



AF Offshore Decom

Complexity & challenges in offshore decommissioning

Offshore Norge November 2024

Vision

Clearing up the past,
building for the future

Business concept

Create value and opportunities
through project activities with an
uncompromising attitude towards
safety and ethics



Offering integrated engineering, preparation, removal and disposal (EPRD) solutions for offshore decommissioning

AF Offshore Decom EPRD solution

~80% of total EPRD scope



Offshore preparation and removal



In-house engineering capabilities for preparation and removal of offshore installations



One-stop-shop offering project management and a total decom solution, incl. offshore team



Utilize fit-to-purpose vessel, either through acquisition of transportation service or through partnership

~20% of total EPRD scope



Onshore disposal and recycling



Owner of Europe's most advanced purpose-built facility for recycling offshore installations



Disposal and recycling of platforms and floating units (FPSO, FPU, ships, loading buoys, etc.)



Turning oil rigs to material banks for onshore construction

Fit for purpose vessel cooperations to date

AF Offshore Decom has cooperated with a large selection of vessels with a wide range in lifting capacities to support its EPRD removal programs:

- Offshore construction vessels below 500 tons capacity
- Sheerleg with less than 1000 tons capacity
- Wind installation vessels from 600 – 3000 tons capacity
- Heavy lift vessels from 8000 – 20.000 tons capacity
- Heavy transport vessels with 20.000++ tons capacity

Offshore removal campaigns requires from 20 – 400 people in the field for a limited duration.

AF will as a main contractor remove 21 installations from the southern north sea between 2022 - 2026



Decommissioning Track Record

■ EPRD (Engineering, Preparation, Removal & Disposal)
 ■ Disposal



Ekofisk tank
ConocoPhillips ('04-'08)



Indefield
Shell ('07-'11)



Ekofisk Cat 1 & 2
ConocoPhillips ('08-'14)



Ekofisk 2/4W
('09/'10) ConocoPhillips



Kittiwake LB
Venture Production
('08-'09)



H7 & B11
Equinor ('11-'16)



Ekofisk 2/4G Topsides
BP ('15)



SBM-C
Equinor/Deep Ocean ('12)



Murchison
CNR ('14-'18)



Janice FPSU
Maersk ('16-'18)



Ekofisk Cat 3
ConocoPhillips ('17-'21)



LOGGS field
Harbour Energy ('17-'24)



Huldra
Equinor ('19)



Jotun
HMC ('20)



Brent jacket
Shell/HMC ('20)



Brae Bravo
Marathon/TAQA ('20-'22)



Dunlin Alpha
Fairfield ('18-'23)



Goldeneye
HMC ('21-22)



Curlew FPSO
Shell ('20-24)



Tor (Ekofisk)
ConocoPhillips ('22-'25)



L7 field
Total Energies ('22-'25)

OUR TRACK RECORD



97% Recycling rate for materials received for decommissioning



~ 400,000 Metric Tonnes dismantled and recycled

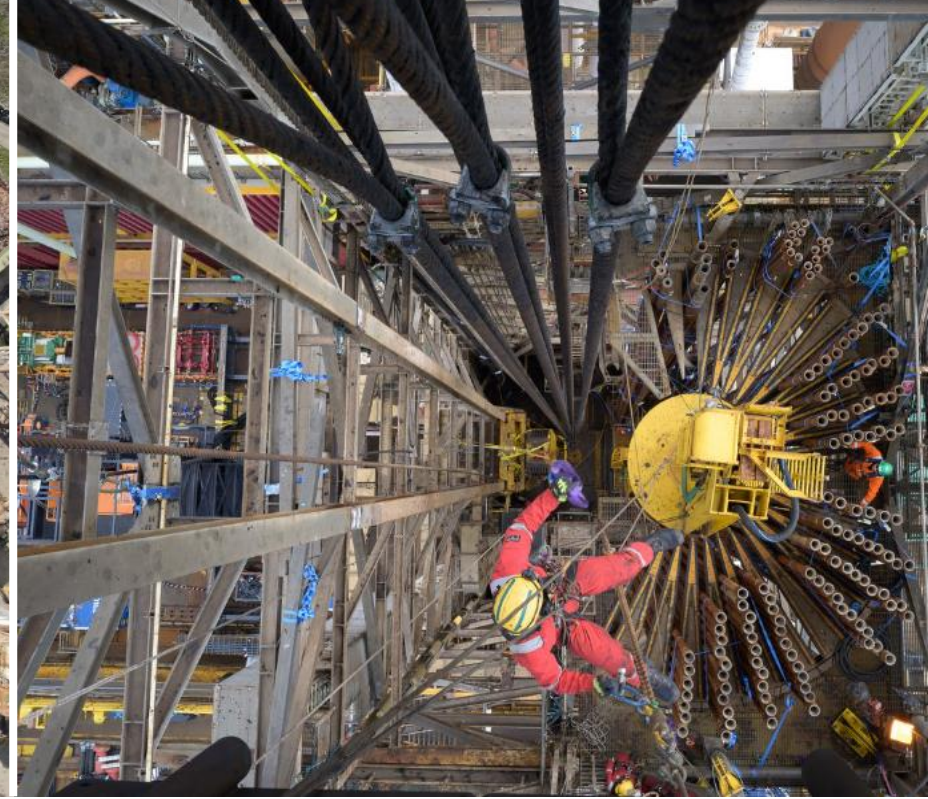


58 Number of installations recycled



> 20,000 Metric Tonnes of hazardous waste removed from the waste cycle.





Complexity in decommissioning seen from the contractor side:

- Decommissioning is a liability
 - No sense of urgency
 - Postponements & cancellations
- Each platform is unique and requires bespoke removal solutions (usually unpaid)
 - Each client is unique and requires special in-house contractual terms & conditions
 - Available documentation versus reality - unknown modifications & repairs



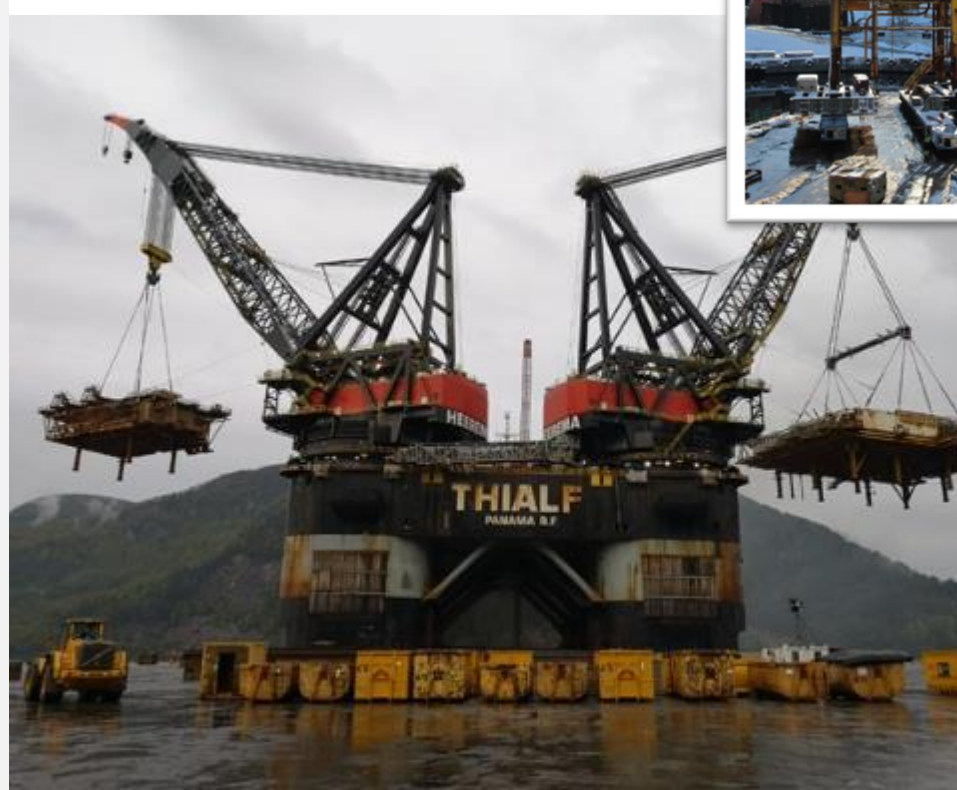
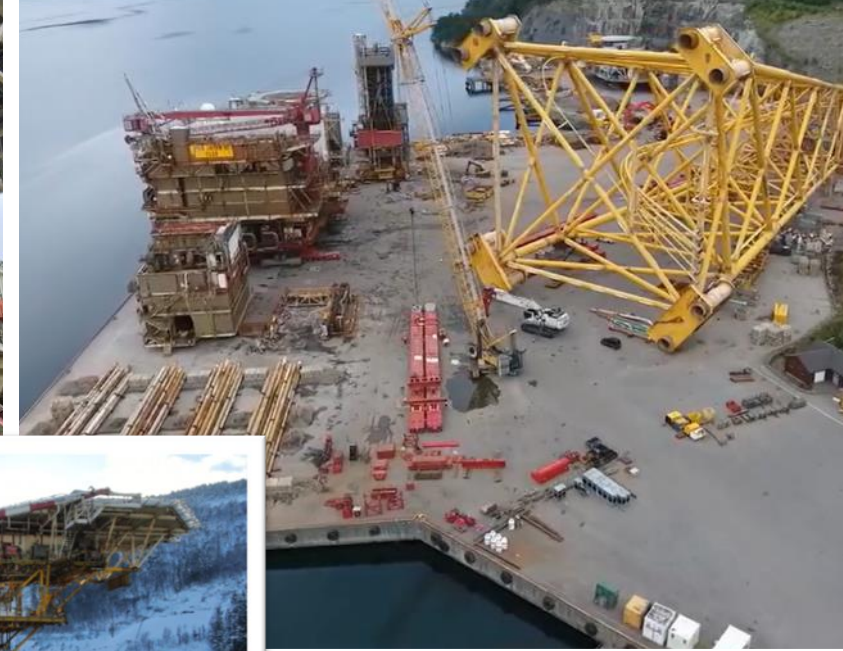
Complexity in decommissioning

- Removal is not reverse installation!
- Corrosion between cease of production and actual removal offshore.
- Dropped objects prevention and creating safe access for personnel.
- Ability to manage risk related to safety, health exposure and environment.
- Control & containment of multiple hazardous materials.
- Weight uncertainty and structural integrity.



Complexity in decommissioning

- Every single structure is unique
- Units delivered on barges or directly offloaded to quay
- Delivered both horizontally and vertically
- Weight range from 100 – 40.000 tons
- Increase in onshore dismantling complexity with new ultra heavy lift vessels performing large single lifts
- Site move of complex and heavy structures due to condensed load-in during the short offshore removal season



Overcoming planning challenges in decommissioning

Case example: The Dunlin Alpha EPRD project

- Client: Fairfield
- Removal Contractor: Heerema Marine Contractors (HMC) and AF Offshore Decom (AFOD) in a consortium (HAF)
- Removal year 2022
- Removal scope: Topside of approx. 20,000 tons
- Complex removal project with numerous interfaces
- GBS structure not part of scope (left in situ)
- All disposal done at AF Environmental Base Vats



Removal methodology Dunlin A

- Removal with two separate HLV campaigns:
 - Preparation & removal campaign with Thialf:
 - Duration: 30+ days
 - Complete 95% of all Hookdown scope
 - Removal of 14 modules transported on Thialf deck
 - Offloading directly to AF Environmental base Vats
 - Lifting campaign with Sleipnir:
 - Duration: 7+ days
 - Complete last 5% Hookdown scope
 - 4 modules transported on Sleipnir deck
 - Main Support Frame lifted with 8 modules on top. Transported in dual crane hooks
 - Offloading directly to AF Environmental base Vats



Offshore preparations Dunlin A

- AF Offshore Decom responsible for all preparatory work on Dunlin Alpha.
- Detailed engineering with more than 300 document deliverables for AF alone.
- Extensive verification activities offshore during cold stack period.
- Including subcontractors, AF had more than 330 personnel in rotation for offshore preparation with a max POB of 170 onboard Thialf.
- More than 65.000 offshore preparation work hours without any serious incidents.



Offshore preparations – scope highlights

- Make safe inspections
- Safe access, escape and emergency systems
- Utility set-up (electrical, air, firewater, oxygen/propane systems)
- Draining of fluids/remaining hydrocarbons
- Removal (where required) and handling of all hazardous waste
- Equipment set-up, incl. 3 mobile cranes & 3 excavators on the platform/vessel deck
- Preparation of areas for lift point installation
- Clearance/hook-down scope inside modules and between modules to be lifted
- Underdeck clearance work to allow for safe and efficient set-down onshore



Dunlin A Success factors

- Established solid teams individually and collectively
- Close collaboration between HAF consortium and Client with open discussions and “we win together or loose together” mentality
- Decom mindset from both Contractor and Client teams enabled an efficient offshore campaign and fit for purpose documentation requirements.
- Long period of cooperation and surveys offshore during engineering phase gave high confidence to all technical deliverables and execution schedule
- Thorough cold stack planning and early cooperation by all parties led to excellent starting conditions for the offshore preparation & removal campaigns
- Early Concept freeze allowed sufficient time for detailed engineering and mitigations. Time to identify and resolve the numerous interfaces and interdependencies.



Planning challenges in decommissioning

- Potential slack in removal programme following COP used by client and less flexibility is left for EPRD contractor with LD milestones on both removal and disposal completion. Opportunity to reduce risk & cost by early engagement and accessibility to the asset.
- Limited availability to asset for surveys and verification activities during detail engineering phase.
- Client contract and the requirements not necessarily fit for purpose for decommissioning.
- Significant amounts of old paperwork expected to be verified by contractor within a short period of time - identifying errors and omissions in several hundred asset related reports.
- Huge differences in standards and unique in-house requirements between various clients creates islands of different project execution models for decom contractors.
- Lack of decom mindset and/or extensive use of consultants with a different agenda resulting in multiple document review cycles and extensive requirements inherited from commissioning.

Much of this is resolved with a balanced contract, mutual incentives, motivated people and sufficient time.

