UKCS TECHNOLOGY NETWORK

10th June 2021

technology leadership board

Oil & Gas Authority

OGTC

Technology Network Meeting: June

Pre-Read & Context	
Pre-Read:	- www.the-tlb.com, https://www.ogauthority.co.uk/the-move-to-net-zero/case-studies/, North Sea Transition Deal - GOV.UK (www.gov.uk) - OGTC - Closing The Gap, OGA - Decarbonising Oil & Gas Production in the UKCS & The CCC - Sixth Carbon Budget
Context:	- North Sea Transition

10:00 to 12:00		
1000	**Welcome,** - Agenda, Last Meeting Recaps	Mikki/Steve
1010 (30mins)	**ASTF - Decarbonising Oil & Gas Production in the UKCS** - Net Zero Task Group (ASTF Co-Chair & OGA) - Case Study - Methane Emission Detection & Reduction Strategy (BP)	Andy Brooks Pauline Ruddy
1040 (30mins)	**Appraise - UK 6th Carbon Budget, and Net Zero Transitioning** - A Common Base of Understanding toward a Net Zero Context - Carbon abatement, Offshore electrification, - CCS and Hydrogen	Carlo
1110 (15mins)	**OGTC - Energy System Integration Roadmaps**	Martyn
1125 (15mins)	**TLB – North Sea Transition Workgroup - The Role of Technology** - Appraise, Frame, Solution Pathways	Kirk
1140	**Discussion, followed by Wrap-Up**	Steve
1200	**Close**	

Oil & Gas Authority

OGA/ASTF Context – Net Zero

Technical Managers Network

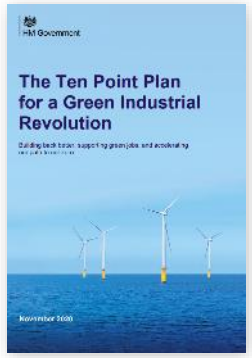
Andy Brooks
CNS Area Manager and ASTF Co-Chair

10th June 2021

Landscape

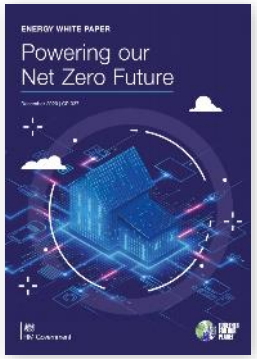
Oil & Gas Authority

1



10-point plan

2



Energy White Paper

3

CCC 6th Carbon Budget

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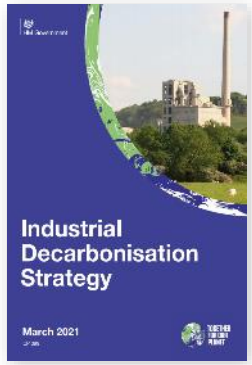

Industrial Decarbonisation

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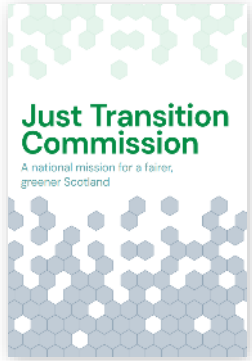

Just Transition Commission

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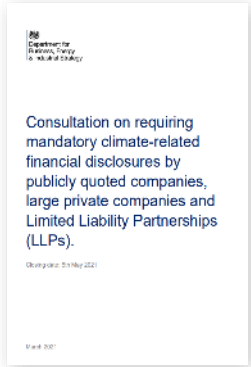
OGA Strategy

7

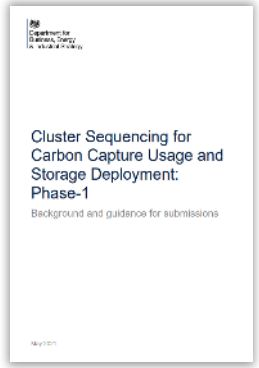
North Sea Transition Deal & Licensing review

8



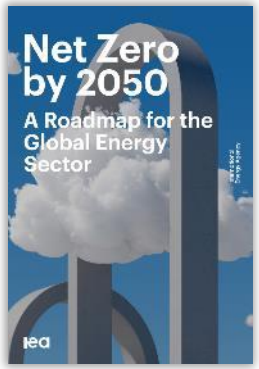
Climate-related financial disclosure

9



CCUS Cluster Sequencing

10



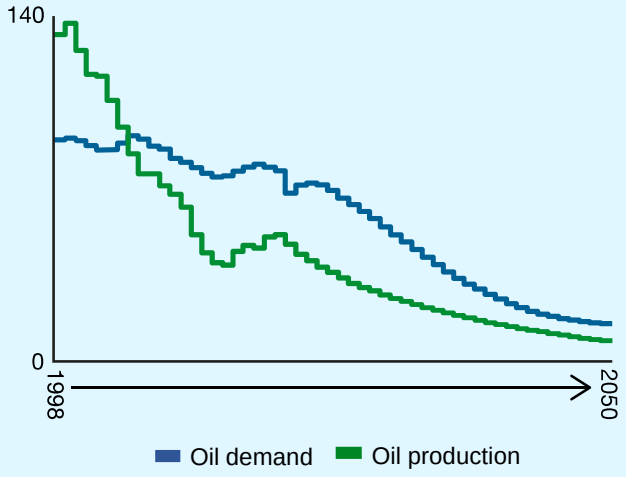
IEA

Landscape continues to change….

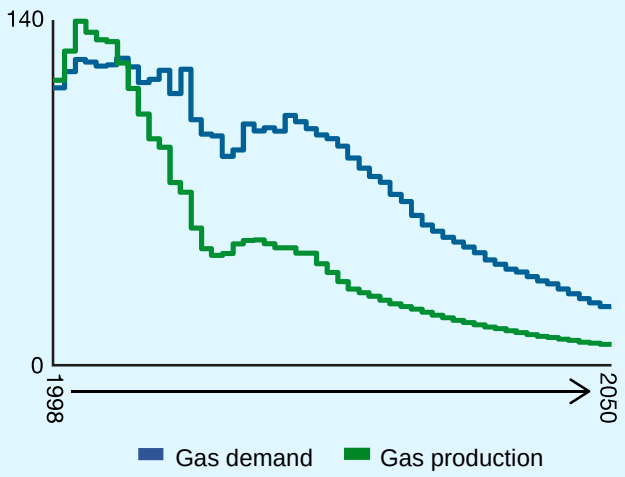
North Sea Transition Deal

Oil & Gas Authority

UK Oil demand and production



UK Gas demand and production



NSTD: £16bn investment committed

- £10bn for hydrogen
- £3bn for electrification
- £3bn for CCS
- 50% local content
- Supply Chain Champion

Industry commitment to reducing upstream GHG emissions

- 10% — 2025
- 25% — 2027
- 50% — 2030
- 2050 — Net zero basin

OGA tracking and monitoring progress

GHG target as OGA KPI

Annual OGA dashboard

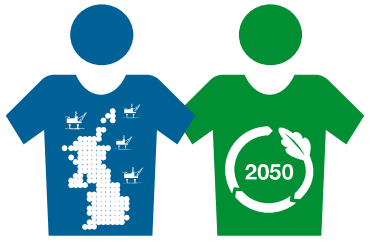
- Intensity benchmarks
- Flaring & venting
- Overall KPI target progress

Focus

Oil & Gas Authority

New OGA Strategy

- **Requirement to take account of net zero considerations**
- **New supporting obligations on CCS and collaboration**
- **New approach to carbon economics**
- **New guidance and net zero Stewardship Expectation**



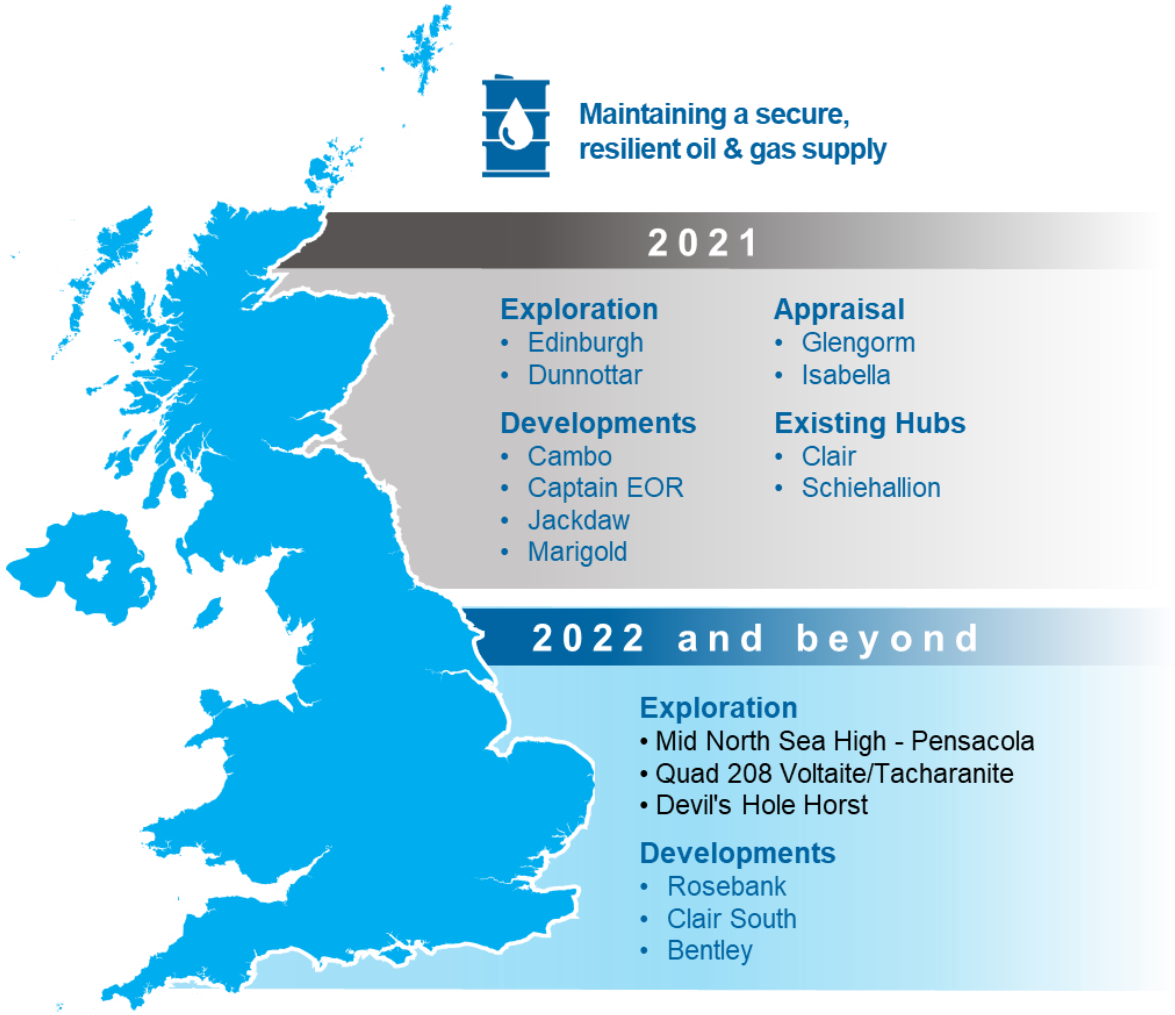
OGA One Team, MER UK & net zero

Senior level engagement: net zero 'deep dives'

Priorities

Oil & Gas Authority

Resource Progression



Maintaining a secure, resilient oil & gas supply

2021

Exploration
- Edinburgh
- Dunnottar

Appraisal
- Glengorm
- Isabella

Developments
- Cambo
- Captain EOR
- Jackdaw
- Marigold

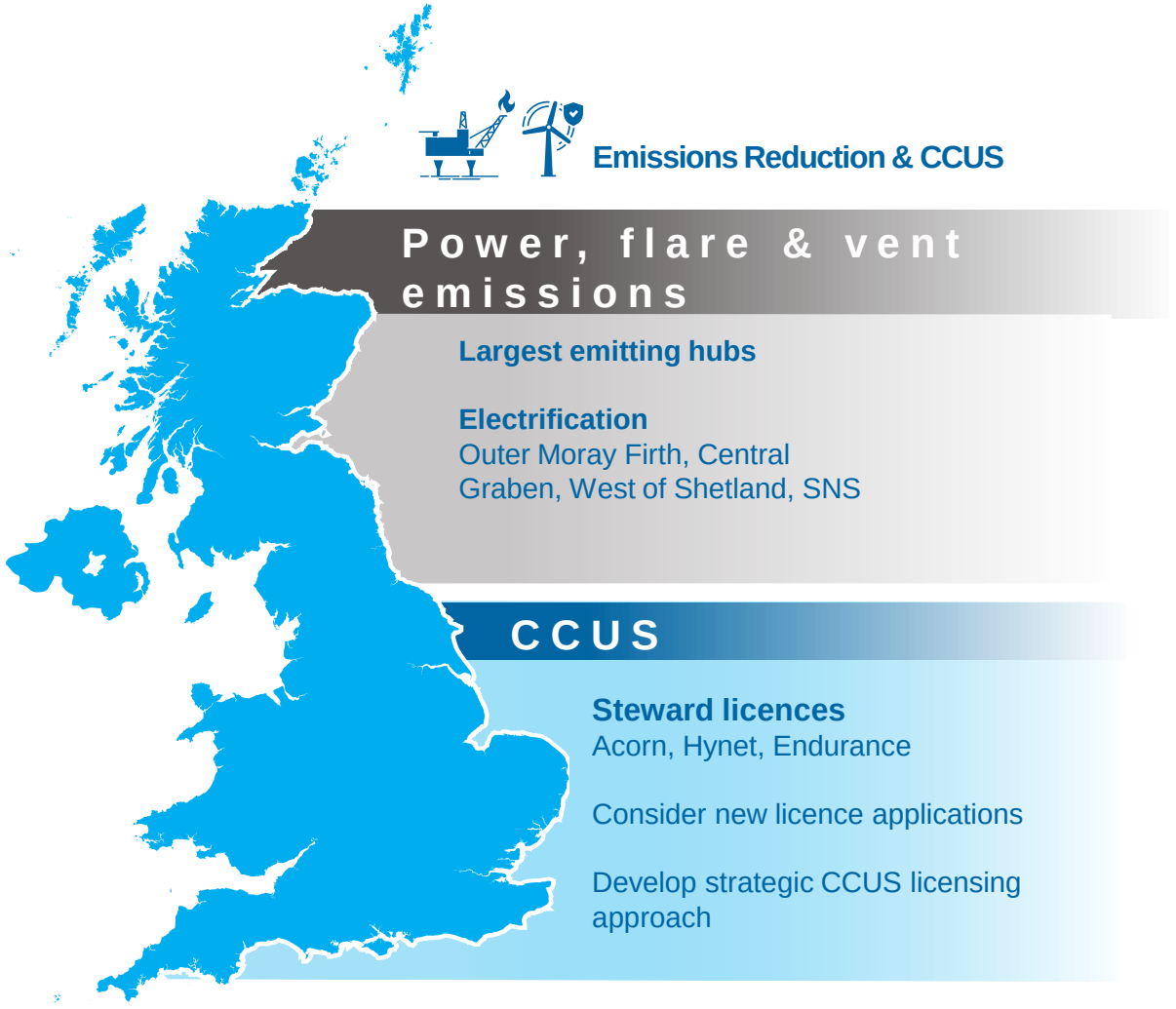
Existing Hubs
- Clair
- Schiehallion

2022 and beyond

Exploration
- Mid North Sea High - Pensacola
- Quad 208 Voltaite/Tacharanite
- Devil's Hole Horst

Developments
- Rosebank
- Clair South
- Bentley

Emissions Reduction



Emissions Reduction & CCUS

Power, flare & vent emissions

Largest emitting hubs

Electrification
Outer Moray Firth, Central Graben, West of Shetland, SNS

CCUS

Steward licences
Acorn, Hynet, Endurance

Consider new licence applications

Develop strategic CCUS licensing approach

Asset Stewardship Task Force (ASTF)

North Sea Transition Forum

The NSTF (Formally MER UK Forum) brings together the OGA, government and industry. The NSTF, supported by its steering group, will set the strategic direction for the sector and will also be accountable for the delivery of the North Sea Transition Deal.

The objectives of the forum are:

- Provide Strategic direction, oversight and support of the offshore oil and gas industry.
- Drive alignment, accountability, action and delivery on key priorities including net zero.

North Sea Transition Steering Group

The Steering Group has oversight and co-ordinates the work for the North Sea Transition Task Forces, discusses and reviews strategic matters and ensures that key topics are discussed at the NSTF.

Asset Stewardship Task Force	Decommissioning Task Force	Efficiency Task Force	Exploration Task Force	Supply Chain & Export Task Force	Wells Task Force	Technology Leadership Board

Each of the Task Force group are led by an industry representative. The Task force groups are important vehicles for driving innovation, improvements and cultural change, whilst supporting the OGA Strategy

Asset Stewardship Task Force (ASTF)

The Asset Stewardship Taskforce (ASTF) works to support the OGA Strategy in relation to both MER and net zero obligations by improving asset stewardship in the UK Continental Shelf area.

Resource Progression Task Group

Task group lead: Katy Heidenreich (OGUK)

- Encourage application of the Resource Progression Tool Kit by industry
- Seek feedback and learnings from companies that have used the tool kit
- Exploit learnings from where the tool kit has been applied to identify focus areas that could help drive resource progression

Production Efficiency Task Group

Task Group Lead: Brian Rodger (CNOOC)

- Industry Loss Reporting Data Collection, Root Cause Analysis
- Publish industry wide best practice for production loss management
- Update UKSS production loss reporting for 2022 survey

Net Zero Task Group

Task force co-leads: Myrtle Dawes (OGTC) and Laurent Parra (Total)

- Targets, Measurement & Reporting – develop and seek agreement on initial approach to tracking UKCS net zero performance
- Stewardship – development and implementation of a Net Zero Stewardship Expectation (SE11)
  Case Studies – identification and sharing of industry case studies that have positively impacted net zero performance
- Electrification - provide line of sight to all the cross-electrification activity and identify the barriers that are slowing progress

ASTF

Net Zero Task Group

	Objectives	Deliverables	Commentary
Targets & Reporting Mike Tholen, OGUK Loraine Pace, OGA	Representation of UKCS O&G emissions. Development of reporting structure, establishing "GHG Targets" to identify CO2e emissions and drive efficiency gains.	• Alignment around emissions intensity targets at field and basin level • Methane emissions: baseline and target • Delivery Framework, short & long term • Improved emissions reporting approach	Short term (2025) Average UKCS CO2 Emissions Intensity target proposed. Emissions Intensity analysis & benchmarking pack to be piloted with OGUK Environment Managers group. Methane Working Group progressing towards methane emissions baseline & target.
Stewardship Alistair Macfarlane, OGA	Create culture of emissions reduction within UKCS. *Net Zero Stewardship Expectation* to promote good practice and support MER.	• Net Zero Stewardship Expectation ✓ • Road testing of expectations ✓ • Issue SE11 ✓ • Road Testing of FDP/CoP Guidance	110+ companies performed road testing with ASTF and wider industry through OGUK
Electrification Bethan Pugh, Shell	OGUK committed to cut emissions to 50% by 2030 and 90% by 2040. Monitor progress of Electrification Cluster Groups.	For each cluster group: • Develop an open-book industry model for electrification • Business case framework to assess proposals • Report on regulatory and stewardship matters • Report on Stakeholder engagement	Details in later Slide
Case Studies Dave Mackinnon, TLB	Knowledge Base of Good Practice and Value Demonstrator	• Operator Engagement ✓ • Case study delivery ✓ • Design & communication strategy ✓	decarbonising-oil-gas-production-in-the-ukcs.pdf (ogauthority.co.uk)

Examples: UKCS CO_2 Emissions

Oil & Gas Authority

2019 to 2020 CO_2 Emission % Change by Installation

Nearly **2/3 of all UK upstream O&G installations reduced** their CO_2 emissions from 2019 to 2020, including terminals

Source: EU ETS
** In scope of the EU ETS*
*** Carbon Intensity defined as offshore installation CO_2 emissions in scope of the ETS per unit of sales production.*

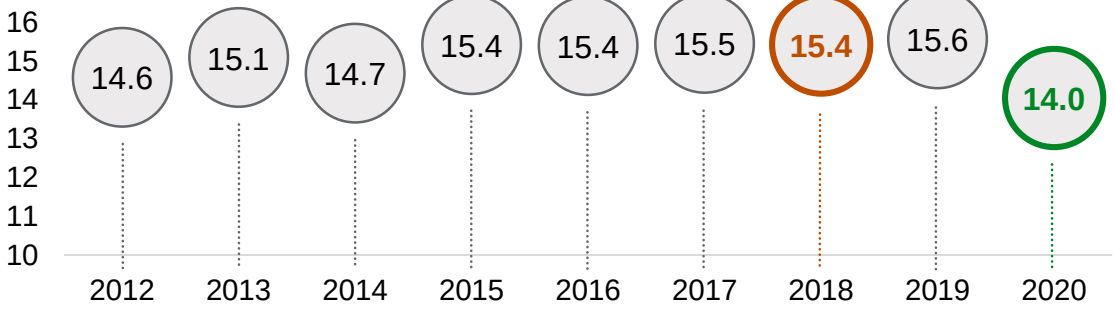
OGA influence: 970k tonnes emissions avoided

1. Operator held to account
- Vapour recovery unit installed
- Saving 22 tonnes flared gas per day

2. Compression Project
- OGA economic modelling
- Electric drive recommendation agreed

3. Excess flaring
- Stewardship identified issue
- Operator rectifying

UKCS Total CO_2 Emissions Trend (Mt)



Flaring volume reduction

22% decrease in 2020 from previous year

ASTF

NZTG – Electrification

To achieve the 25% reduction in emissions by 2027 and the 50% by 2030 aims, at least one or two step-change electrification projects (equivalent to approximately 1.8 MTe CO2e reduction) will need to be progressed at pace in the 2020s.

Purpose: *To monitor and report on the OGA/ Industry Electrification Cluster Groups as development studies and work in support of investment decisions are progressed.*

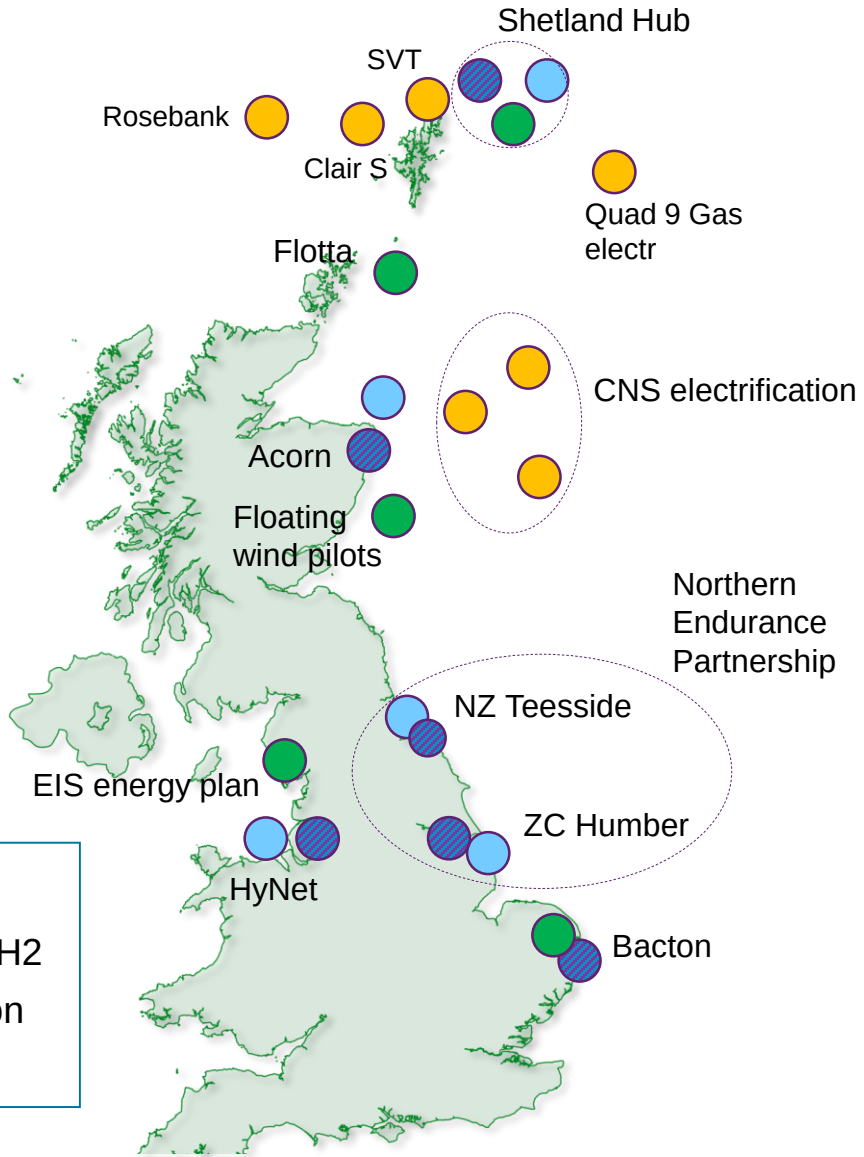
- Support progress in regulatory and stewardship matters where Industry and OGA can take leadership.
- Share electrification cluster progress updates
- Develop guidance document on methodology for economic evaluation that is supported by OGA
- Develop a business case framework and case study template to support project submissions
- Develop a stakeholder assessment and agree communication plan

Oil & Gas Authority · OGTC · OGUK · Port of Cromarty Firth · Neptune Energy · Total · Shell · equinor · Harbour Energy · CNOOC · bp

Creating pathways from vision

Oil & Gas Authority

Net zero indicative projects



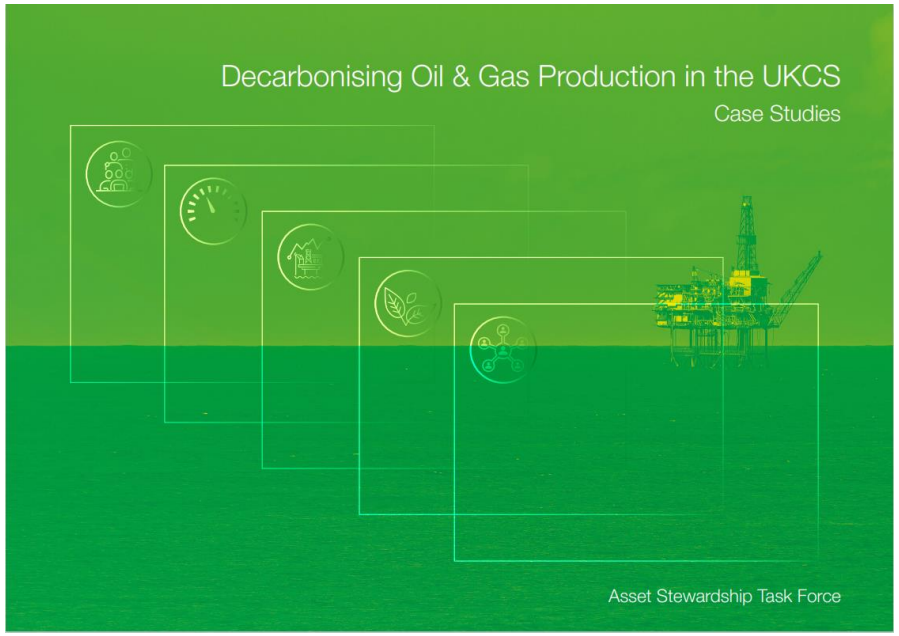
Vision & potential pathways

	2025	2030
Offshore Electrification	• >1 electrification scheme from windfarms operational in CNS • >2 greenfield electrifications (shore/wind) sanctioned in WoS	• 3MtCO2 pa emission reductions • £5bn Capex invested • 2GW of wind power growth stimulated
Carbon Capture & Storage	• CCS first injection at >2 pilots • >2MtCO2 pa injected • Commercial roll-out sanctioned at >4 industrial clusters	• >4 commercial scale CCS projects operating • 17 MtCO2 pa injected • £8bn Capex invested
Energy Hubs	• >2 Blue Hydrogen pilots operational • 2 more net zero Hubs identified with Blue / Green H2 plans	• Blue H2 commercial scale, 4GW methane reforming installed • 1GW green H2 capacity installed • £7bn Capex investment

20MtCO2 abatement and £20bn Capex by 2030
Supports delivery of UKCS net zero potential by 2050

NZ Case Studies

Oil & Gas Authority



https://www.ogauthority.co.uk/the-move-to-net-zero/case-studies/

Good Practices

Culture	Energy Management System Certification Inspiring Net Zero Capital Investment Projects
Measure, Report, Lower	Digital Emissions Management CO2 Reduction in Ageing Assets Methane Emission Detection & Reduction Strategy
Capital Asset Development	Power & Gas Ring Main Fulmar: Auk Interconnector Project Carbon Capture at SEGAL Terminal – St Fergus
Net Zero Enabling Technologies	Triton FPSO: Emission Reduction Think Wider, Study in Detail Electrification: Evaluation Framework
Stakeholder & Partner Engagement	Incorporating Paris Agreement/Sharing NCS Practices Setting Environmental Targets within Financing Energy Area Plan Collaboration

Within this Case Study Booklet, the ASTF/OGA has adopted “CO2” in respect to all matters pertaining to Carbon Dioxide Equivalent (CO2e)

Download Booklet

technology leadership board

Bp Methane Strategy & North Sea Trials

bp

technology leadership board

Types of measurement - bottom up and top down

Top down measurement

Aim 4

Reducing Methane

Install methane measurement at all BP's existing major oil and gas processing sites by **2023**, publish the data and then reduce methane intensity of our operations
by 50%

bp

bp methane hierarchy*

Tier	Strategy	Example Technology	Verification
A – Continuous site or source quantification >95% coverage	• Add quantification of fugitives and vents if needed • Plus all activities under tier B	• Quantitative image processing • Sensor networks • Vent monitoring	Continuous coverage
B – Continuous quantification at source level where 80-95% emissions covered	• Fuel metering and emissions tracking • High accuracy flare metering* and efficiency measurements*	• PEMS* • CEMS • CFD flare analysis • FlarelQ* • In-line gas analysers • VISR*	Top-down measurements: Drones*, Satellites
C – Continuous site level detection	• High sensitivity monitoring	• Permanent cameras • Sensor networks	
D _Source reporting with specific emission factors	• Flare analysers	• Leak detection cameras* • Fuel and flare metering	
E Generic emission factors	• De minimis emissions		

Beyond current OGMP requirements

OGMP – Level 5

*Leading role by North Sea facilities in technology development and early-adopters

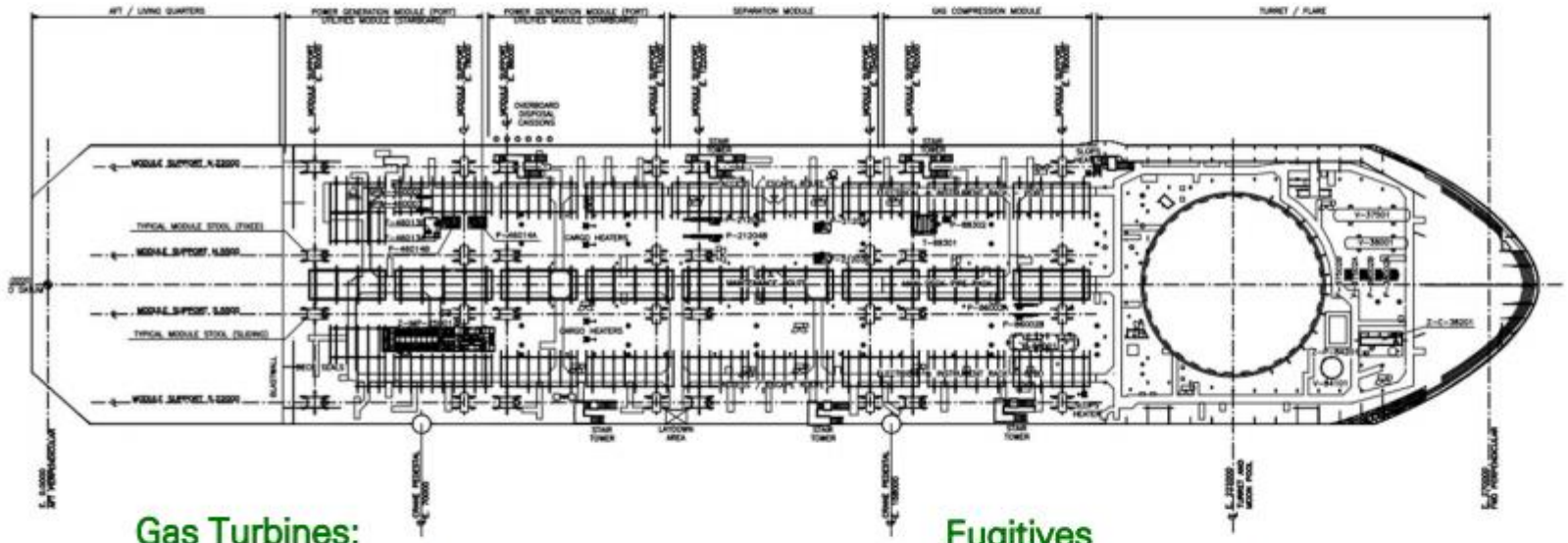
Glen Lyon FPSO

Top Down:

Measurement aim: Measure major sources
Current method: None
Technology: Drone mounted methane sensor

Vents:

Measurement aim: Monitor
Current method: Estimated
Technology: Meters



Flare:

Measurement aim: Measure
Current method: Meter
Technology: FlareIQ, Mantis VISR, CFD, Flare Analyser

Gas Turbines:

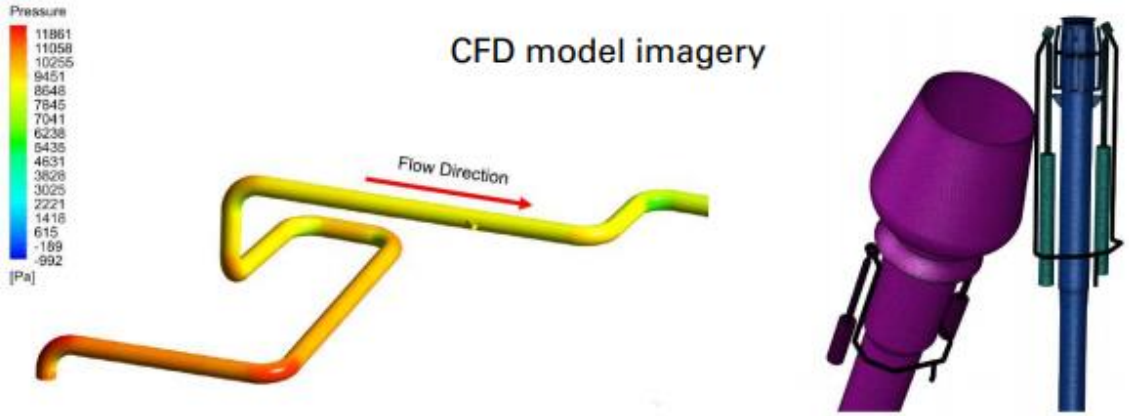
Measurement aim: Predictive modelling
Current method: Estimated
Technology: PEMS

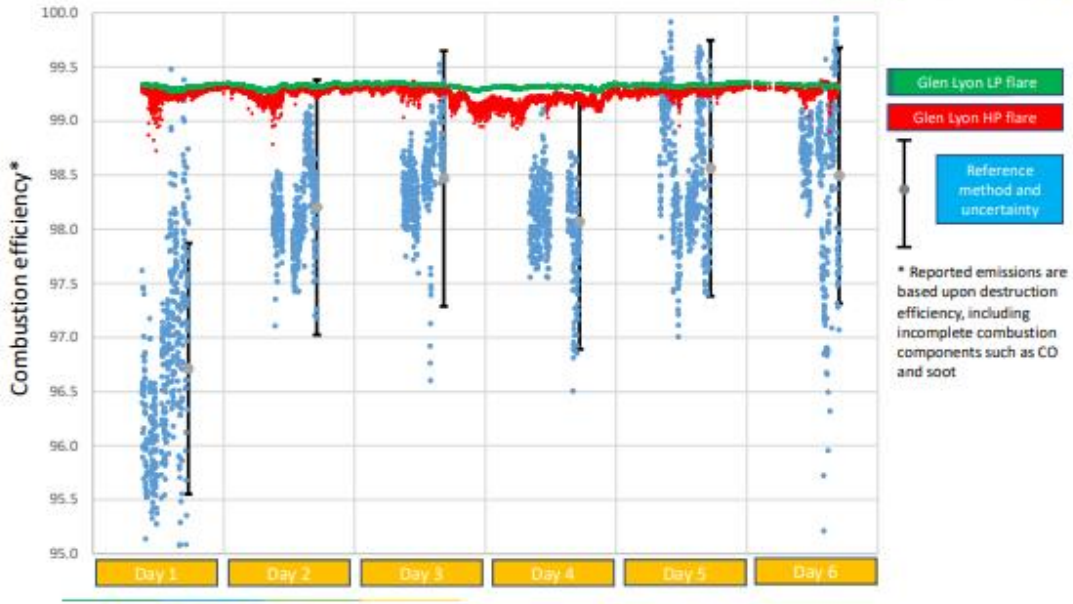
Fugitives

Measurement aim: Measure
Current method: FLIR camera / Estimated
Technology: TBD

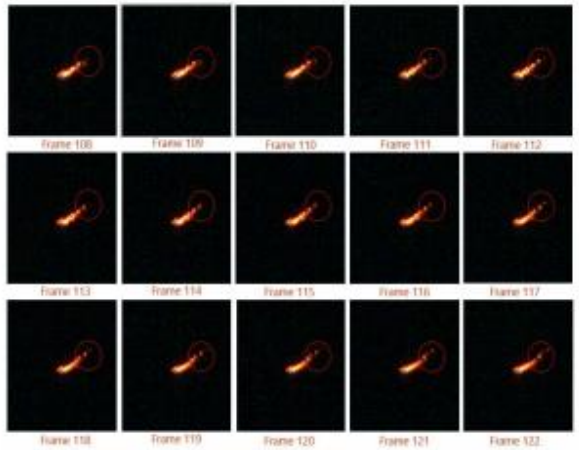
technology leadership board

Flare management systems





VISR camera on Glen Lyon



Frame by frame analysis of flare

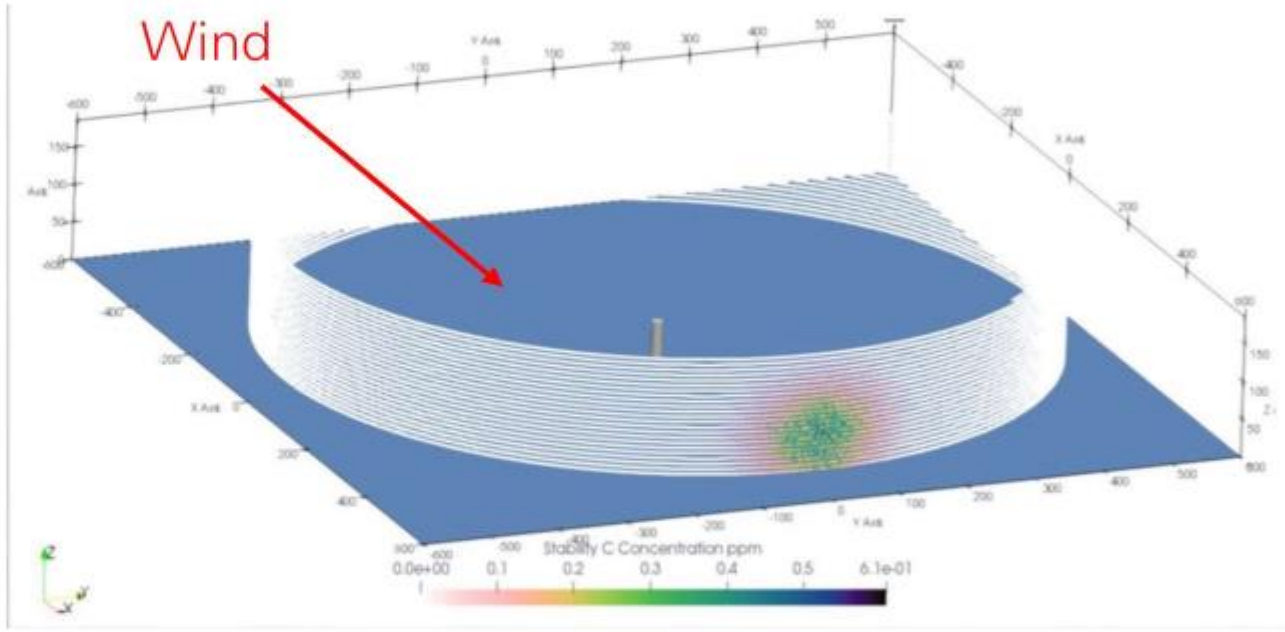
technology leadership board

Turbine measurements

bp

technology leadership board

Offshore drone measurements



bp

Offshore drone measurements

Objective:

- Determine methane emission rates from offshore assets via aerial drone survey

Vision:

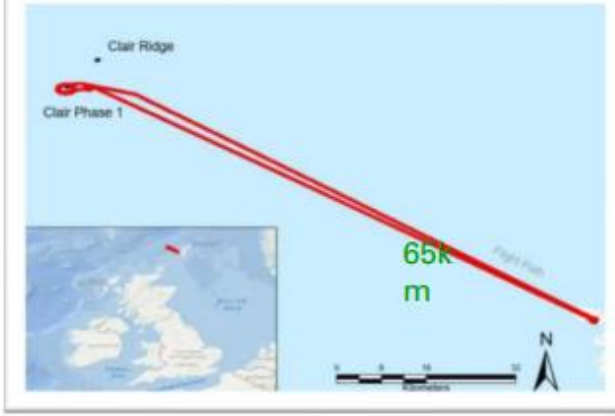
- Stimulate the creation of a low-cost methane measurement service for the O&G industry in the North Sea

Value:

- Validate emission data which we can confidently act upon and report externally
- Provide a counterpoint to measurements / studies published by external research

Status:

- bp Measurements for 3 assets
- Full consortium research (OGTC) Taqa, Harbour, Shell, Equinor, Total due for release Q3 2021



Flylogix drone & SeekOps sensor

Appraise - Net Zero Transitioning

A Common Base of Understanding

Oil & Gas Authority

Oil & Gas Authority

Separate Slide Pack

OGTC

Energy System Integration Roadmaps

Technology
Driving
Transition

Roadmap to net zero

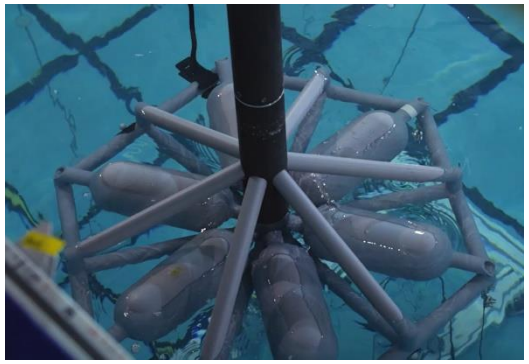
Programme	Theme	Outcome
Emissions Reduction	Field development Production, operations and logistics Late life and decommissioning	 Technology to help reduce UKCS operational emissions to net zero
Energy System Integration	Renewables and energy storage Hydrogen and other clean fuels Carbon capture, utilisation and storage	 Technology to help create an integrated net zero offshore energy system
Offshore Energy 4.0	Smart assets Field automation and remote control Robotics and autonomous systems	 Technology to enable remotely controlled operations empowered by data, automation and robotics

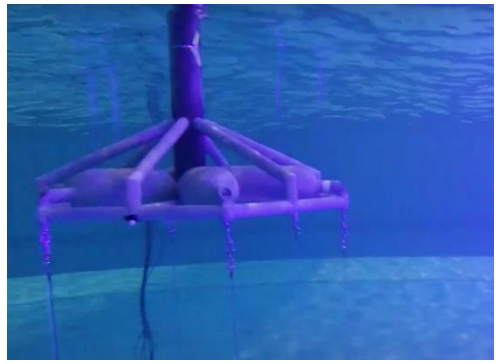
ESI Roadmap – June 2021 (Sub-Programme: Hydrogen and other clean fuels)

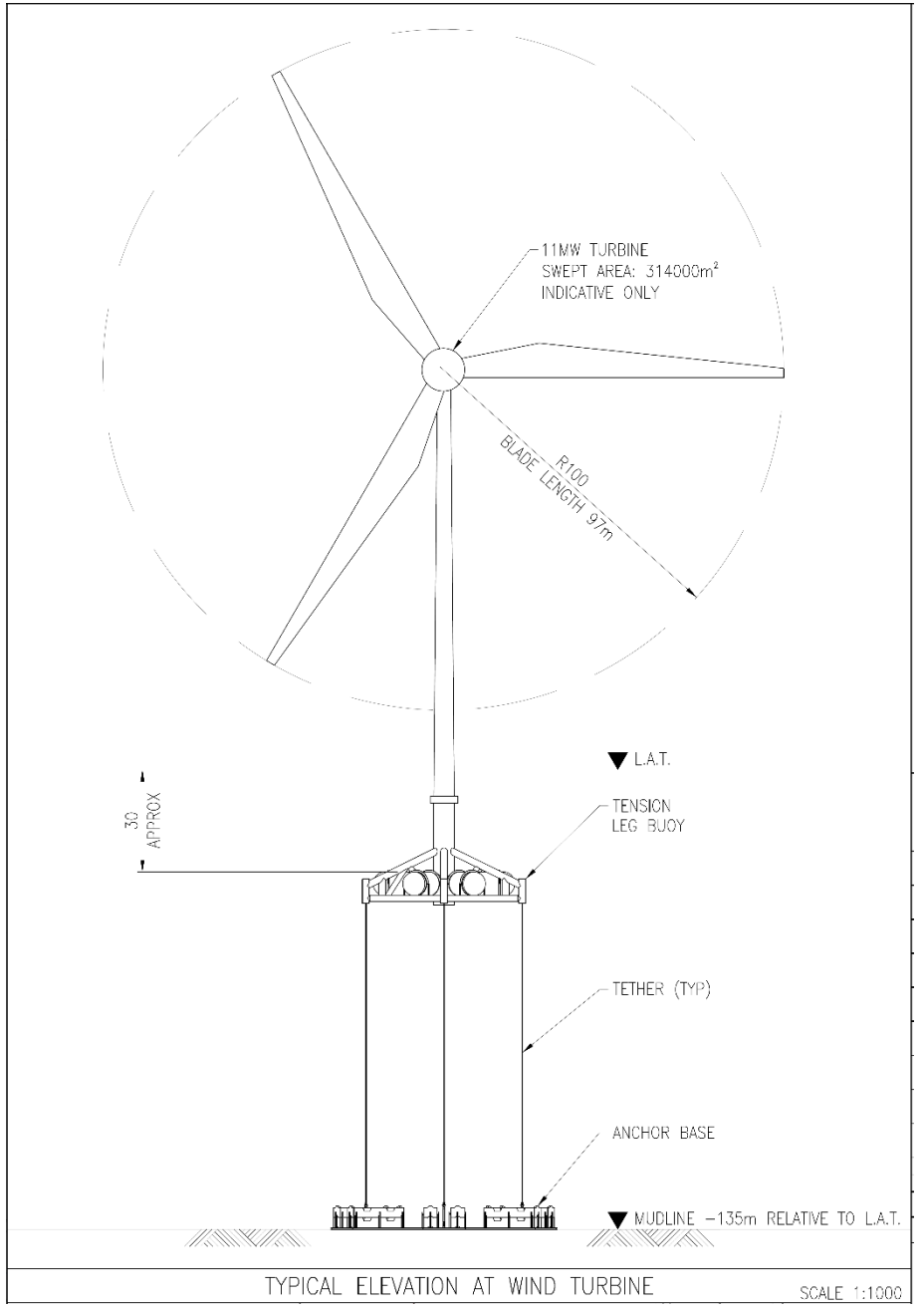
Hydrogen & other clean fuels

Hydrogen Production	Transportation & Storage	Alt. Fuel Production
Cost competitive green and blue hydrogen production Blue £1.8/kg (2020) to £1.5/kg in 2030 Green £3.5/kg (2020) to £2.0/kg in 2030	**Affordable hydrogen transportation and storage solutions** Two major trunk lines repurposed for hydrogen transportation; 2TWh/y hydrogen exported to Europe by sea	**Carbon based synthetic fuels with a low-carbon footprint are approaching commercialisation** Synfuel production cost reduces from £1.1/ltr (2020) to £0.8/ltr in 2030
Saltwater electrolysis	Storage & operation	Catalytic conversion processes
Enhanced electrolyser efficiency	Pipeline reuse	GW+ techniques
Offshore wind to hydrogen	Marine transport of hydrogen	Adapting existing conversion systems

Floating Wind – Axis TLB (Tension Leg Buoy)





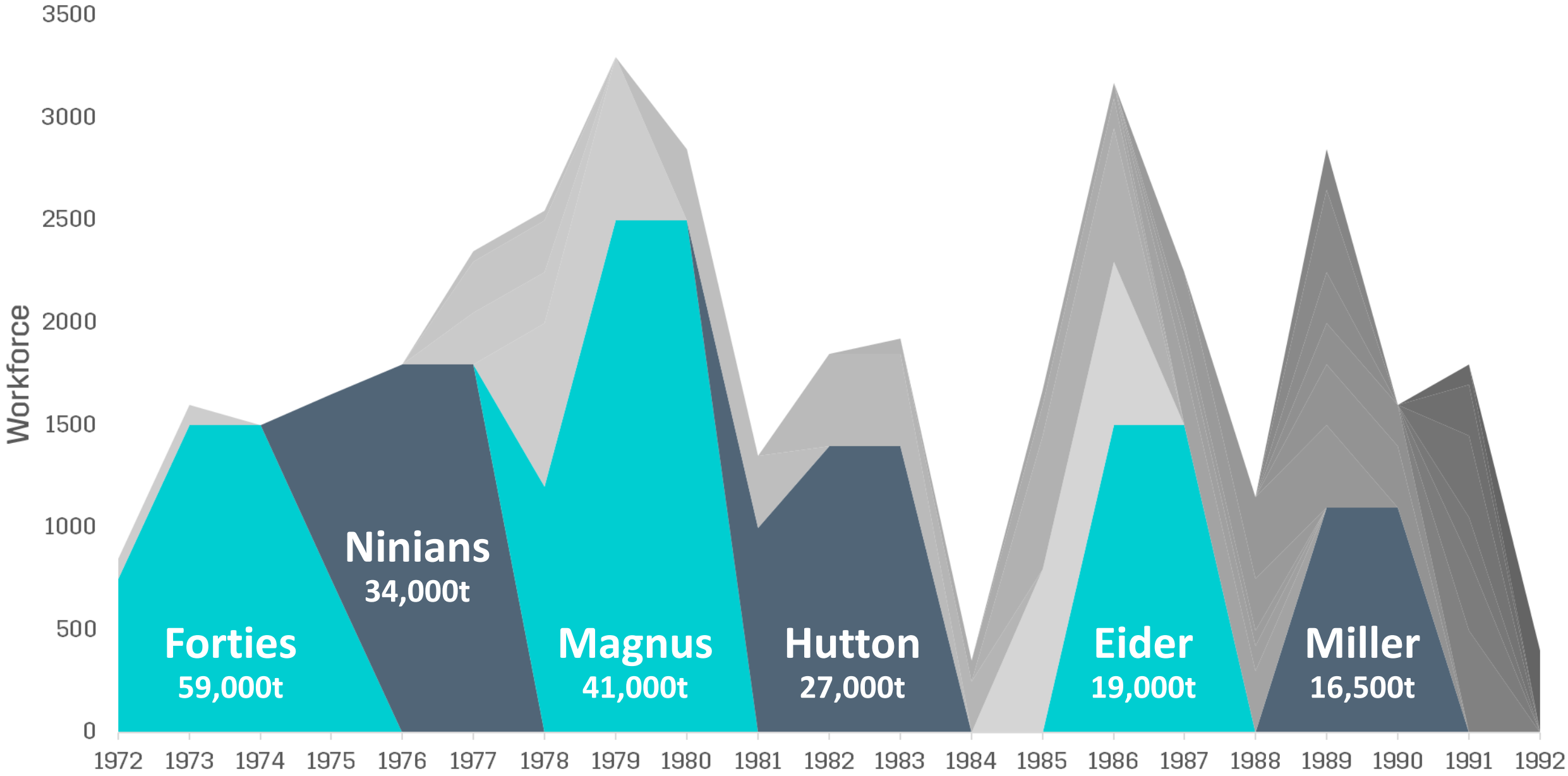


Magnus

Source: Flickr – Carry MacKay (Photo courtesy of Billy Winton)

Source: Dr Peter Lane (ex. CEO of BP Exploration and Production), **Hitcham and Taplow Society**

Nigg Fabrication Workforce 1972-1992



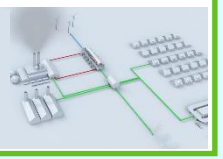
OGTC Hydrogen Project Portfolio

under development

ongoing or completed

SUPERCRITICAL

Developing the world's most efficient electrolyser



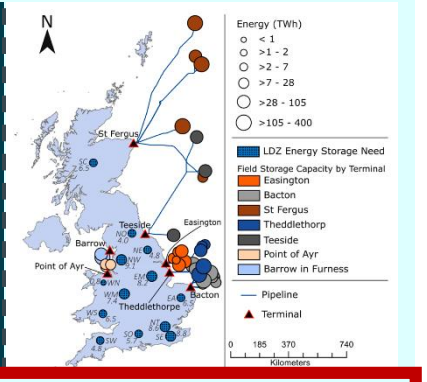
sHYp

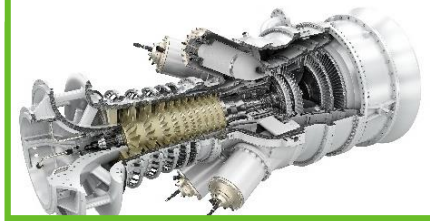
Membraneless Seawater Electrolysis

Hydrogen Flow Meter
Developer details confidential

Reduced Cost Desalination
Developer details confidential

Geological Storage of Hydrogen
Developer details confidential





Alt. Fuel Gas Turbines
Developer details confidential

Offshore Hydrogen Backbone
Under development – multi-partner concept and tech development

ORION Project (Shetland Energy Hub)
Working in partnership with Shetland Islands Council operators and supply chain to develop an integrated energy hub focused around Sullom Voe Oil Terminal and Gas Plant

NE Hydrogen Vision
Joint project between ONE, ACC, AC, AHB, OGTC, Pale Blue Dot and Scottish Enterprise. Building on Aberdeen's world-leading hydrogen demonstration projects to ensure the region delivers integrated hydrogen projects.

Hydrogen for Shipping and Harbours
OGTC led project undertaken in partnership with Aberdeen harbour Board investigating hydrogen production and use to decarbonise the maritime sector

Bacton Energy Hub
Working in partnership with Hydrogen East, ORE Catapult, N. Norfolk District Council, and New Anglia LEP to develop an integrated energy hub focused around Bacton Gas Terminal

Scottish Enterprise Hydrogen Production and Export Study
OGTC and ORE Catapult are undertaking a study assessing potential large-scale hydrogen production sites across Scotland, blue and green hydrogen production technology and export markets /customers.

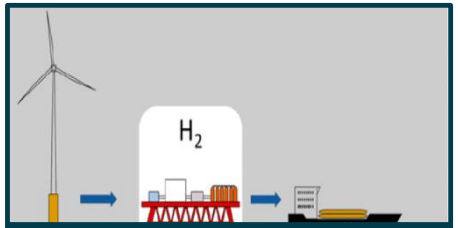
Metal hydride storage
Developer details confidential

Offshore wind to Hydrogen
Offshore Wind Innovation Hub funded study of the techno-economics of offshore wind to hydrogen

TNO North Sea Energy
Participating in multi-partners study assessing potential cross-border Dutch/UK hydrogen transport and storage infrastructure (TNO, OGTC, Boskalis, DEME, Port of Rotterdam, Port of Antwerp…)

Hydrogen Offshore Production
BEIS Low Carbon Hydrogen Supply funded £500k feasibility study .

Marine Transport of Hydrogen
OGTC led project with funding from Scottish Govt, CFPA, SIC, Global Energy, Pale Ble Dot

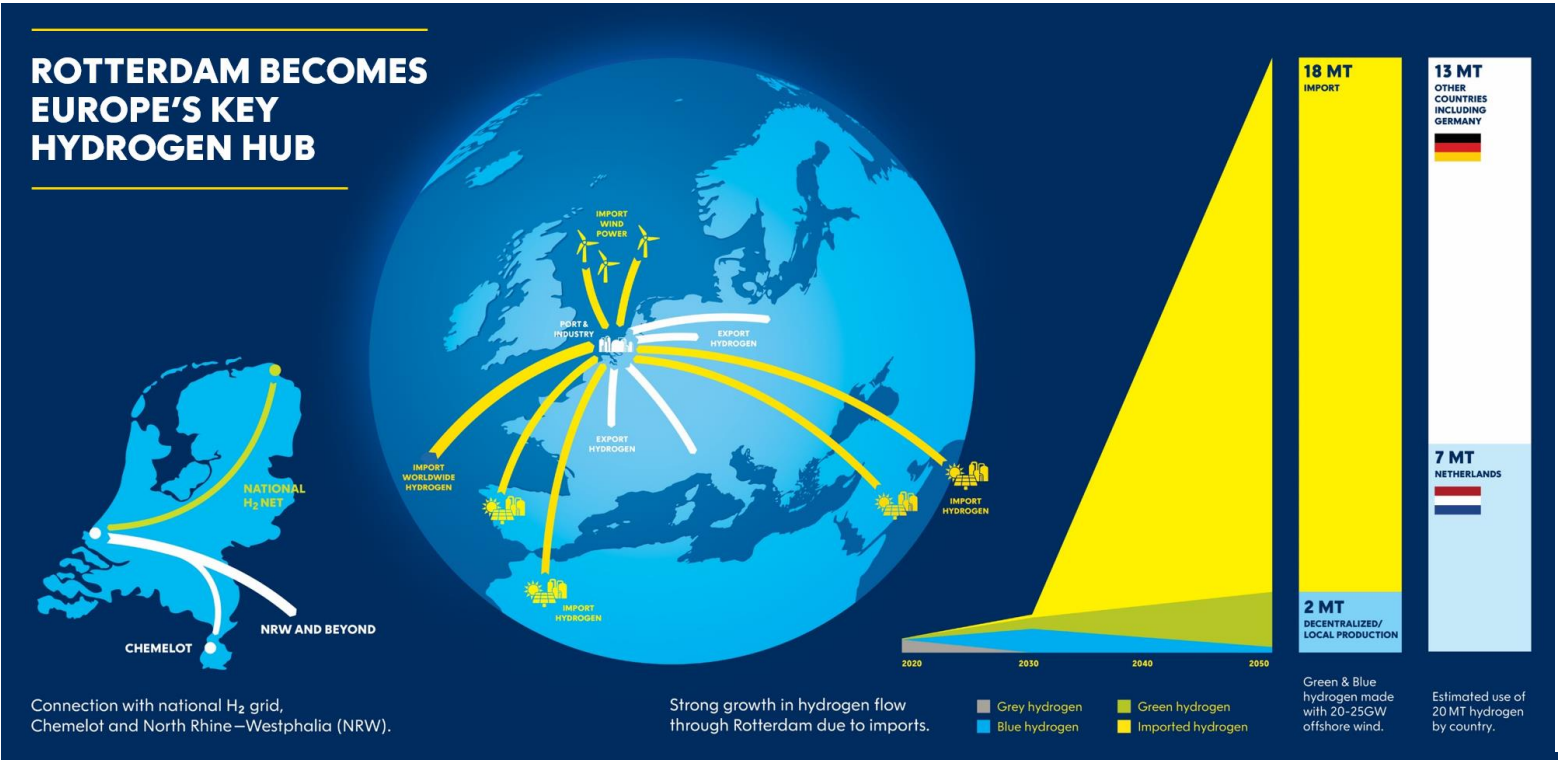


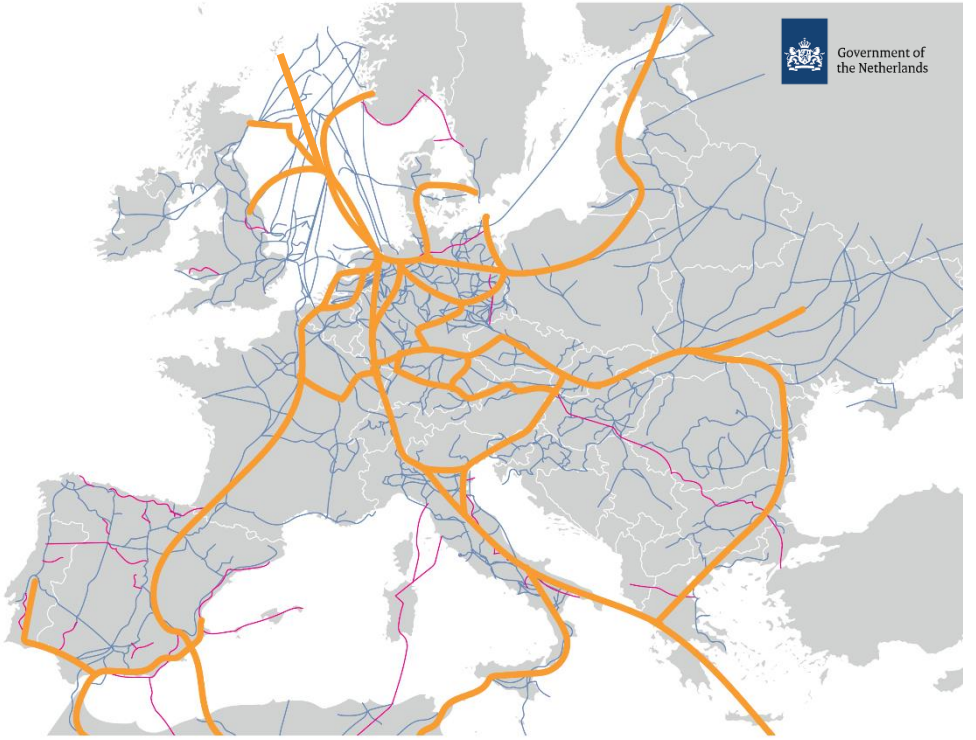
Maritime Hydrogen Use
Joint project between OGTC and Aberdeen Harbour Board

Production | Transport | Storage | End Use

Technology Development Project | Study | Multi-Country/Partner Project

Offshore Hydrogen Backbone





Blending/ Deblending

Compression

Metering

Pipeline Reuse

Valves

New Pipeline Materials

Marine Transport – Ammonia, LOHC

OGTC CCUS Project Portfolio

Power Hub
Power from Shore alternative featuring offshore carbon capture and storage

Hermetically sealed CO2 pump
Developer details confidential

CO2 metering solution
Developer details confidential

CO2 flow quantification and measurement
Developer details confidential

Pipeline Reuse for CO_2
Proposal to work with NPL and others to lead the generation of standards for reuse.

ACT3 (Accelerating Carbon Tech. 3)
Re-using depleted oil & gas fields for CO_2 sequestration. International collaboration

SSSV for CO_2 storage
Collaoration with various CCS project operators to develop a SSSV

Autonomous Robotics Ltd (ARL)
Autonomous flying nodes for OBC seismic suitable for CCS monitoring

Silicon Microgravity
Downhole microgravitimeter tool field trial – CO_2 flood monitoring – on hold due to Covid19

Heriot Watt Uni. – PDRA Project
CO_2 flow model being developed for use in CO_2 storge projects.

VULCAN Project
Crown Estate funded project investigating interaction between offshore wind and CCS

Mocean/EC-OG
Wave power + battery storage offers alternative to power & control umbilical for CO_2 injection wells

Heriot Watt Post Docs
Evaluating the Geological Case for CO_2 Storage in Depleted Gas Fields in the Southern North Sea

SMART-DAC
BEIS competition winner - Sustainable Membrane Absorption & Regeneration Technology for Direct Air Capture

TNO North Sea Energy
Participating in study assessing potential cross-border Dutch/UK CO2 transport and storage infrastructure

Scotland's Net Zero Roadmap (SNZR) Phase 2
OGTC is one of 12 partners developing a plan to decarbonise industry in order to help reach Scotland's target of Net Zero carbon emissions by 2045. £1.2 million project funded by BEIS via the via the Industrial Decarbonisation Challenge.

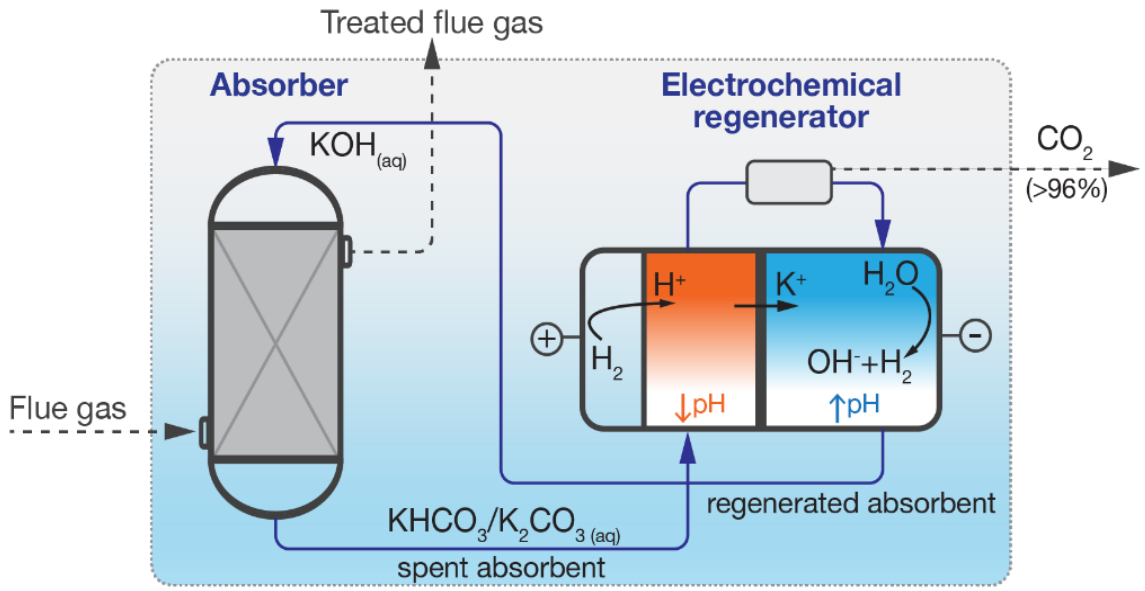
CONCENCUS
EU Horizon 2020 Project - Carbon neutral clusters by electricity-based innovations in Capture, Utilisation and Storage

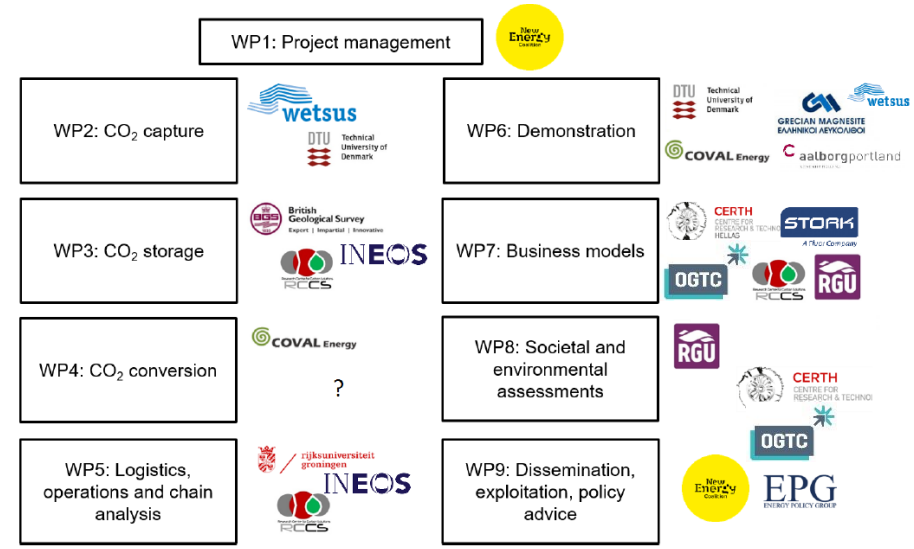
Capture | Transport | Storage | Utilisation

Potential Project

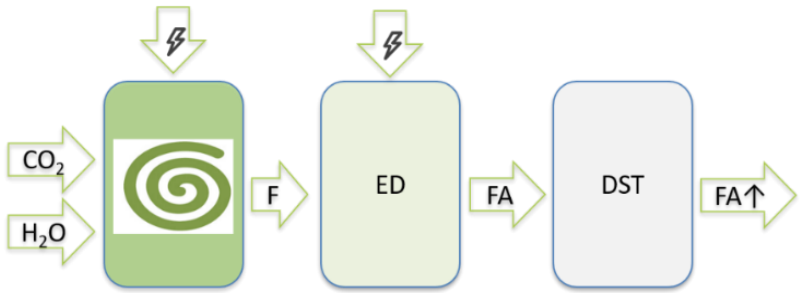
Ongoing Project

ConsenCUS





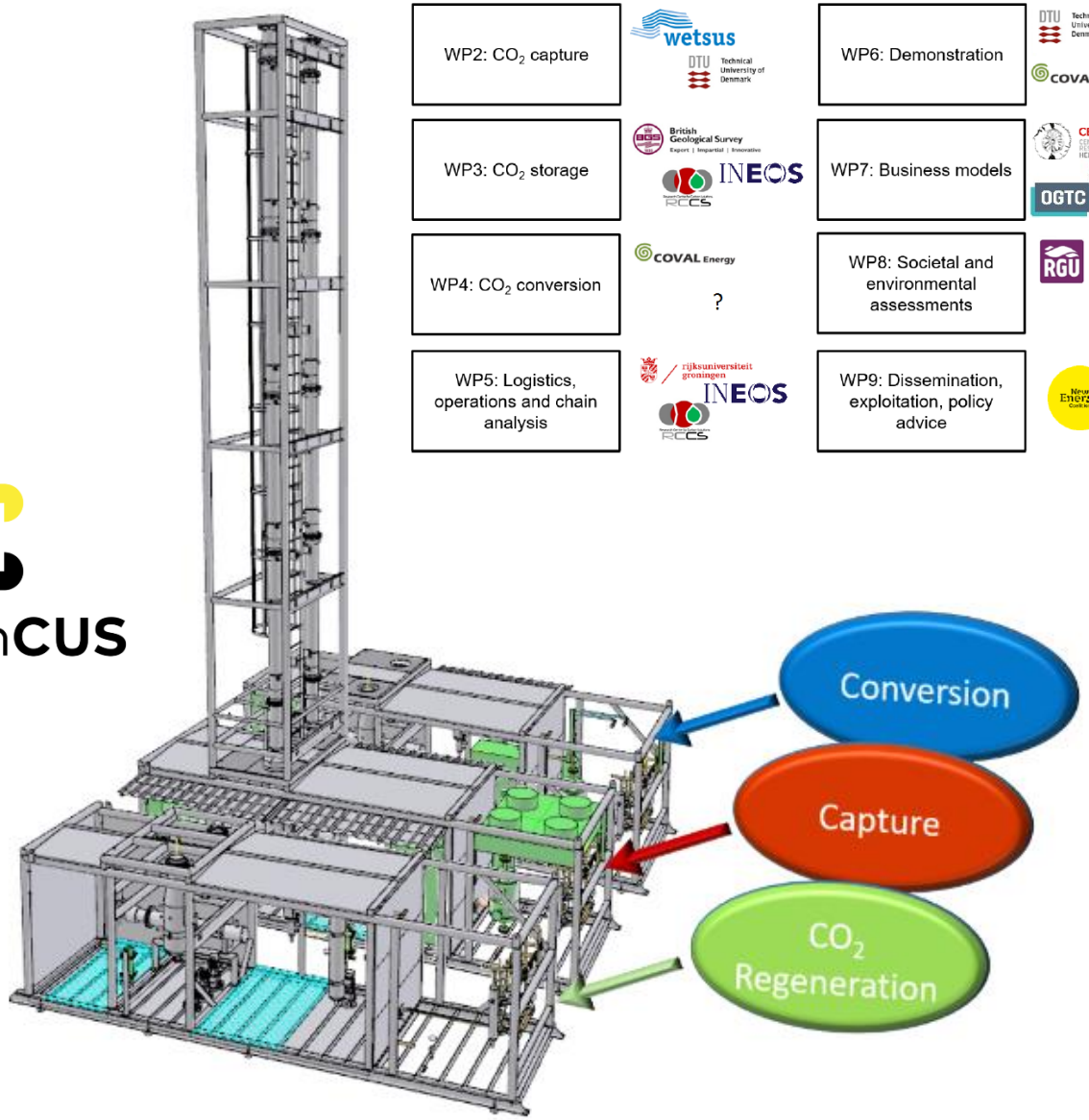
COVAL Energy Process overview



F : formate

FA : formic acid
FA↑: formic acid high concentration

ConsenCUS



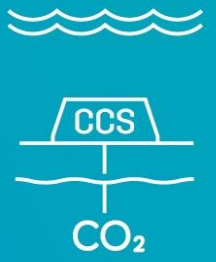
We have identified a range of critical technologies, which include but are not limited to:

Oil & Gas

- Ammonia or other low-carbon fuelled turbines
- Marine hydrogen transport solutions
- Plaform electrification (AC/DC cabling solutions)
- Subsea electrification cost reduction

Offshore Wind

- UK-specific floating wind foundations
- Innovative floating wind mooring systems
- Dynamic cabling solutions to reduce wind downtime



Carbon Capture & Storage

- Modelling of geological behaviours of CO2
- Modular, retrofittable carbon capture solutions
- Direct air/seawater capture
- CO2-compatible well plug and abandonment techniques
- High-capacity sorbents durable at high temperatures

Hydrogen

- Seawater electrolysis
- Electrolyser catalyst innovation
- Subsea electrolyser systems incorporating compression
- Improved efficiency of existing SMR and ATR technology
- Enhanced SMR reactor membranes and catalysts
- Alternative blue hydrogen production methods
- Inter-seasonal hydrogen storage

CATAPULT Offshore Renewable Energy | Technology Driving Transition | OGTC

North Sea Transition - Workgroup

Sector Deal Transitioning to Net Zero

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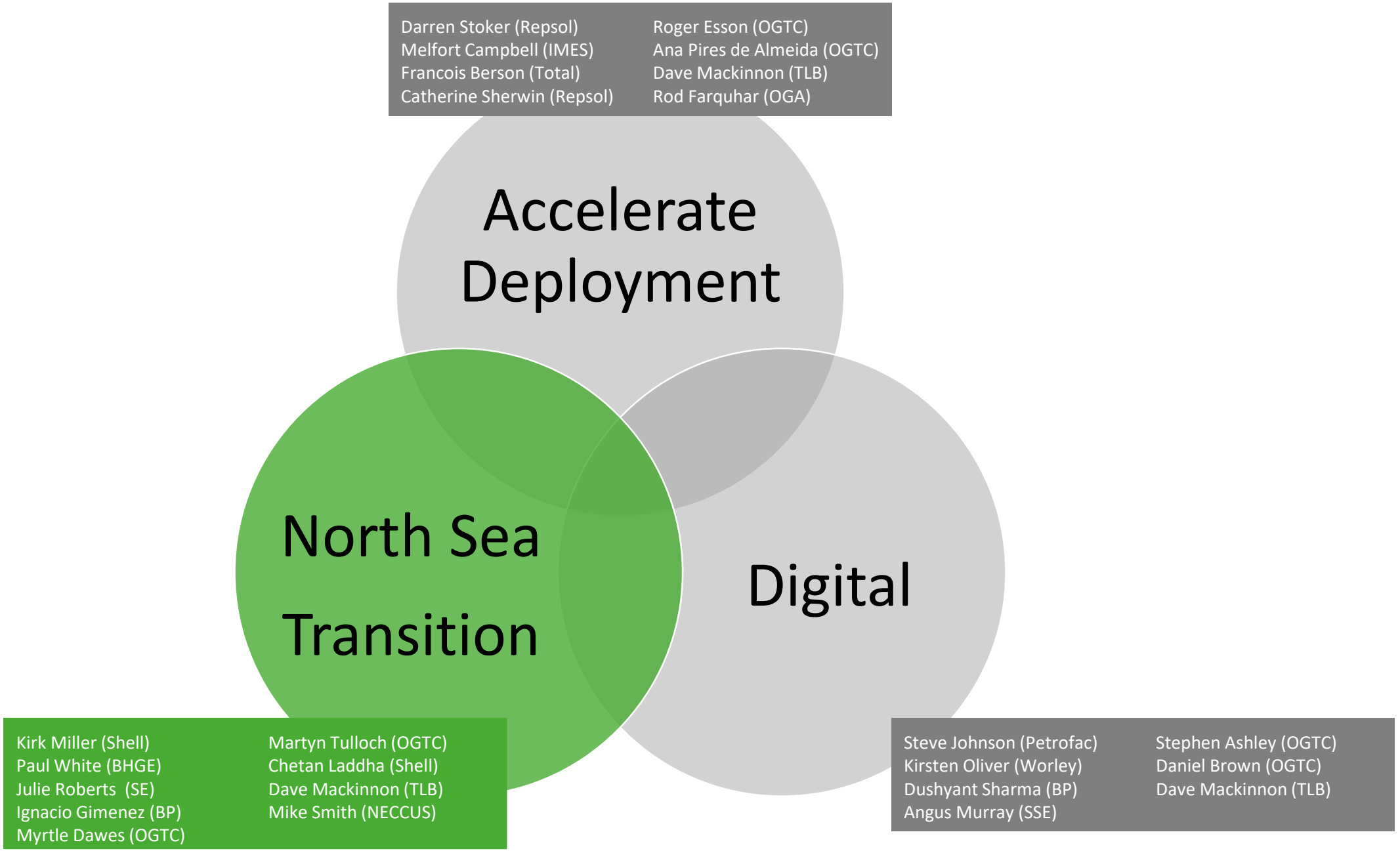
TLB Workgroups



Darren Stoker (Repsol)
Melfort Campbell (IMES)
Francois Berson (Total)
Catherine Sherwin (Repsol)
Roger Esson (OGTC)
Ana Pires de Almeida (OGTC)
Dave Mackinnon (TLB)
Rod Farquhar (OGA)

Kirk Miller (Shell)
Paul White (BHGE)
Julie Roberts (SE)
Ignacio Gimenez (BP)
Myrtle Dawes (OGTC)
Martyn Tulloch (OGTC)
Chetan Laddha (Shell)
Dave Mackinnon (TLB)
Mike Smith (NECCUS)

Steve Johnson (Petrofac)
Kirsten Oliver (Worley)
Dushyant Sharma (BP)
Angus Murray (SSE)
Stephen Ashley (OGTC)
Daniel Brown (OGTC)
Dave Mackinnon (TLB)

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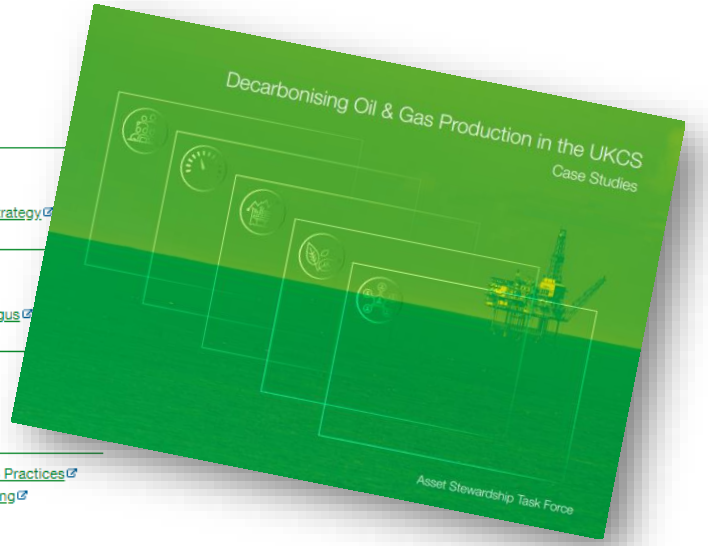
North Sea Transition Workgroup Focus

Enhancing Technology

Good Practices

Culture	Energy Management System Certification Inspiring Net Zero Capital Investment Projects
Measure, Report, Lower	Digital Emissions Management CO2 Reduction in Ageing Assets Methane Emission Detection & Reduction Strategy
Capital Asset Development	Power & Gas Ring Main Fulmar: Auk Interconnector Project Carbon Capture at SEGAL Terminal – St Fergus
Net Zero Enabling Technologies	Triton FPSO: Emission Reduction Think Wider, Study in Detail Electrification: Evaluation Framework
Stakeholder & Partner Engagement	Incorporating Paris Agreement/Sharing NCS Practices Setting Environmental Targets within Financing Energy Area Plan Collaboration



Portfolio Technologies

Accelerate Deployment of:
- Performance Optimisation
- Energy Efficiency
- Measurement

Capital Investment of:
- Power Sharing Solutions
- Alternative Power Solutions
- Flare & Vent Reduction

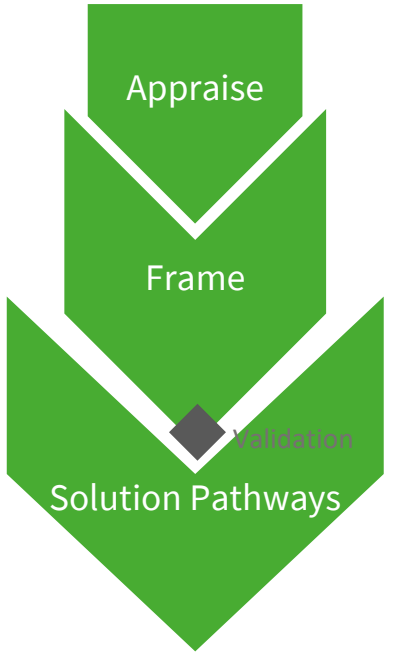
Deployment

Transitional Technology

- **60Mt reduction in UK GHG emissions**
- **£14-16bn investment levels**
- **40,000 new energy jobs**

50% UK content over the lifecycle of all related new energy projects, as well as oil and gas decommissioning, including 30% locally provided technology content

- **Oil & Gas**
- **Carbon Capture & Storage**
- **Hydrogen (Blue & Green)**
- **Offshore Wind**



Anticipation & Knowledge Share

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Route Map

Appraise

- 2018 - 2050 UKCS Emissions & Milestones (Relative to 2018)
  - 2025 – 10%
  - 2027 – 30%
  - 2030 – 50%
- UKCS Prod Expectation
  - Oil
  - Gas → Blue H2 feedstock points
- Industrial Clusters - CCS & Facilities Demand
  - Pilots → Capture & Storage Evolution
  - Technology Value Gaps
- H2 Blue Centres - User Demand
  - Pilots → Transportation Evolution
  - Technology Value Gaps
- Identifying Offshore Renewables Growth Centres
  - Green Hydrogen & Floating Wind
    - Pilots → Transportation Evolution
    - Technology Value Gaps
- Network infrastructure/transportation and security of supply Requirements?

Framing

- Technology Themes
  - Oil & Gas
  - Carbon Capture
  - Hydrogen Production (Blue & Green)
  - Offshore Renewables
- Sector Positioning & Life Cycle
  - Upstream, Midstream, Downstream
  - Exploration → Decommissioning

- Need Assessment
  - Oil & Gas
  - Carbon Capture
  - Hydrogen Production (Blue & Green)
  - Offshore Renewables
- Activity Mapping
- Supply Chain Mapping → EIC

UKCS Survey & Engagement

Solution - Pathways

- Validate Sector Technology Demands & Needs
- Seek to consolidate Technology Pathways
- Ensure all “premiered” Activities are Coordinated
- Support Consortia to Deliver Technology
  - Strategic Funding as necessary
- Communicate on behalf of Technology Ecosystems
  - Sector Deal 30% Local Technology Content

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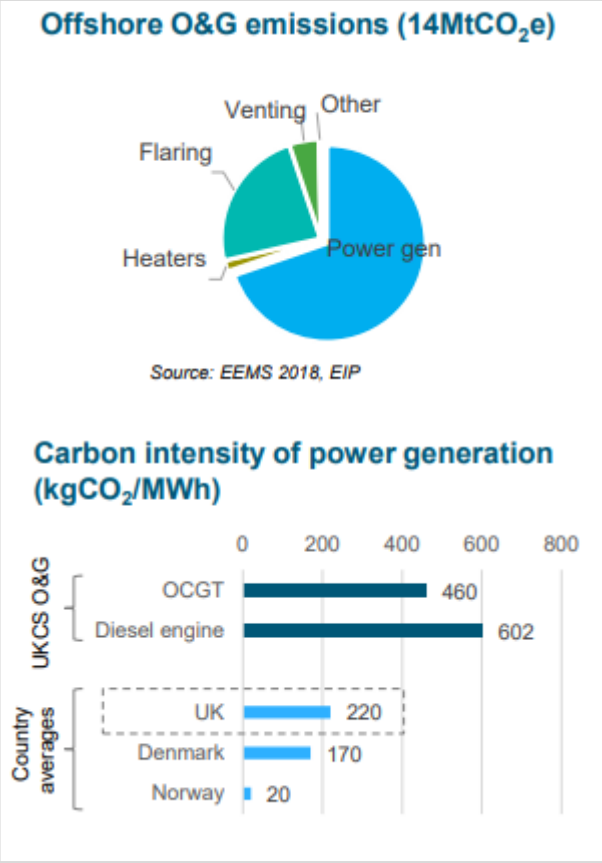
Summary of Workgroup

2020s

Maintaining our licence

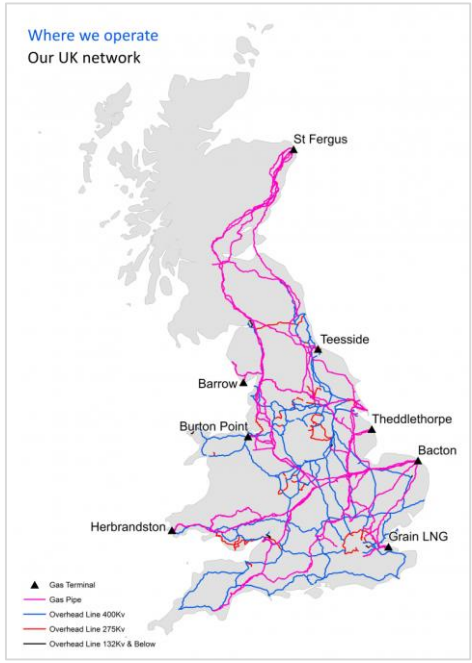


- Power Delivery Solution
  - Electrification and "Non-Grid" Solutions
    - Brownfield Assets
    - Greenfield Developments
- Energy Optimisation including Flare & Vent Mgmt.
- Collating our Knowledge Management
  - Piloting CCS, Hydrogen and Floating Wind
  - Design & Operating Efficiencies

2030s

UK Infrastructure Build-out

- National Infrastructure Investment driven by Ofgem
- A natural evolution in roles
  - Wind v CCS v Hydrogen
  - Validate viability of hydrogen - minimisation of grid (gas & electricity) constraints, and to mitigate supply continuity

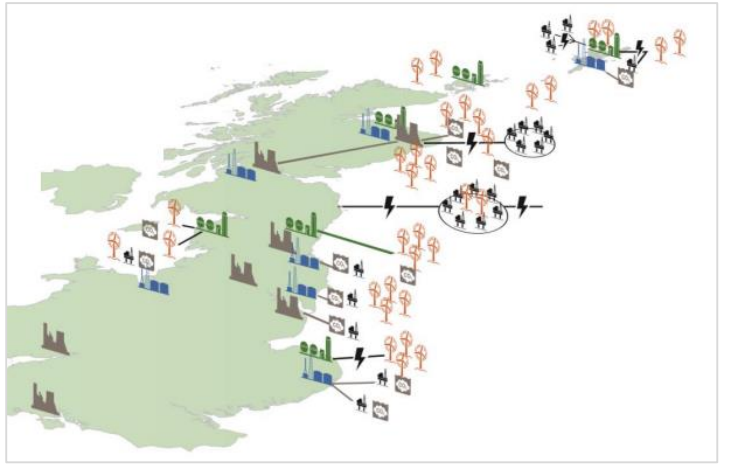


- CO_2 Requirement
  - Exploration, Storage Management & Abandonment
  - Capture Optimisation
  - Remote Operations
- Hydrogen Requirement
  - Transportation & Storage (Geological)
  - Electrolysis Efficiency – On/Offshore

2040s

Large Scale Commercialisation

- Wide Scale End User Transitioning
- Emerging trend in End User energy preferences in combination with market forces



- Low Carbon Lifecycle Management & Certification
  - Conceptualisation
  - Construction
  - Operation
  - Abandonment
- Federation of Energy Networks (Local, National & International)
  - Hydrocarbon
  - Wind
  - CCS
  - Hydrogen

Discussion & Wrap-Up

Thoughts & Feedback
20mins

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Oil & Gas Authority

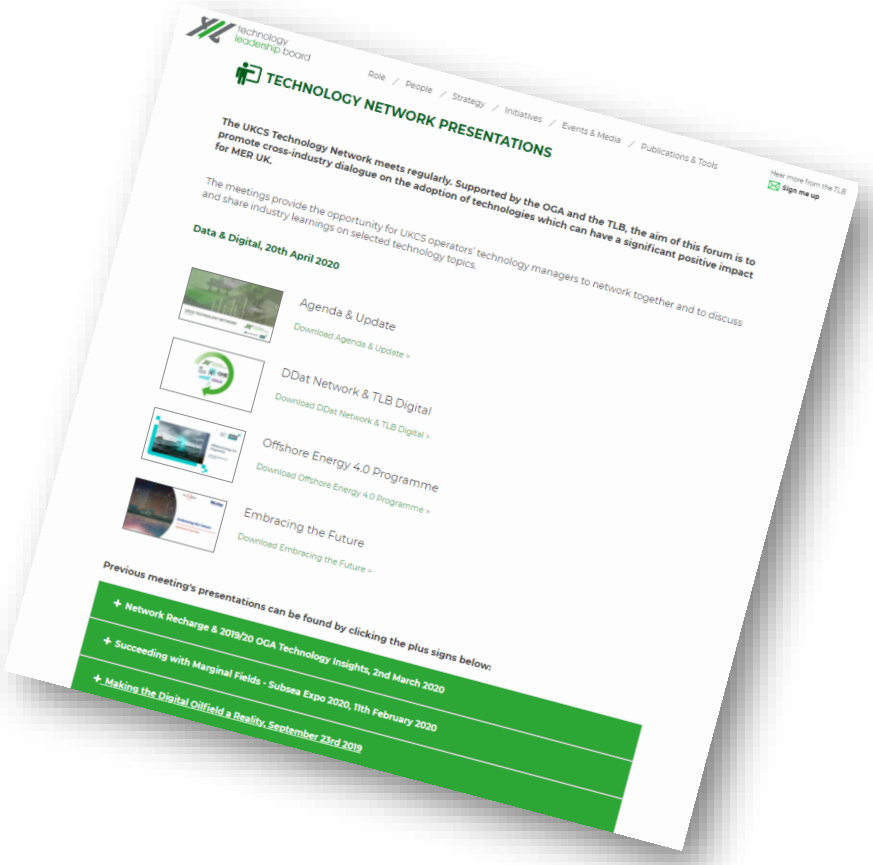
OGTC

Technology Network Meeting: Updates

- **Slides - TLB website** - **Technology Network Presentations**

- **Previous Discussions**
  - **OGA 2019/20 Technology Insights**
  - **TLB Website – "Release 2" - End of June**

- **Next Event**
  - **Accelerate Deployment** - selected technology and field trail successes will be promoted - **24th August**



What to know more or participate?
- *info@the-tlb.com*

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www.the-tlb.com

UPCOMING EVENTS

	Tue 2nd Mar	Tue 20th April	Tue 8th June	Tue 24th Aug	Tue 5th Oct	Tue 7th Dec
Theme	Accelerating Deployment	Data & Digital	North Sea Transition	Accelerating Deployment	Data & Digital	North Sea Transition
Time	1400 - 1600	1000 - 1130	1000 - 1130	1000 - 1130	1000 - 1130	1000 - 1130
Action	Zoom	Zoom	Zoom	TBC	TBC	TBC
Outline Agenda	• Recharge • Technology Insights • Knowledge Mgmt.	• Phase 2 Insights • Sector Actions	• Engagement Plan • Tech Threads • Insights Debate	• TRL Hopper • Trial Feedbacks	• Proof of Concepts • OLTER Progress	• TBC

Typically - 60mins of Presentations with 30mins of Discussion or Networking

BACK-UP

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