



Oil & Gas
Authority

EOR Industry Task Group

Terms of Reference

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1. Objectives

Support OGA in meeting the EOR Strategy and executing the EOR Delivery Programme, speaking as a single voice for this particular subject area.

Grow industry capabilities that address principal barriers towards implementation of the EOR Strategy and associated delivery program.

Promote collaboration/enterprise learning to enable industry to benefit from learnings to date. Without this stimulus, it is unlikely that industry will achieve the OGA strategic objectives for EOR; which is one of 4 areas identified in the Wood Review report (to increase production in the UKCS).

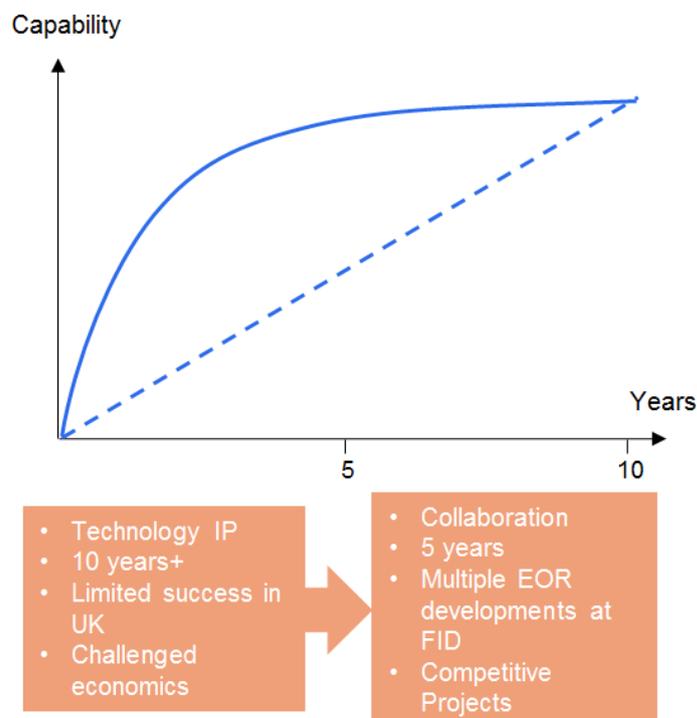


Figure 1: Learning Curve

2. Scope

- Alignment with expectations of MER UK Asset Stewardship Board
- Alignment with the OGA EOR strategy: deliver a strategy to facilitate sanctioning of up to 250 million barrels of additional reserves through polymer, low salinity water flood activity and other secondary recovery opportunities, by Q1 2021
- Alignment with the OGA EOR delivery programme
- Focus on MER UK, not individual owner positions
- Leverage the best practices from operators currently investing in polymer EOR
- Enable UK operators to identify and progress projects at a pace that meets the OGA EOR strategy expectations (5 years)
- Consider the supply chain capabilities within guiding principles
- Respect the intellectual property of individual companies by focussing on sharing of non-confidential information
- Consider full life cycle costs for chemical EOR, to support discussions on potential fiscal improvements to stimulate activity in the EOR sector.
- Initial focus on polymer EOR. Evaluate the potential to expand to other technologies within 12 months.

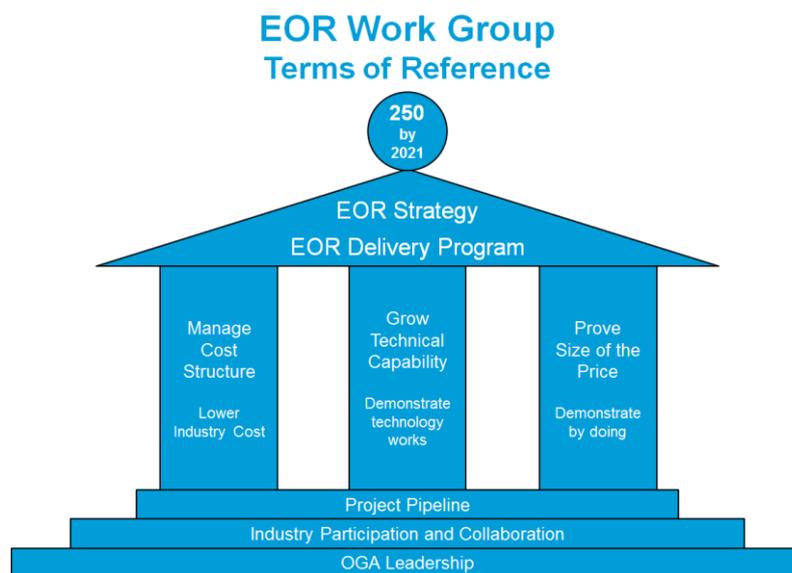


Figure 2: Terms of Reference (ToR)

3. Governance

Client: Oil and Gas Authority

Governance Group: Asset Stewardship Board

Project Management Team:
Representatives from 4 operators currently investing in EOR (BP, Chevron, Shell, Statoil)

OGA Task Group lead: William Lindsay

Industry Task Group lead: Richard Hinkley (Chevron)

Purpose: To advise and steer the project during execution on a quarterly basis

4. Givens

- No intellectual property conflicts
- Avoid current, or new, Research & Development that requires significant technology development
- No requirement for confidentiality agreements
- Enable UK operators to leverage the knowledge of early adopters through sharing learnings
- Focus on polymer EOR to get early win
- Strengthen industry co-operation through continual improvement in and support for, industry codes of practice, forums and standards
- Commit to continuous improvement through regular review of the charter section in this document

5. Deliverables

DEVELOP A BODY OF KNOWLEDGE

(E.g. guiding principles), leveraging industry know-how, best practices and lessons learned, which addresses principle barriers towards implementation of the EOR Strategy and EOR delivery program

PUBLISH AN EOR “STARTER PACK”

Containing Guiding Principles/Recommendations that assist UK operators to identify and evaluate EOR and accelerate their capabilities to address key issues and mitigations

EOR VALUE PROPOSITION

OGA led

EOR SCREENING

OGA led

EOR FOCUS AREAS / RISKS / ISSUES AND MITIGATIONS

Industry led

DOCUMENT PUBLISHED BY OGA IN Q3 2017

Targeting June 2017 Asset Stewardship MER Board meeting for endorsement

6. Charter

This part of the document shall be regularly reviewed as part of the workgroups commitment to continuous improvement.

6.1 ROLES AND RESPONSIBILITIES

NAME	TITLE	ROLE	RESPONSIBILITY
Richard Hinkley	Chevron: GM Projects and Growth	Task Group Lead – Industry	Ensure alignment with Asset Stewardship MER Board
William Lindsay	OGA: Projects/CCS/EOR Manager	Task Group Lead - OGA	Ensure alignment with MER UK
Dave Puckett	OGA: Senior Reservoir Engineer EOR	Task Group Member	Ensure alignment across focus area's and coordinate write-up of final documents
Marco Goense	Chevron: Captain EOR Subsurface Team Lead	Task Group Member	Facilitate Focus Area review sessions and coordinate development of guiding principles
Ruben Schulkes	Statoil: Lead Technology Developments	Task Group Member	
Alex Smout	Shell: Senior Reservoir Engineer Joint Ventures	Task Group Member	
Martin Towns	BP: Manager of EOR Technology	Task Group Member	

6.2 WORK PLAN

EOG **Task Group kick-off** in November 2016

Define the Polymer EOR **focus areas**

Develop Task Group **charter** and assign **roles and responsibilities**

Each company member of the task group is responsible for completing their respective focus area, facilitating focussed session in that area and harnessing support from others where they can.

OGA hosts **monthly focus sessions** to address Problem Statements and Focus Areas:

- **January 2017:** 1st focus session facilitated by Chevron: “Polymer EOR Project de-risking” and “Impact on operations from produced polymer”
- **February 2017:** 2nd focus session facilitated by BP: “Polymer EOR Testing Standardisation”
- **March 2017:** 3rd focus session by Shell: “Polymer EOR Injectivity”
- **April 2017:** 4th focus session by Statoil: “HSE considerations for polymer EOR”
- **May 2017:** 5th session facilitated by OGA: “EOR Starter Pack”
- **June 2017:** Contributing company internal endorsement and approval for release of materials
- **July 2017*:** Publish draft document
- **August 2017*:** Publish document *Subject to duration of necessary approvals from contributing companies and/or their JV partners

Report progress to Asset Stewardship Board on quarterly basis

Compile output from Focus Sessions into **EOG ‘Starter Pack’**, containing guiding principles

Document **endorsed** by EOR Industry Task Group representative organisations

Document **published** by OGA

6.3 STANDING AGENDA

- 1 Review Task Group Charter (including polymer EOR focus areas) and minutes from previous meeting
- 2 Main topic
- 3 Discuss JIPs and Conferences related efforts – as required
- 4 Summary of discussions
- 5 AOB

6.4 POLYMER EOR FOCUS AREAS

Leverage the work of the EOR polymer group across five focus areas that are considered highest priority for industry:

POLYMER EOR PROJECT DE-RISKING.

Build industry capability to de-risk EOR projects by identifying options to mitigate or manage risks associated with pilot and full-scale EOR deployment. Focus areas will be injectivity, subsurface uncertainty, logistics, capital and operating costs, operational issues, production efficiency and HSE. This work will result in recommendations for managing risks, reducing costs and improving project economics in combination with appropriate incentives.

POLYMER EOR TESTING STANDARDISATION.

Develop standardized tests of polymer products for EOR, allowing fair and consistent comparisons to be made and providing consistent onsite QA/QC criteria. API RP 63 provides methods for evaluating polymers but it is out of date. Industry practitioners have revised methods to improve efficiency and to address observed differences in performance between laboratory studies and deployment at scale. Original procedures were developed for conventional polymers and are not necessarily suitable to evaluate the extensive array of today's new polymer chemistries. A new set of standard tests could accelerate product screening, reduce project evaluation time and cost, consistently assess impact on produced fluids, and enable cross-industry exchange.

IPOLYMER EOR INJECTIVITY.

To understand injectivity loss during polymer injection and provide robust de-risking strategies. Injectivity loss and subsequent reduced throughput is one of the main risks in EOR polymer injection. It can erode the value of the polymer flood and put base waterflood performance at risk. Work will address: The underlying reasons for changes in injectivity during offshore EOR polymer injection/the likelihood of injectivity problems occurring, calibrated to industry experience/appropriate de-risking strategies for prevention, mitigation and remediation

HSE CONSIDERATIONS FOR POLYMER EOR.

To establish knowledge in relation to persistence and degradation of polymers in the marine environment and thereby obtain a more complete understanding of environmental risk. Standard biodegradation tests (OECD 306 and 308) indicate very low biodegradation, but it is important to study other potential types of degradation such as biological, chemical and physical degradation (e.g. via UV radiation and oxygen radicals) in the marine environment. This work can enable acceptable standards and thresholds for disposal to be determined.

IMPACT ON OPERATIONS FROM PRODUCED POLYMER.

To understand and mitigate risks associated with produced polymer in the production facilities. Once polymer breaks through into the producing wells, produced water quality and processing may be impacted (e.g. separation efficiency, water treatment, polymer precipitation at elevated temperatures). Understand impact

