify the objectives of project	
	2. Site description **2.1 site topographic** **2.2 environment surrounding** **2.3 population** **2.4 economic activities** **2.5 weather conditions** **3. Contamination condition** **3.1 sources of contamination** **3.2 kind of pollution** **3.3 receptors** **3.4 path ways** **3.5 degree of contamination**	**Identifying the geographical nature of the site and weather conditions helps in understanding environmental considerations, and identifying the affected communities and their economic activity gives a perception of the potential changes resulting from the project.** Identify potential environmental impacts on the environment and risks assessment Identify potential risks to public health and the population	**MoE** **MoO** **MoE** **MoH**

	4. Decommissioning procedure **4.1 methodology** **4.2 infrastructure in site** **4.3 removal methods** **4.4 waste expected**	**Determining the most appropriate method and best practices from an economic, social and environmental view to implement the project according to the infrastructure, expected outputs and quantities of waste generated**	**MoO** **MoE**
	5. Environmental management plan **5.1 legislations and regulations** **5.2 expected pollutants** **5.3 environmental impact** **5.4 mitigation methods** **5.5 hazardous wastes classification** **5.6 treatment and disposal** **5.7 monitoring and verification**	**Reducing potential environmental impacts and protecting the local population by identifying risks and measures to be taken to mitigate in accordance with national legislation, international practices and the requirements of the international chemical conventions, Basel, Stockholm in particular, taking into account the classification of waste and methods of handling it**	**MoO** **MoE** **Private sector** **MoIM**
	6. Cost and cost recovery **6.1 Estimated cost of project** **6.2 cost recovery**	**Determine the expected cost** **Determine the sources of the recovered cost through the assets, equipment and waste that can be recycled or reused**	**MoO** **MoP** **MoF**

ANNEX 6. ACTION PLANS

Participants were required to Please identify at least 1-2 Priority challenge that they would like their country team to take forward.

COLOMBIA

Priority Challenge for Action	Current Efforts	Additional Steps to be taken	Focal Points / Lead Institutions

Reglamentar aspectos específicos del desmantelamiento costa afuera mediante normas o con apoyo en guías.	Se están consolidando los estudios ambientales para habilitar la actividad Ajustar el Plan Nacional de Contingencia para que opere en el medio marino	La coordinación entre las instituciones de los sectores minero energético, ambiental, hacienda y Marino	Minero energético, ambiental Comunidades locales Organizaciones No Gubernamentales Universidades
Regular el cubrimiento de costos del desmantelamiento	Hay garantías financieras desde lo ambiental (exiguas para costa afuera) Hay garantías financieras que se exigen al operador al suscribir el contrato Hay garantías financieras a la autoridad maritima	Revisar las condiciones del contrato del gobierno con el operador	Minero energético

GHANA

Priority Challenge for Action	Current Efforts	Additional Steps to be taken	Focal Points / Lead Institutions
Implementation/Enforcement of regulations	Awareness creation on regulations developed	Involvement of relevant stakeholders	EPA, Fisheries commission, Ghana Maritime Authority, IOCs
Payment for cost of decommission activities	Development of guidelines on funding of decommission	Setting up of reclamation bonds by IOCs for future decommission activities	EPA, Ministry of Finance, Petroleum Commission, IOCs

IRAQ

Priority Challenge for Action	Current Efforts	Additional Steps to be taken	Focal Points / Lead Institutions
There is no clear legislation or law related to decommissioning that must be implemented	Increasing knowledge in this field will lead to influencing decision-makers to legislate and implement binding laws	Need to issue clear and comprehensive instructions regarding decommissioning of oil and gas assets, based on the iraqi law of enhancement and protection of Environment	MoE MoO
Human resource and lack of knowledge and financial funding for these activities	Raise the awareness for decision makers to take in account for funding decommission process with all requirements	Need for capacity building on all the levels, specially the decision maker in this aspect, also to enhance and develop the decommissioning technologies including all the facilities and resources	MoE MoO Private Sector

MOZAMBIQUE

Priority Challenge for Action	Current Efforts	Additional Steps to be taken	Focal Points / Lead Institutions
Ausência de Guiões que detalham os procedimentos para a desmobilização tanto em terra como no mar.	Assegurar que o Regulamento de SSA em vista remeta a elaboração dos guiões para desmobilização.	Reforço da capacitação institucional e coordenação inter-sectorial	MIREME/INP MTA MTC MIMAIP ANEA
Como assegurar a monitoria do local após a desmobilização das infra estruturas após o término do Contracto de Concessão	Possível actualização dos Contractos de Concessão no futuro	Coordenação com o departamento legal do MIREME	MIREME/INP MEF