



Upstream Carbon Steering Meeting

22nd January 2019

Attendees – 22nd January 2019

Upstream Carbon Steering Team Members	
Upstream COO, Production, Transformation, Carbon	Gordon Birrell
Head of Global Operations	Andy Collins
Upstream Senior Portfolio Advisor	Rob Cooper
VP Group Strategic Planning	Dominic Emery
VP HSE & Engineering Authority, BPX Energy	Kola Fagbayi
Regional President, North Sea	Ariel Flores
Senior Advisor, Environment & Carbon	Susan Ford
Chief Digital and Technology Officer	Ahmed Hashmi
VP Carbon Management	Gardiner Hill
VP Upstream HSE	Dave King
Head of Global Wells	Andy Krieger
CEO, BPX Energy	David Lawler
Head of Segment Planning and Commercial	Kirsty McCormack
Assistant General Council	Mike Nash
Head of Global Projects	David O'Connor
Upstream Carbon Lead Advisor	Robert O'Brien
Director, Upstream Portfolio and Investment Governance	Brian Povey
VP Maintenance and Engineering, GOO	Bruce Price
Upstream Carbon Manager	Karen RagoonananJalim
Head of Upstream Engineering	Aleida Rios
Head of Communications, Upstream	Stephen Shaw
VP & Head of Regulatory Affairs	Bob Stout
Senior Vice President, US C&EA	Mary Streett
VP Digital Innovation	Morag Watson
VP Operations - Regions	Matt Werner

Additional Invitees for 22nd January 2019 Meeting	
Environmental Engineering Lead	Peter Evans
Campaigns Director	Clare Moore-Bridger
Head of Group Content & Campaigns	Rachel Woods

Upstream Carbon Steering Team Meeting

Agenda – 22nd January 2019

Location: Skype / SJS Room TBC

Houston Start Time	London Start Time	Duration	Agenda Item	Pre- Read	Lead
07:30	13:30	00:20	Context	No	Gordon Birrell
07:50	13:50	00:05	Review of Actions	Yes	Dave King
07:55	13:55	00:10	Overview of Plan Status	Yes	Rob O'Brien
08:05	14:05	00:20	Gas and Methane Advocacy Plan	Yes	Clare Moore-Bridger, Steve Shaw, Bob Stout
08:25	14:25	00:20	Xpansiv	Yes	Sue Ford
08:45	14:45	00:15	AOB	Yes	Dave King

Upstream Carbon Steering Team Meeting

Actions from previous meetings

Meeting Date	Action	Who	Target Date	Status
05/09/18	Consider power from shore options for Clair South during Optimise	John Goldie	28/02/19	In Progress
16/10/18	Check whether GOO Flaring Policy (in development) covers post-TAR start-up flaring	Bruce Price	06/12/18	Complete
16/10/18	Plan an Upstream Carbon Workshop during 1H 2019, to be aligned with plans for a Group Carbon Workshop	Dave King	30/06/19	In Progress
16/10/18	Develop SER economic evaluation methodology and present to Upstream Carbon Steering Team	Rob O'Brien Rob Cooper	06/12/18	Complete
16/10/18	Develop a high-level vision statement for the methane measurement and monitoring strategy and validate with Upstream Carbon Steering Group	Peter Evans	31/12/18	Completed (see AOB)

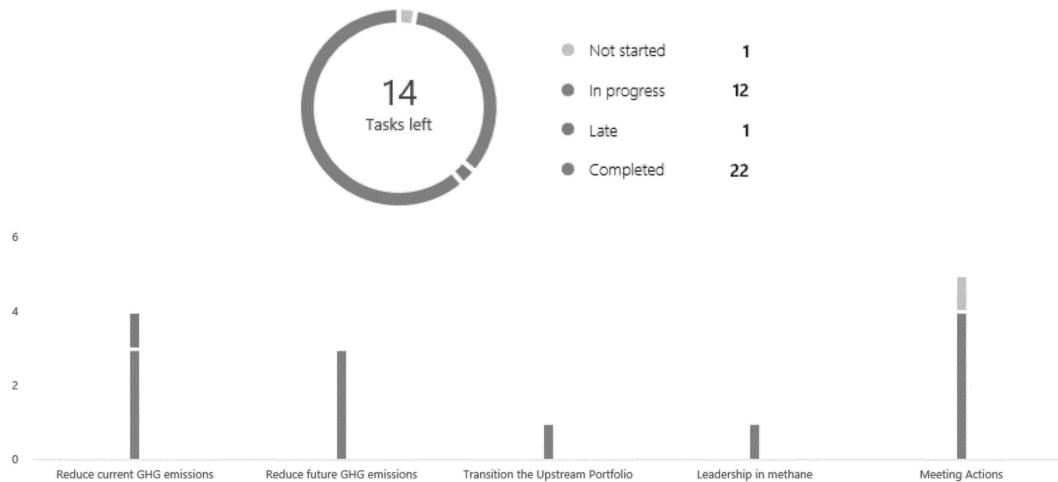
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Agreed topics to cover at future meetings:

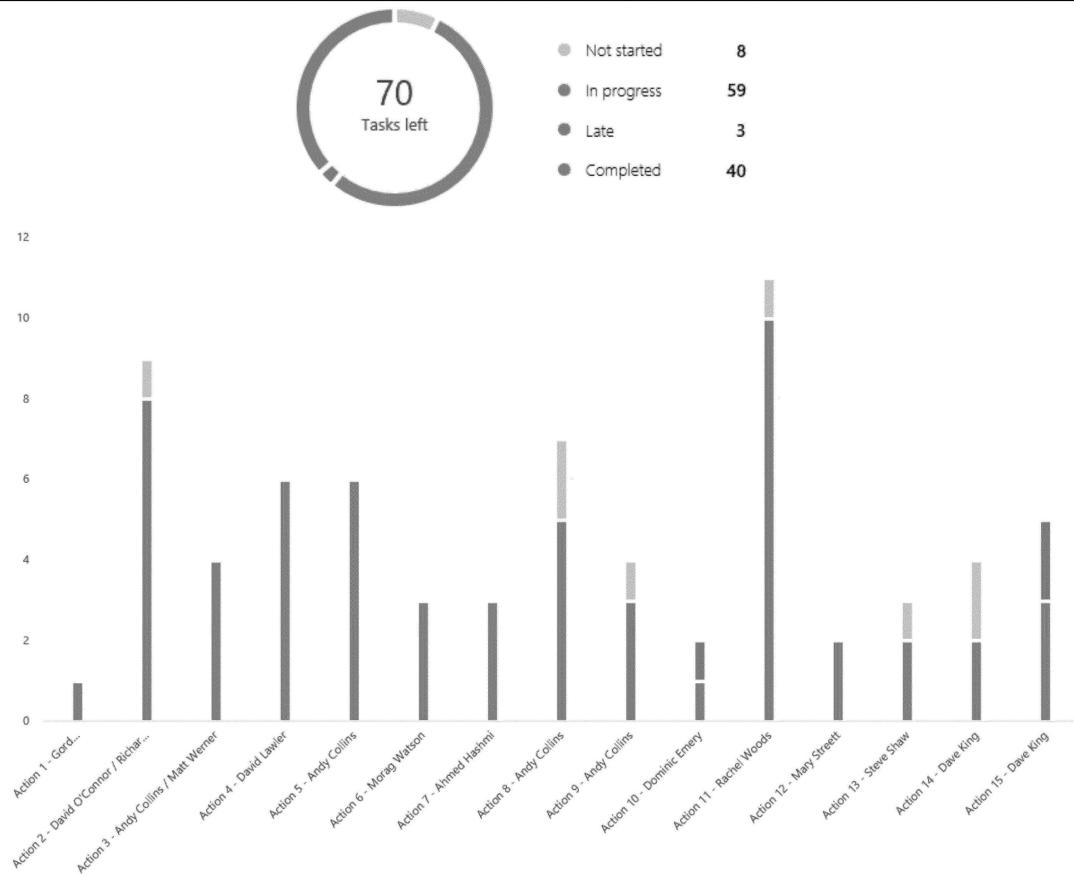
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- Xpansiv (on agenda for 22nd January meeting)
- GPO Projects Review

Carbon Roadmap Action Status



Methane Leadership Plan Action Status



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Gas and Methane Advocacy Plan



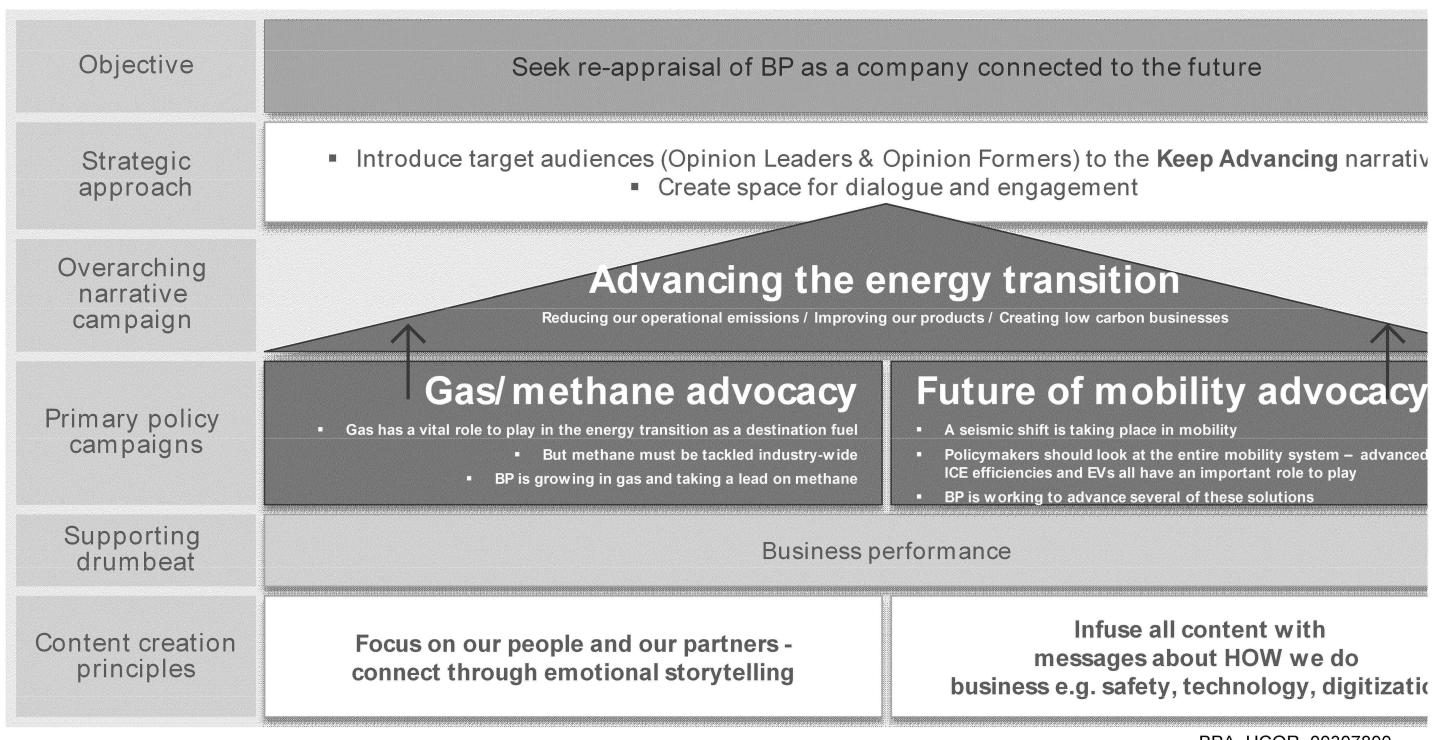
Gas and methane advocacy: C&EA update for the Upstream Carbon Steering Meeting

Pre-read for 22nd January 2019

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2019 – Communications & External Affairs strategy on a page



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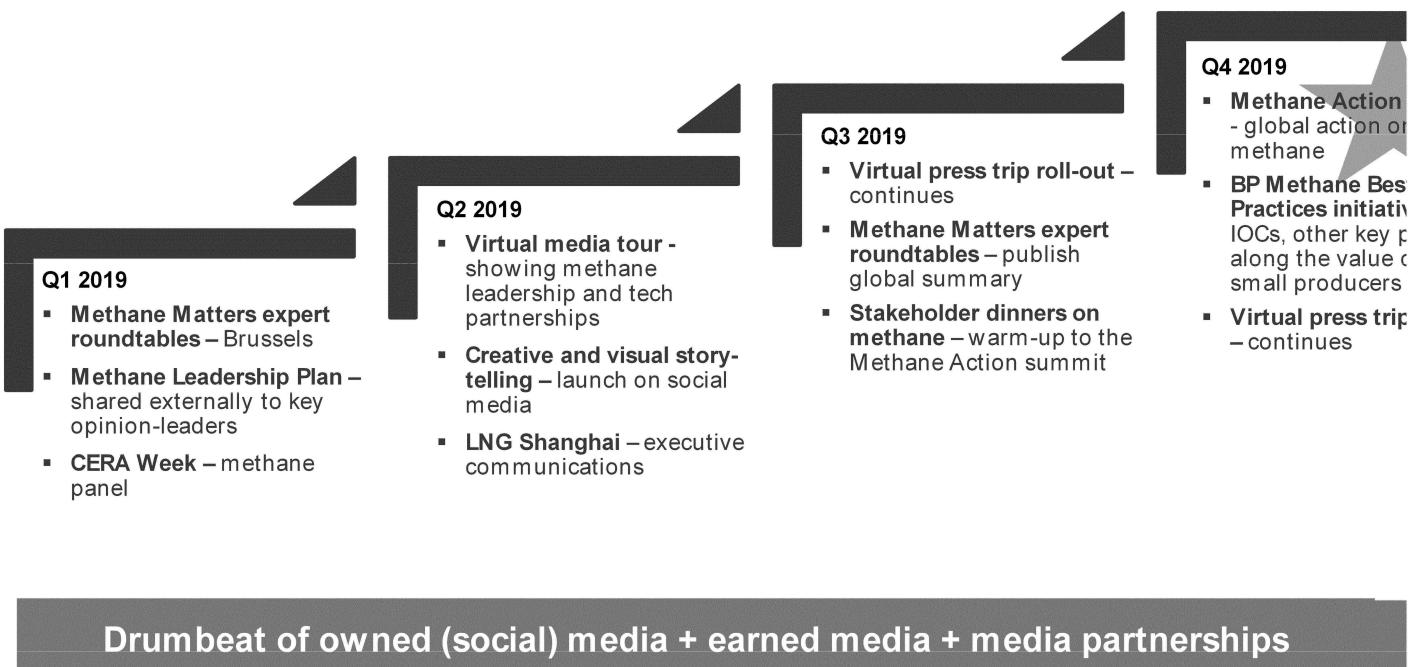
Summary of campaign activity to date

Activity	Date	Location	Outcomes
Stakeholder roundtable	Apr	London	Engaged 30 external stakeholders in industry best practice and policy discussions
Stakeholder roundtable	Oct	Washington	Engaged 30 external stakeholders
Stakeholder roundtable	Nov	Beijing	Engaged 60 external stakeholders
Reuters energy correspondent media briefing – Ron Boussso	Dec	London	Educated an influential journalist on the BP methane target and operational plans
Social media posts	Nov-Dec	Global	Audience awareness – Dec '18: 422,000 views of advocacy content, 2115 liked, clicked-through, commented
EPA methane regulation	Dec	Washington	Submitted comments urging greater flexibility for new technologies

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Action 11: Gas and methane advocacy campaign overview



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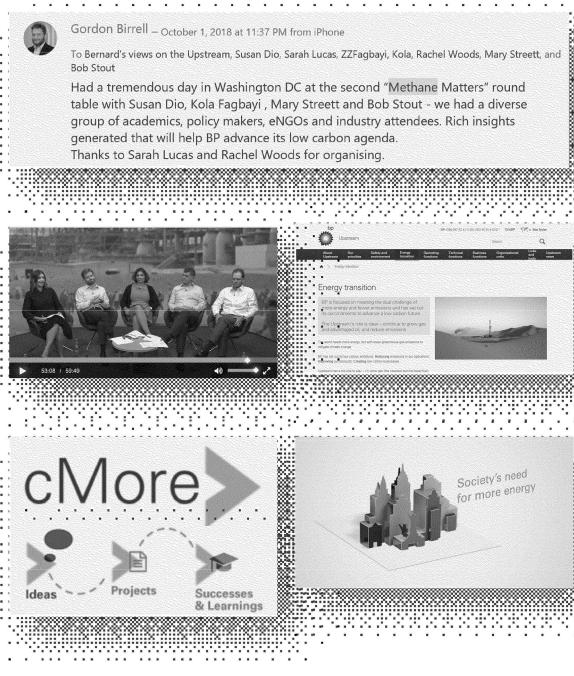
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Action 13: Educate employees



Objectives

1. Raise awareness and pride in the Upstream's purpose and role in the energy transition
2. Create understanding of the carbon and methane challenge and Upstream's ability to compete in a low carbon energy world.
3. Encourage employees to innovate and share ideas and best practice
4. Help make lower carbon part of the Upstream culture

Approach

Align employees around the challenge and why the Upstream is responding

- Communicate Upstream's low carbon commitments, sense of urgency and prominent role in energy transition (tactics: webcast, film, reference in existing channels and events)

- Leverage region and function C&EA teams to share messages and encourage involvement

Connect employees on what Upstream is doing and how they can get involved

- Share low carbon stories to demonstrate plans & progress (intranet, Yammer, existing channels) – e.g. methane technology stories on Yammer
- Create opportunities to get involved and share ideas (through cMore, ALC accreditation and recognition programmes (energize! and Helios Awards)) – esp. launch of SER fund (tbc) – including new animation (1Q)
- Enlist 'Energy Transition' influencers to bring to life what is a low carbon mindset and what people can do differently (scope and timing tbc)

Enable leaders to inspire their teams and actively contribute

- Build Upstream low carbon mindset – business ownership, values and ways of operating
- Equip leaders with relevant messages, stories and materials

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Input and discussion areas for today

1. In what regions or countries, and on what topics, would policy solutions help support your business objectives?
2. Are there advocacy opportunities we are missing?
3. What is your comfort-level with sharing the Methane Leadership Plan externally?
4. Any other feedback?

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Xpansiv Update

Preamble

BP Ventures, together with other backers, have invested **\$10 million** in Xpaniv. Xpansiv sits at the convergence of two trends that will profoundly transform commodity markets:

- Low-Carbon Transition
- Data Revolution and Digitization

In today's commodity markets there is no value-added differentiation for natural gas that is produced responsibly. As markets shift to value **low-carbon** production, producers will be rewarded for removing high greenhouse gas (GHG) sources from their production creating a new market incentive to "brand" commodities based on how they are produced.

Digitization will refine previously muddled data into coherent and actionable information, allowing producers to share highly detailed insights into production and provenance.

Xpansiv's core product, **Digital Feedstock™**, will enable previously undifferentiated commodities to fall into distinct product categories, so that a market increasingly looking for low-carbon energy sources can **reward** best practices.

For producers, this means **improved margins for responsible production**, allowing for capital recovery as they move toward a low-carbon economy. It also provides the ability to communicate detailed, verifiable information about production practices.

Over the past several decades, various incentive and pricing regimes have emerged for energy-related social costs, as have voluntary efforts to establish more responsible supply chains. The systems that rely on **regulatory-compliance** frameworks either charge polluters for a share of finite pollution rights or compensate producers of renewable energy for the gap between required rates of return and prevailing market prices.

On the **voluntary** side, some commodity producers have relied on branding efforts to market more responsible production. Examples include fair-trade coffee. These voluntary markets do not involve any pricing differentiation but rely on stated claims at the point of consumption, usually in retail.

In neither case—regulatory nor voluntary markets—is there a widespread, transparent mechanism to **price externalities** across an entire product class, for example natural gas. Yet the ability to differentiate responsible production will be a critical mechanism in the market transition to come.

The New Data Economy

The emergence of computing technology has radically transformed business processes and markets in every sector of the economy (e.g. retail, music, video, telecommunications).

The "internet of things" (IoT) and "big data" are two trends poised to remake the energy industry. IoT is the ability to collect data, often remotely through telemetry, at innumerable nodes along a physical system. At the same time, radical advances in data science have increased the ability to process this enormous pool of data into meaningful, actionable information. The implications in energy markets are **enormous**

Xpansiv has developed a technology to refine raw data from physical commodity systems e.g. natural gas into a high-resolution, high integrity format called **Digital Feedstock**. Digital Feedstock is a transactable digital asset created and maintained on a database. Digital Feedstock represents the physical reality of commodity production, transportation, storage, and consumption.

Each unit of Digital Feedstock is a highly detailed digital representation of each unit of commodity produced. It is generated from production source data.

Digital Feedstock can include **intelligence** about the **environmental attributes** of production, such as **fugitive methane leakage**, the quality and use of **co-produced water**, or whether the wells were completed using **hydraulic fracturing** or not. Furthermore, externally generated information can be associated with a unit of Digital Feedstock – such as environmental certifications (e.g. **IES Trustwell Gold**), or even data from drones or methane sniffers.

Producers are now faced with increasing calls from investors, employees, regulators, communities, and stakeholders to treat **externalities** as vital information. Stakeholders are demanding transparency and accountability with respect to externalities.

For the first time, producers will be able to reliably communicate their **responsibility efforts** to their stakeholders. Xpansiv provides an independent, high-resolution, high-fidelity, auditable insight into an array of responsibility features, including methane emissions and carbon intensity.

Digital Feedstock: From Data to a Digital Asset

Producers still have a responsibility to their shareholders to produce at the lowest cost and for the highest value - and here, the value of Digital Feedstock is most powerful, because it enables producers to transform basic commodities into differentiated products. Producers and supply chain buyers can transact Digital Feedstock using the Xpansiv platform as a transaction registry.

Trading is possible either as a whole, where a unit of Digital Feedstock representing the entire unit of production is traded alongside a physical barrel or mmBtu, or in part, where an attribute of Digital Feedstock is transacted separately from the physical volumes.

There is a groundswell of support on the part of energy buyers to procure “**cleaner**” fuels, and the easiest wins are in low-methane production **and** with top-of-class producers that can achieve recognized certifications e.g. IES Trustwell Gold certification.

Trialing Xpansiv: Progress to date

BP has made a commitment to target a methane intensity of 0.2% and hold it below 0.3%. Using the Xpansiv platform BP's aim is to trade differentiated low fugitive emission natural gas.

DIO hold Actions in the Upstream Methane Leadership Plan to progress the Xpansiv Technology: “Transform Undifferentiated Products into Intelligent Commodities”.

The Xpansiv business proposition was communicated to key Upstream stakeholders in BP during 2H 2018 (GOO, IST, UEC, GWO, BPX, IST, HSE, UT and Procurement). This was done to support decisions on where to run Proof of Concepts (PoC).

A Proof of Concept (PoC) Scope of Work has been developed which includes:

- Identification of BP Gas Assets for the PoC
- Testing up-load of BP historical energy-production data onto the Xpansiv platform
- Testing the platform's ability to carry out calculations on the production data and transform it into Digital Feedstock.
- Production of a BP demo and communication materials to help BP transfer lessons learned from the PoC to other Upstream Regions.

BP resource requirements, ideal well characteristics, and a data schema for the PoC have all been defined. DIO will fund the PoCs. An NDA is in place.

Based on the PoC findings it is envisaged that **full scale-ups** will be planned for 2019 which will extend to verification, certification and marketing of a differentiated gas product.

License Agreements and the **Title to the Digital Feedstock** will need to be in place before full scale up.

Proof of Concepts:

Proof of Concepts are progressing for:

- AGT Shah Deniz Alpha (GOO AtR leading)
- BPX SoHa - Haynesville Basin (WIP)
- BPX San Juan Working Interest Logos Basin (WIP)

It is expected that these PoCs will be completed in **1Q 2019**. It should be noted that due to the advanced nature of the Environment Products market in the US, **BPX is BP's immediate area of interest**.

Each PoCs will include production data from 10 - 50 wells being ingested into the Xpansiv platform and digitized. A representation of digital feedstock will be produced by Xpansiv but a trade will not occur. PoCs in other Regions are also being considered to test the resilience of the technology e.g. Oman.

Following completion of the PoCs a technology review will be completed by DIO to determine if a full scale up is warranted.

AOB



What is the vision and strategy for methane measurement and monitoring?

OUR VISION

An Upstream business where every methane molecule is accounted for

OUR STRATEGY

Measured

Cost effectively determine the source and scale of methane emissions

Monitored

Minimise the time taken to respond to changes

Managed

Turn data into action to reduce methane emissions

- Assure flare volumes and methane destruction efficiency
- Quantify fugitive sources
- Track transient and periodic emissions incl. vents
- Assure combustion efficiency

- Permanently installed systems whenever feasible
- Periodic total flux measurements
- Develop remote sensing and automated systems

- Prioritise effectively
- Support and improve reporting with standardised protocols that give credit for going beyond current legal requirements
- Deepen understanding of sources
- Build trust