



Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean



OIL & GAS DECOMMISSIONING ACTION PLAN



FOREWORD

The future of the industry in Scotland's territorial waters and the wider UK Continental Shelf is bright, with up to 20 billion barrels of oil still to be recovered, and our focus must remain on efficiency and in maximising the economic recovery from the basin.

Scotland has been at the forefront of developing the oil and gas industry we see today, not just in Scotland's waters, but around the World. The industry here has been established in one of the most challenging environments anywhere and, after more than forty years of production, and associated wear and tear on assets, new exploration and new production wells are now juxtaposed with more mature assets that are reaching the end of their productive life.

Scotland's oil and gas sector is well-known for its ability to innovate and to deliver in those most challenging conditions and we believe it is very well placed to capitalise on the commercial opportunities arising from the decommissioning of end-life assets.

Decommissioning is a key part of the lifecycle of operations in the North Sea and the Scottish Government recognises the significant economic opportunities that it brings. The industry estimate that up to £17.6 billion could be spent on decommissioning over the period to 2025, and we are determined to ensure that the supply chain in Scotland is best placed to capture that work.

The development of this Decommissioning Action Plan is, therefore, an important step towards setting out the strategic direction and actions that the Scottish Government and our Enterprise Agencies will take to support an effective approach to decommissioning, which maximise opportunities for the Scottish supply chain.

There is also a huge prize in terms of the ability to export the capabilities and technology developed by

our supply chain in the North Sea towards other global basins that will be decommissioning in the future.

However, decommissioning involves much more than just the removal of the visible infrastructure, such as topsides and jackets, which we see in the North Sea. In the decommissioning process, the majority of activity has to be undertaken in aspects that are largely invisible to us, and this work is of much higher relative and financial value. Therefore, this Action Plan seeks to bring into sharp focus the range of different activities involved in decommissioning programmes, from high value offshore activity such as well plugging and abandonment, to the relatively lower value contracts for onshore disposal - much of which is yet to be carried out.

The evidence in this Plan demonstrates that Scottish companies are already securing very significant value from a range of offshore decommissioning activities, and that the majority of work is commissioned from UK contractors, with Scottish-based firms already securing the lion's share. However, the aim of the Plan is to maximise the value of all aspects of decommissioning for our supply chain when the opportunities become available. Our commitment to this is outlined in our Programme for Government 2016-17.

This Decommissioning Action Plan has been developed with vital input from industry - for which we are very grateful - and the plan is complementary to the Oil & Gas Authority's Decommissioning Strategy and Delivery Plan.

The current downturn in the oil and gas sector has brought the decommissioning of offshore infrastructure into greater focus and also highlighted the importance of extending field life and maximising economic recovery. The success of this plan is predicated on concerted action by all stakeholders, and I urge everyone to play their part.

Paul Wheelhouse MSP
MINISTER FOR BUSINESS, INNOVATION AND ENERGY

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1. INTRODUCTION

Scotland is recognised internationally as a Centre of Excellence for the global Oil & Gas industry. The world-class supply chain that has developed through 50 years of Exploration & Production (E&P) activity in the United Kingdom Continental Shelf (UKCS) is a key component of this. Supply chain companies in Scotland are known for their expertise, delivery of technological and innovative solutions and exporting this to international oil and gas markets.

The [Scottish Government Economic Strategy](#) sets four priorities for sustainable growth in Scotland: Investment, Innovation, Inclusive Growth and Internationalisation. The Oil & Gas industry is one of our most strategically important industrial sectors and contributes significantly to these priorities.

As a successful oil and gas producing region since the 1970s, the UKCS is a mature basin with an emphasis on 'Maximising Economic Recovery'. The Scottish Government and Enterprise Agencies are fully aligned in support of this principle. Focus will remain on extending field life and late life asset management to support continued development and recovery of the estimated 20 billion barrels of oil and gas remaining.

At the same time, as part of the oil and gas operations lifecycle, when assets do cease production, UK and European legislation require the infrastructure to be decommissioned safely, with due regard to the environment.

Relatively few fields in the UKCS have been decommissioned to date, but this activity is increasing, with many companies in Scotland already active in the oil and gas decommissioning market. Case studies throughout the action plan highlight examples of this but more than 100 have been involved in one significant UKCS project and several Operators have indicated that more than 80% of activity will be delivered by UK supply chain companies.

The economic value for Scotland could be significant – analysis by Scottish Enterprise suggests the estimated Gross Value Add (GVA) of decommissioning activity for Scotland over the next decade could be between £8.3 billion and £11.3 billion; supporting peak employment of 16,925-22,775.

However, large scale decommissioning is relatively new and has brought a new set of challenges. The nature of oil and gas decommissioning is different from investment-led E&P. It represents a significant cost for Operators, Government and taxpayers. Consequently, it is clear that there is a need to undertake decommissioning in a cost-effective manner and to do so, a different mindset and approach is required, while still ensuring that decommissioning is carried out safely, efficiently and effectively. Innovation in developing decommissioning approaches will be key.

As Well Plugging & Abandonment (P&A) is forecast to account for 47% of an estimated £17.6 billion decommissioning spend between 2016 and 2025, this will be a particular area of focus for industry, and companies in Scotland are already competing well for this work. At the other end of the spectrum, Onshore Recycling & Disposal is estimated at just over 1% of spend but is the most visible and remains an important element of the decommissioning lifecycle and an opportunity for Scottish ports and onshore yards.

Operators and supply chain companies are adapting and rising to the challenges. They are building on the expertise gained from operating/servicing UKCS assets and harnessing the extensive existing oil and gas supply chain capability. As a result, a considerable knowledge base is being created through the rigorous planning required for decommissioning and the safe execution of those plans. This provides a strong competitive position.

Decommissioning activity is still at very early stages across the globe, with the exception of shallow water activity in the Gulf of Mexico. Therefore significant scope exists to develop world leading and exportable

capability. Opportunities will also exist for companies in other sectors to adapt knowledge or technology to meet oil and gas decommissioning requirements.

Scottish Enterprise (SE) and Highlands and Islands Enterprise (HIE) therefore aim to establish Scotland as an international Centre of Excellence for decommissioning. We will support the Oil & Gas industry in Scotland to become the leading location for expertise and the development and delivery of effective solutions for decommissioning, capitalising on existing expertise located in Scotland.

INDUSTRY ALIGNMENT

The Oil & Gas Authority (OGA) published a Decommissioning Strategy in June 2016. It identified three priorities:

- Cost certainty and reduction in a technically competent, safe and environmentally responsible manner;
- Decommissioning delivery capability in terms of supply chain expertise and capacity, effectively supported by appropriate business models, contracting arrangements and industry alignment;
- Decommissioning scope, guidance, and stakeholder engagement by working with the Department of Business, Energy and Industrial Strategy (BEIS) and other relevant parties to identify and evaluate opportunities to optimise and define parameters for decommissioning scope and to improve industry engagement with the organisations that regulate the decommissioning process.

The actions set out in this Plan are aligned to the OGA Strategy and priorities, and have been developed using evidence from industry reports and consultation with decommissioning experts within the OGA, BEIS, Operators, supply chain companies, industry organisations and academia.

The OGA's overarching focus will be on minimising costs and working towards achieving at least a 35% reduction in costs relative to the 2015 base case cost. Our actions are intended to help achieve this goal by supporting companies in Scotland to develop and deliver efficient and effective solutions for decommissioning.

Many of the actions will be led by SE and HIE, but the Plan includes some activity to be led by other organisations which we will contribute to or support. We will continue to work closely with the OGA, BEIS, Skills Development Scotland (SDS) and industry bodies such as Decom North Sea (DNS) and Oil & Gas UK (OGUK), to ensure initiatives are aligned or delivered in partnership.

STRATEGIC OBJECTIVES



Achieving these objectives will help Scottish-based companies to secure significant experience and capture an increasing percentage of decommissioning activity in domestic and international markets over the coming decades.

Decommissioning in the UKCS will also provide a strong foundation from which Scottish based companies can develop experience and world-

leading capability and generate export earnings from undertaking projects in international markets as other oil and gas basins mature.

This Action Plan summarises our approach and outlines initial actions to assist this growing and strategically significant sector of the industry. As the sector develops further and evolves, so too will our actions.

2. SCOPE & SCALE OF DECOMMISSIONING OPPORTUNITY

The existing infrastructure within the UKCS that will eventually be decommissioned includes 302 oil and gas installations², 373 subsea installations³, 16,000km of pipelines and more than 5,000 wells. The 302 oil and gas installations include:

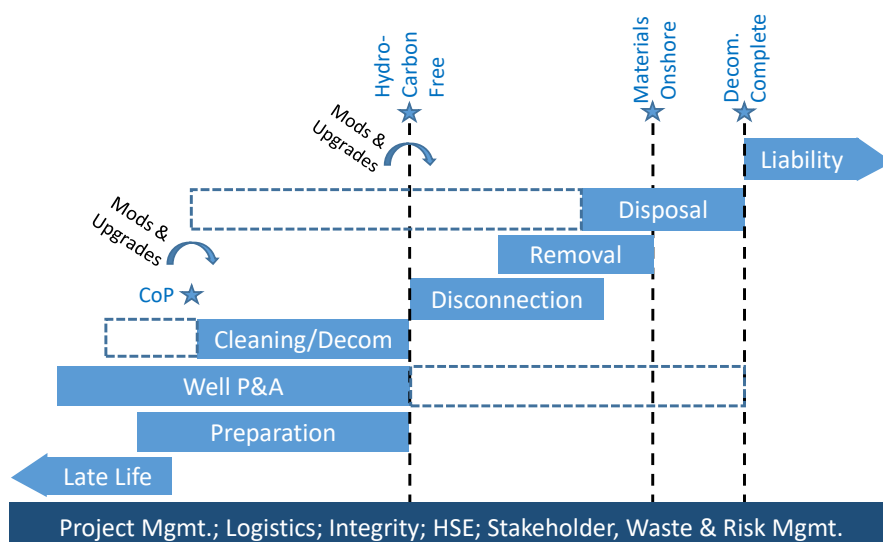
- 241 Small Steel Platforms
- 31 Large Steel Platforms (jacket weighing >10,000 tonnes)
- 19 Floating Production Storage and Offloading (FPSO) / Floating Process Facility (FPF)
- 8 Concrete Gravity Based Platforms
- 3 Jack-Up Platforms

Decommissioning this infrastructure requires consideration of a number of factors including regulatory requirements, technical feasibility (influenced by the original installation design), health, safety, security and environmental implications, economics and the strategies implemented by oil and gas Operators.

The removal of platforms will therefore differ and various methodologies will be considered. For example, fixed steel platforms will be considered for removal through single lifts of the topsides and jackets, removal in sections, or dismantling offshore in small pieces. Floating facilities and jack ups will be towed to shore and platforms that have a concrete gravity base or large steel jackets may apply for derogation to obtain permission to leave the substructure or part of it in place on the seabed.

The decommissioning stages illustrated in Figure 1 below will be common to most projects; however, the specific approach taken will be customised to each installation.

FIGURE 1: DECOMMISSIONING STAGES



Source: Scottish Enterprise, Accenture and Decom North Sea (2013)⁴

² Table of Current UKCS Installations, August 2016

³ OSPAR Offshore Database 2015

⁴ Decommissioning in the UKCS, Scottish Enterprise, Decom North Sea and Accenture 2013

Although relatively few fields have been decommissioned to date, several are currently in the process of being decommissioned and many others are entering late life operations or in the early stages of planning for decommissioning.

The table below highlights key parameters forecast for UKCS decommissioning activity over the next decade.

- 94% of UKCS projects do not yet have firm timings and are still in the early planning stages. (p.6)
- In the Central and Northern North Sea, 82% of platform topsides and 90% of substructures due for removal are yet to be contracted (p.30)

[Oil & Gas UK, 2016]

TABLE 1: ACTIVITY FORECAST 2016 TO 2025

	Southern North Sea and Irish Sea	Central North Sea	Northern North Sea and West of Shetland	Total
Number of projects*	39	83	31	153
Numbers of wells for P&A	396	644	430	1,470
Proportion of wells that are platform wells	80%	37%	73%	60%
Number of platforms for removal	67	16	12	95
Topside weight to be removed	90,260 tonnes	187,238 tonnes	262,022 tonnes	539,520 tonnes
Substructure weight to be removed	63,745 tonnes	71,056 tonnes	96,737 tonnes	231,538 tonnes
Number of mattresses to be decommissioned	4,526	5,979	1,162	11,667
Subsea infrastructure to be removed	4,268 tonnes	56,714 tonnes	1,697 tonnes	62,679 tonnes
Number of pipelines to be decommissioned	200	484	96	780
Length of pipelines to be decommissioned	3,426 kilometres	2,666 kilometres	1,038 kilometres	7,130 kilometres
Total tonnage coming onshore	164,834 tonnes	369, 190 tonnes	360,456	894,480 tonnes

* Project is defined by the operator and can range from a single well for P&A to multi-platforms.

DECOMMISSIONING EXPENDITURE

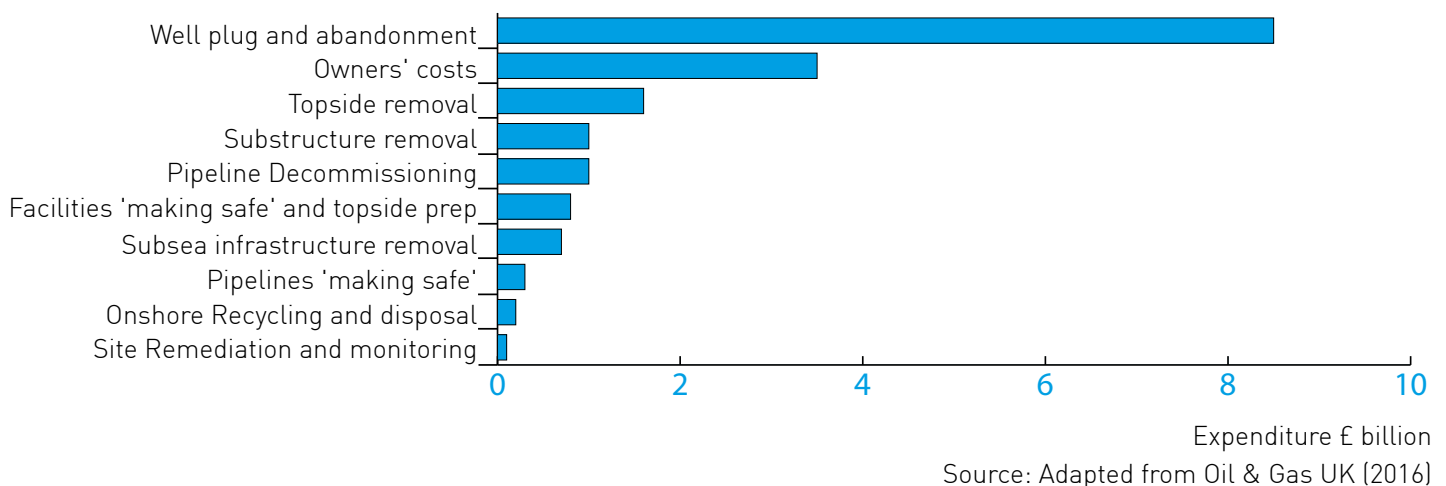
Oil & Gas UK's 2016 Decommissioning Insight report forecast spend of £17.6 billion between 2016 and 2025. This has been broken down in Figure 2 below to highlight the estimated spend in specific areas of activity.

The area with the most significant spend, which accounts for 47% of the total, is Well Plugging & Abandonment; while the smallest proportion of

expenditure is for Site Remediation and Monitoring at less than 1% and Onshore Recycling & Disposal at 1.2%.

This provides a good indication of scale and value, hence where industry will initially focus to ultimately reduce costs.

FIGURE 2: DECOMMISSIONING SPEND BY ACTIVITY 2016-2025



⁵ Gross Value Add (GVA) is an indicator of wealth creation, measuring contribution to the economy from economic activity. GVA is defined as the value of the output produced over a specified period, less the value of the goods and services consumed as inputs to the production process. Estimating GVA is not an exact science and relies on the evidence available and a set of underlying assumptions.

GROSS VALUE ADD FOR SCOTLAND

Based on Oil & Gas UK's expenditure forecast of £17.6 billion for 2016-2025, the Gross Value Add⁵ (GVA) of decommissioning activity for Scotland has been estimated at between £8.3 billion and £11.3 billion for the same period; supporting peak employment of between 16,925-22,775.

The figures represent cumulative impacts at 2016 prices and include direct impacts from businesses participating in decommissioning activity and indirect impacts from the uplift in supply chain activity from an increase in inputs and services.

The range calculated was in accordance with low and high scenarios for the percentage of decommissioning activity that companies in Scotland could potentially deliver; shown in Table 2. This was estimated from analysis of information following the industry consultation.

TABLE 2: SCENARIO BREAKDOWN OF POTENTIAL ACTIVITY

ACTIVITY	SOUTHERN NORTH SEA		CENTRAL AND NORTHERN NORTH SEA	
	Low %	High %	Low %	High %
Well P&A	40	60	70	90
Operator project management	40	60	70	90
Removal and associated activity	10	20	35	55

3. STRATEGIC OBJECTIVES AND ACTIONS

This section sets out the actions that will be undertaken to support development within the oil and gas decommissioning sector and to maximise opportunities for the Scottish supply chain. They were identified following analysis of the industry consultation and review of decommissioning studies. The actions are intended to help promote strengths and address challenges and opportunities. Appendix A provides a summary of the analysis.

The actions are designed to support achievement of each of the six strategic objectives outlined below:

- **Information and Stakeholders**
 - improve the information available to the supply chain, operators and other stakeholders to support decommissioning activity
- **Supply Chain Capability**
 - promote and develop decommissioning knowledge and capabilities of Scottish-based supply chain companies
- **Technology and Innovation**
 - support development and deployment of technology and innovation contributing to cost-effective solutions
- **Competitive Infrastructure**
 - encourage development of appropriate port and onshore yard infrastructure
- **Skills and Training**
 - develop skills and training to achieve a flexible, safe and efficient workforce recognised for competency across the breadth of decommissioning activities
- **International Opportunities**
 - identify and develop opportunities for international trade and potential inward investment

Actions to be delivered by SE and HIE are identified as 'Our Actions' and have been allocated timescales as follows:

- short term (up to 6 months)
- medium term (6 months – 2 years)
- long-term (>2 years)

We will also be involved in other activities that will be delivered in partnership. These actions are identified within 'How we will support others'. Many of these have yet to be scoped and planned; therefore it is not currently appropriate to allocate timescales.

INFORMATION AND STAKEHOLDERS

STRATEGIC OBJECTIVE

Improve the information available to the supply chain, operators and other stakeholders to support decommissioning activity

BACKGROUND

Greater visibility of planned and future decommissioning activity is needed to generate better knowledge, understanding and alignment of all stakeholders to support strategic planning and delivery of industry requirements.

OUR ACTIONS

Develop an economic model to track decommissioning costs and enable analysis of the potential economic value of the market to Scotland over the long term	Short - Long term
Benchmark decommissioning activities by companies in Scotland to determine baseline and establish appropriate measures to track progress	Short - Medium term
Develop key facts to facilitate a common understanding of the level of Scottish activity and value of decommissioning to Scotland and share/discuss with stakeholders e.g. Scottish Government, Local Authorities, Trade Unions	Short term

HOW WE WILL SUPPORT OTHERS...

Work with OGA, DNS, OGUK and industry to provide more detailed information on decommissioning projects, contracts, specific opportunities/ challenges and levels of activity in Scotland

Continue to support DNS with development of the Late Life Planning Portal (L2P2) to share lessons learned and enable companies to understand the planning process with significant scope to extend to execution phase

SUPPLY CHAIN CAPABILITY

STRATEGIC OBJECTIVE

Promote and develop the decommissioning knowledge and capabilities of Scottish-based supply chain companies

BACKGROUND

A deeper understanding of current supply chain capability needs to be developed with support provided to build on existing knowledge and experience to develop world-class capability.

OUR ACTIONS

Provide guidance and assist companies to access the Enterprise Agencies support in areas such as operational efficiency, stimulating innovation and R&D, strengthening leadership, developing people, gaining entry to international markets and leverage on investment	Short -Medium term
Develop and publish a Scottish capability statement highlighting decommissioning strengths	Short term
Develop a Decommissioning Support programme to provide expert advice to 50 companies between 2017-2019 to support decommissioning and creation of collaborative approaches to assist Scottish-based SME's offer a wider range of competitive combined services	Medium term

HOW WE WILL SUPPORT OTHERS...

Work with OGA and DNS to develop a supply chain capability matrix for UK wide use and assist with Scottish content

Work with OGA, DNS and OGUK to encourage operators and tier 1 contractors to engage early with the supply chain to provide companies with opportunities to understand requirements and develop/offer appropriate cost effective solutions

Promote Scottish Government strategy⁶, Zero Waste Scotland and DNS initiatives encouraging re-use and remanufacture of decommissioned equipment

⁶ Making Things Last, A Circular Economic Strategy for Scotland, Scottish Government, 2016

CASE STUDY



Xodus, headquartered in Scotland, provides integrated engineering and advisory support to clients in the oil and gas, renewables and utilities industries worldwide.

Xodus has completed over 80 decommissioning projects including comparative assessment studies, review of decommissioning concepts, qualitative and quantitative decommissioning studies, technical feasibility studies, pipeline cleaning strategies, determining cost and schedule estimates, Environmental Impact Assessments (EIA), supporting environmental studies, decommissioning programmes and Independent Review Consultancy (IRC) services

This strong track record includes projects such as:

- Nexen Petroleum - Ettrick & Blackbird subsea decommissioning FEED
- Oil & Gas UK - industry review of pipeline decommissioning removal techniques and costs
- Repsol - full regulatory support for Rev pipeline decommissioning
- Shell - Brent field pipelines detailed concept selection, including cleaning strategy
- Tullow Oil - Thames Area decommissioning concept selection

CASE STUDY



Bibby Offshore, headquartered in Scotland, provides project management, engineering, subsea construction and inspection, repair and maintenance services to the oil and gas subsea sector.

Decommissioning has been a key area of focus for Bibby Offshore for many years and it has built up a strong track record supporting clients, globally.

One example was a contract award from Endeavour International Corporation for the Renee and Rubie decommissioning project in 2015. Using their ROVSV, Bibby completed a side scan sonar survey, sub-bottom profiling, pipeline and mattress surveys. The recovery phase involved subsea preparation works to ensure the safe and efficient recovery of the production manifold, cross-over structure, 2.5km of rigid flowlines, control umbilicals, concrete mattresses and general debris. All materials were offloaded at Peterhead Harbour for recycling and disposal safely and responsibly with minimal environmental impact.



CASE STUDY



Expro provides services and products that measure, improve, control and process flow from high-value oil and gas wells, across the full lifecycle of the well. This includes a strong focus on mature field production optimisation, late field life enhancement and well decommissioning.

With over 40 years of experience, our 4200 employees operate in over 50 countries, providing the highest levels of safety and service quality. This allows us to deliver a truly world-class, fully integrated decommissioning service solution.

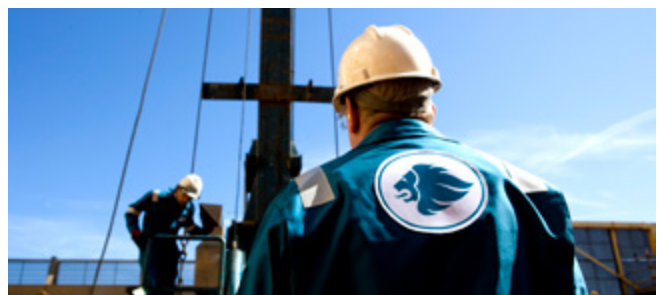
Technology development and adaptation is part of Expro's abandonment approach. This is demonstrated through our long-term working relationships with technology partners, including perforating systems company, Owen Oil Tools. This recent collaboration resulted in successful design, development, testing, build and delivery of three new PAC™ gun systems within 80 days of award. The new gun systems was designed as per the client's abandonment requirements to provide selective multiple perforation with limited damage to secondary string regardless of primary to secondary string orientation.

Our late life /well abandonment project portfolio includes the following key aspects:

- Production enhancement solutions
- Well integrity data management
- Ranking of project abandonment candidates
- Selection of appropriate abandonment strategies
- Implementation of identified well abandonment techniques, technologies and procedures
- Wireless barrier monitoring for temporary abandonment
- Well-site supervision of abandonment Operations

This includes a strong track record of projects/clients:

- Decommissioning studies / RA - Talisman Galley; Hess IVRR; Centrica Rough A5; Exxon Mobil Welland
- Pre-abandonment well intervention - Repsol-Sinopec Beatrice A, Saltire; Shell Armada
- Rigless P&A - BP Miller; Apache GOM; Perenco SNS



TECHNOLOGY AND INNOVATION

STRATEGIC OBJECTIVE

Support development and deployment of technology and innovation contributing to cost effective solutions

BACKGROUND

Innovative approaches, adapted current technology and new technology will be key to delivering effective and efficient decommissioning projects to help meet the OGA target of reducing the cost of decommissioning by 35%.

OUR ACTIONS

Offer Decommissioning Innovation Review to 4-6 Operators between 2017-2019 to introduce innovative thinking and concepts to project development and delivery for those developing decommissioning programmes

Short - Medium term

Between 2017-19 engage with 150 companies to raise awareness of and stimulate demand for Innovation and R&D support – Seek & Solve, Collaborative R&D, Open Innovation Challenges, R&D and SMART Scotland grants

Short - Medium term

Provide guidance concerning support and funding at EU, UK and Scottish levels for companies seeking to develop term technology or innovative solutions

Short - Medium term

HOW WE WILL SUPPORT OTHERS...

Work with the Oil & Gas Innovation Centre (OGIC), and the Oil & Gas Technology Centre (OGTC) to identify decommissioning technology priorities, companies with potential solutions and routes to market to deploy solutions

Continue to work with industry to understand the potential for “digital oilfield” as an enabler for decommissioning and with partners such as Datalab, CENSIS and Innovate UK develop appropriate support / funding mechanisms.

CASE STUDY:



Exceed, headquartered in Scotland, delivers integrated well project management and engineering solutions for its international customers. Operations include drilling, well testing, completions, production technology, subsea tree installation intervention/workover and decommissioning.

Exceed were part of the team that project managed the pre-works intervention for HESS decommissioning project awarded in 2010. The workscope included:

- Preparation of 7 wells to accommodate rig abandonment programme
- Recovery of tree caps
- Confirmation of production packer integrity
- Disconnection and blanking of flow lines, umbilical's, trees and manifold outlets
- Confirmation of tree valve barrier integrity post suspension plug installation

Based on offering proven, experienced engineers with a flexible commercial model to suit customer requirements, Fairfield Energy awarded Exceed the Well Engineering Services contract in 2016 for decommissioning the 45 platform wells on Dunlin and 16 subsea wells on Osprey fields.

Exceed have formed strategic collaborative alliances with major service providers. Through continuous review of industry best practice, available tooling and new technology, Exceed continues to expand their wells decommissioning capability to offer the best technical and commercial solutions.



COMPETITIVE INFRASTRUCTURE

STRATEGIC OBJECTIVE

Encourage development of appropriate port and onshore yard infrastructure

BACKGROUND

The onshore element of decommissioning is a small proportion of total costs yet offloading and dismantling oil and gas infrastructure at ports and onshore yards is the most visible component. Scotland's Ports are ideally located and many already support decommissioning but water depth and capacity constraints exist (existing capacity of main ports outlined in Appendix B). Currently, large topsides, modules and jackets cannot be offloaded directly from Heavy Lift Vessels to quaysides. Therefore there is a need to better understand market demand and the pipeline of potential activity to determine potential future investment requirements.

OUR ACTIONS

Influence industry to provide better forward market information to enable port operators to assess whether further investment in ports can be economically justified

Short term

Continue engagement with ports and onshore yards to encourage a strategic approach in the provision of appropriate facilities including consideration of potential investment to improve facilities

Short - Medium term

Work with Ports and Onshore Yards to provide more detailed information on current/planned facilities and capability/ capacity to handle specific type and size of oil and gas assets and wastes. Update 'Scottish Energy Ports'⁷ website with improved information

Ongoing

HOW WE WILL SUPPORT OTHERS...

Working with SEPA and other regulators to provide consolidated information on consenting, licensing and waste management requirements for onshore decommissioning facilities

⁷ <https://www.sdi.co.uk/knowledge-hub/articles/insight/scottish-energy-ports>

CASE STUDY



Veolia-Peterson, a joint venture between environmental services provider Veolia and global logistics specialist Peterson, provides full decommissioning services including decontamination, deconstruction, waste management and environmental services together with associated logistics, marine and quayside operations.

Veolia-Peterson has decommissioning ready facilities in Lerwick, Great Yarmouth and Teesport in the UK, and Lutelandet, Norway. To date the joint venture has recovered over 75,000 tonnes of offshore materials and achieved 'excellent' environmental assessment ratings in the process.

The flagship location of the partnership is Greenhead Base in Lerwick, Shetland where ~60,000te has been landed for decommissioning. The base has a new Single Lift ready quayside (the only quayside in Scotland capable of receiving Single Lift structure loads of 60te/m²) and a 20,000m² fully permitted

decommissioning pad capable of handling major decommissioning projects, with expansion plans for the future.

Projects include:

- Total Frigg TCP2 Single Load-in of ~10,000te Module Support Frame.
- Total Frigg MCP-01 Piece Small receipt, processing (~10,000te) and Project Logistics base.
- HESS FFFA & IVRR Subsea structures, ~16,000te of material reused, recycled and disposed.
- West of Shetland redevelopment/ decommissioning project, handling ~12,000te of subsea structures, risers, moorings and chain, and transportation of new structures/material offshore for deployment.
- CNR Murchison Safe handling/ processing of 4,500te of conductors from the platform.



SKILLS AND TRAINING

STRATEGIC OBJECTIVE

Develop skills and training to achieve a flexible, safe and efficient workforce recognised for competency across the breadth of decommissioning activities

BACKGROUND

Skills and workforce adaptability is a key component of a competitive supply chain and a critical factor to building and retaining a sustainable competitive advantage. Decommissioning offshore oil and gas assets will demand many of the same skill sets required for E&P activity. However, as different mindsets and approaches are required the skills and knowledge transfer achievable from the existing workforce will need to be identified and support given to orientate these into the decommissioning environment, recognising changing demands and processes.

SKILLS DEVELOPMENT SCOTLAND ACTIONS

Identify and engage Employers and Skills & Learning providers to articulate key skill requirements for current and planned decommissioning activity.	Short term
Engage with other industries (e.g. nuclear) to identify potential to adapt or modify their expertise to oil and gas decommissioning and promote within the industry	Medium term
Develop decommissioning work programme and build a Labour Market Insight Model (LMIM), to capture scale, duration and technology and skill requirements for successful deployment.	Medium term

HOW WE WILL SUPPORT OTHERS...

Encourage companies to capture skills developed from decommissioning projects and share via case studies

Help to promote UK's first Masters degree for Decommissioning (University of Aberdeen and Robert Gordon University)

Work with key partners and stakeholders to establish data sharing requirements to inform the LMIM

INTERNATIONAL OPPORTUNITIES

STRATEGIC OBJECTIVE

Identify and develop opportunities for international trade and potential inward investment

BACKGROUND

The UKCS is currently the world's second largest region for oil and gas decommissioning following significant levels of activity in the Gulf of Mexico. With decommissioning also taking place in other regions, there is immediate and long-term potential to export knowledge, skills and services but also to develop understanding and learning from others.

OUR ACTIONS

Explore opportunities for alliances with Heavy Lift Vessel operators and/or potential investment within Scotland	Short - Medium term
Publish a capability statement for international markets highlighting: <ul style="list-style-type: none"> • Scotland's knowledge, experience and strengths • inward investment opportunities 	Medium term
Identify projects in key overseas locations and potential opportunities for supply chain companies in Scotland	Medium term
Establish relationships with overseas decommissioning regulators and operators and promote Scottish supply chain companies	Medium - Long term
Facilitate trade missions to/from Scotland for international organisations involved in decommissioning and explore inward investment and partnership opportunities	Medium term

HOW WE WILL SUPPORT OTHERS...

Work with Department of International Trade on UK wide initiatives to strengthen decommissioning offer and to support inward investment / trade missions to international markets

4. DEVELOPING & DELIVERING EXCELLENCE FOR SCOTLAND

Decommissioning oil and gas infrastructure on the UKCS is a growing sector which provides the opportunity to develop industry leading capabilities. Many companies in the Scottish oil and gas supply chain are already active in decommissioning, supporting Operators to deliver decommissioning programmes.

The enormous consideration that goes into determining the scope and how to execute decommissioning plans has created a knowledge base that is extremely advanced. Alongside, the supply chain in Scotland is well known for the ability to deliver technological and innovative solutions for the oil and gas industry. However, decommissioning is still a relatively new sector and more must be done to increase efficiency and importantly, reduce costs.

Underpinning all of this is the need for effective information sharing. It is fundamental to designing and delivering efficient practice and processes, and helps companies better consider opportunities for investment and development, whether for technology,

infrastructure, processes or people. Appropriate information provides the ability to develop a common understanding and create a shared vision. From such a platform, it is possible to develop different approaches and realise true collaborative working.

Achieving the actions set out in this plan will deliver progress towards our objectives and overall aim for decommissioning. This will require ongoing development over the decades to come but importantly; will take place alongside our ongoing focus on extending the life of fields and Maximising Economic Recovery on the UKCS.



We would like to thank Re-Energise for the ongoing support throughout the preparation of the Action Plan and the following companies and organisations for their valuable advice and input during the consultation exercise:

- Aberdeen Harbour
- Aker Solutions
- ASCO
- ATKINS
- Babcock International
- Bibby Offshore
- Bilfinger Salamis
- BP
- CNR International
- Decom North Sea
- Department for Business, Energy & Industrial Strategy
- Expro Group
- Fairfield Energy
- Forth Ports
- Global Energy Group
- John Lawrie Group
- Lerwick Port Authority
- NorSea Group
- Oil & Gas Authority
- Oil & Gas Institute, Robert Gordon University
- Oil & Gas UK
- Peterson
- Port of Cromarty Firth
- Premier Oil
- Shell
- Subsea 7
- Wood Group PSN

We look forward to continuing our work, together with industry, to establish Scotland as a location for decommissioning excellence and to export this to other international oil and gas basins as decommissioning activity develops.

APPENDIX A: ANALYSIS - STRENGTHS, OPPORTUNITIES AND CHALLENGES

The following summarises the strengths, opportunities and challenges for decommissioning in Scotland based on the industry consultation and decommissioning studies^{8,9} previously carried out by Scottish Enterprise and partners. They have broadly been aligned to Oil & Gas UK's 2013 Work Breakdown Structure (WBS) below, which describes key activities within each area.

WORK BREAKDOWN STRUCTURE

Operator Project Management	Project management core team, stakeholder engagement, studies to support decommissioning programme and scope definition/method development, decommissioning programme preparation and decommissioning programme reporting/close-out (admiralty charts, fish safe etc).
Facility running/owner costs	Logistics (aviation and marine), operations team, deck crew, power generation, platform services, integrity management (inspection and maintenance) and operations specialist services e.g. waste management.
Well P & A	Rig upgrades, studies to support well programmes, well suspension (spread rate/duration), wells project management, operations support, specialist services e.g. wireline, conductor recovery, cleaning and recycling, vessel.
Facilities / pipelines making safe	Operations (drain, flush, purge and vent), physical isolation (de-energise, vent and drain), cleaning, pipeline pigging and waste management.
Topsides preparation	Engineering-up of temporary utilities (power, air and water), module process/utilities separation, dropped object surveys and subsequent remedial actions.
Topsides removal	Removal preparation (reinforcements and structural separation for removal) vessels operations, sea-fastening, transportation and load-in.
Substructure removal	Removal preparation, removal, vessels, sea-fastening, transportation and load-in.
Topsides and substructure onshore recycling	Cleaning and handling hazardous waste, deconstruction, reuse, recycle, disposal and waste management accounting (traceability of all streams).
Subsea infrastructure (pipelines, umbilicals)	Vessel preparation for subsea end-state (remove, trench, rock-dump), sea-fastening and transportation, load in, subsea project management and waste management accounting (traceability of all streams).
Site remediation	Pile management, oil field debris clearance (500m zone and 200m pipeline corridor) and over-trawl surveys.
Monitoring	Navigation aids maintenance and monitoring programme for any facilities that remain.

8 Decommissioning in the North Sea, Decom North Sea, Scottish Enterprise and ARUP, 2014

9 Decommissioning in the UKCS, Decom North Sea, Scottish Enterprise and Accenture, 2013

STRENGTHS

Operator Project Management

- Operators and main contractors highly experienced in project management and have strong asset knowledge
- Supply chain highly experienced in technical, engineering and environmental studies/analyses

Facility Running / Owner Costs

- Supply chain highly experienced providing people/services/equipment to operate offshore installations
- Experienced incumbent contractors often provide decommissioning services

Well Plugging & Abandonment

- Mature market for well services with extensive expertise, tools and technology associated with drilling, completions and interventions
- Established presence of global contractors in Scotland, with experience of complex well situations and well abandonment from other regions
- Technology development strongly associated with supply chain companies in Scotland

Facilities / Pipelines Making Safe

- Strong supply chain capability, experience and knowledge of shut down operations e.g. flushing/cleaning, pipeline pigging and waste management
- Innovative technologies brought to market such as inline cleaning and inspection
- Supply chain has good understanding of asset base

Topsides Preparation

- Supply chain supports wide range of preparation e.g. temporary power, scaffolding, rope access, disconnection and structural integrity
- Good cutting capability with various proven technologies
- Incumbent contractors are familiar with installations

Topsides, Substructure and Subsea Infrastructure Removal

- Removal often driven by asset proximity - Scotland well-placed for Northern/Central North Sea
- Experienced project management and support capability in Scottish supply chain
- Leading subsea supply chain - vessel and service providers with strong capability and capacity
- Vessels owners and range of Scottish ports well placed to compete for subsea and piece small infrastructure removal
- DSV, construction, support vessels and services contractors support single lift and reverse installation methods which reduce offshore work, man-hours and safety hazards

Onshore Recycling & Disposal

- Onshore recycling and disposal is a mature sector with established supply chain partnerships
- Established contractors are experienced in handling hazardous materials
- Increasing awareness of Circular Economy approaches focusing on re-use/re-manufacturing

Site Remediation & Monitoring

- Proven capabilities within Scottish supply chain for site remediation and monitoring activities, particularly within marine mammal science, environmental impact of cutting piles, debris removal, survey and sampling

OPPORTUNITIES/CHALLENGES

Operator Project Management

- Limited visibility of projects and timing of activity. More detailed information will enable greater understanding and support development /investment
- Decommissioning is driven by existing legislation/regulations – need to determine whether this supports delivery of overall most efficient operation
- Need to optimise planning/execution within cost-conscious environment
- Operators may not want to become decommissioning experts. Supply chain could develop programme management/joint venture/consortium approaches for late life/decommissioning
- Few large scale decommissioning projects to date, so lack of continuity and experience
- Sharing lessons learned and promoting best practice will increase pace of development
- Most projects adopt traditional investment or bespoke approaches. Standardised approaches would create transparency of what takes place, when, so supply chain understand entry points
- New operating models called for - expertise from other industries could lead to more efficient models that support a shared risk/reward culture but must align with oil and gas safety culture

Facility Running / Owner Costs

- Lack of asset knowledge may limit new entrants and potentially inhibit competition

Well Plugging & Abandonment

- Well P&A is the most expensive activity - greater efficiency would result from more efficient planning and execution prior to Cessation of Production (CoP)
- Innovative approaches / solutions required to reduce costs but limited progress achieved. Establishment/consolidation of dedicated Well P&A forum may stimulate
- Collaborative approach incorporating consortia of Scottish based SMEs has potential to offer a turnkey campaign solution across multiple assets and multiple operators
- Technology development should be prioritised; risk of other geographies driving development
- Wells suspended for long periods particularly challenging - conditions deteriorate with time and complexity increases. Minimising well-suspension time may require greater legislative stimulus
- Regulatory environment and liability in perpetuity may be impacting scope and cost

Facilities / Pipelines Making Safe

- Challenges around the identification and characterisation of hazardous materials. Technologies have improved but scope for better quantification
- Industry would benefit from standard approach to required level of cleanliness prior to removal of infrastructure, or for pipelines that remain in situ
- Disposal routes and regulatory compliance for waste management can be complex. Disposal contractor should be integrated earlier in the process

Topsides Preparation

- Tendency to engineer solutions same as new investment projects. This may not be necessary but must be done safely and with environmental responsibility

Topsides, Substructure and Subsea Infrastructure Removal

- Market not consolidated on approach to removing topsides. Method to be used generally unknown until commercial tendering has taken place
- Single lift and reverse engineering potentially prevalent in NNS and CNS - require HLV and significant engineering for structural integrity
- HLV capacity is limited and expensive. Vessels/removal contractors foreign owned and often awarded EPRD contracts so use foreign established deep-water ports/disposal yards
- Stronger relationships/partnerships with Scottish ports and supply chain needed and demonstration of Scottish capability and capacity
- Limited deepwater infrastructure in Scotland to directly receive large topsides, modules or jackets. HLV-Barge transfer in sheltered water close to ports used instead but results in double handling - increases risk, time and cost
- Foreign facilities and consortia supported/funded by national Governments are currently lower cost option. To capture large scale decommissioning investment needed
- Innovative solutions through technology or novel contracting could mitigate HLV constraints. Ports and consortia are developing flexible approaches but greater support needed

Onshore Recycling & Disposal

- Competition from European ports and yards with deep water access and range of complementary capabilities. Links needed between removal contractors, Scottish ports/yards
- Limited facilities with permits and capability for hazardous waste. Potential for strategic development. Better understanding of facilities and locations required
- HLV operators may have flexibility for when to remove structures - this may create uncertainty for onshore preparation and availability of onshore facilities
- Difficult for companies to invest in greater capacity and capability without proven demand
- Steel recycling facilities and other final disposal options are not located in Scotland, which increases transportation and cost

Site Remediation & Monitoring

- Long term monitoring can enable businesses to forecast activity. An industry-wide solution for ongoing monitoring may have beneficial impact on costs
- Regulatory changes for operator liabilities or environmental requirements may impact long term arrangements between operators and the supply chain or increase scope and cost

APPENDIX B: MAIN SCOTTISH PORTS – SUMMARY OF CURRENT CAPACITIES

Facility	Quayside Length Total	Longest Quay	Deepest Berth Draft (m) (all below CD)	Heaviest Quay Weight bearing	Associated Open Area behind Quayside (except where noted)
Aberdeen*	1475m	525m	9m	10t per sqm	11ha
Energy Park Fife	360m	184m	5.7m	20t per sqm	38ha
Kishorn	453m (inc. dry dock)	160m (dry dock)	13m (dry dock)	25t per sqm	19ha
Lerwick (Dales Voe)*	127m	127m	12m	60t per sqm	4 ha
Lerwick (Greenhead Base)*	785m	785m	9m	Heavy Lift Pads 10t per sqm	20ha
Lyness	385m	171m	9m	150t per sqm	30 ha (laydown and storage area)
Montrose	977m	251m	9.5m	15t per sqm	1.4ha
Nigg	910m	370m	12m	50t per sqm	10.85ha
Peterhead*	1169m	754m	10m	20t per sqm	10.6ha
Port Babcock Rosyth	2830m	300m	12m	15t per sqm	
Port of Cromarty Firth	950m	805m	14m	12t per sqm	7.5ha
Port of Dundee*	1100m	445m	9.5m	6.3t per sqm	2.2ha
Wick	1366m	140m	4.5m	11.5t per sqm	1.22ha

* Ports with current expansion plans

APPENDIX C: TABLE OF ABBREVIATIONS

BEIS	Department of Business, Energy and Industrial Strategy
DIT	Department of International Trade
DNS	Decom North Sea
DSV	Dive Support Vessel
E&P	Exploration & Production
EIA	Environmental Impact Assessment
EPRD	Engineering, Procurement, Removal and Disposal
FEED	Front End Engineering and Design
FFFA	Fife, Flora, Fergus & Angus Fields
FPF	Floating Production Facility
FPSO	Floating Production Storage and Offloading
GVA	Gross Value Add
ha	Hectares
HIE	Highlands and Islands Enterprise
HLV	Heavy Lift Vessel
IRC	Independent Review Consultancy
IVRR	Ivanhoe & Rob Roy Field
LMIM	Labour Market Insight Model
m	Metres
m ²	Square Metres



MER	Maximising Economic Recovery
MSP	Member of the Scottish Parliament
OGA	Oil & Gas Authority
OGIC	Oil & Gas Innovation Centre
OGTC	Oil & Gas Technology Centre
OGUK	Oil & Gas UK
P&A	Plugging & Abandonment
RA	Root-cause Analysis
ROV	Remotely Operated Vehicle
ROVSV	Remotely Operated Vehicle Support Vessel
SE	Scottish Enterprise
SEPA	Scottish Environmental Protection Agency
SNS	Southern North Sea
sq m ²	Square Metres
SV	Support Vessel
t	Tons (UK)
te	Tonnes (Metric)
te/m ²	Tonnes per square metre
UKCS	United Kingdom Continental Shelf
WBS	Work Breakdown Structure

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