A ROADMAP FOR CUTTING DECOMMISSIONING COSTS BY 30%

By Philip Whittaker, Eric Oudenot, and Martha Vasquez

Oil and gas operators worldwide need to dramatically slash the costs of decommissioning wells and installations. For the North Sea alone, estimates of the total price tag start at close to $150 billion. Cost reduction isn't a concern solely for oil and gas industry players. Governments also have a vested interest in reducing costs: taxpayers can be on the hook for as much as 50% to 80% of the bill for decommissioning.

Recognizing the urgency, some governments have set a goal to reduce decommissioning costs by 30% or more. But the path to achieving reductions of this magnitude remains uncertain. In the past, the challenge of decommissioning was a balance sheet issue, with operators focused on reducing their asset retirement obligations (AROs). But as the number of wells and installations at the end of their economic lifespan soars, it's now a real-world problem. Operators must meet or even exceed the promises made on the ledger with actual reductions in abandonment expenses (abex).

Although the goal of reducing decommissioning costs by 30% is ambitious, our experience supporting governments and operators suggests that it is achievable. BCG has worked with industry players to significantly cut decommissioning costs at the national, company, and project level. To get there, operators and governments need a detailed roadmap for applying a variety of levers designed to make the most efficient use of decommissioning resources.

Ambitious Goals, Hard Challenges

In 2018, the UK's Oil and Gas Authority (OGA) announced its intention to cut decommissioning costs in the UK continental shelf to no more than £39 billion, a reduction of at least 35% from the 2017 estimated cost base of £59.7 billion. This followed from the OGA's commitment made in 2016 to reduce the 2015 cost base by at least 35%.

Also in 2018, Nexstep, the Netherlands' national initiative for oil and gas infrastructure reuse and decommissioning,

announced its commitment to a 30% reduction in total decommissioning costs. These costs are estimated to reach €7 billion. The announcement was consistent with the commitment made in 2016 by Energie Beheer Nederland (EBN), the Dutch government-owned operator, to reduce decommissioning costs by 30% to 35%.

However, most operators and governments have not yet demonstrated that they are ready to translate their ambitions into actual cost reductions. Indeed, their cost reduction plans typically have not included details about what it will take to reach those goals. For example, the OGA has recognized that 90% of the decommissioning cost estimates made by companies it oversees have a high degree of uncertainty.

Some operators stand out for having surpassed cost expectations in decommissioning activities with a specific technical scope, indicating that bold ambitions can be realized. In 2016, Shell's Brent Bravo team announced cost reduction targets of 70% for removal preparation and 40% for conductor removal compared with the Brent Delta project. Within months, both targets had been met.

Before developing the high-quality database on which any cost reduction roadmap depends, operators and governments must first acknowledge the most critical challenges for their decommissioning projects. Common challenges include the stop-and-start nature of the projects, the poor quality of data relating to wells and installations, a lack of tailored standards and processes, the absence of a low-cost mind-set, and immature collaboration models.

Operators and governments must assess whether, in light of these challenges, their current estimates of AROs and abex are realistic, as well as whether cost reductions above and beyond these estimates are possible. AROs are often out of date, underestimated, and not well linked to abex estimates. Operators have started to actively challenge their abex estimates with internal and external benchmarks and to pressure-test the validity of factors underlying the estimates. Strengthening these estimates is essential to the development of a cost reduction roadmap.

Six Levers to Reduce Costs

In developing cost reduction roadmaps for decommissioning, we have identified dozens of sources of value and risk. To capture the value and mitigate the risks, leading operators and governments have applied six cost-reduction levers. (See Exhibit 1.) No single lever is sufficient by itself. To realize cost reductions of as much as 30%, stakeholders must take an orchestrated approach that applies each of the levers relevant to a specific decommissioning project or campaign.

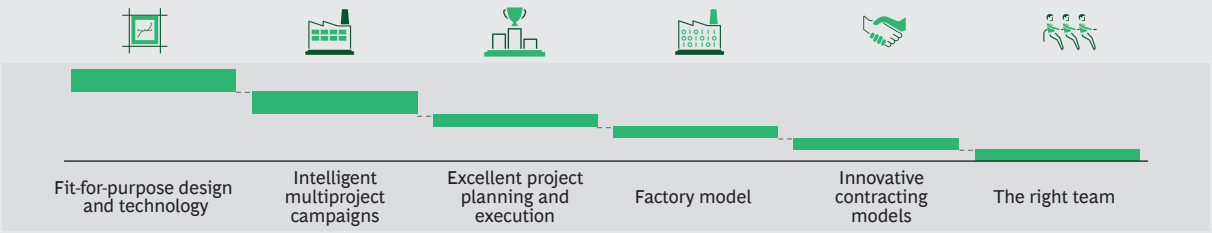
Fit-For-Purpose Designs And Technology

Operators often select designs and technologies that are more complex, and more expensive, than required for a specific project. By using designs and technologies that are "fit for purpose"—that is, adequate for meeting legal and technical requirements—they can reduce decommissioning costs by at least 10%. Examples include:

- **Developing a Technical Standard.** The standard should apply best practices to provide a baseline for prudent operations in each region. Technical requirements vary by region. Instead of applying the strictest regional standard in all locations, which entails unnecessary cost and complexity, operators can augment their baseline standard as needed to meet the requirements of stricter regions. One operator reduced decommissioning cost estimates by 30% in some regions by developing and adapting a baseline technical standard.

- **Identifying and Deploying Fit-for-Purpose Equipment.** In its subsea plugging and abandonment (P&A) projects, one offshore operator had been using a dive-support vessel to remove mattresses and small subsea items weighing less than 10 metric tons.

The Application of Six Levers Can Enable 30% Savings



Fit-for-purpose design and technology	Intelligent multiproject campaigns	Excellent project planning and execution	Factory model	Innovative contracting models	The right team
Develop standards that enable fit-for-purpose designs in each region Commission and deploy fit-for-purpose equipment Reduce equipment footprint and complexity of specifications and improve utilization	Aggregate similar activity archetypes in the right sequence Ensure continuity of a dedicated team Identify and pursue benefits of greater scale	Challenge cost estimates and reduction plans Invest early in access to high-quality data Make a clear transition to decommissioning Manage performance rigorously	Identify wells at or near end of useful life Front-load bottleneck process steps Bundle and batch activities Secure early approvals from partners and regulators	Involve contractors early in the solution design Include the right incentives in the contract Give contractors flexibility to maximize utilization Be willing to experiment with new models	Attract and retain a high-caliber, well-rounded team Make team accountable for late-life and decommissioning operations Institute a tailored project-assurance process

Source: BCG decommissioning team.
Note: Abex = Abandonment expenses; height of bar indicates relative savings.

By switching to a low-specification construction vessel with a remote, salvage-specific retrieval tool, the operator was able to save $75,000 a day.

- **Reducing the Equipment Footprint and Specifications and Improving Utilization.** An onshore operator was able to reduce the number of rigs needed for P&A by more than 30% (from 9 to 6) and slash miles traveled by rigs and crews by more than 70% (from approximately 7,000 to about 2,000). It was also able to replace 25% of double rigs with single rigs and coiled-tubing units.

Intelligent Multiproject Campaigns

Operators typically execute P&A or removal projects on a standalone basis. This limits their opportunities to build and apply knowledge over a series of projects and to create efficiencies for suppliers. By designing and executing multiple projects as part of cohesive campaigns, operators can reduce decommissioning costs by at least 10%.

Some leading operators have used campaigns for offshore and onshore P&A and facilities removal. These campaigns tend to tap into common sources of value, notably maximizing the benefits of the learning curve by aggregating the right type of projects in the right sequence. For example, an operator can design a P&A campaign for wells involving the same type of equipment, starting with the platform having the largest number of wells. Campaigns also allow for continuity of execution by a dedicated team. Collaborative campaigns among multiple operators can yield even larger gains, although participants must manage greater complexity.

Several examples illustrate the benefits of approaching multiple decommissioning projects as a campaign. Shell is applying this approach to P&A for the four platforms in the Brent field (total of 154 wells). Lessons learned helped to accelerate the work over the course of the four P&A projects. In the fourth project, involving the Brent Charlie platform, the time required for P&A improved by approximately 75% compared with the first project, involving the Brent Delta platform. The average time to complete P&A in Brent Charlie has been about eight days per well.

Petroleum Development Oman (PDO) conducted a rigless P&A campaign in Oman that encompassed 60 wells. Compared with well-by-well abandonment, the campaign approach reduced time per well by approximately 65%, from 7 days to about 2.5 days. Stone Energy conducted a P&A and remov-

al campaign in the Gulf of Mexico involving 360 wells and 109 structures. The campaign increased the scope covered by 40% and reduced costs by 30% compared with work performed on a well-by-well, structure-by-structure basis. The greater scale allowed the operator to commission a bespoke lift boat, eliminate costs for mobilization and demobilization of equipment and personnel, and conduct concurrent operations.

To design campaigns, operators need a portfolio optimization tool that assesses decommissioning spending for each activity archetype and determines how to generate savings. The tool should draw on the knowledge gained from past campaigns and expert insights into the impact of future technologies and practices. An operator used such a tool created by BCG to design four campaigns covering well P&A and removal of offshore platforms and subsea structures over the course of five years. The operator applied the results of the analysis to help define its contracting strategy, plan for technical studies, and develop the integrated decommissioning plan and schedule.

Excellent Project Planning and Execution

We have observed vast differences in project performance, both offshore and onshore. Some operators are two to three times more cost efficient than others in removal projects. (See "The North Sea's $100 Billion Decommissioning Challenge," BCG article, March 2017.) Operators can promote cost efficiency by ensuring competitive estimates and high-quality execution. Excellence in project planning and execution can help reduce decommissioning costs by at least 5%.

We have seen operators take a variety of actions to promote project excellence, such as:

- **Invest in high-quality data.** Operators should invest early in high-quality data that can be used to define the scope of work and challenge cost estimates. For example, an operator reduced rig time by seven days per well by gathering well integrity data before cessation of production (CoP).
- **Make a clear transition to decommissioning.** The transition from production should be addressed before and after CoP. For example, three months after CoP, Fairfield Energy made sleeping space available for decommissioning crews by reducing the size of the core operations crew of its Dunlin team from 65 to 30.
- **Focus on decommissioning performance.** Operators should apply the same rigor to decommissioning performance management as they do to managing development and production performance. For example, one independent oil company introduced digital performance dashboards for decommissioning, providing immediate access and higher visibility to KPIs and performance variations.

To achieve project excellence, a company must rigorously structure decommissioning activity and have access to cost and efficiency benchmarks. It also needs the ability to tailor performance dashboards to both executive and technical teams and to embed the dashboards into its existing performance management forums and systems. With BCG's support, an operator designed and implemented such dashboards across business units to enable performance dialogues on a daily, weekly, and monthly basis.

Factory Model

A fit-for-purpose approach is not optimal for every decommissioning project. A standardized approach—known as a "factory model"—may be more effective for P&A of simple wells, removal of small, low-complexity structures, and site remediation work. The factory model has been used by some onshore P&A operators in the US. It is potentially applicable more broadly, including to most US onshore projects and in other onshore and offshore regions with suitable wells, structures, and sites. On appropriate projects, the factory model can help reduce decommissioning costs by at least 5%.

To apply a factory model, an operator must take four core steps:

- **Characterize and define.** Identify wells and sites that are idle or close to CoP. Group them by geographic area to enable initial cost estimates and scope constraints that will determine prioritization.

- **Plan and prioritize.** Confirm that joint-venture partners have approved the decommissioning plans, sequence sites and wells by geography, and prioritize the geographic groupings on the basis of the detailed constraints.

- **Prepare for execution.** Draw up designs, focusing first on wells and sites approved for decommissioning. Obtain required permits, authorizations for expenditures, and title clearances.

- **Execute standard programs.** Use standard, predefined programs to complete P&A or remediation.

These steps generate savings in a variety of ways. Operators gain better visibility into pipeline status, such as the testing dates for idle wells and which wells are within three years of CoP or are flagged as "run to fail." They also gain the ability to front-load bottleneck process steps that are not time-dependent and bundle or batch as many activities as possible. Additionally, operators are able to secure early approval from partners and regulators, implement revised KPIs, and apply lessons learned from previous projects in future designs.

Innovative Contracting Models

Contracting for decommissioning projects is different from contracting for development or construction projects. By using innovative contracting approaches to take advantage of these differences, leading industry players have been able to reduce decommissioning costs by at least 5%. Examples include:

- **Give contractors flexibility.** Agreements should give contractors flexibility to maximize utilization of their assets, equipment, and crews. With no "first oil" date to aim for, the deadline for completing P&A or removal projects is usually flexible. As a result, contractors can be given greater latitude on timelines for completing work, which allows them to use resources more efficiently.

- **Include the right incentives.** Operators should ensure that contracts include the right incentives to share risks. For example, an onshore operator introduced a "one down, all down" policy under which a service supplier's time was considered uncompensated downtime when any of its equipment was taken out of service for repair. The policy resulted in a 5% reduction in paid time during a P&A project.

- **Involve contractors early.** Operators can minimize the uncertainty of the project's scope by involving contractors early in the design of the technical concept and investing in front-end engineering and surveillance. Because operators have a limited amount of decommissioning experience and immature technical solutions, they should be open to contractors' insights on how to efficiently achieve the project's goals. Independent and small operators are typically more willing than large operators to partner with contractors. For example, Canadian Natural teamed up with Heerema and AF Gruppen early in the decommissioning of the Murchison field. The project was completed for 10% less than the budgeted amount.

- **Experiment with new models for supply contracts.** Many operators have entered into full-service "engineer, procure, remove, and dispose" contracts with suppliers, including ExxonMobil in the Jotun field and Repsol in the Varg field. Well-Safe Solutions has launched the P&A Club, which drives efficiencies by delivering decommissioning services across multiple operators and well projects. Decom Energy is in discussions with a number of operators in the UK continental shelf to take over the

management and coordination of their decommissioning projects.

The Right Team

Creating a dedicated, specialized decommissioning team can help operators reduce decommissioning costs by at least 5%. Such teams enable both excellent projects and successful campaigns by ensuring that the operator has access to a strong knowledge base. Outside the Gulf of Mexico, decommissioning knowledge lies with individuals rather than organizations, because most operators have never undertaken a decommissioning project or fail to retain experienced decommissioning personnel after projects are completed. Additionally, operators find it hard to define an attractive career path for decommissioning specialists.

Some operators have implemented successful practices to retain or gain access to decommissioning specialists with the right capabilities. For example, when Total developed the Frigg Field Cessation Plan in 2003, it drew upon its experience and personnel from previous decommissioning projects: North East Frigg in 1996 and 1997, East Frigg and Lille-Frigg subsea in 2001, and the Frøy wellhead platform in 2002. The participation of experienced personnel helped Total complete the Frigg project two years ahead of schedule. (Since then, however, the talent from the Frigg project has moved on to other operators or retired.)

As Fairfield Energy transitioned from operations to decommissioning in the Dunlin field, it identified and filled the gaps in its capabilities relating to P&A, stakeholder engagement, and project management. And in decommissioning the Rose and Stamford fields, Centrica Energy outsourced most of the design and execution of small decommissioning projects to specialized service companies.

One of the main impediments to retaining talent is the stop-and-start nature of decommissioning projects, which makes it difficult to maintain continuity of activities and teams. The start date of decommissioning projects may be delayed by cash constraints and competing investment opportunities, which can make it difficult to lock down plans and schedules. The delay makes it hard for asset teams to commit internal and external resources. Additionally, tension often exists between operations and decommissioning teams—the team that gets more beds on offshore platforms is typically a good indicator of an operator's priorities.

Operators have various options for stabilizing plans and schedules and easing the tension between decommissioning and oil and gas operations. The following are among the actions taken or being considered by leading operators:

- Establish an integrated late-life and decommissioning organization with decision rights over how to use its budget.
- Appoint a single asset director to be accountable for both late-life and decommissioning operations and for assessing the benefits and tradeoffs in decision making.
- Institute a pragmatic and accelerated project assurance process that is tailored to decommissioning. Cost efficiency is established as a key criterion in decision making. This contrasts with the extensive evaluation of project concepts required for making a "go, no-go" decision in development work.
- Establish a decommissioning company independent of the parent company approximately three years before CoP of the first portfolio asset to be decommissioned.
- Obtain external financing in order to commit resources to decommissioning and to stabilize plans and schedules.

Priorities Based on Impact

To maximize cost reductions, operators should focus more aggressively on those levers that are most valuable for a specific decommissioning project. To identify the factors that have the greatest impact on cost performance, operators can use a sensitivity

analysis, which models how changes in key variables affect a project's outcome. As one would expect, this analysis typically confirms that rates for rigs and vessels and changes in scope are the most influential factors. Locking rig and vessel rates at the bottom of the price cycle for oil and gas is critical to holding costs down, but operators often struggle to do this. Additionally, "train wrecks," such as wells in poor condition that require twice the number of rig days for abandonment, are not uncommon.

The existence of these high-impact factors—attributable to macroeconomic conditions and long-term operating and maintenance practices—is often beyond an operator's control at the time of decommissioning. However, by applying the six levers, operators can manage the consequences and thereby prevent or mitigate the negative impact on project costs.

Many operators and governments have shown impressive leadership in announcing their intention to aggressively reduce decommissioning costs. It is now time to realize those ambitions through rigorous planning and execution. A well-orchestrated effort using multiple levers is critical to maximizing the benefits. By hardwiring these levers into their operations, organizations can create a virtuous cycle of continuous improvement that will unlock ever-increasing value over the course of multiple campaigns. Those operators and governments that master the path to 30% cost reductions will reap substantial rewards: easing the burden on taxpayers, protecting government finances, and increasing value for operators' shareholders.

About the Authors

Philip Whittaker is a director in the London office of The Boston Consulting Group and co-leads the firm's decommissioning work globally. You may contact him by email at whittaker.philip@bcg.com.

Eric Oudenot is a partner and managing director in BCG's Paris office and co-leads the firm's decommissioning work globally. You may contact him by email at oudenot.eric@bcg.com.

Martha Vasquez is a principal in BCG's London office and a member of the firm's global decommissioning team. You may contact her by email at vasquez.martha@bcg.com.

Acknowledgments

The authors would like to thank Eugene Chiam, Emmanuel Ricolfi, Alberto Santos, and Rene Willemars, each members of BCG's decommissioning team, for their contributions to this article.

10/18 Rev. 3/19