

From late-life operations to decommissioning – maximising value at every stage

The third article in our “Future of the North Sea” series

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The recent arrival in the North Sea of the world's largest ship, Allseas' giant heavy lift vessel, the Pioneering Spirit, to begin work removing the Delta platform from the iconic Brent field, is a clear signal that decommissioning activity in the basin is now fully underway. In the last two years, and for the first time in the basin's history, the number of UK wells that were plugged and abandoned exceeded the number drilled for exploration and appraisal. Decommissioning also presents one of the few guaranteed industrial growth sectors in the region and, as such, is a significant business opportunity. However, before reaching this stage, there are other opportunities to capture value which are being missed. It is crucial to ensure that the whole process, from late-life asset management through to final decommissioning, is as effective and efficient as possible.

This article, the third in our “Future of the North Sea” series, sets out the four essential elements for success: developing clear late-life asset strategies, maximising value from very late phase operations, applying best-practice capital project approaches to decommissioning and developing a supportive regulatory environment for the North Sea.

Today, decommissioning of oil and gas infrastructure in the North Sea is truly underway. The recent step-up in activity comes after a 20-year period in which the pace and scale of decommissioning were consistently slower and smaller than expected, due to technical improvements and a buoyant oil price that enabled greater recovery and extended field life. The impact of this was remarkable – in 1997 the industry forecast that, by 2006, 43 major assets would have been decommissioned. In fact, by 2006 only three assets had actually been decommissioned, and production from the remaining 40 was over 250,000 barrels per day.¹ However, this unexpected run is coming to an end – in the past five years, 27 UK fields ceased production and a third of them have approached the regulator for approval to decommission. The number of wells plugged and abandoned in the UK has more than tripled in the past three years, and now exceeds the number of exploration and appraisal wells drilled (see *Exhibit 1*). Operators are scheduled to plug and abandon over 900 wells to 2023, and spend at least £15 billion² on decommissioning existing assets; on the NCS, decommissioning spend may approach £7 billion³ over the same period. Decommissioning activity is likely only to accelerate should the oil price remain at current levels, as more and more fields fail to generate sufficient revenue to cover operating costs.

Decommissioning is an expensive and challenging activity and one that operators try to push as far into the future as possible. It requires operators to divert cash and human resources away from revenue-generating activities, and removes the option to use the asset in the future to access and develop oil and gas production, both for the operator but also for the holders of adjacent licences who might use the infrastructure. We believe that industry thinking needs to shift. Effective decommissioning – and, before that, efficient late-life asset management and operations – are fundamental to maximising the economic potential of the region. However, this will require much more innovative ways to keep costs low and so defer decommissioning in the current oil price

¹ “The surprising story of the Brownfield Forty-Three”, McKinsey & Company, SPE conference presentation, December 2011

² Oil & Gas UK, Decommissioning Insight 2014

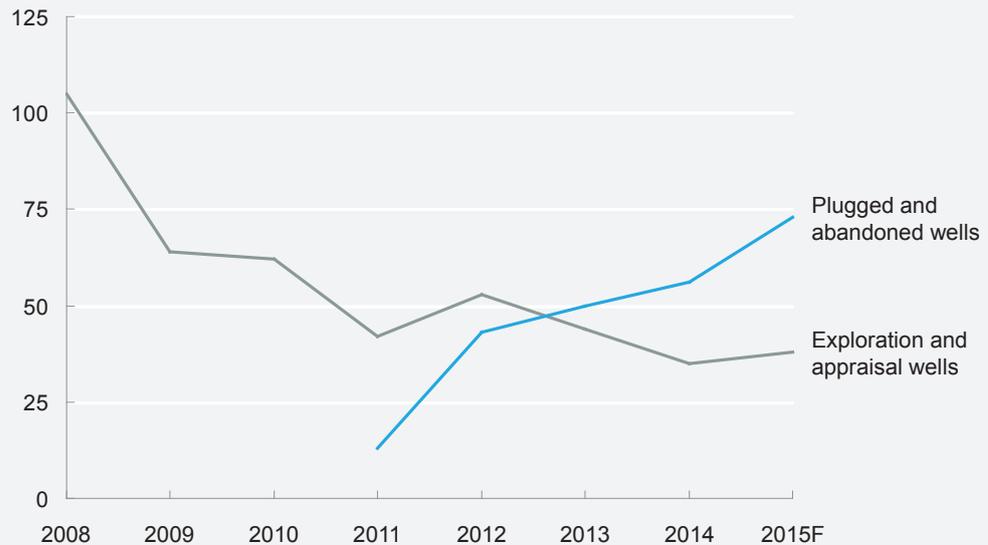
³ Decom North Sea, Review of Decommissioning Capacity, October 2014

Exhibit 1

The number of UKCS wells plugged and abandoned per year now exceeds those drilled for exploration and appraisal

Well activity in the UKCS

Number of wells drilled



SOURCE: DECC; Oil & Gas UK, Annual Activity Surveys and Decommissioning Insights

environment, but also operators must begin to accept the inevitable and prepare for cost-effective and safe decommissioning. The UKCS Maximising Recovery Review led by Sir Ian Wood has pointed out the need to avoid the premature decommissioning of key assets and infrastructure, but to also capture a “competitive industrial capability” as decommissioning progresses.⁴

The opportunity to generate considerable value over the next two decades is clear, though we believe few companies have truly positioned themselves to capture this yet. In the following section, we examine the disruptive changes to operating models, supply chains and sources of revenue that industry players are beginning to encounter; and lay out our view on what excellence entails in this transformative phase of the sector.

A new phase of growth in the North Sea

Today is not the first time that the North Sea has entered a major new phase with significant uncertainties but also opportunities. Recalling the first activities on the UKCS, one early explorer remarked: *“Applications and drilling commitments made at this time were very much an act of faith or a shot in the dark, whichever way you wish to look at it. There were no rigs capable of drilling in those water depths at the time, whilst if finds were made it was not known how they might be produced nor how pipelines might be laid in*

⁴ UKCS Maximising Recovery Review: Final Report, Sir Ian Wood, 24th February 2014

*such water depths.*⁵ The parallels with the emerging decommissioning industry are clear. The arrival in the North Sea of the giant Pioneering Spirit heavy lift vessel, to begin work on decommissioning, suggests that as much innovation and pioneering will be required to end the fields' lives as was needed to create them in previous decades.

In fact, the decommissioning industry possesses three characteristics which invite comparisons with the sector's early years.

1. A remarkable business opportunity

A recent article in the Financial Times describes the magnitude of this opportunity: "Almost all the North Sea's remaining 470 platforms, as well as 10,000 km of pipelines and 5,000 wells, will be decommissioned over the next 30 years, with companies expected to spend £40 billion by 2040."⁶ It is not merely a North Sea market but one with global scope that could be worth more than USD100 billion by 2030. A local oil services sector that pioneers effective approaches will stand to gain enormously, and reinforce its worldwide position as a premier exporter of technical expertise. Furthermore, operators who run efficient late-life assets and minimise decommissioning costs will create significant value above current business plans. And those that innovate successfully with alternative uses of offshore infrastructure, such as in carbon capture and storage, or wind and marine power generation, may even capture unexpected streams of revenue. The UK's Energy Technologies Institute is currently working to identify five potential storage sites under the North Sea, and the initial response from upstream operators has been enthusiastic.

2. The need to develop new operating models

Late-life assets need to achieve a drastic reduction in costs to remain profitable; and that can come only with elimination of activities that do not deliver cash or safety, proactive management of the safety case to reflect and support the new approach, slimmer organisations, and relentless cost discipline from staff and management. Operating models which are agnostic about resource constraints are a drawback in late-life asset operations. Some operators have discovered that, while they may be appropriately resourced for the fields operating at peak capacity a decade or longer ago, they have not been able to reduce staffing levels as production declines. In fact, the number of offshore staff deployed in the North Sea for every million barrels produced has increased by 10 per cent per year since 2000. At the same time the North Sea's highly interconnected export network introduces a risk of otherwise economic production being stranded by the decommissioning of uneconomic infrastructure along the export route. Addressing this challenge requires a new collaboration model between the operators.

3. A requirement for a new and innovative supply chain

Operators with upcoming decommissioning projects continue to encounter supply chain uncertainty. For example, single-lift technology for the largest facilities or in the deepest

⁵ Tales from Early UK Oil Exploration 1960–79; Petroleum Exploration Society of Great Britain, 30th Anniversary Book

⁶ The Financial Times; 3rd February 2015

waters is still under development, and supply chain constraints and bottlenecks change with the oil price. This makes accurate budgeting difficult in the planning phase, and increases technical and execution risks during project delivery. One operator cited a lack of benchmarks at the time of submitting the draft decommissioning project plan resulted in unrealistically low cost estimates. Another operator which made a mid-project change in the removal approach found that topsides removal costs nearly doubled as the new technology was deployed but required more people offshore and strained both accommodation and logistics capacity. A recent analysis by Decom North Sea,⁷ comparing capability against experience of suppliers across the decommissioning lifecycle, revealed that, while nearly half the suppliers polled claimed to possess capability in each lifecycle phase, only a quarter had actual experience in it. At the same time operators face their own capability challenges; their buyers of these services can rarely draw on deep prior experience, and several also struggle to attract staff to work on decommissioning projects, particularly for the plugging and abandonment (P&A) of wells. The potential for cost and schedule overruns not only reinforces the need for excellence in project and supply chain management but also serves as a reminder of the importance of collaboration with suppliers – particularly where new technologies and specialised skills are needed. Meanwhile, the increasing importance of technical advances and low-cost approaches will enable, and even require, new entrants from other sectors to disrupt incumbent supply chains.

As in the 1960s and 70s, decommissioning offers operators risks and opportunities in good measure, and presents the classic tension between established practices and new approaches that will help them tackle emerging challenges more effectively from dedicated dismantling yards, dedicated decommissioning rigs, to new offshore equipment mothballing strategies for very final stage of production. The next section proposes specific drivers for achieving excellence in decommissioning and late-life operations.

Achieving decommissioning excellence in the North Sea

Delivering a decommissioning project on time and on budget, and preferably at the lowest possible cost, is the single largest driver of the remaining value accrued from a late-life asset. However, operators have observed that acting only when an asset is on the verge of ceasing production is, frankly, too late. It is crucial to evaluate early both the benefits of maintaining rig operability well past cessation of production (CoP) and the acceptable standards of asset integrity to allow crews on board for the project. We cannot pretend that navigating late-life complexities is easy, for many factors come into play and few precedents exist in the North Sea to offer material lessons learnt. Our numerous client conversations and in-depth analyses of late-life performance data lead us to believe that late-life production operations, preparation for CoP and ultimate decommissioning are all parts of the same path – and four drivers are pivotal to achieving excellence throughout that journey:

1. Develop a clear late-life operator strategy
2. Maximise operations value from productive asset wind-down
3. Apply best-practice capital project approaches to decommissioning
4. Develop a supportive regulatory environment for the North Sea

⁷ Decom North Sea, presentation to the SPE, September 2014

1. Develop a clear late-life operator strategy

We believe this requires operators to gain clarity on their assets' true potential and then segment and manage against this in an appropriate way. This will include making the tough decision to move assets into the final late-life phase, and by doing so removing future optionality. The answer will require operators to move beyond prescriptive remove/hold/sell matrices that run the risk of being overly simplistic, but will be influenced by the regional resource potential, export infrastructure network, financial strength of the parent company and prevailing economic environment. However, to navigate through this complexity we recommend a practical approach: plan ahead with brutally honest perspectives on the asset's future potential, segment portfolios to identify late-life assets as such (and the criteria that make them so), and use the operating strategy to provide a clear direction to late-life operations teams.

- **Plan ahead.** The best-practice approach to developing a late-life asset strategy is to build the abandonment date, approach and economics into life-of-field plans that are regularly updated as market, reservoir and facility conditions change. In truth, we have come across many instances where either a change of operator or “strategic limbo” clouds the decision. If life-of-field plans have not been updated by former owners or operators, current operators may find themselves without the necessary fact base to reach decisions. Many companies, too, linger in an indefinite period of decline without decisively moving towards decommissioning. They run multiple exercises to off-load a declining asset to an enthusiastic investor; prolong reservoir reviews to examine and re-examine regeneration opportunities, however uneconomic or incompatible with their capabilities; or continue to operate as before, with investments suitable to more productive assets. No matter which of these describes their “strategic limbo”, the lack of timely and decisive strategic choices can be both expensive and unproductive. Therefore, managing late-life assets requires a brutally realistic perspective on their long-term performance potential, the company's willingness and ability to invest, and the operator's capabilities to deliver incremental resource opportunities and then taking the hard decisions about the asset future that result from this assessment.
- **Identify late-life assets.** Designing the best economic outcome involves taking a portfolio view and differentiating between late-life assets – mature or troubled facilities that are now cash-neutral or negative – and regular assets that generate cash and possess long-term potential. This portfolio segmentation enables implementation of a differentiated approach, as late-life assets require radical operational interventions to prevent further loss of value for owners and operators, while regular assets can be safeguarded from value dilution. The principles behind this approach are not completely new – indeed, several assets were managed along these lines in the low-price environment of the mid-1990s, with BP's Mature Asset Team (MAST) perhaps the best known. However, it is even more critical in the current climate. With a segmented portfolio, operators can make deliberate choices, based on clear decision criteria, on which assets they wish to keep at a sustainable long-term low-cost position, which to divest for maximum return on capital, and which to decommission after a productive and ultra-low-cost wind-down.
- **Commit to the chosen operating strategy.** Since long periods of strategic ambiguity are costly, operators who commit to a strategic direction and remodel their operating teams

around it are better positioned to capture value – e.g., by reducing spend on activities to prolong field life beyond the decommissioning date. Sometimes this commitment can go as far as clarifying the differentiated approach to the markets. Recently, an operator elected to issue a statement that the company would split in two: while one division would continue to maximise production and extend field life, the other would aim to become a safe and ultra-low-cost operator at the forefront of late-life asset management. This kind of commitment allows consistency in implementing new operating models, and generates strong ownership from senior management to the front line.

2. Maximise operations value from productive asset wind-down

An asset that is winding down must be operated differently from one in its more productive life stages. This is all the more important as a late-life asset is resource-constrained and has to compete harder for capital and talent than more economically attractive elements in the operator's portfolio and therefore requires a radically different operating model for late-life assets.

Different types of assets have different needs. We have already talked about differentiating between regular and late-life assets when setting an operator strategy, but how should they be managed differently? Managers of regular assets maximise production and value of life-of-field plans; those of late-life assets ensure predictable and steady cash demand through the final life stage of the asset. Therefore, while regular assets track metrics such as maximising cash flows, production efficiency and project performance, late-life assets aim for a reliable delivery of cash flows versus plan. At regular assets, asset managers are fully accountable for delivery but adhere to existing operating processes, corporate obligations and compensation schemes. At late-life assets, only asset managers are accountable for delivery and own their respective profit-and-loss accounts. They are empowered to decide autonomously how best to achieve aggressive performance targets, can choose fit-for-purpose procedures or relax in-house processing requirements, and are compensated strictly based on performance. In the current high-cost environment in the North Sea, even regular assets need to be focused on costs; but for late-life assets, this becomes a question of survival. We discuss solutions for cost reduction at length in the second article in our "Future of the North Sea" series.⁸ In this current article, we define two areas of radical cost management that we have found to be particularly pertinent to the late-life context.

- **Reduce headcount at late-life assets.** The principal resourcing optimisation code is to take a clean-sheet approach and match resourcing to future activity levels. On the one hand, this implies eliminating tasks and increasing multi-skilling to define a minimum "emergency" organisation. On the other hand, it embeds the building of desired specialised capabilities (e.g., decommissioning) into the resourcing plan. A North Sea operator with a late-life asset in steep decline redesigned its offshore organisation using the clean-sheet approach to define a minimum "emergency" manning level that met regulatory and company standards. Resources were added to this base only if deemed essential for operational efficiency. Multi-skilling (e.g., creating a combined electrical-instrumentation-telecom position) together with a campaign maintenance approach was vital in achieving a drastic 40 per cent reduction in

⁸ Meeting the challenge of increasing North Sea costs, McKinsey & Company, July 2014

personnel on board; and, given the higher costs associated with offshore personnel, all non-essential tasks were transferred onshore. Reducing offshore headcount also reduced associated logistics spend and support functions onshore.

- **Manage demand and use new procurement techniques to help radically reduce external spend.** When operators ask incumbent vendors to offer savings, the response is often a 10 or 20 per cent reduction in unit prices. This gesture typically has only limited impact on overall operator lifting costs. Internal decisions to reduce non-critical activity helps squeeze the overall bill of materials, but implementation of that change may call for renegotiation of existing contracts. Some offshore operators have begun to combine a rigorous challenge to specification requirements with innovative procurement approaches such as e-auctions to achieve the more substantial overall spend reduction they now need in late-life operations. A recent exercise run on a critical component for offshore production installations delivered a reduction of 60 per cent of original unit cost through a combination of de-specification and e-auction.

Like their younger cousins, late-life assets have to continue to make improvements in offshore performance (e.g., through better tool time). But they also need to keep one eye on preparation for the ultimate decommissioning work – e.g., by executing as much of the P&A programme as possible to minimise the time between CoP and when the platform is hydrocarbon-free. Needless to say, the introduction of new operating models cannot compromise compliance with HSE and integrity standards.

3. Apply best-practice capital project approaches to decommissioning

Decommissioning programmes are ultimately capital projects and have similar pillars of success. A successful decommissioning programme is also safe, cost-effective and environmentally sound. However, recent history in the North Sea suggests that the industry can find decommissioning projects even more challenging to deliver than developments (*see Exhibit 2*). This may not be surprising given that operators have significantly more experience of putting infrastructure in place than removing it. While the industry continues to learn about successful decommissioning project delivery, operators can adopt good development project delivery practices, just as they have applied downstream reliability approaches to upstream operations.

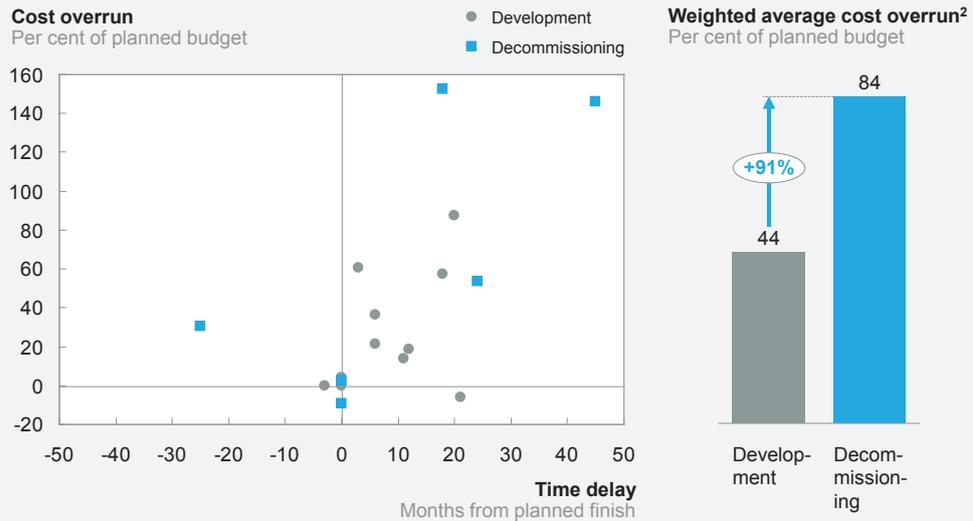
And while we believe that rigid application of the same full project delivery process used for development projects is not the best approach for decommissioning, we see five areas where principles of good development project delivery can inspire owners of decommissioning programmes.

- **Concept optimization** is just as, if not more, important in decommissioning as it is in development projects. Critically, it forces an analysis of the value and risk trade-offs of different concepts, and tests their resilience to potential risks or uncertainties. Is the concept robust in light of the availability and reliability of heavy lift vessels or the ability to hire skilled local staff quickly? What additional engineering requirements should be completed before project start to ensure a safe and stable removal?

Exhibit 2

Recent decommissioning programmes have shown a wide range of project delivery performance

UKCS project performance¹



¹ Includes 13 developments and 6 decommissioning projects completed from 2003–13 in the UKCS for which data is publicly available
² Weighted average using actual project cost

SOURCE: DECC; operating company reports

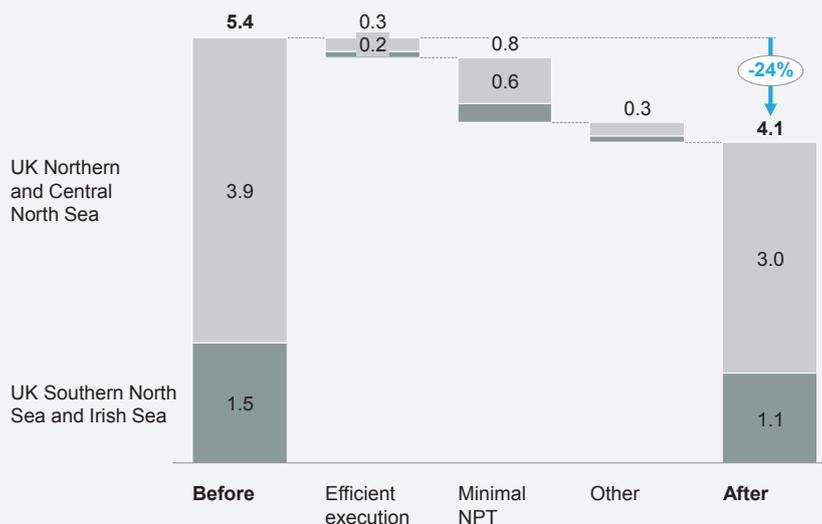
- **Contracting strategy and contractor management** affect the delivery of the project on time and on budget. a risk-based contracting approach not only improves project performance but also contractor relationships – contractors see operators as partners in driving the project to the highest combined value through the contract structure and how they work together. Decommissioning projects, with their inherent technical risks (e.g., presence of hazardous materials not previously recorded, or new technology deployment), call for a particularly rigorous approach to contractor management. What pre-qualification or due diligence process will help uncover technical risks of the project? How should the operator share that risk with contractors and build it into the incentives scheme and contractor performance management cycle? And, importantly, how can operators more accurately describe the scope of work given the lack of experience to draw in from previous projects?
- **Risk management** – development and decommissioning projects alike face technical, execution, market, socio-political and organisational risks; in fact, it is not difficult to argue that the technical, commercial and stakeholder ambiguity in decommissioning is even greater. One decommissioning project which experienced a 150 per cent cost overrun cited at least ten major factors (beyond severe weather-related deferrals) that had impeded efficient delivery, including a mid-project change in removal techniques, no pre-qualification of the new approach, accommodation and logistics constraints, tight heavy lift vessel and talent markets, and a complex web of social stakeholders. A common risk where facilities have changed hands is in collating adequate information on the integrity of the core structures – wells, topsides, jackets and pipelines – before laying out “make safe”

Exhibit 3

There is a large prize for operators if the North Sea exhibits the same performance ranges as the Gulf of Mexico

Well abandonment cost improvement potential

£ billions for 2014–23 (based on Gulf of Mexico performance ranges)



SOURCE: Oil & Gas UK, Decommissioning Insight 2014; "Abandonment in the Gulf of Mexico – Enhancing value through collaboration", McKinsey & Company

plans. Another is the residual operator liability after project completion for site remediation and ongoing monitoring. Again, the integrated end-to-end development project risk approach brings robustness to decommissioning programmes all the way from the initial risk identification and assessment through to mitigation tracking and follow-up.

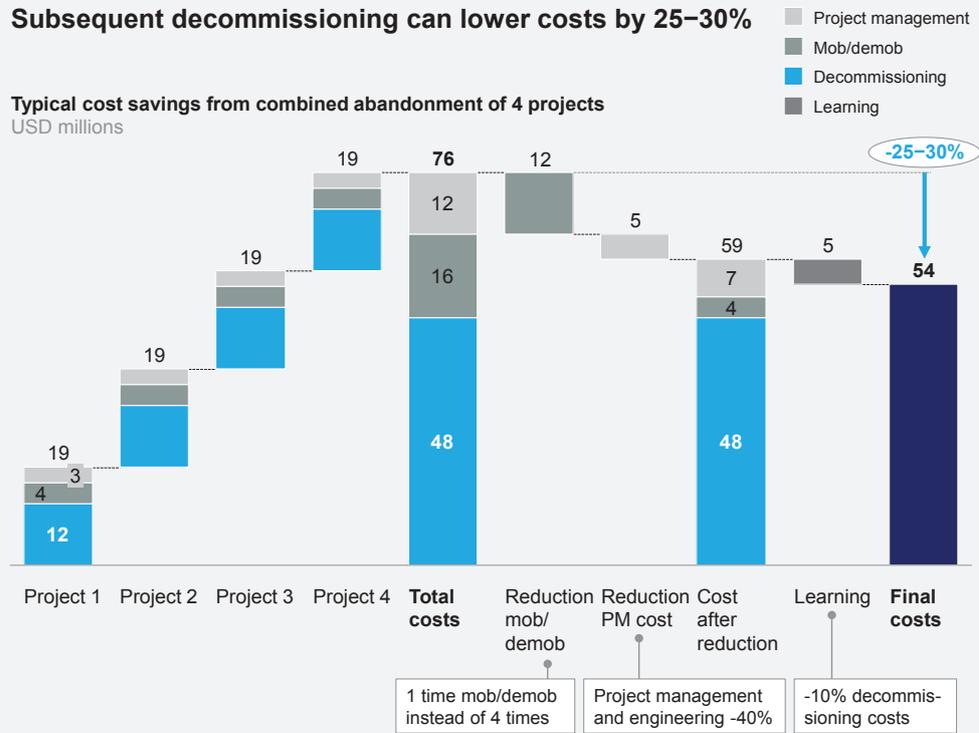
- Applying lean principles** to on-site execution and drilling in development projects is now becoming increasingly common, and we believe that this approach can similarly help improve frontline productivity and speed of execution in decommissioning projects. Just as effective commissioning requires a smooth transition from projects to production operations, so effective decommissioning requires a smooth handover from production operations to projects. Applying lean principles to drilling and completions has reduced well costs by 15–20 per cent without negative effects on safety. The same techniques could improve decommissioning economics in three ways: enhancing productivity in each process step from wells P&A, topsides, substructure and pipelines removal to site remediation; using waste reduction methodologies; and managing the planning process effectively at different project stages. A McKinsey analysis of abandonment in the Gulf of Mexico⁹ estimated that lean and integrated execution, optimised maintenance programmes and procurement optimisation could reduce the well abandonment liability by 20–30 per cent. Applying this same opportunity to the portfolio of wells expected to be abandoned in the UKCS by 2023 could be worth over £1 billion (*Exhibit 3*).

⁹ "Abandonment in the Gulf of Mexico – Enhancing value through collaboration", McKinsey & Company, SPE Conference presentation, September 2014

Exhibit 4

Subsequent decommissioning can lower costs by 25–30%

Typical cost savings from combined abandonment of 4 projects
USD millions



SOURCE: McKinsey analysis

- Pooling resources** can improve project economics. Well campaigns are typically more cost-effective than individual well programmes, as learning curve effects and scale advantages help reduce the spend, but we think that operators can go further. If there are wells to plug and abandon across multiple assets, it may be more cost-effective to design cross-portfolio campaigns; if there are neighbouring operators with an asset to decommission, sharing resources and expertise (mobile rigs, heavy lift vehicles, or even concept design) across that wider, regional, or even global portfolio may help strip out costs from individual programmes and promote learning across the basin. Example cost savings from combining the abandonment of four subsequent projects can be as much as 25–30 per cent (*Exhibit 4*).

4. Developing a supportive regulatory environment for the North Sea

It is clear that, alongside operators and contractors in the supply chain, regulatory bodies in the North Sea, both international and national, have a crucial role to play to support the collaboration between players that will be required.

Recent moves by the UK Government to remove uncertainty on the tax liabilities through Decommissioning Relief Deeds have been well-received and are an important enabler to a healthy trade in mature assets, not least by reducing the cost of letters of credit to current and potential future operators and opening the market to new, smaller and potentially more innovative players in the late-life phase. But there remain some opportunities to support and shape the decommissioning industry further. The first area

is on the requirements operators need to meet during the decommissioning process. As we learn more about the consequences of decommissioning choices for topside removal, substructure disposal and the approach to pipelines, through the upfront comparative assessments and then through monitoring completed programmes like Rig-to-Reef in the Gulf of Mexico, optimising the cost-benefit trade-off further and adapting the derogations and requirements accordingly would be one benefit.

The second area is in exploring roles governments can themselves play in decommissioning activities, given that their goals and resources are very different from those of private companies. The UK Government will, through tax relief, cover the majority of decommissioning cost and so has a clear additional incentive to ensure this is done in an efficient and effective way. An interesting model is being developed in Germany to allow the government there to facilitate the decommissioning of nuclear power stations. A somewhat analogous model in the North Sea could be to create a central DecommCo that offers fixed (or partly fixed) terms to decommission an asset. Like an insurance company, it would be able to aggregate risk across multiple projects and create a more acceptable risk profile than a single operator. Capital could be provided through equity funding, debt tranches or, perhaps, with a government “backstop”. The company would have a natural incentive to encourage a broad and healthy service industry and, by taking on a contract with DecommCo, an operator would free up capital for investment or to enable a sale to a smaller and more focused operator, which may itself look to create a niche competitive advantage operating assets in this phase of life. Ideas like this could help regulators ensure a healthy and functioning decommissioning sector that supports the maximising of economic recovery across the North Sea.

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Decommissioning in the North Sea presents an unrivalled opportunity for the region and is a crucial pillar for success in maximising its economic potential. We believe that achieving excellence in late-life operations and decommissioning, through developing clear late-life asset strategies, maximising value from very late phase operations, building performance into decommissioning project delivery and developing a supportive regulatory environment for the North Sea, will help operators remain robust and profitable in a harsh margin environment, and enable this mature region to make the most of a guaranteed area of growth.

daniel_cole@mckinsey.com
jayanti_kar@mckinsey.com
diederik_nelissen@mckinsey.com
ed_lock@mckinsey.com
florian_christ@mckinsey.com
john_barker@mckinsey.com
christopher_forr-rydgren@mckinsey.com

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