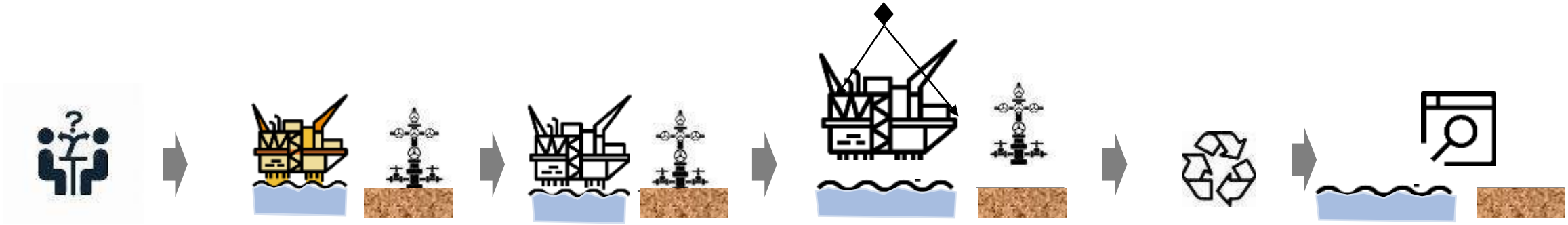
Module 1a: An overview of the decommissioning process

*From late life operation, cessation of production (**CoP**) to decommissioning*



CoP decision

Warm suspension
Live wells

Cold suspension (“De-energise”)
Plugged wells

Removal

Dismantle
& Dispose

Site
Surveillance

5 years prior to Removal

- Late life maintenance activities
- Form decom. project team
- Pre-decom. surveys
- Data gathering, Studies
- Stakeholder engagements

2 years prior to Removal

- Prepare onshore demolition yard
- Mobilise equipment
- Well plugging
- Hydrocarbon free (de-oil, de-energise, isolate)
- Removal preparatory work

- Site restoration
- Cutting
- Removal
- Waste management

- Plan to execute decommissioning- prepare Decommissioning Plan, waste management plans, EIA, contracts etc

Stakeholders

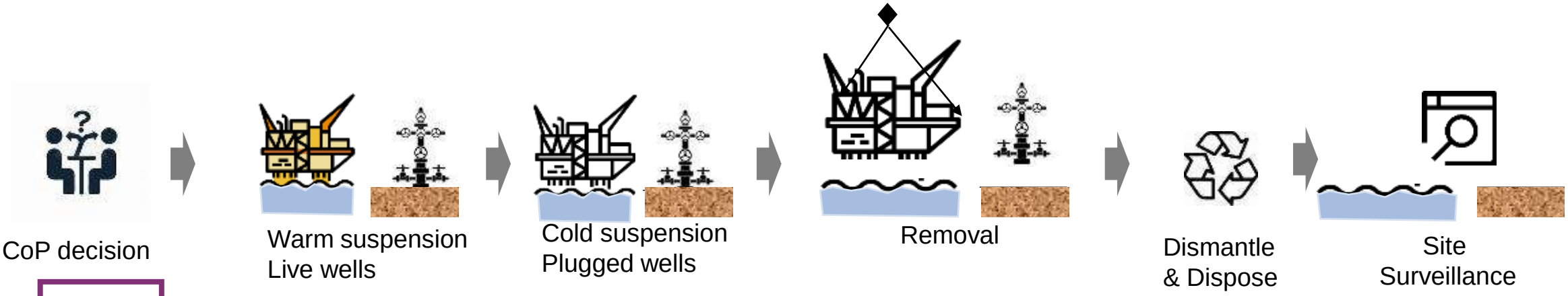
General	Onshore	Near shore / beach specific	Offshore
• Asset owners (O&G companies) • Regulators • Government *(increase local employment)* • Environmental NGOs • Community	• Town and Country planning Department • Forestry Department • Land owners	• Local fishers	• Commercial fishers • Seafarers / Mariners • Marine Department

Common goals:

1. No harm to the environment (During and after decommissioning)
2. No harm to people (During and after decommissioning)
3. Cost effective – *owners, government*

Key decommissioning decisions

Options selected via a multi criteria decision analysis / comparative assessment process considering safety, environment, social economic and stakeholders' views



When?

1	2	3	4
Level of maintenance & inspection?	Extent of removal / "end state"	Where? How?	How often?
Early removal scope?	Decommissioning Methodology	Waste management strategy and plans	Post decom ownership

Options and decisions:

1

Level of maintenance & inspection?

Early removal scope?

Warm/ Cold suspension

Discuss what should be the minimum requirement of maintenance? Discuss what happens if no maintenance occurs

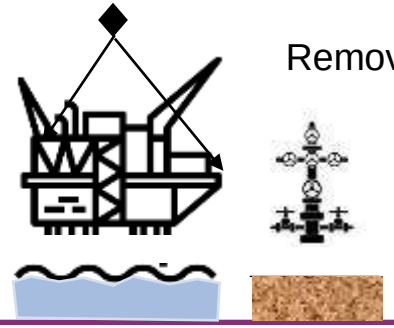
- All wells not yet plugged: checks for pressure.
- For large offshore platform- some critical equipment e.g. crane, facilities to enable safe access (helideck, boatlanding), underwater- ensure platforms have cathodic protection in-place.

Options and decisions:

2

Extent of removal / “end state”

Decommissioning Methodology



Removal

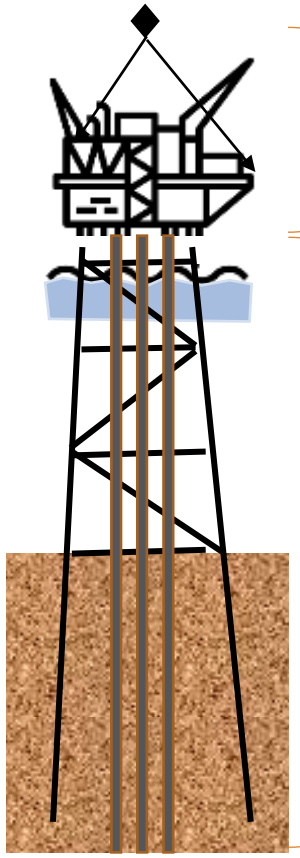
Onshore

Typically

- 1 permanent downhole plug & environment plug
- All above ground facilities: Fully removed
- Underground facilities- Pipelines etc- risk-based
- Conductor cut below ground level

Refer to later module: Onshore case decommissioning module

Offshore



Typically

- Topsides – removed to shore for dismantling

Jacket, Conductors, Piles

- Options: Remove all or partial removal – depends on a range of factors
- Conductor and piles cut below seabed level

Pipelines

- if buried or rock-dumped- leave in situ
- If on seabed, depends - if there are bottom fish trawling, or present snagging risk- remove / rock-dump / bury

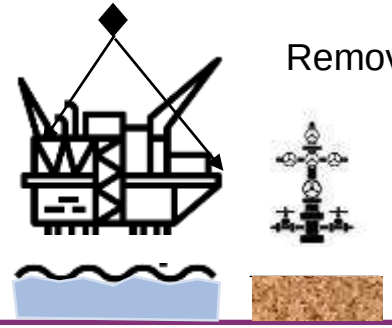
Refer to later modules: Offshore case study- run through process; and decision-making tools used (Comparative Assessment, Multi Decision Criteria Analysis)

Options and decisions: Methods of removal

2

Extent of removal / “end state”

Decommissioning Methodology



Removal

- Options: Piece small / single lift
- Onshore demolition
- Technology has advanced significantly, allowing for safer and faster removal.
  - Single lift of Brent Bravo (25000MT topsides in 9 Seconds) in 2020 by Marine Vessel (MV) Pioneering Spirit: Pioneering Spirit removes third platform from Shell's Brent field – YouTube (3.5mins)

Piece-small

Piece-medium/ Modular

Options and decisions:

Dismantle & Dispose

3

Where? How?

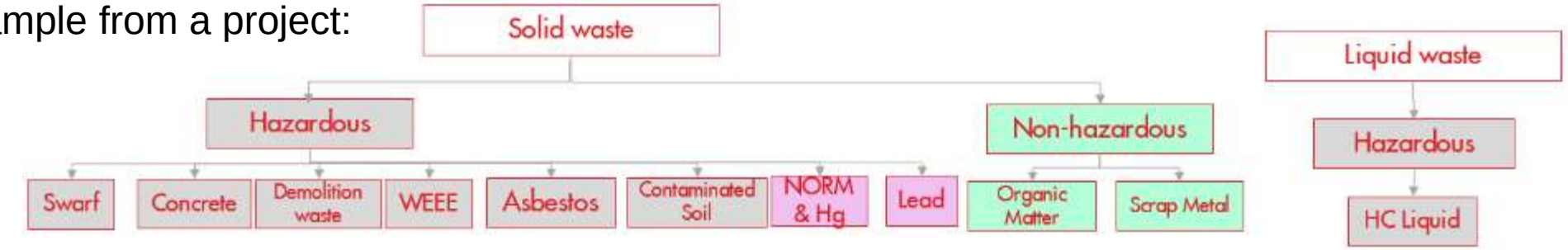
Waste management strategy and plans

Refer to later modules: Onshore decommissioning

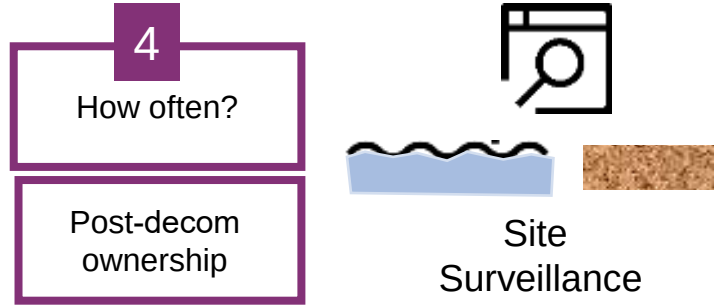
- Dismantling Ninian Legs by explosives: https://youtu.be/29tNV5nBR4I

Early in the project, the project team must:
1- estimate the volume
2- assess if current system can process wastes
3- develop a strategy to manage the waste stream

Example from a project:



Options and decisions:



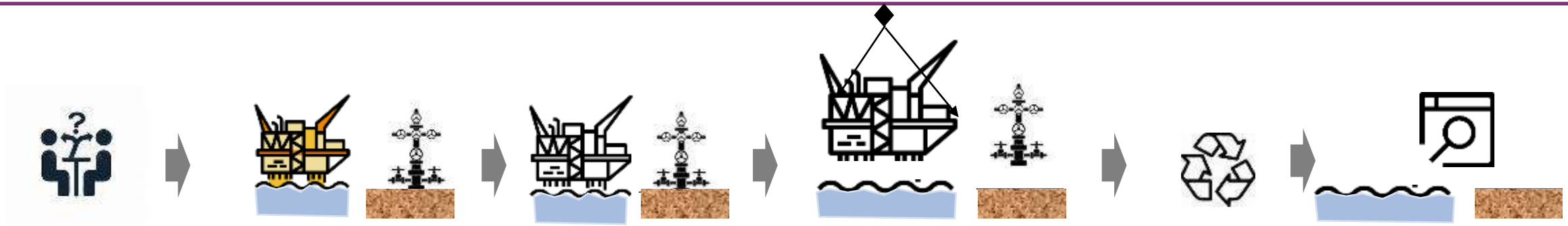
What happens after decommissioning? Who owns the site / assets if decommissioned in-situ?

- At the decommissioned site, the assets are left in an *agreed final* state with the regulators. This can mean:
  - All items above ground / above seabed removed from site. Well conductors are cut e.g. 2m below ground / seabed level
  - There are items decommissioned in-situ after made safe to people and environment- e.g. steel structure footings, underground pipelines

- Various models exists globally, ranging from:
  - The site / assets being handed over to the government after an agreed observed period or at time of acceptance of decommissioning close-out report
  - The ownership stays with the last asset owner in perpetuity. If owner ceases to exist, then it is returned to the state
  - The ownership is transferred to the state after the mining license expires

- Abandoned and orphaned wells: Alberta Energy Regulator: https://youtu.be/_uCKjJVVACk (1 min- starts at 1:41 to 2:32)

Summary part 1



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These steps will be discussed further in subsequent modules

Summary part 2

1. Where options are available, decisions are made considering multiple criteria- e.g. safety, environment, technical feasibility/costs, socio-economic impact, etc.
2. Depending on project complexity, **early planning is critical to a successful outcome.** It is Important to estimate timing of cessation of production to ensure sufficient planning

   Early planning:

   - Ensure sufficient funds available
   - Agree on decision making process with stakeholders
   - Align with stakeholders' views
   - Allow time for data gathering
   - Understand constraints – e.g. waste management capacity
   - Assess opportunities
3. Plan for risk-based assets inspection and maintenance

These steps will be discussed further in subsequent modules