

GAS & OIL TECHNOLOGIES (GOT) INITIATIVE

Update to EOR as CCUS Conference

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Rice University, Houston, TX

**Global
Dialogue**



INTERNATIONAL ENERGY AGENCY GAS & OIL TECHNOLOGIES (GOT) INITIATIVE

Overall focus

Explore the strategic role of oil and gas technology in the long term energy future

**Global
Dialogue**



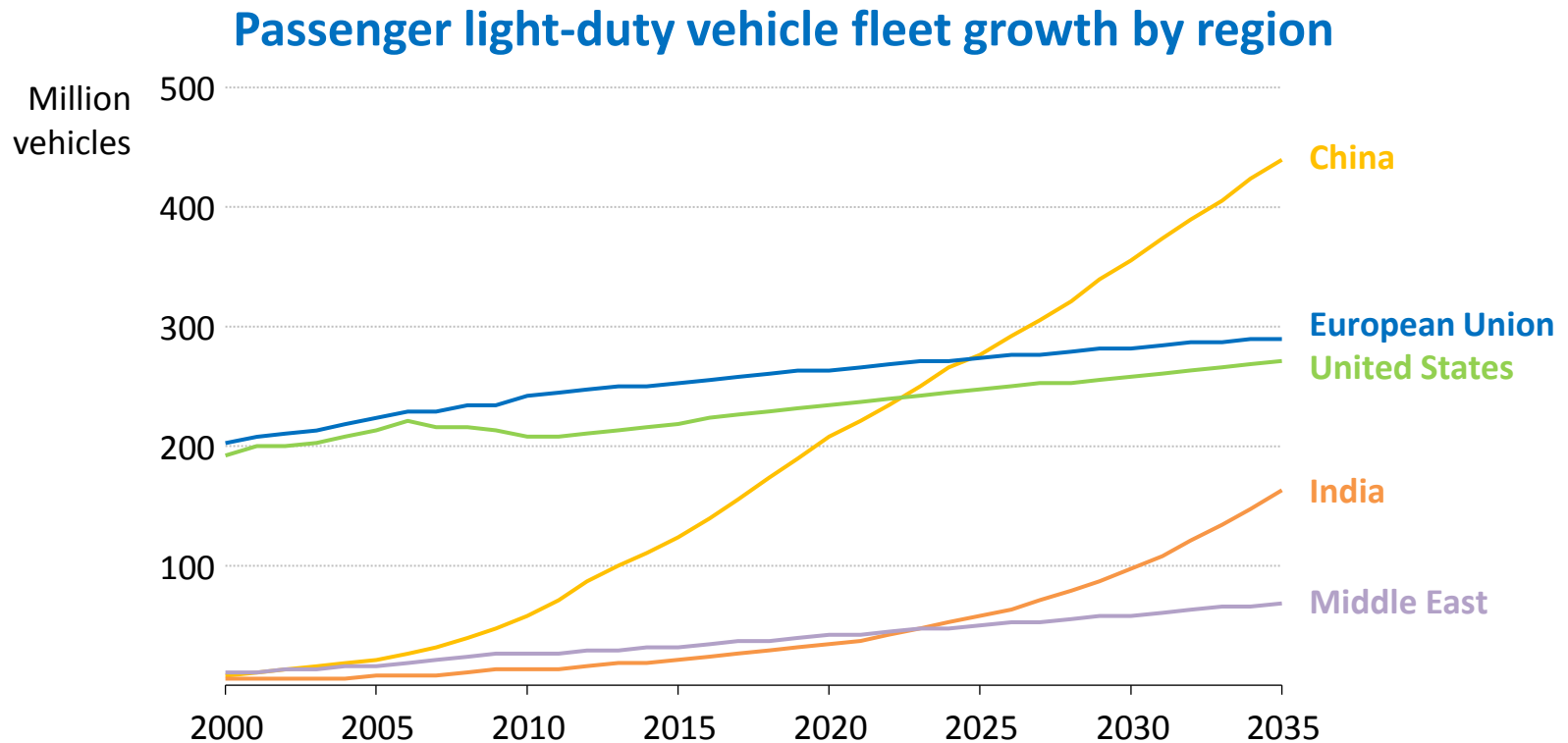
▶ Energy Security

▶ Environmental Protection

▶ Economic Growth

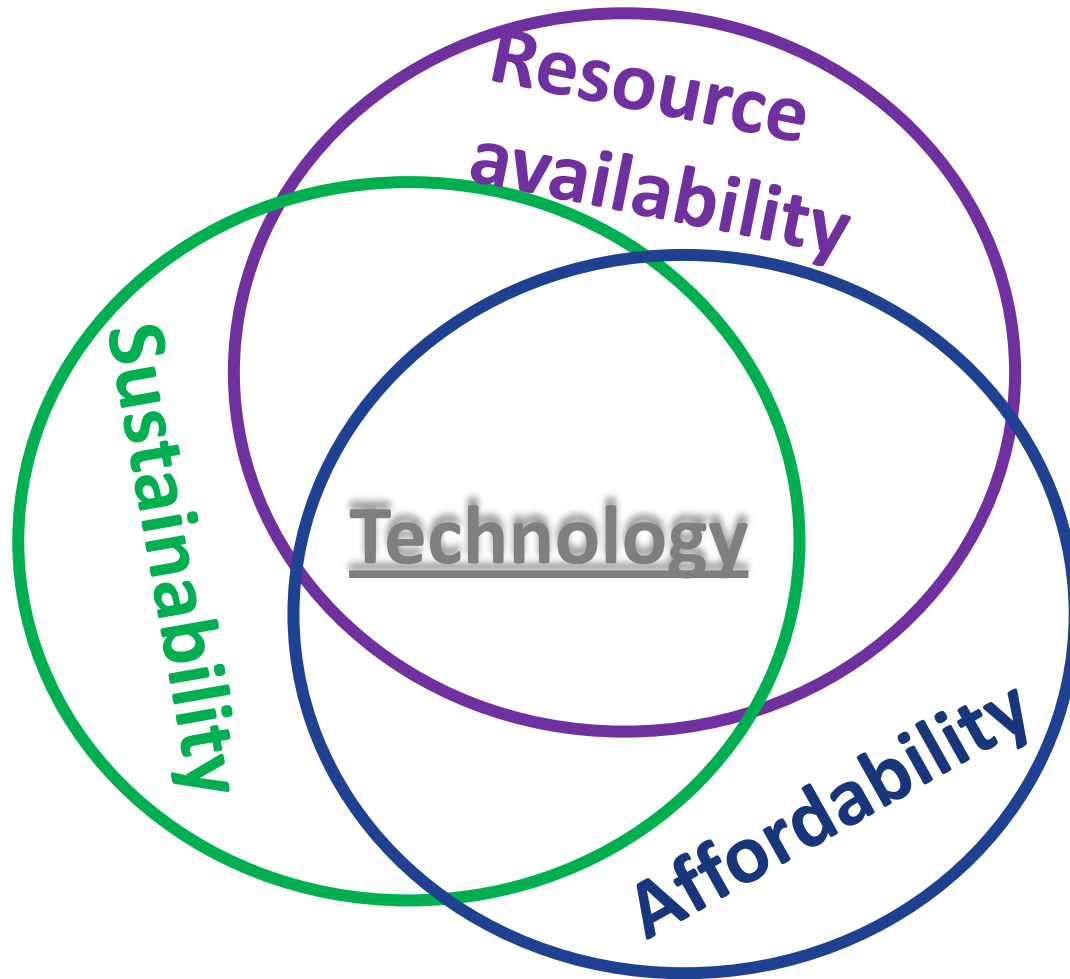
▶ Engagement Worldwide

The need for mobility means long term reliance on oil and gas



The PLDV fleet worldwide is projected to expand from around 900 million in 2012 to over 1.7 billion in 2035, with most of this growth coming from non-OECD countries

In the next 20 years, investments will total \$850B to maintain supply (IEA)



Creating Value – Role of Technology

Approach:

1. Establish current unit cost levels
2. Identify the most important cost drivers
3. Analyse effect of cost compression after recent oil price reduction

$$\text{Cost} = \text{Unit cost} * \text{Volume}$$

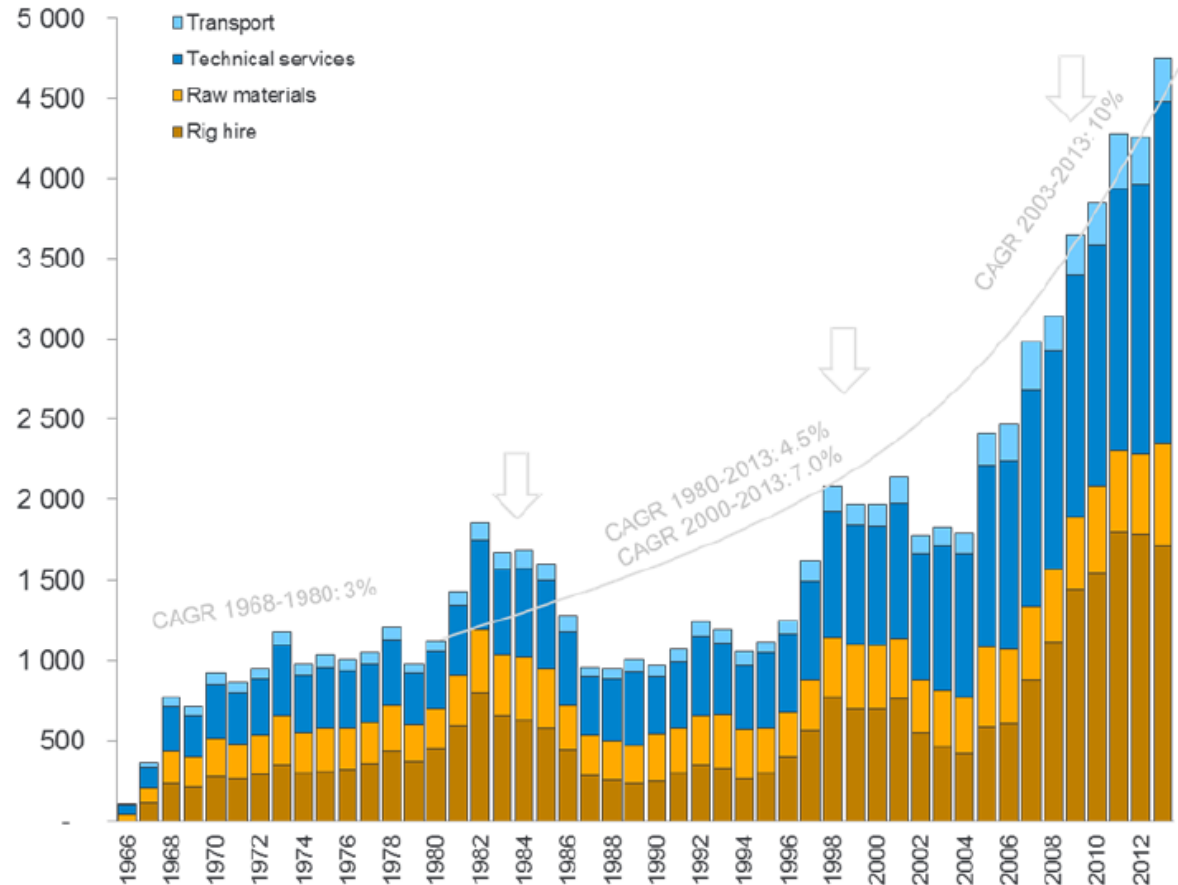
$$\text{Volume} = \text{Activity} * \text{Complexity}$$

Total cost: Observed and projected E&P spending
 Volume: Observed activity indicators such as rig days.

Complexity can be addressed with technology development and is normally driven by three factors

- *Nature given challenges.* F.ex. harsh environment, complex reservoirs or deep waters
- *Maturation of fields/basins.* F.ex. depleted reservoirs
- *Work processes and/or regulations*

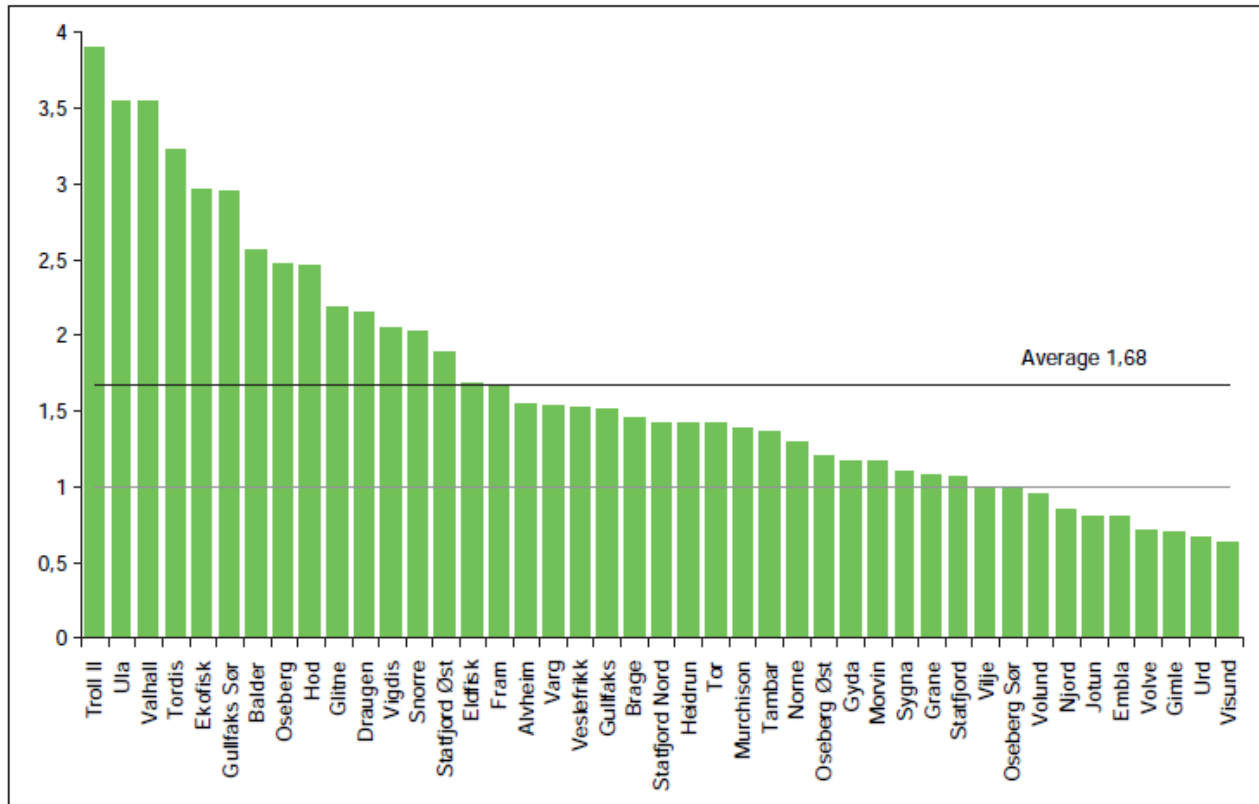
Historical drilling costs on the Norwegian Continental Shelf (NC), by cost category
 Million NOK per semi-drilling day equivalent



Source: Rystad Energy

Huge variation in EOR levels worldwide a challenge

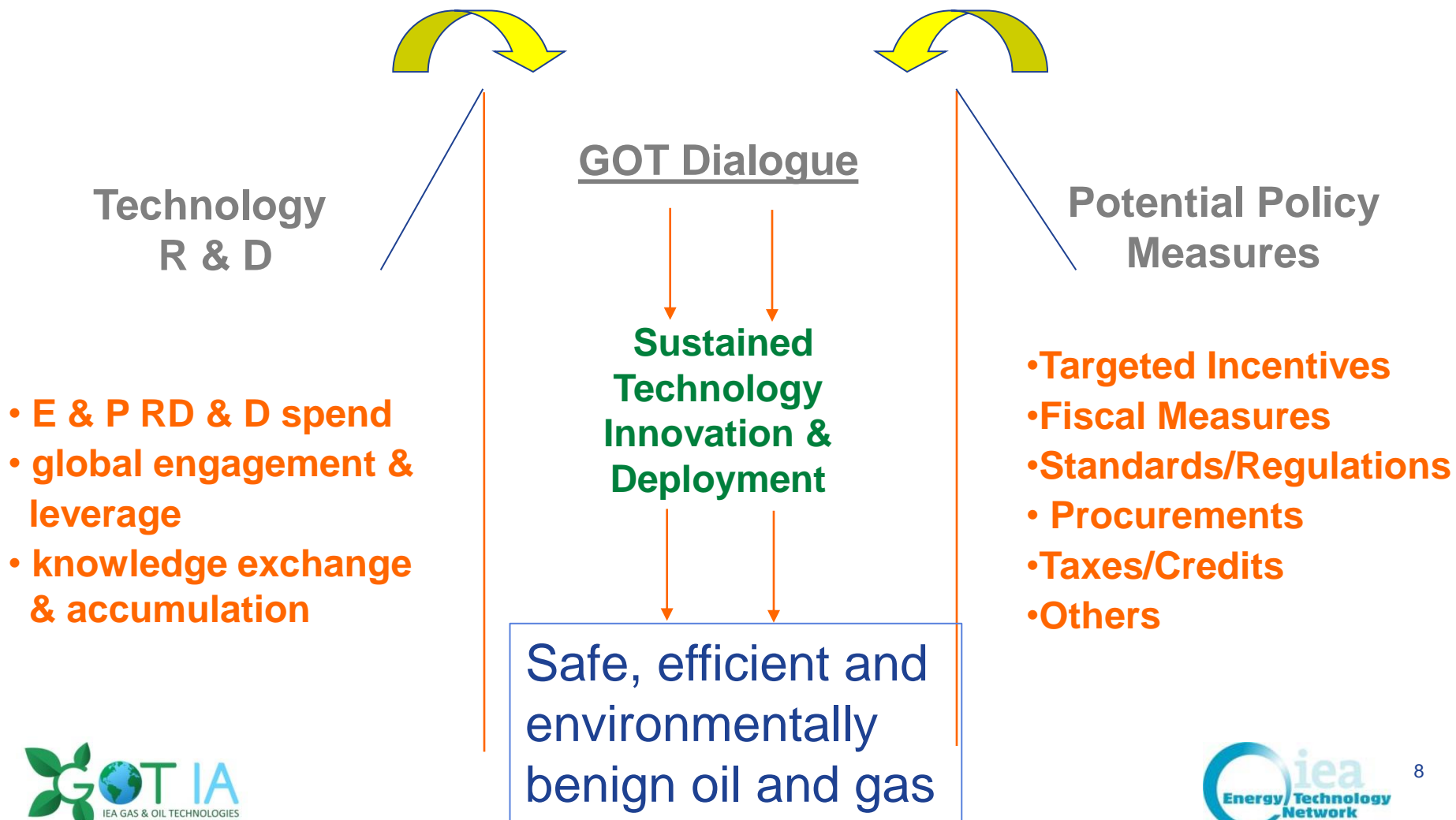
Increased recovery from existing fields, NCS



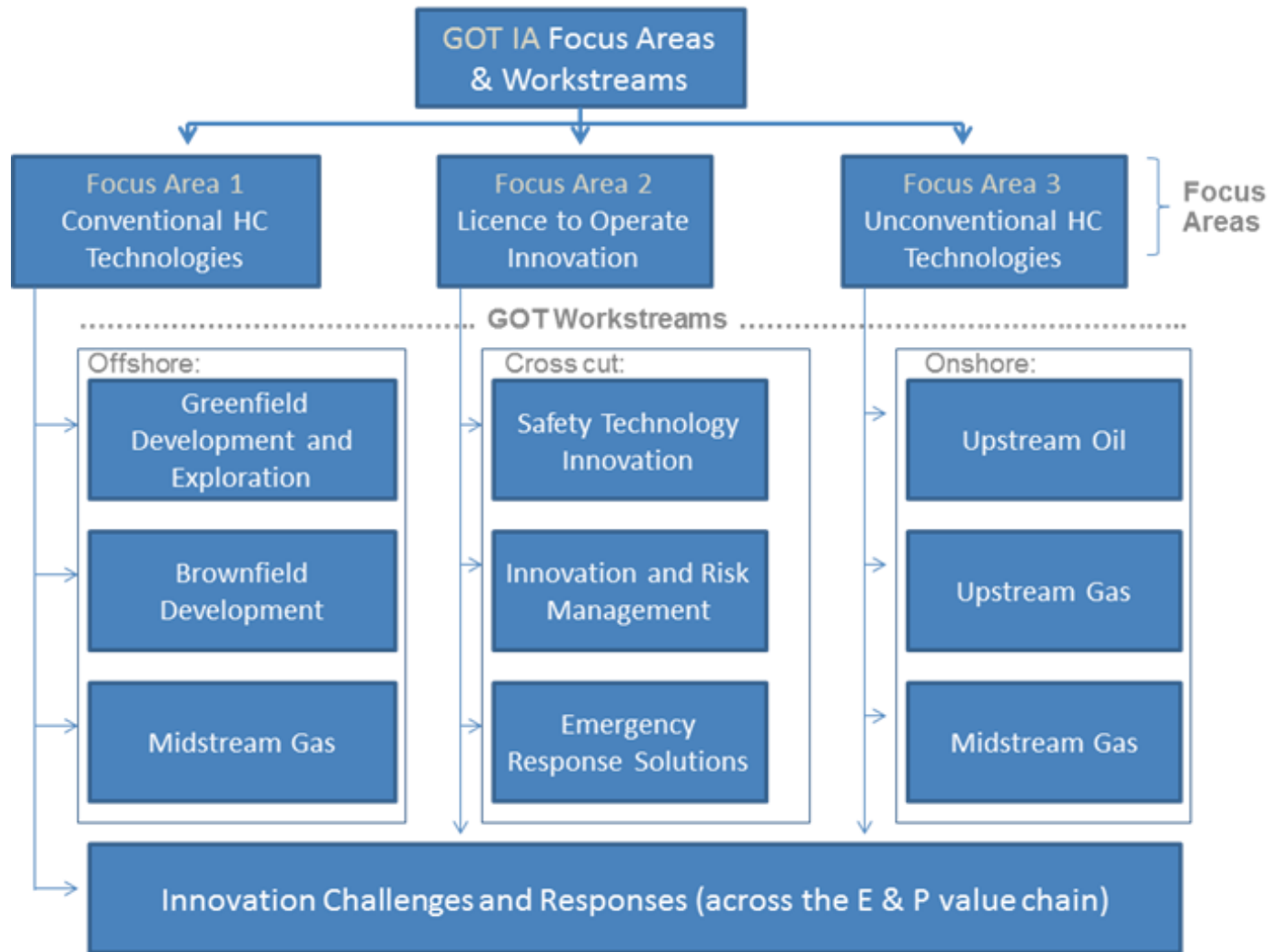
How will GOT address this challenges?



A multi-party, cross-functional global initiative



GOT Focus Areas & Workstreams



Technology Forums Held

- Washington, DC
- Beijing
- Perth
- Rio de Janeiro
- Houston

Technology Forums Planned

- Brussels – Oct 27-28 (UCR)
- 2016 TBD

GOT Green & Brownfield Technology Studies

HC Resources

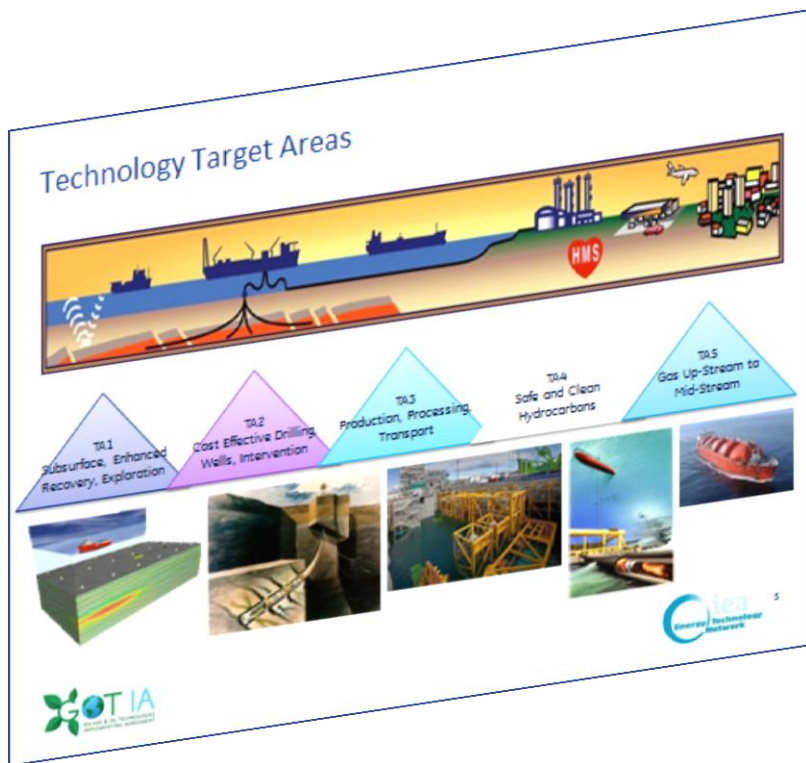
Conventional

Assessments:

Conventional Greenfield Technology

Conventional Brownfield Technology

Unconventional



Proposals from TNO and Rystad

Peer review panel planned

GOT IA has initiated a study on the value of closing important technology gaps within the E&P industry.

Three reports will be written. Each report addresses a specific scope defined by GOT IA:

GOT Study Scope 1: Challenges in relation to unconventional gas

- and oil**
- A. Hydraulic fracturing and stimulation methods and techniques to enhance
 - B. recovery
 - C. Water use, drinking water and disposal of wastewater
 - D. Air emissions related to unconventional hydrocarbon production
 - E. Technologies for best drilling practices and inspection
- Reducing footprint: Air, water, waste and, community impacts

GOT Study Scope 2: Development technologies in greenfields and frontier

- areas**
- A. Enhanced reservoir characterization and modeling
 - B. E&P – technologies, operations, safety and environment practices for harsh
 - C. environments
 - D. Development of efficient/low cost small fields
- More efficient resource and environmentally friendly utilization of associated /

GOT Study Scope 3: Drilling and intervention technologies in offshore

- brownfields**
- A. Maximum exploitation of petroleum resources in producing oil fields
 - B. Enabling production of stranded oil in mature oil regions, e.g.
 - C. immobile oil
 - D. Enhancing gas recovery/economic field life of gas fields
- Extending economic life time of producing fields

— THE STUDY

The final three reports will contain the following main elements

— 1. CHALLENGES

This part will establish the main challenges within the scope of study through analyzing

- Historical exploration and production and field development
- Decomposing E&P spending into activity, price and productivity
- Current challenges related environmental impact and social license to operate

Other factors representing main challenges

— 2. KEY TECHNOLOGIES

This part will identify key technologies likely to solve the main challenges. It will also assess and quantify how these technologies are likely to affect resources, environmental impact and social license to operate.

— 3. IMPACT

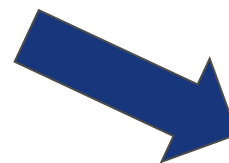
This part will quantify the global impact of each new key technology in terms of cost reductions, increased resources or reduced environmental impact. Aggregated results will be presented and discussed.

GOT ... From awareness of the problem to the development of a solution

Global workshops
& roundtables



Studies &
analysis



Global dialogue
& collaboration

Technology development + regulatory & policy drivers =
safer and more sustainable development

Thank you for your attention

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Dialogue**

