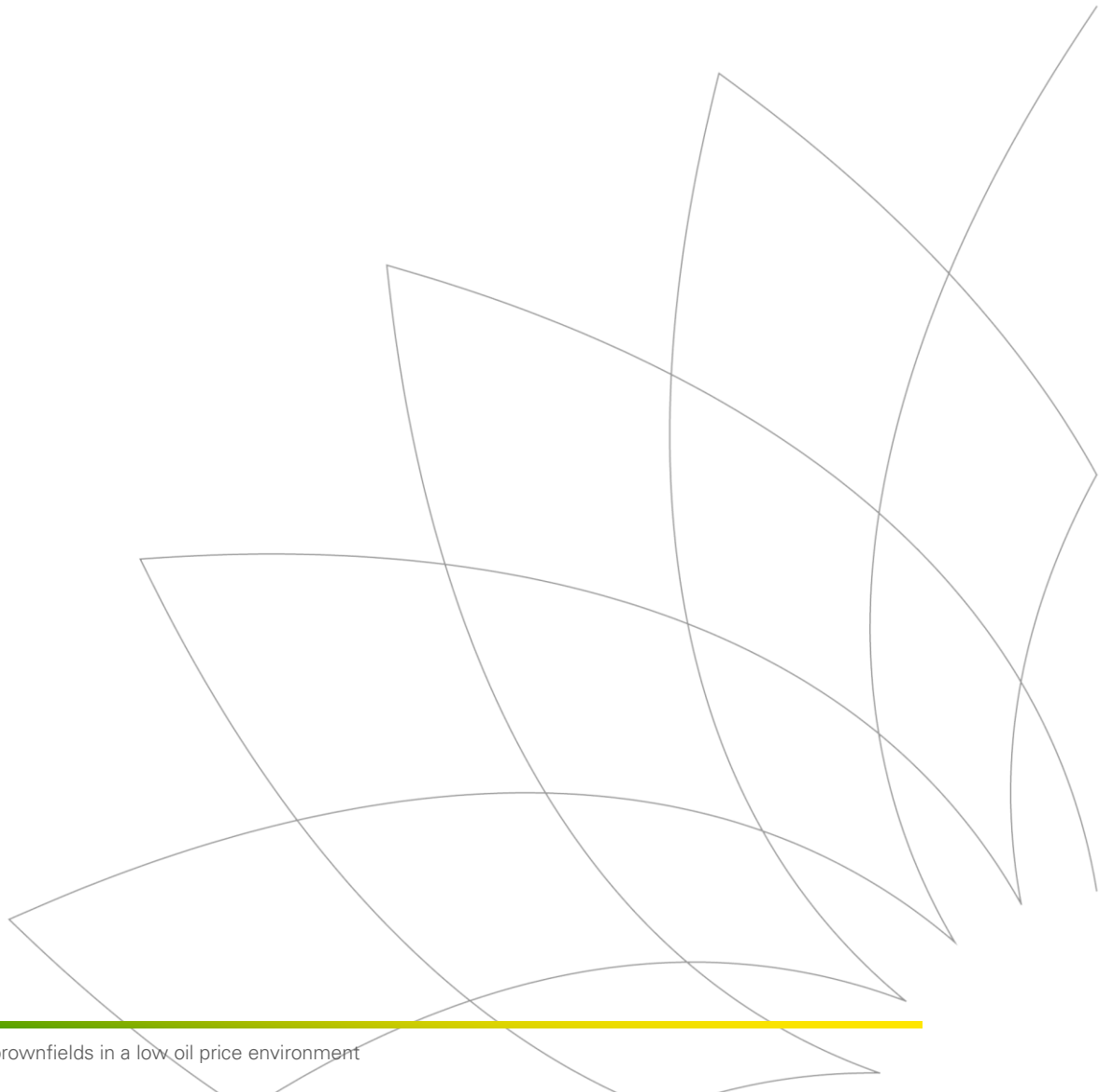


Squeezing more from brownfields in a low oil price environment

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At BP, we have a strong portfolio of new greenfield projects but the bulk of our business is brownfield giants.

Since our company was established our portfolio has been dominated by supergiant and giant oil fields, although today gas is fast catching up.

We have influenced more than half of the world's 20 largest oil fields – through discovery, operations, joint venture and technical support. And in that time we have learned a thing or two about how to squeeze more from brownfields.

Take our experience with the supergiant Prudhoe Bay on the North Slope. When we sanctioned it in the 70s, the recovery factor was expected to be under 40%. Today, we expect it to exceed 60%.

This 50% increase equates to 5 billion more barrels.

But it doesn't come by chance: it takes discipline, a long-term approach to investment – and sustained commitment to technology.

Prudhoe Bay has benefited from technologies such as surveillance to inform wellwork and new well delivery options, coiled tubing and horizontal drilling, waterflood, miscible gas injection, vaporization – continuous waves of technology.

With brownfields, the initial, and usually largest, investment has already been made, so the focus is on incremental, continuous improvement. BP's approach to brownfields involves three elements:

1. Reliability and Integrity – investing in the long-term health of the infrastructure we operate.
2. Production Optimization – removing bottlenecks and easing constraints right across the system.
3. Reservoir Management – building a detailed understanding of the reservoir and optimizing its recovery mechanisms.

Each of these elements is underpinned by a range of technologies targeted to achieve maximum benefit for an appropriate cost. Let me open these up with a few examples.

Reliability and Integrity. In 2011 our plant reliability worldwide was 85%. 4 years later it has increased to 95% through new technologies, capability development and a sustained program of maintenance. This is good business in any oil price environment.

Operational efficiency is key to unlocking value from brownfields, combatting cost escalation and helping to meet our environmental obligations, for instance in flaring and emissions reduction.

Digital technologies play an important role here, in monitoring and alerting. We recently announced a strategic collaboration with GE which we call Plant Operations Advisor, which, through 'sensors everywhere', will introduce new process surveillance and predictive analytical tools to provide early warnings of potential facility issues, giving us time to intervene proactively.

Production Optimization potential in brownfields is significant, underpinned by dynamic modelling and real-time digital systems.

We currently have production optimization technology in place on around 85% of our operated assets and are extending it to the entire operated asset base. This allows us to look across our wells and facilities to compare current performance with optimal performance, and identify improvement actions for field teams to execute. The value from this technology is significant – upon full deployment, we expect up to 4% increase in production at very low incremental cost.

Nowhere is production optimization more evident than at the Rumaila field in southern Iraq. Our technologies, workflows and expertise have contributed to a 40% increase in production at the world's second largest field, since we took over as lead contractor in partnership with Petrochina and the Iraqi Southern Oil Company in 2009 – hundreds of new wells, artificial lift, remote telemetry, in-well sensing, advanced collaboration and waterflood optimization to name a few.

Finally, on Reservoir Management, we employ advanced seismic processing and analytics to improve characterization of the subsurface. The 30 year old Valhall field in the Norwegian North Sea has recently undergone redevelopment to extend field life by another 30 years.

This investment was justified by reserves illuminated in 4D repeatable surveys. Further north, at Skarv, close to the Arctic Circle, we are employing next generation Amplitude Versus Offset (AVO) processing techniques cost-effectively on existing seismic data to explore opportunities around the Skarv hub.

Enhanced Oil Recovery, presents opportunities to access and accelerate reserves as fields mature. We believe that the world has probably reached a point globally when the potential for enhanced recovery from known hydrocarbon resources exceeds the potential from new discoveries.

That makes the role of brownfields even more important in helping to meet the world's growing energy needs. Our focus at BP is on low-cost, chemical EOR, a suite of what we call Designer Water® and Designer Gas® EOR technologies, like Bright Water deployed more than 100 times at Prudhoe Bay and costing less than \$4 a barrel; or Miscible Gas injection at Magnus in the North Sea, generating more than 30% of its production.

Technologies like LoSal® EOR which we are designing into new greenfield projects, can also be retrofitted into brownfield operations, as we are exploring today with resource holders in the Middle East and North Africa.

A common theme running through all of this is digitization. Digital technology and pervasive digitization are themes that all brownfield operators will need to embrace: Our Technology Outlook to 2050, published last year, singled out digital technologies as offering more potential than any other technology area to transform the cost of supply, as well as crucially, to improve energy efficiency.

To summarize, demand for energy continues to grow. The world will need 35% more energy in 20 years and brownfields will make up a large share of the future energy mix.

Brownfield management requires an integrated approach that encompasses Reliability and Integrity, Production Optimization and Life Cycle Reservoir Management.

Our experience of working with the world's supergiant and giant brownfields tells us that there remains much to be 'squeezed' and at very competitive cost.

This speech was printed as prepared.