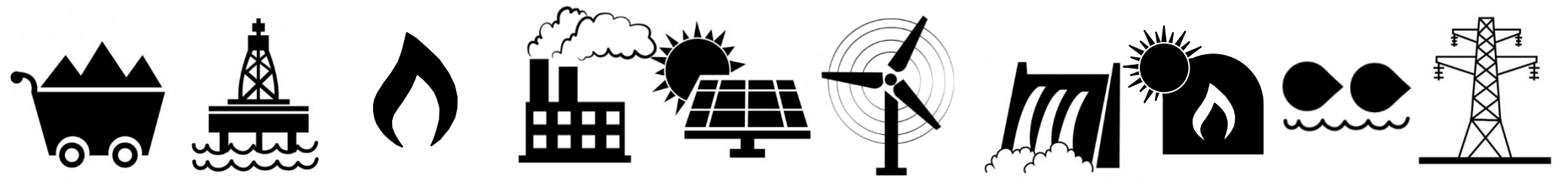
Pale Blue Dot.

Re-use of offshore oil & gas infrastructure

Decommissioning Conference 2015

Allan MacAskill
Sam Gomersall
Dorothy Burke



Agenda

- Introduction
- Beatrice
- Offshore Oil and Gas infrastructure in situ re-use assessment Methodology
- In situ re-use challenges
- Circular economy
- Summary

Introduction

- Allan MacAskill
  - 20 years oil and gas
  - 10 years offshore renewables: wind and wave
  - Founder director SeaEnergy, Pilot, Kincardine
- Dorothy Burke
- Sam Gomersall
  - 20 years oil and gas
  - 10 years Carbon Capture and Storage
  - Founder director CO2DeepStore, Pale Blue Dot Energy

Our approach to support The Energy Transition

Pale Blue Dot delivers Management Consultancy to the energy industry, large energy users and the public sector.

Delivering advice in three key areas

We help organisations of all sizes to **create opportunities** and **mitigate risks** arising from major changes in the energy markets.

Beatrice Example

- Cost Reduction
- Life Extension
- Preparation for decommissioning
- Re-use

Offshore Oil and Gas infrastructure in situ re-use assessment

Methodology

1. Review current asset base
2. Understand offshore markets
3. Develop re-use ideas
4. Create re-use assessment

Offshore Oil and Gas infrastructure in situ re-use assessment

Methodology

Review Asset Base

- Asset types and location
- Condition and remaining life
- Licenses and lease situation
- Commercial aspects
- Current timetable

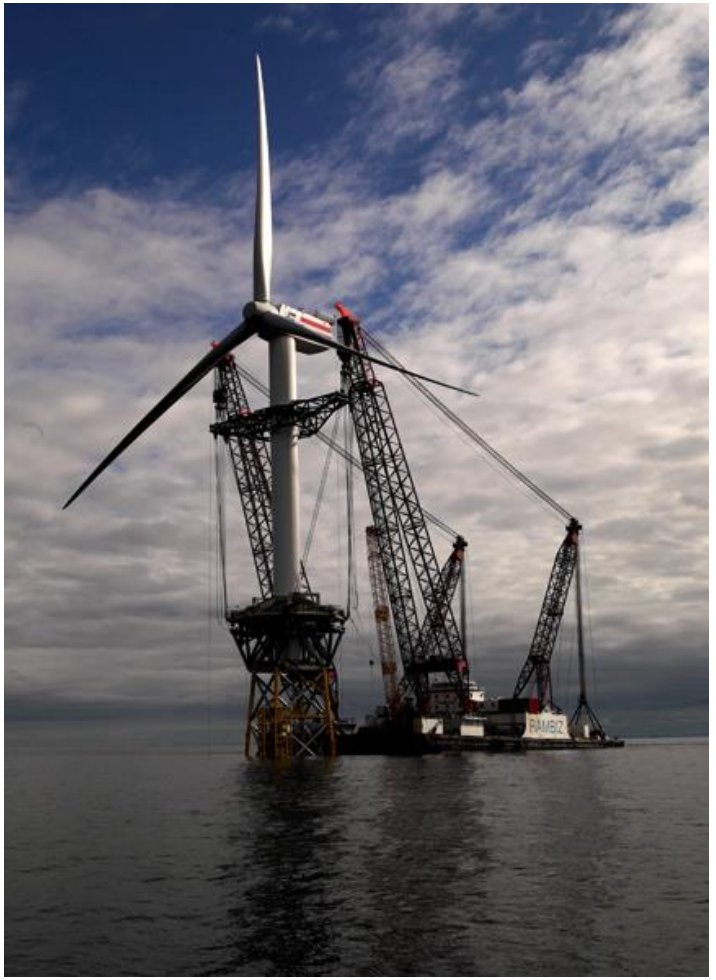
Offshore re-use market

- Oil and gas
- Offshore renewables
- Carbon capture and storage
- Other Energy applications
- Aquaculture
- Other

Offshore Oil and Gas infrastructure in situ re-use assessment

Challenges to delivery of in situ re-use options

- Over coming perceptions of the
  - O&G company
  - Organization with re-use concept
- Identifying a potential applications
  - O&G related
  - Alternative energy
  - CCS
- Develop the ideas
  - Define the opportunities
  - Study the possibility
  - Find potential partners
- Determining practicality and costs
  - How do we do it?
  - What are the key issues to delivery
  - What are the implications



Beatrice turbine installation

Offshore Oil and Gas infrastructure in situ re-use assessment

Carbon Capture and Storage - CCS

- The need
  - CCS is a key climate change mitigant
  - CO2 storage in the UKCS is critical for Europe
  - Significant effort is ongoing on CO2 storage appraisal
- Asset re-use areas
  - Subsurface reservoirs for CO2 storage
  - Pipeline systems for CO2 transport
  - Facilities & wells for CO2 injection

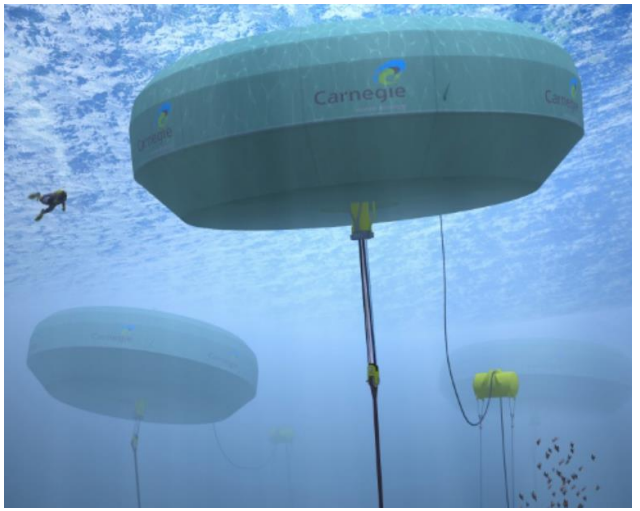
  eg Goldeneye
  - Potential for CO2 EOR
- Challenges
  - Data access
  - Different regulatory systems
  - Long lifetimes required
  - Lack of CO2 storage developments to date

Offshore Oil and Gas infrastructure in situ re-use assessment

Alternative Energy

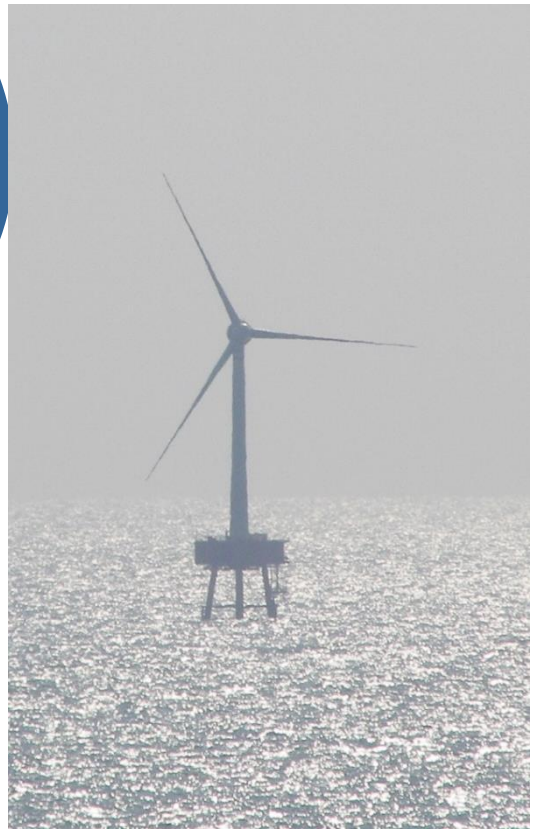
- Potential Options
  - Offshore Wind
  - Wave / Tidal
  - Geothermal
  - Others
- Challenges
  - For generation
    - Resource base
    - Location
    - Export facilities and distance
  - For hub
    - Distance to nearest development
    - Suitability of infrastructure
    - Collaboration potential

Carnegie CETO Wave Energy Device

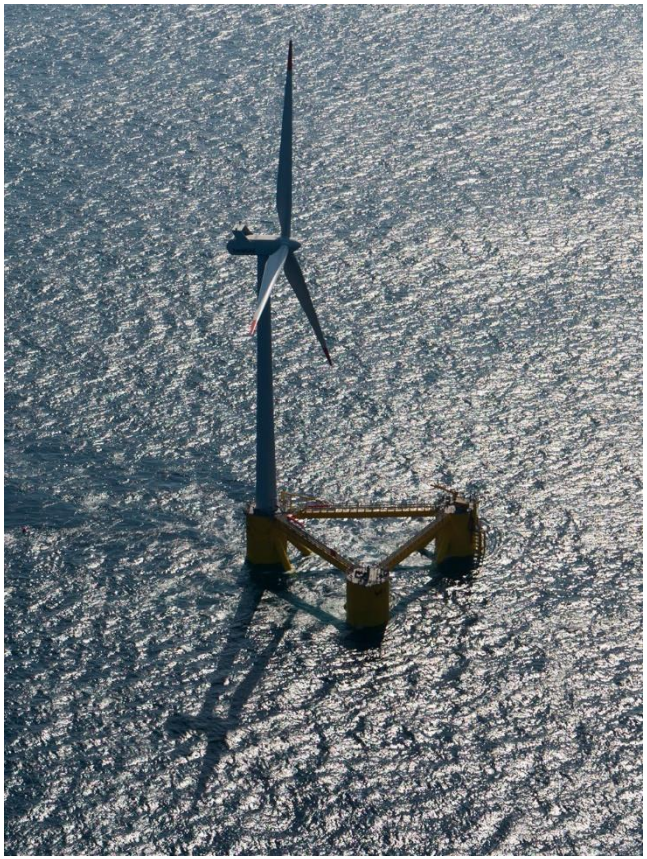


Offshore Oil and Gas infrastructure in situ re-use assessment

Examples



Bohai Bay, China



Windfloat, Portugal

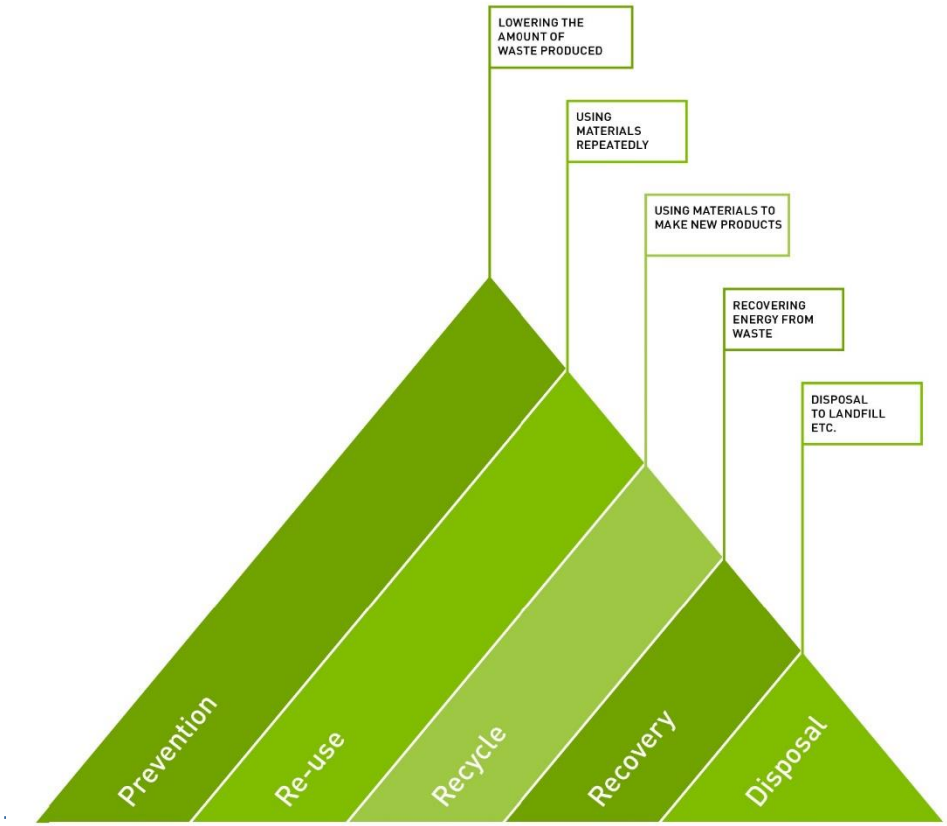
Beatrice, Scotland

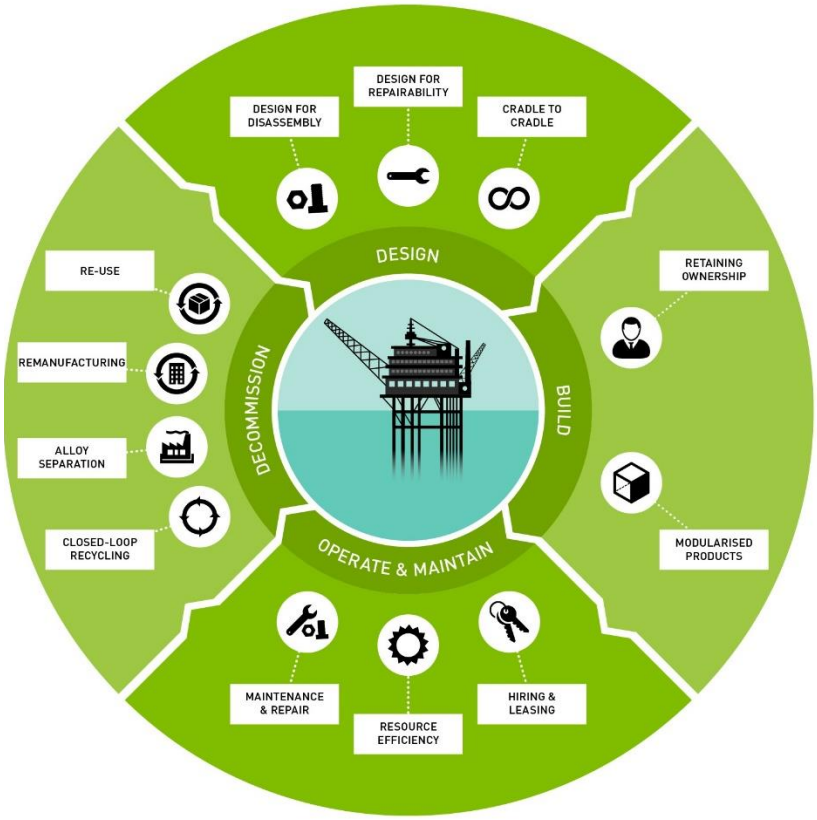
Offshore Oil and Gas infrastructure in situ re-use assessment

Other Uses

- There are a number of possible uses:
  - Aquaculture
  - Offshore Research and Development
  - Others
- Aquaculture
  - Wind industry has investigated fish farming and seaweed

Broader Circular Economy Options





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Summary

- In situ re-use options do **exist**
- They are more **numerous** than many expect
- **Early** re-use assessment is required
- **Cross sector** awareness is key
- There are many **challenges**, but the **prize is big**