



Decommissioning and Restoration

Shell International

Views from Around the World

VI SOMA Workshop

10 October 2018

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Reserves: Our use of the term “reserves” in this presentation means SEC proved oil and gas reserves.

Resources: Our use of the term “resources” in this presentation includes quantities of oil and gas not yet classified as SEC proved oil and gas reserves. Resources are consistent with the Society of Petroleum Engineers 2P and 2C definitions.

Organic: Our use of the term Organic includes SEC proved oil and gas reserves excluding changes resulting from acquisitions, divestments and year-average pricing impact.

Shales: Our use of the term ‘shales’ refers to tight, shale and coal bed methane oil and gas acreage.

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Topics

- Global spending and typical cost breakdown for offshore decommissioning
- Shell international decommissioning experience – selected cases
- Shell operated offshore assets on production in Brazil
- Success factors for decommissioning
- Planning for cessation of production (CoP)
- Regulatory points for discussion

Global Spending

Global spending to decommission assets expected to grow to

\$160 billion

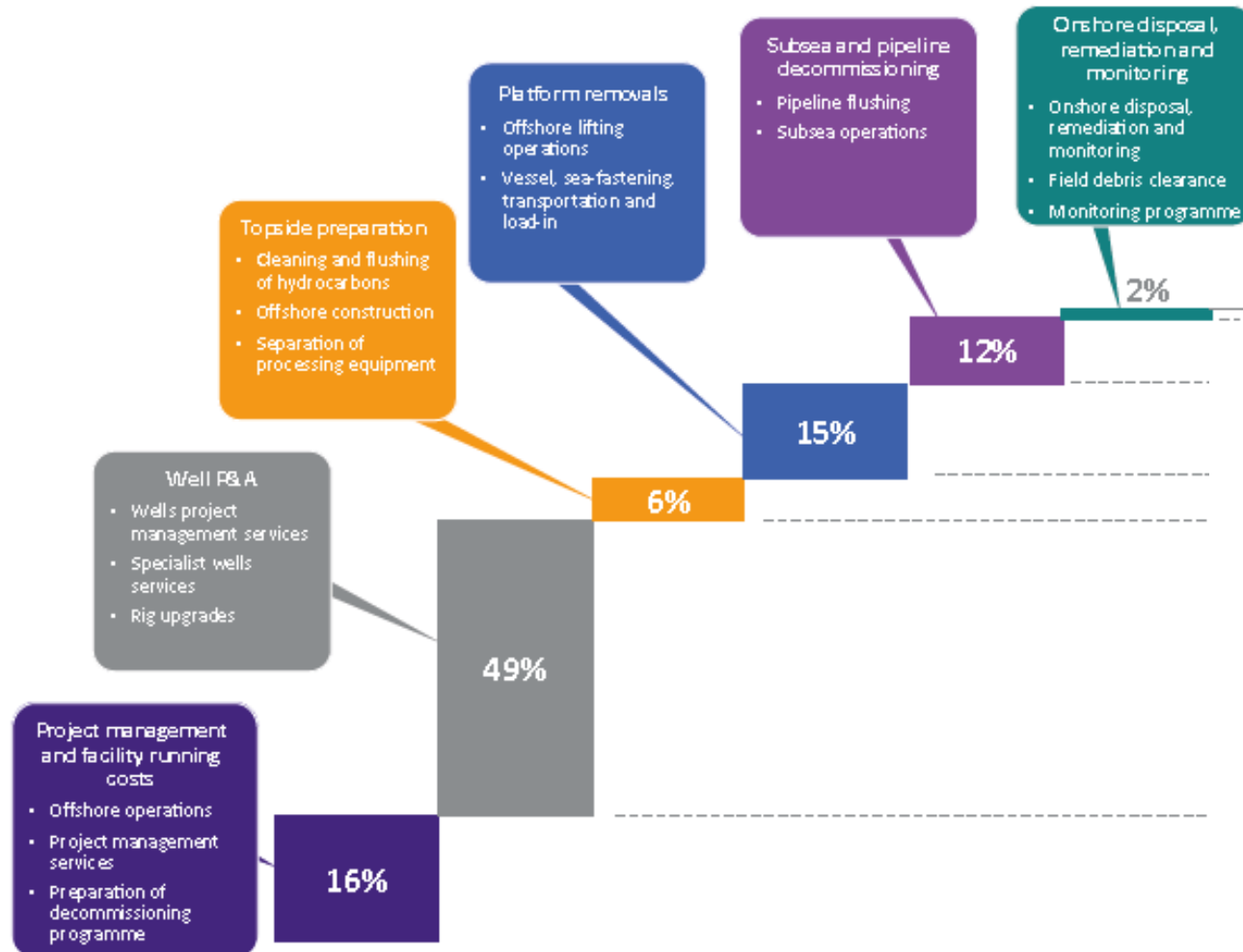
between 2015-2030*

**Source: Woodmac*



Typical Cost Breakdown for Offshore Decommissioning

From OGUK Decommissioning Insights 2017 – Estimated Expenditure in UK in 2017 to 2025



- Offshore wells P&A approximately 50% of the decommissioning cost
- Facilities preparation (6%) and removals (15%) approximately 20%
- Decommissioning cost efficiency programmes should always include a component on Wells P&A

Shell international decommissioning experience – Selected cases

■ Selected Cases:

- Gulf of Mexico
 - South Timbalier ST300 platform
 - Popeye subsea
- North Sea:
 - Brent D topsides
 - Leman BH accommodation block & jacket
- India:
 - Tapti field

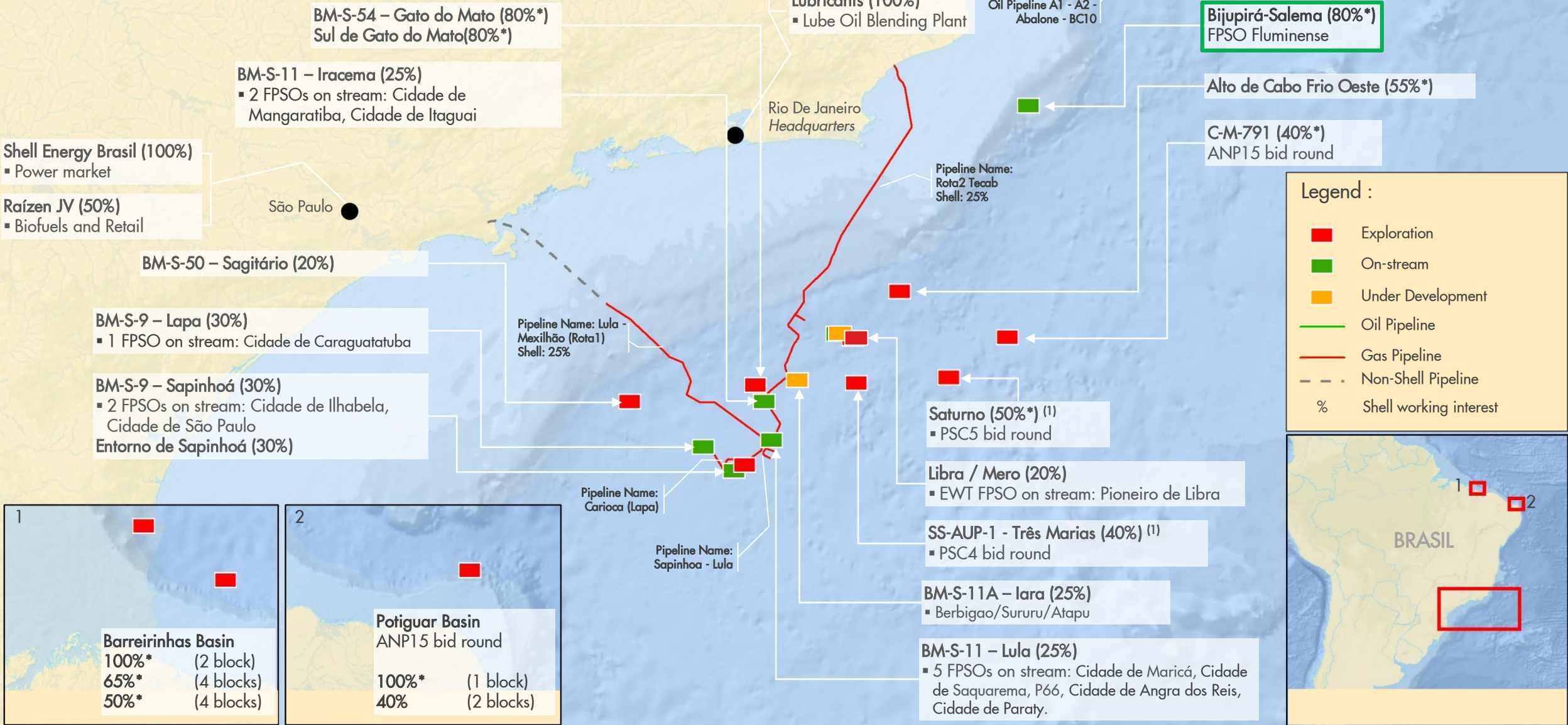
■ Take Aways:

- Scopes could be similar (or not)
- Diverse situations / different contexts
- Risk based approach and flexibility for optimum decommissioning solution



SHELL BRASIL PORTFOLIO

October 2018



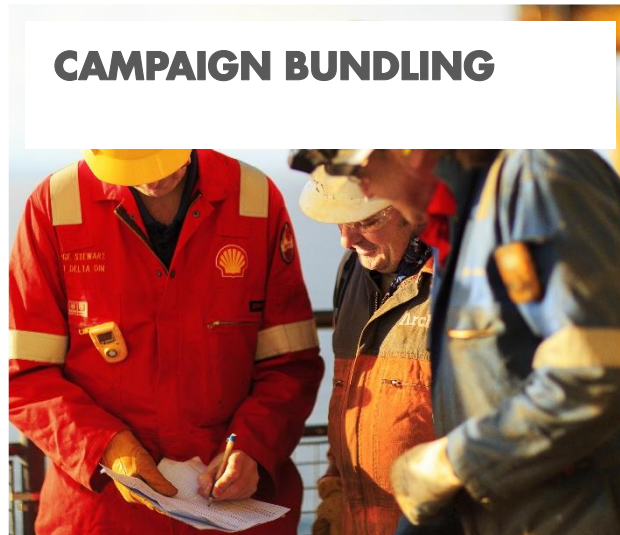
(1) Subject to ANP approval

Shell Operated Offshore Assets on Production in Brazil

- Bijupira & Salema
 - FPSO Fluminense
 - Redevelopment done in 2012/3
 - 22 production and injection wells
 - Concession contract ends in 2025
- Parque das Conchas – BC10
 - FPSO Espirito Santo
 - 3 phases, 4 fields, complex subsea arrangement
 - 29 wells
 - Concession contract ends in 2032



Success Factors for Decommissioning



Learning from Other Countries



- US GoM has seen >4000 structures decommissioned
- North Sea less extensive, but still >150
- Knowledge and experience is building continuously
- Learn from recent D&R projects and plans
- Understand differences due to local context – not 'one size fits all'
- Benchmarking
- Supply chain as well as operators

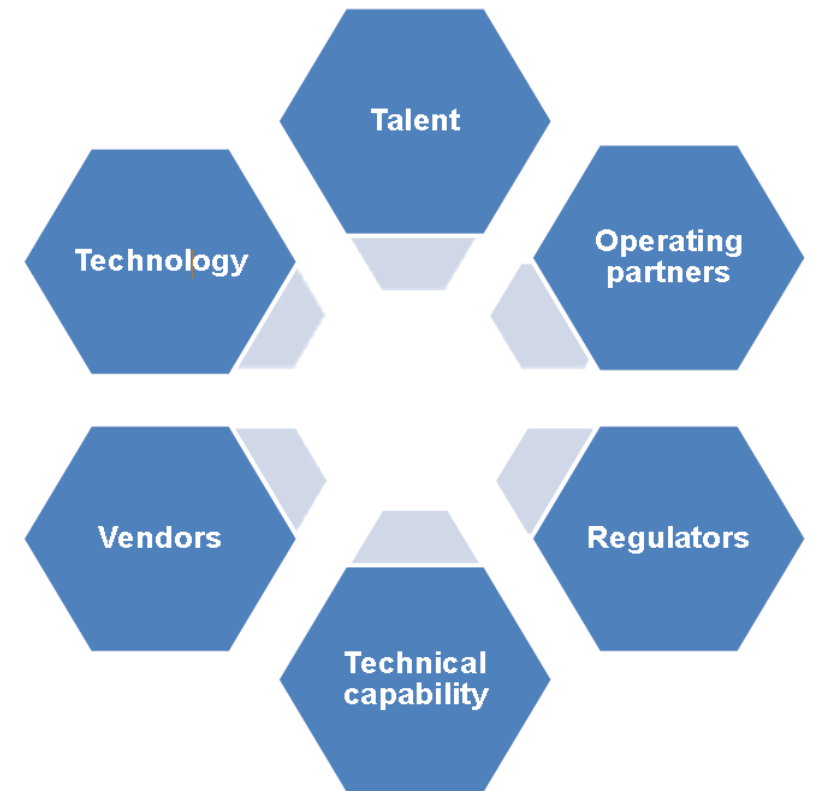
Selected Decommissioning Guidance - Momentum on Risk-Based *Win-wins for safety, environment and cost*

Regulation	Requirements jackets	In situ/reefing	Requirements subsea systems + pipelines
IMO (International Maritime Organisation)	Remove when <100m water and <4,000 tons. Remaining equipment 55m water clearance.	Yes: reefing guidelines	None – safety for other users of the sea.
USA CFR 30.250 (Code of Federal Regulations)	Remove, unless converted to artificial reef. Remaining equipment 28m water clearance.	Yes: state reefing programmes	Remove. Derogation on basis of safety and environmental cost-benefit.
OSPAR (The Convention for the Protection of the Marine Environment of the North-East Atlantic)	Remove. Derogations for concrete gravity-based structures and steel >10,000 tons.	No	Country-specific requirements. Subsea: Remove. Pipelines: Comparative Assessment
ASCOPE guideline (The ASEAN Council on Petroleum)	Follows IMO.	Yes: subject to national reefing programmes	None – safety other users of the sea.
Malaysia	Comparative Assessment Remove, or leave -55m.	Yes	Comparative Assessment
Western Australia	Comparative Assessment	Yes	Comparative Assessment
Brunei	Comparative Assessment. Remove, or leave -55m	Yes	Comparative Assessment

Examples of Good Practice Sharing (Collaborate Whilst Maintaining Competition)

- Brazil - Joint Industry Project on risk-based comparative assessment for subsea decommissioning; Best practice guidelines for wells P&A
- International - IOGP Decommissioning Committee
- Malaysia - COREL cooperative initiative on good practice
- Australia - Operator cooperation APPEA
- India - Indian Decommissioning Conference
- UK - Govt (OGA) led cross industry collaboration
- Netherlands - Cross-industry and government cooperative platform "Nexstep"
- Annual Industry Conferences UK, Norway, USA, APAC

Expanding collaboration into new areas



Planning for Cessation of Production (CoP)

Key Drivers Resources Holders / Regulators:

- Safe, environmentally responsible production of oil & gas
- Maximum recovery of oil & gas
- Safe, environmentally responsible, efficient decommissioning of oil & gas facilities

Key Drivers Concessionaires:

- Safe, environmentally responsible production of oil & gas
- Maximum **economic** recovery of oil & gas
- Safe, environmentally responsible, efficient decommissioning of oil & gas facilities

- The Oil & Gas Authority in the UK has issued a Guidance Document on requirements for the planning for Cessation of Production (July 2018), to align Regulators and Licensees regarding CoP planning:
 - Overview of (OGA) requirements
 - Process to be followed by Licensees
 - Content and submission of a CoP document
 - Explanation of how Regulator respond, generally by objecting or not objecting to proposed CoP

<https://www.ogauthority.co.uk/media/4994/cop-guidance-july-2018.pdf>

Regulatory Points for Discussion (I)

- Allow operators to plan for decommissioning: Develop **clear and efficient decommissioning approval process**; **coordination** between the main Regulatory bodies
- Agree on approval process to **minimize post-CoP (Cessation of Production) OpEx and Safety exposure**, such as FPSO float-off as soon as possible after CoP
- Adopt **risk-based comparative assessment** of alternatives for subsea decommissioning, based on **multiple criteria** (safety, environmental impacts, technical feasibility, society/stakeholders needs and cost)
- Develop processes and assessments which are **scale-able to fit the complexity** of the decommissioning project
- Consider **decommissioning in situ** (cleaned, made safe, left in place) as an effective D&R option that could be permitted if the assessments show acceptable risks to users of the sea and the environment



Regulatory discussion points (II)

- Allow decommissioning execution under flexible schedule, to capture opportunities and maximize efficiency (like scopes bundling)
- Develop fit for purpose new regulatory framework on decommissioning security/guarantees and post-abandonment obligations, taking consideration of the business strength of the operators



