



OTC2016

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ENDLESSINNOVATION

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**Introducing a new Recommended Practice for
Fit for Purpose Well Abandonment**

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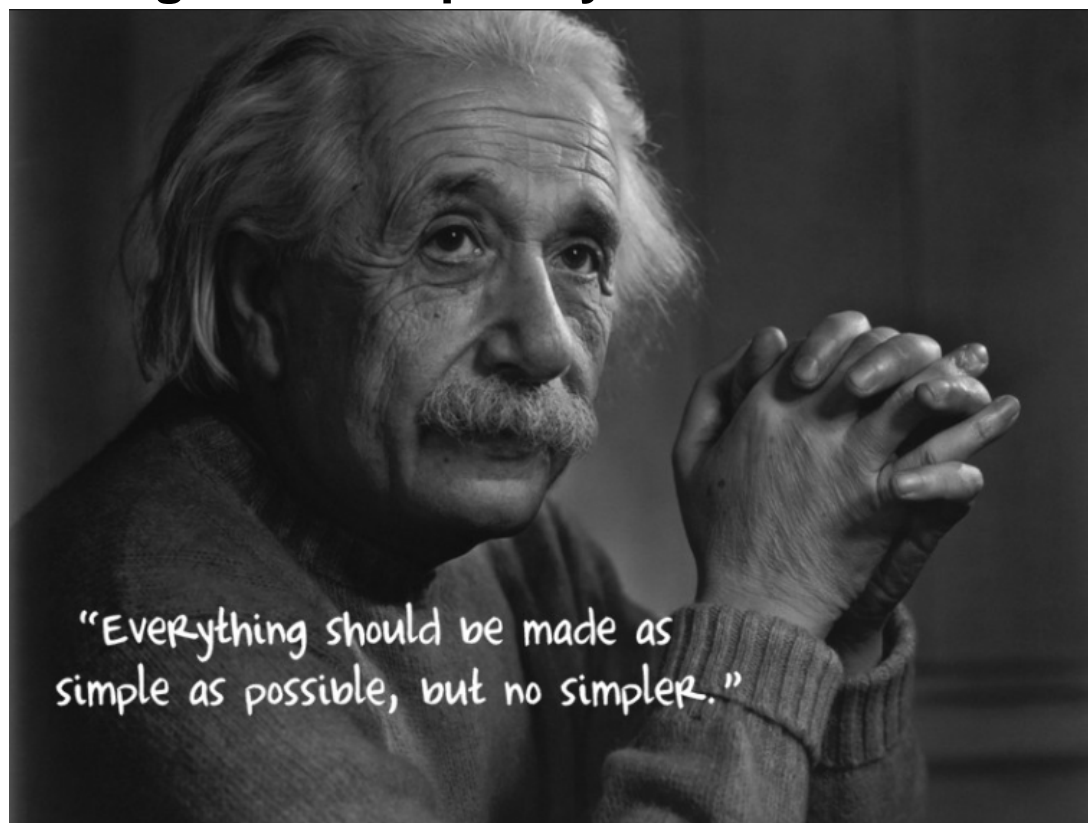
Introducing New DNV GL RP

- In May 2016, DNV GL are releasing a new Recommended Practice (RP)

Risk-Based Abandonment of Offshore Wells

- The document is currently available online at the following address:
www.dnvgl.com
- The RP can be an alternative to current practices

Dealing with Complexity in Decommissioning



"Everything should be made as simple as possible, but no simpler."

Fit-for-Purpose Method

Current P&A Regulations Internationally

- There are prescriptive requirements as to the number and size of plugs required.
- The requirements are the same for all types of wells (one-size fits all).

Alternative ways

- The industry is looking to differentiate between P&A requirements on a well-by-well basis.

Fit-for-purpose

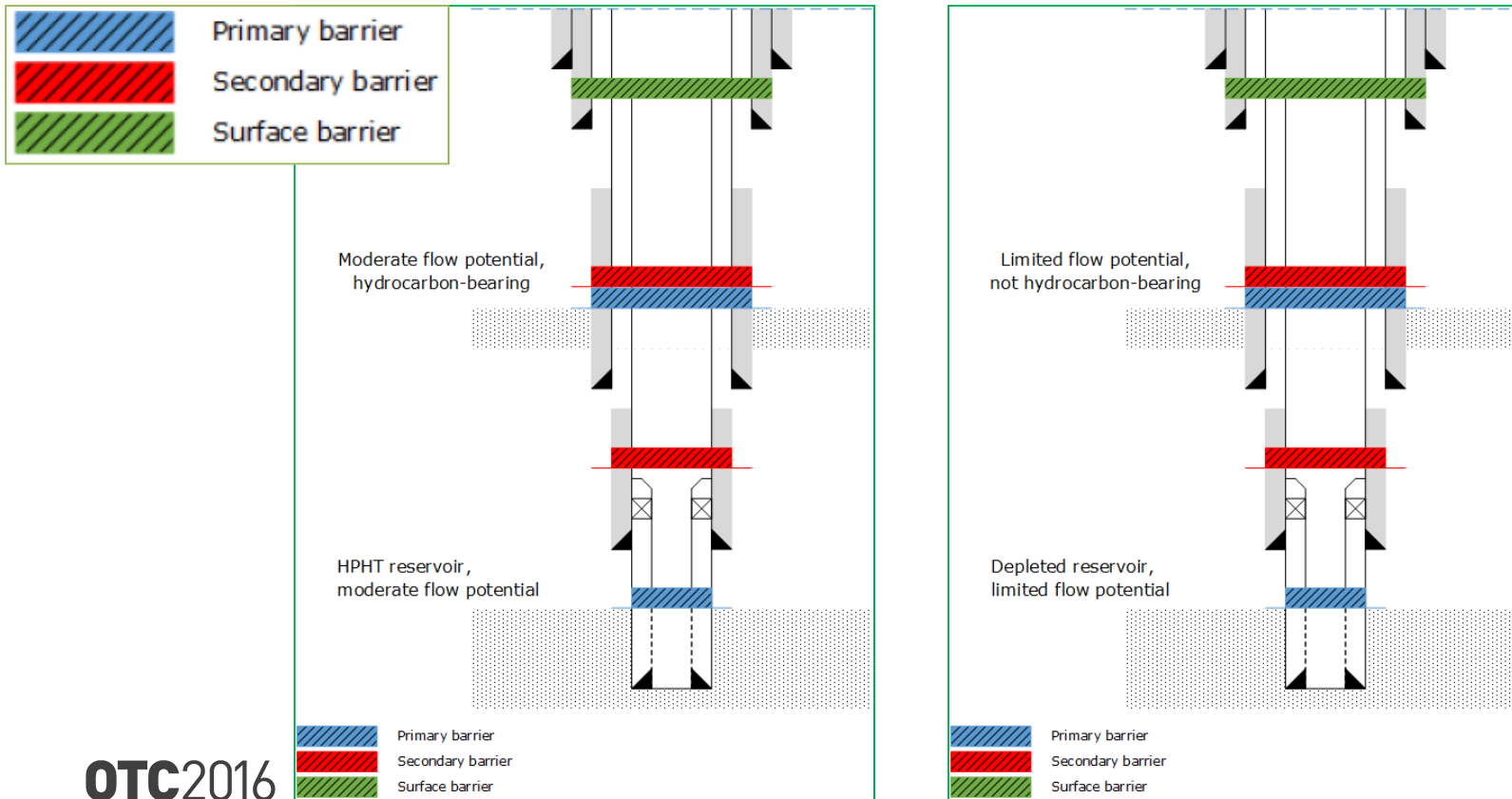
- The DNV GL RP adopts a fit-for-purpose method, where both the risk acceptance criteria is site-specific and the abandonment well design can be well-specific.

Global P&A Barrier Length Requirements

Regulator	No of Plugs	Minimum Length (m)
Norway	2	100
UK	2	~30
Netherlands	1	100
Germany	1	100
USA (BSEE)	2	~30
Canada	1	~8
Russia	1	~24
Australia	1	~30
Malaysia	1	~30

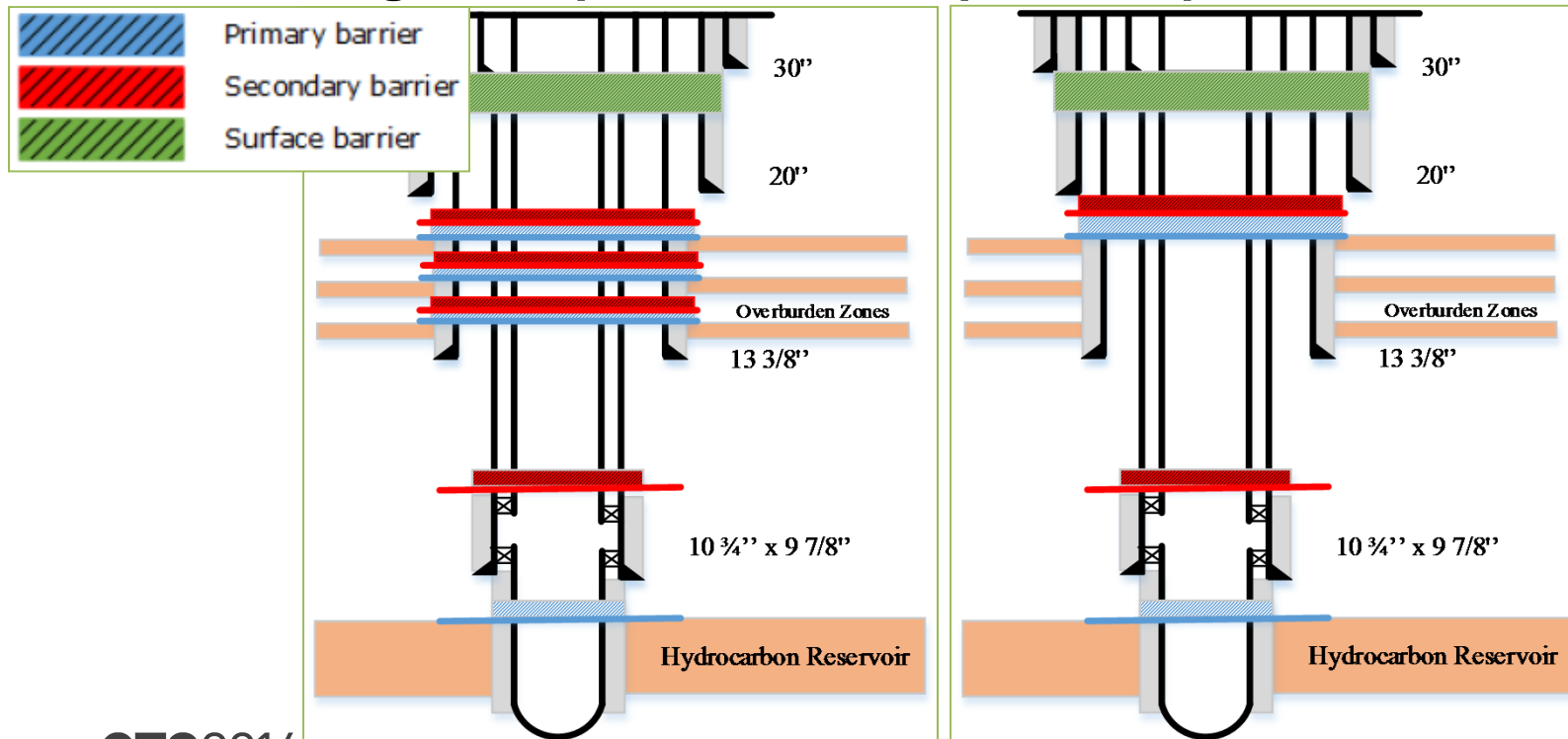
[1] - "Plugging and Abandonment (P&A) Challenges" The Challenge of Well Integrity in a Subsea Environment, Jules Schoenmakers, Shell 2014

Are all P&A Wells the Same?



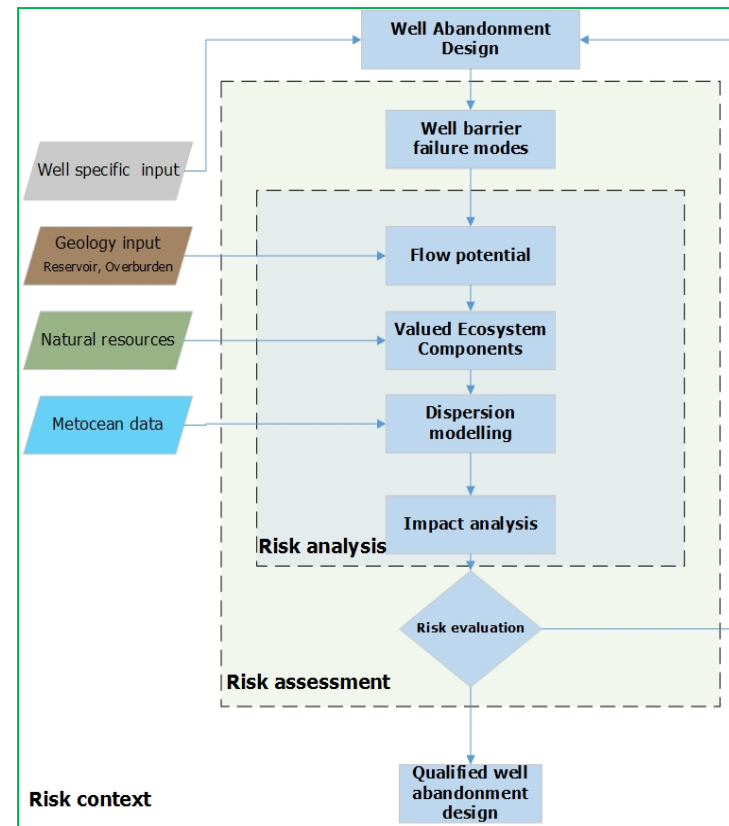
Concept

Cost Saving - Comparison Prescriptive Requirements v. Risk Based

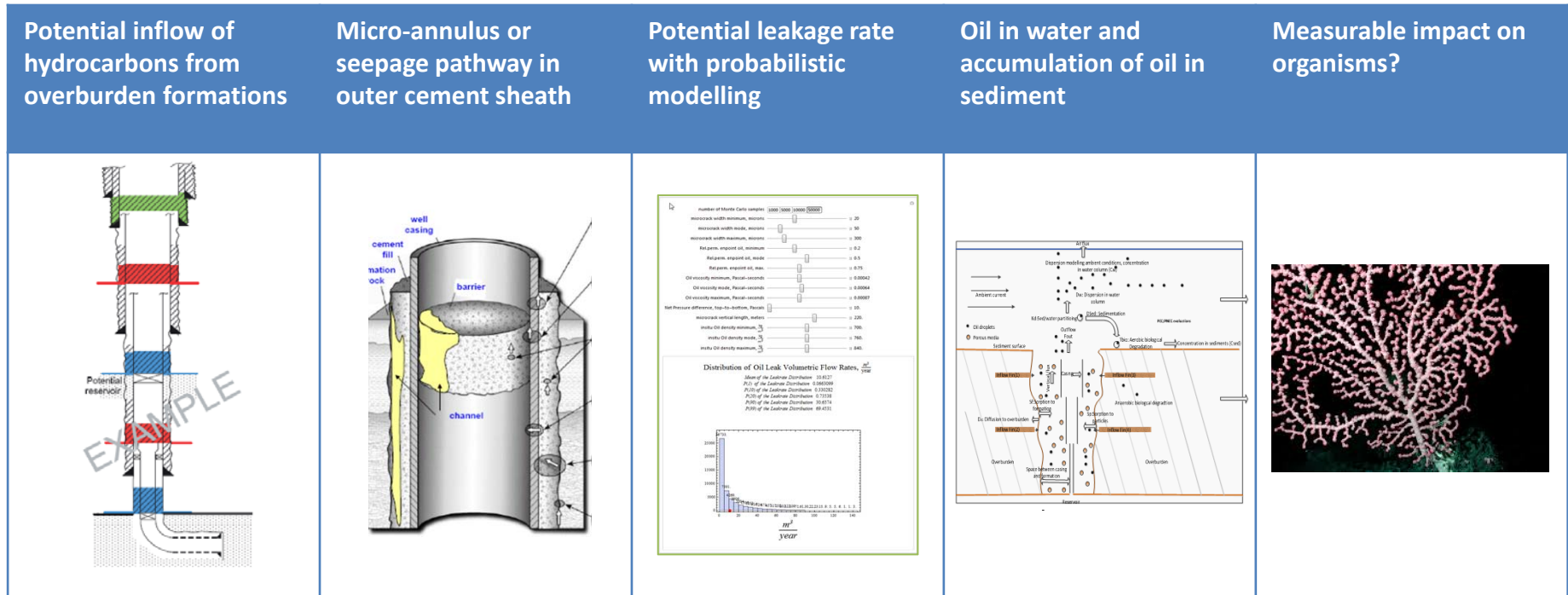


Approach - Well Abandonment Risk Assessment

- Based off ISO 31000:2009: Risk Management - Principles and Guidelines
- Can assess environmental and safety risk
- Can evaluate alternative well abandonment designs to assess their suitability



From Well Parameters to Environmental Risk Metrics



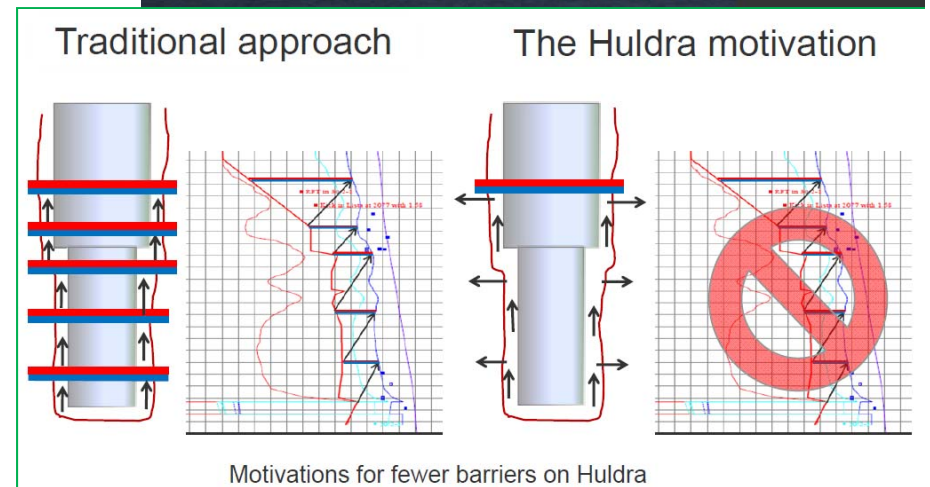
Acceptance Criteria – an example

	% overlap with VECs within extended field area (e.g. 50 x 50 km)		
THC concentration	5-20 %	20-50%	>50 %
<5 ppb	n/a	n/a	n/a
5-20 ppb	1×10^{-2}	1×10^{-2}	1×10^{-3}
20-50 ppb	1×10^{-2}	1×10^{-3}	1×10^{-3}

- Based on DNV GL experience, long-term leakage that lasts more than 10 years should have an annual likelihood less than 1×10^{-3} if the environment is to be unaffected 99 % of the time.
- However, this should be operator and site specific.

Case Study

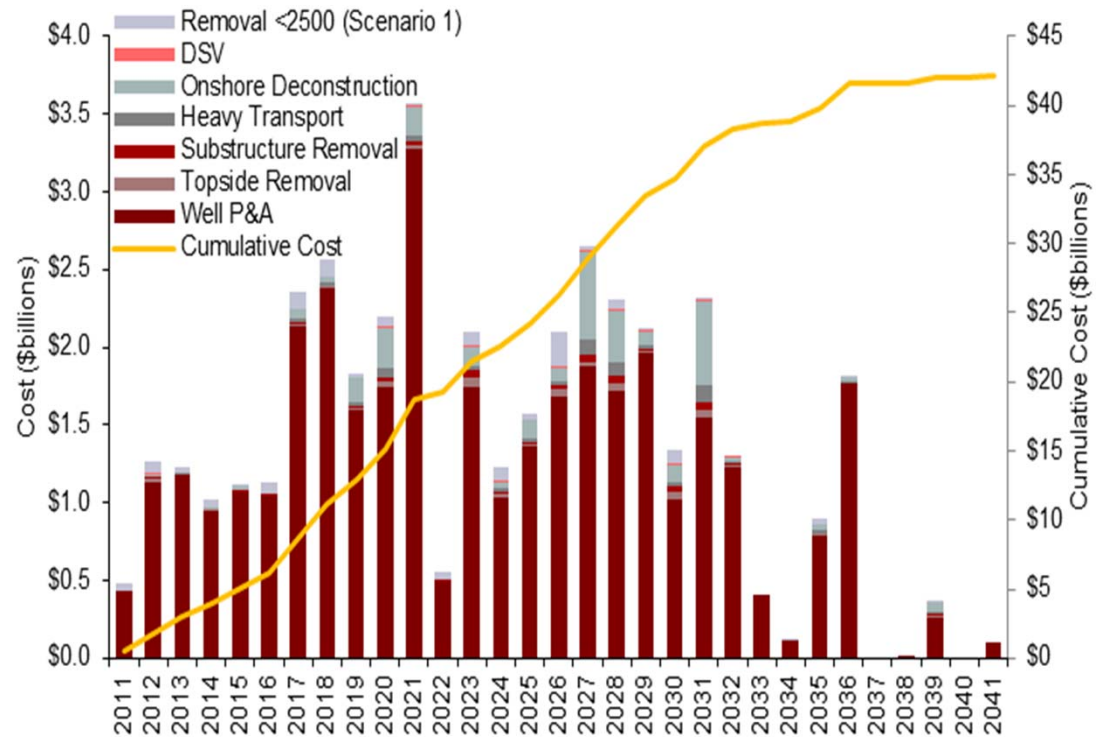
- Fit-for-purpose solutions have been implemented in well P&A in Norway²
- Risk assessing the proposed well abandonment designs strengthens the case for alternative solutions
- There is a large savings potential in well P&A (~\$12 Million per well)



Advantages to Using the Alternative

Advantages to this approach are that it has:

- Explicit criteria for environmental protection
- P&A spending focused on higher-risk zones
- Optimize P&A design
- Flexibility – can incorporate new technology
- Site specific considerations.



[3] - "Decommissioning Expenditure to 2041", DW/ Deloitte Decommissioning Report

Summary

- The RP provides the framework for establishing and evaluating P&A wells individually using a risk perspective.
- Considerable savings can be achieved
- DNV GL can evaluate well abandonment designs and help optimize them to be fit-for-purpose



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Acknowledgements / Thank You / Questions

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