

APPEA Conference Perth, WA

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Australia offshore well inventory characterisation and decommissioning cost saving opportunities through cap rock restoration and rigless/riserless techniques

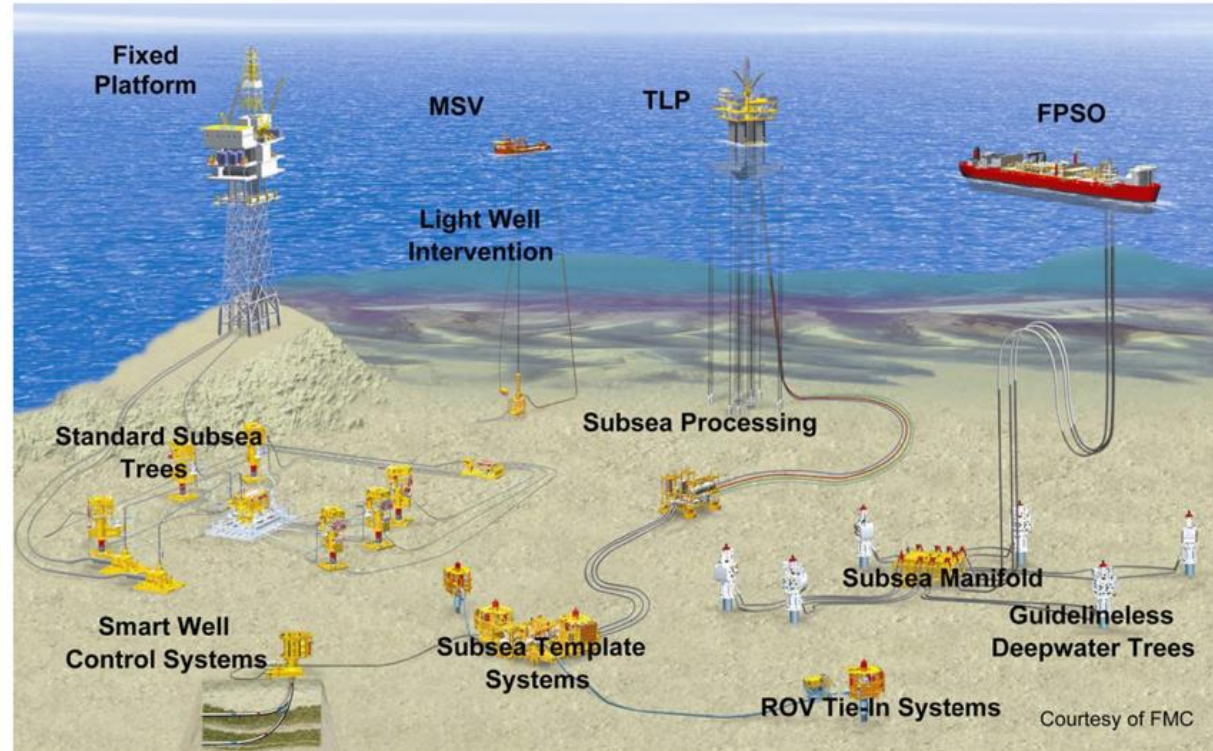
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Australia can save billions of dollars in well decommissioning

Hypothesis

Cap rock restoration (CRR) can be applied to a significant portion of the total well inventory containing a completion (production tubing), then application of rigless/riserless (RR) (subsea wells) and rigless (platform wells) access methods can significantly reduce cost by >40%, versus current practice, while ensuring the same standards of well integrity.



Offshore Oil and Gas Decommissioning Liability (Australia)

ADVISIAN Exec Summary (10 Mar 2021 - public)

Commonwealth + state wells included in Advisian report

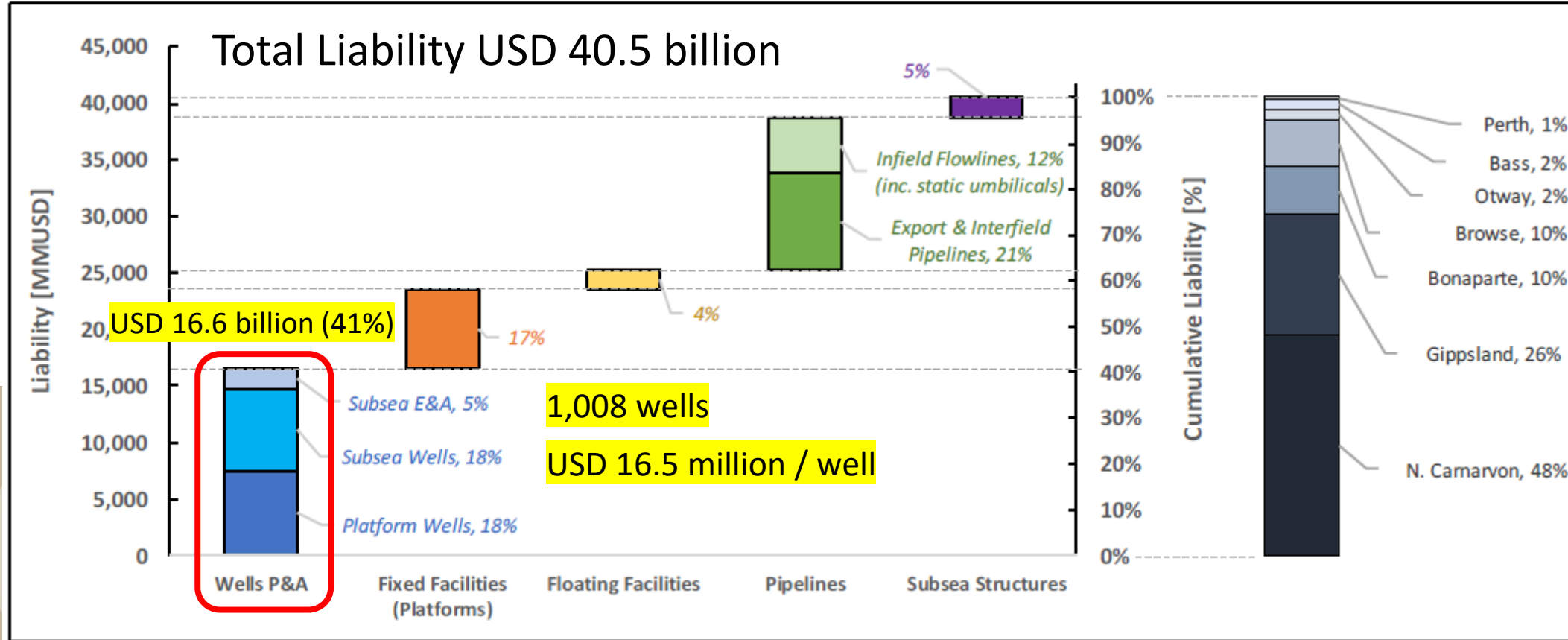
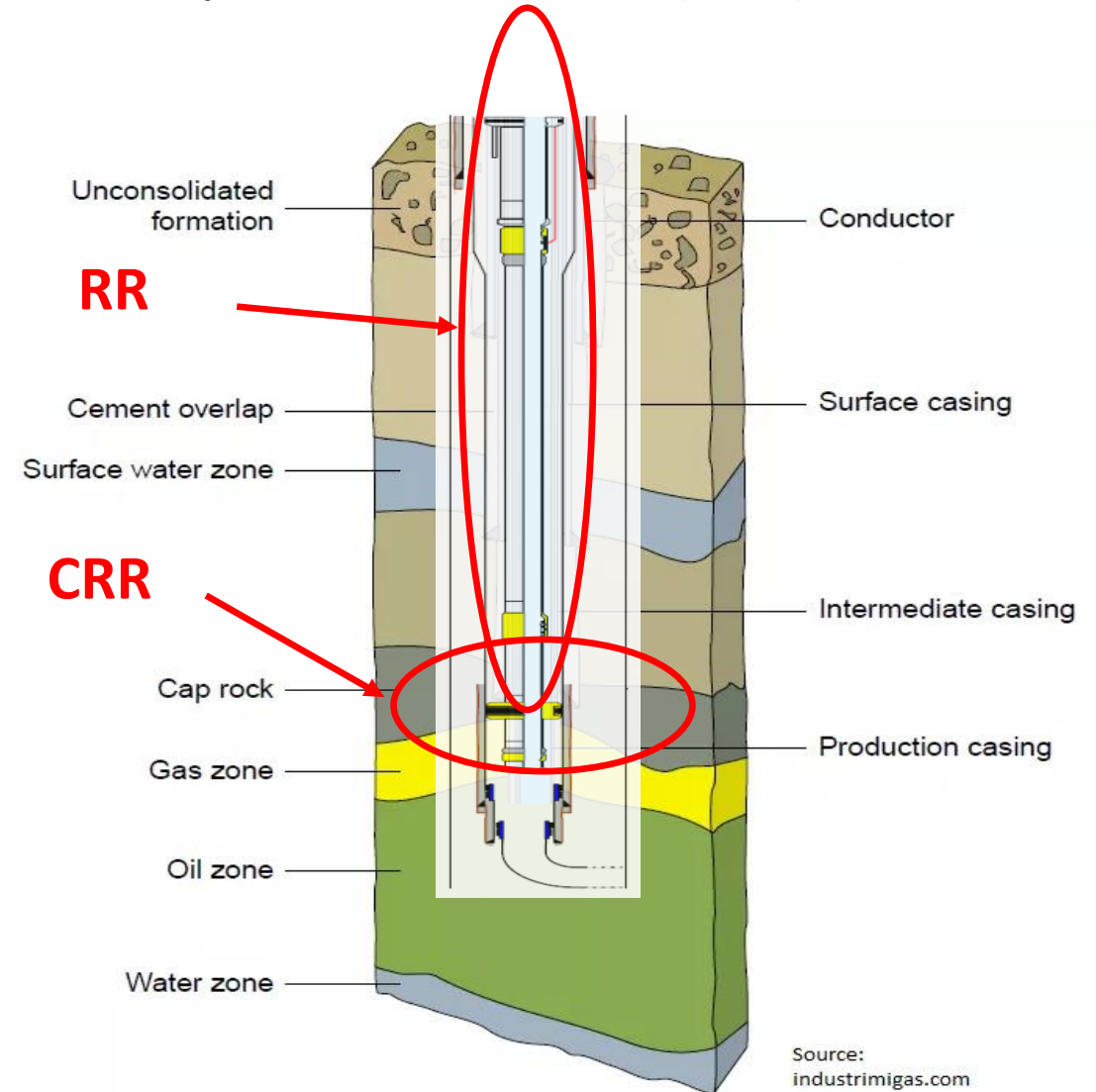
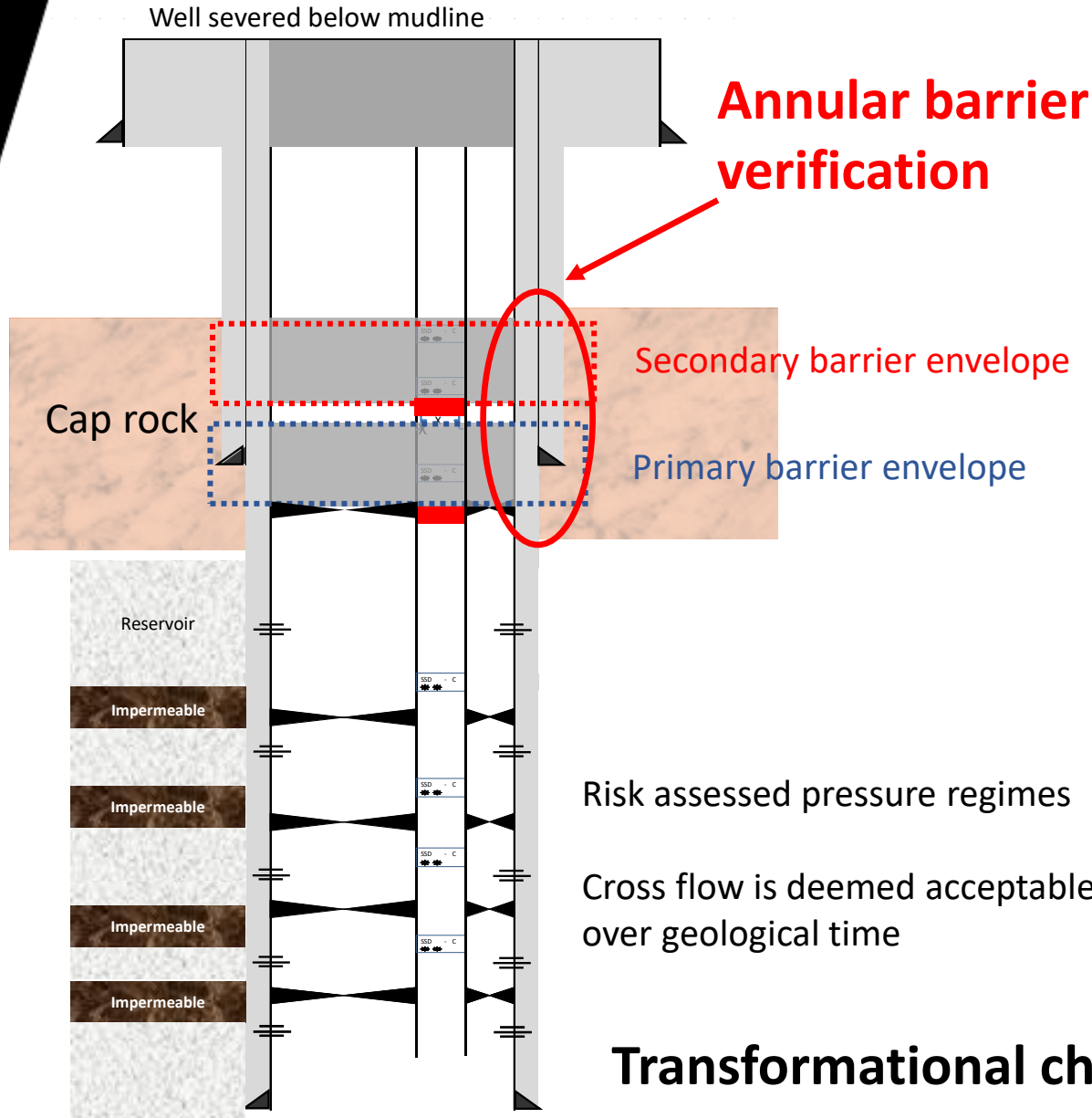


Figure 2: Australian offshore oil and gas decommissioning liability by asset typology

Well Decom: Identifies USD 4.1 billion (~25% of well liability) in potential reductions (Collaboration, technical limit, new technology)



Rigless/riserless (RR) well decommissioning with cap rock restoration (CRR)



Source: industrimigas.com

Not to scale

4.3 Annular Barrier

The annular barrier should be verified by an appropriate combination of:

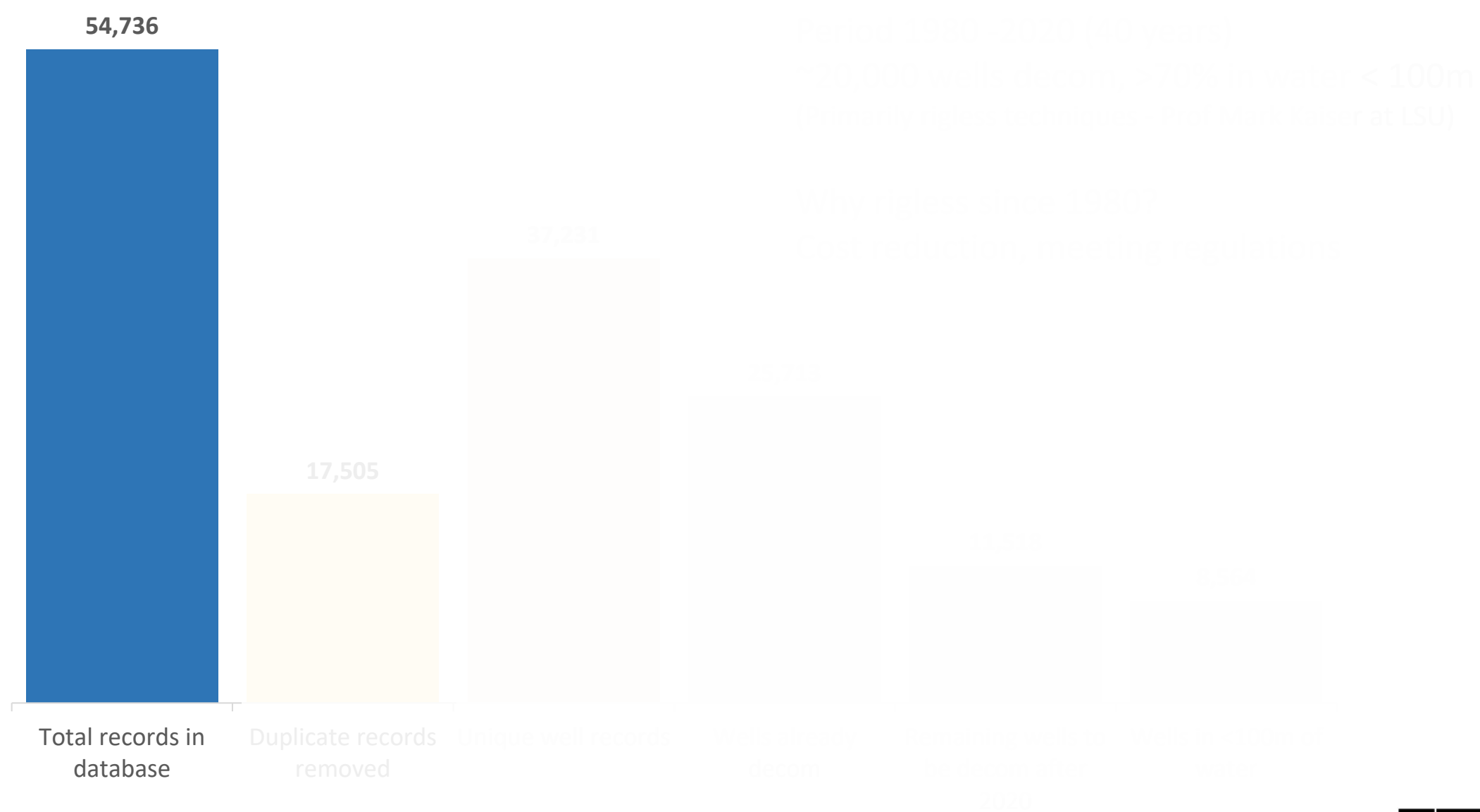
- Testing (e.g. perforate and test)
- Records from cementing operations (e.g. volumes pumped, returns during cementing, differential pressure, losses, centralisation etc).
- Sufficient annular isolation through the original cement job. If the quantity of annular cement (the estimate of the volume of cement placed in the annulus during the original cement job) is not considered to be adequate for the required adequate for the equivalent of two barriers or a combination barrier based on the assumption that sealing has occurred somewhere in the annulus cement. This may be increased or decreased on a well-by-well basis depending on the confidence level of the original cementation (refer to Figure 14).
- Casing pressure history during the life cycle of the well
- Well-integrity reporting
- The leak-off test when the casing shoe was drilled out
- Field experience
- Pressure history
- Modelling of cement job
- Logs (e.g. cement bond, temperature, sonic)
- Sampling of annular fluids

Everything else comes first
(a cement evaluation log is nice to have)

Single most important item?

Note: Validity of historical data (logs, cementing records etc.) should be considered based on potential isolation degradation, or potential improved sealing properties, over time.

Lessons learned - GoM Well Decommissioning



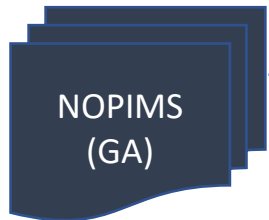
Period 1980-2020 (40 years)
20,000 wells decommissioned with water < 100m
(Primarily rigless techniques - Prof Mark Kaiser at LSU)

Why rigless since 1980?
Cost reduction, meeting regulations

Source: BSEE borehole database statistics (Jan 2021)
GoM = Gulf of Mexico

Curtin University Well Inventory Model (CUWIM)

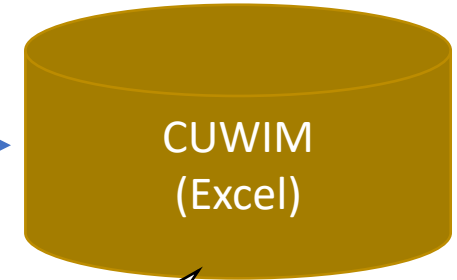
Australian Wells Databases
(public)



>20k Records of
hard to visualise data

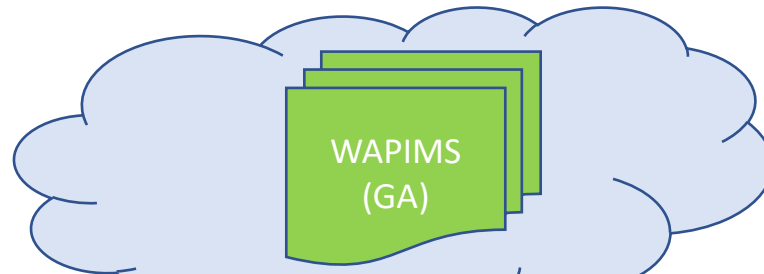
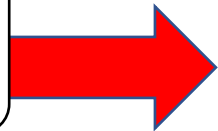


>20k Records
Fully customizable
sort and filter
capabilities
+ graphics



Mar 2020

For this study 840
offshore Commonwealth
wells were analysed



>4,000 additional records added to CUWIM

~900 wells on Barrow Island



Six well classifications were defined

- (i) DNC – dry, not completed
- (ii) DCNR – dry, completed, not rigless
- (iii) DCR – dry, completed, rigless
- (iv) WNC – wet, not completed
- (v) WCNR – wet, completed, not rigless
- (vi) WCR – wet, completed, rigless

CRR & RR

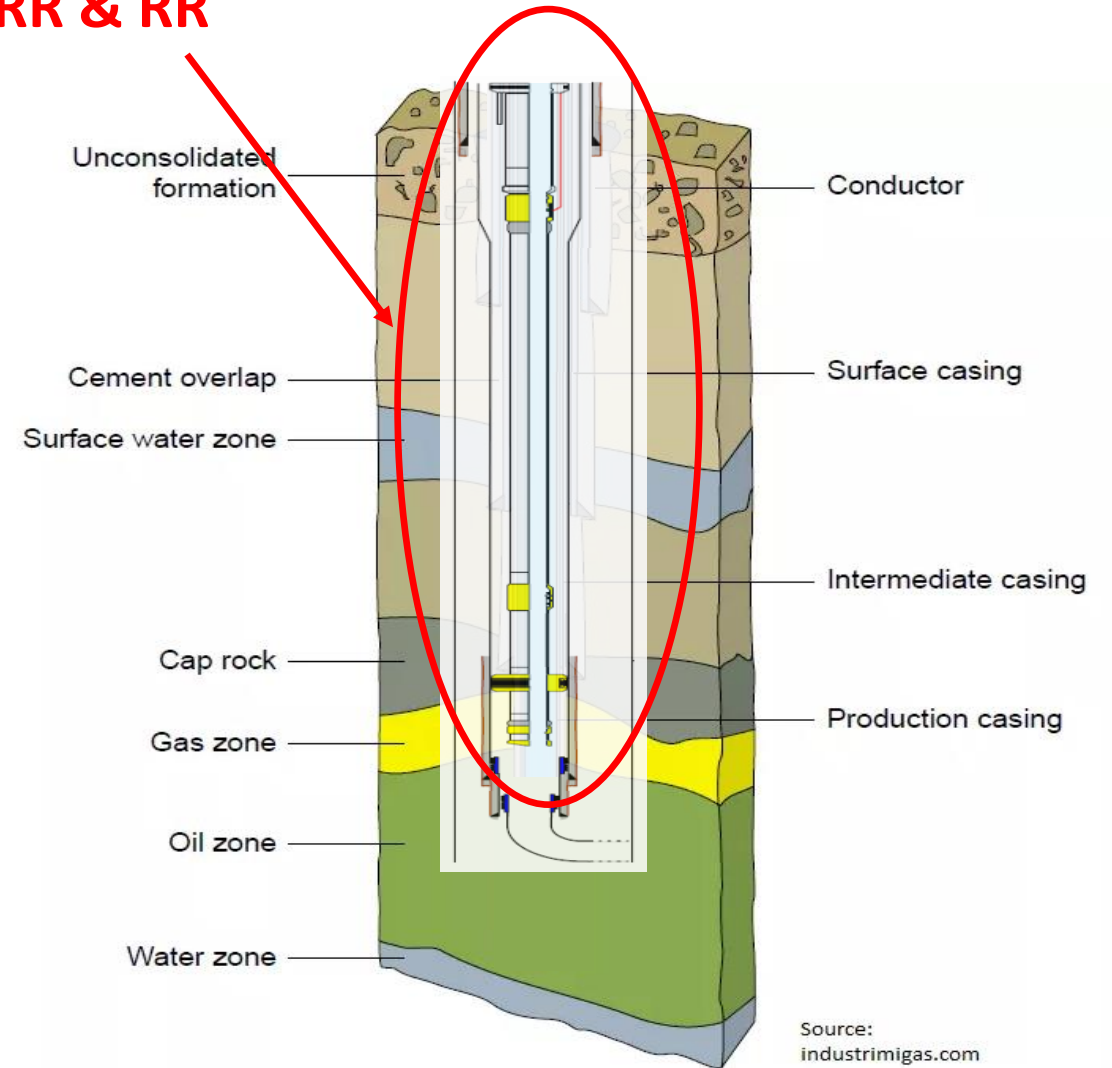


Table 1. Single well access method and cost estimate

	Access Method Description	Well Decom Million USD	Duration Days ^A	Total Well Cost Rate USD/day ^B
i	Floating rig (semi)- conventional techniques	7.70	35	220,000
ii	Floating rig (semi) - rigless/riserless techniques	3.80	20	190,000
iii	Jackup - conventional techniques	3.75	25	150,000
iv	Jackup - rigless techniques	1.88	15	125,000
v	HWU - conventional techniques	2.40	20	120,000
vi	HWU - rigless techniques	1.65	15	110,000
vii	Rigless - only wireline & pumping	1.02	12	85,000

^A Interfield rig move included in duration, international mob excluded.

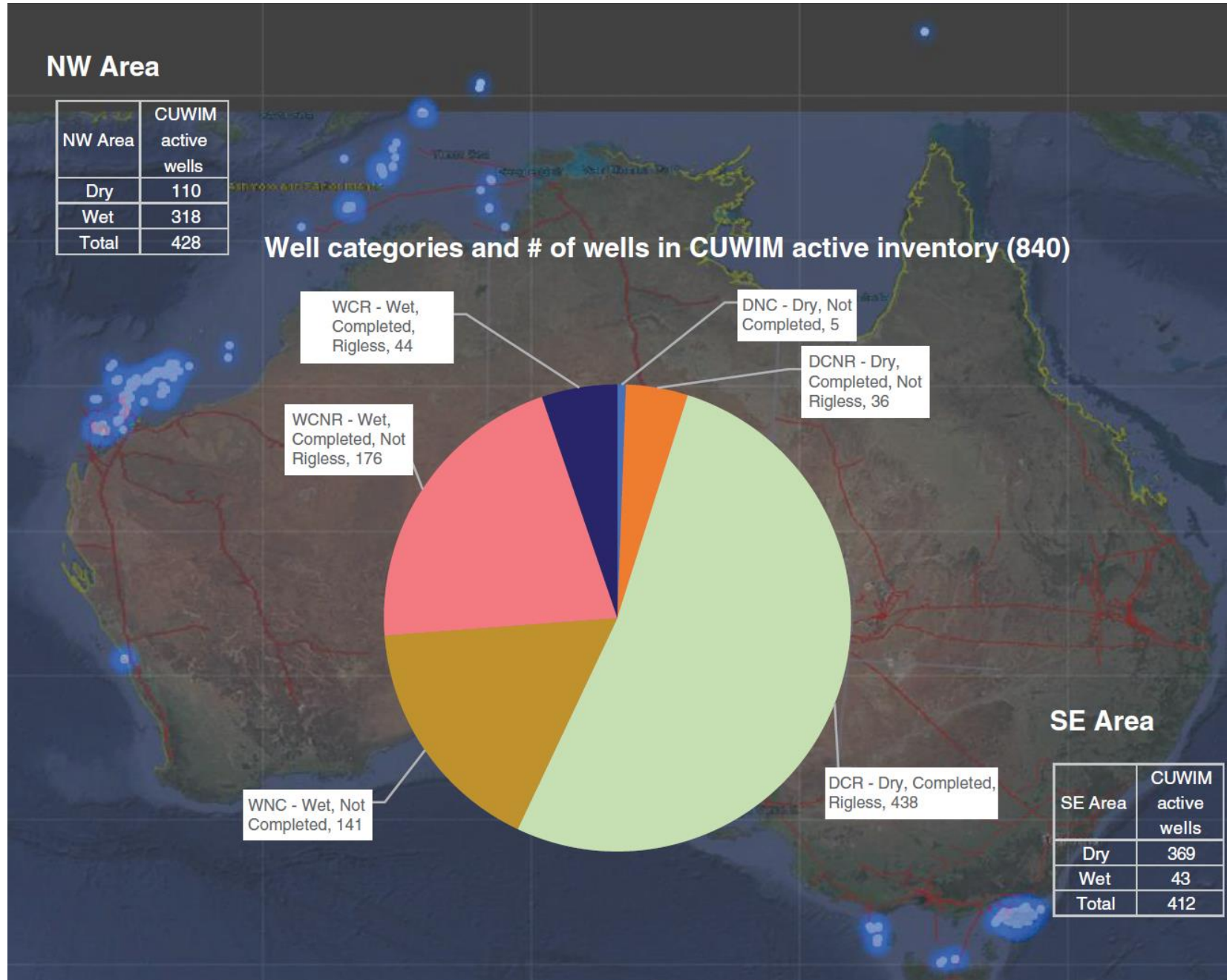
^B Operator total cost per well in USD divided by duration days.

Access methods i and iii are in line with costs for Southern North Sea operations (OGUK 2019).

Access methods ii, iv & vi rigless techniques means the unit is used as an access platform. All well work is performed with wireline and pumping. Reduction in USD/day and durations due to multiple service companies not required, drilling BOPs and risers are not used, tripping pipe operations are minimised, completion strings left in situ up to the bottom of the SCSSV.

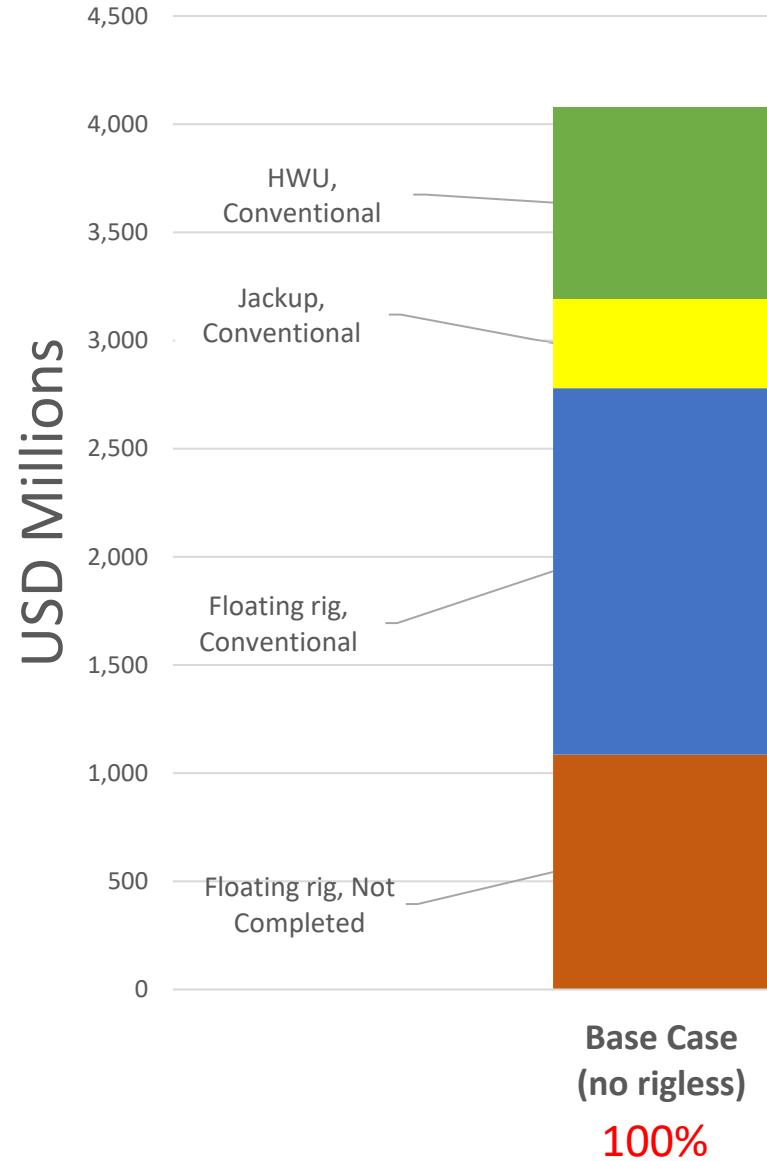
Access method vii rigless uses stand alone wireline and pumping spread supported by a minimum cross trained crew.

CUWIM – Summary of wells (offshore Commonwealth)



CUWIM - Hypothetical cost estimate

Estimated Cost Reduction Opportunities CUWIM (840 wells)



Well Decom – CRR & RR cost reduction SWOT analysis

Strengths

Cost reduction

A well is a hole in the ground

CRR / RR is in NOPSEMA policy
(Section 572 - maintenance and removal of property)

Trailing liability not new (GoM , UK & Norway)

Weaknesses

Lack of experience

Our wells are different

Not engaging the Regulator early

Our well data is confidential

Cost reduction

Research annular barrier verification

Annual barrier verification research

Share well data for detailed analysis

Apply global lessons learned **Collaboration**

Well decommissioning education

Global experience

Educate ALL stakeholders

Opportunities

Misunderstanding regulatory requirements

Annual barrier verification takes effort

We always do what we've always done

Acceptance of very high well decom costs

Trailing liability

Threats

A sunset over the ocean with an offshore oil rig silhouette. The sun is low on the horizon, casting a warm glow over the water. The rig's structure is visible on the left and right sides of the frame.

Thank you

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