I Could Not Resist Showing All My Slides





Brian Allison

UK Department for Business, Energy and Industrial Strategy The UK's Clean Growth Strategy





International Collaboration Bilateral Agreements ACT R&D





The Global International CCUS Summit and Conference 28th & 29th November 2018

in Edinburgh, Scotland, UK



Carbon Capture Usage and Storage (CCUS) policy: the Government's new approach

Brian Allison

UK Department for Business, Energy and Industrial Strategy



What is CCUS?

CCUS is the process of:

- Capturing carbon dioxide (CO₂) emissions from largepoint sources (such as power stations and industrial facilities)
- Transporting CO₂ in pipelines or via ships to very deep subsurface rock formations, where it can be safely and permanently stored
- In some instances the CO₂ captured can be utilised.



IEA and IPCC models indicate CCUS central to keeping temperatures to 2°C



~70% of IPCC models require CCUS for 2°C

87% of IPCC models require carbon removal for 2°C (starting in 2030)

Will be an important feature in 2018 IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emissions pathways

22 projects globally*



*in operation or construction as of February 2018 (GCCSI global database).



A significant scale-up of CCS efforts will be required globally



CCUS needs to be ramped up hundreds of times to achieve long-term goals

CCUS supports the Clean Growth Grand Challenge and least cost pathway to 2050



The Government's new approach to CCUS

- CCUS is an important part of the Clean Growth Strategy, supporting decarbonisation across the economy and maximising economic opportunities
- It is why the Government wants the UK to become a global technology leader in CCUS and work internationally with industry and governments to bring about global cost reductions
- Ambition is to have "the option of deploying CCUS at scale during the 2030s, subject to costs coming down sufficiently"
- Three themes:
 - (1) Progress our commitment to deploying CCUS in the UK, subject to cost reduction;
 - (2) Collaborate with international partners to drive down the cost and accelerate deployment of CCUS; and
 - (3) Invest in CCUS innovation to support cost reduction and deployment in the UK.

Delivery theme 1: Re-affirming our commitment to deploying CCUS in the UK, subject to cost reductions

CCUS Cost Challenge Taskforce

- Set up in January 2018 and comprised of over 40 leading experts, report was published on 19 July 2018.
- Proposes a range of measures and actions to inform the Government's new approach to CCUS.
- Taskforce view is that these will enable cost reductions to be secured and support the Government's ambition of having the option to deploy CCUS at scale, subject to costs coming down sufficiently.

Link: <u>https://www.gov.uk/government/groups/ccus-cost-challenge-taskforce</u>



CCUS Cost Challenge Taskforce concluded that CCUS can deliver value across the UK economy



Infographic: CCUS Cost Challenge Taskforce report

CCUS Cost Challenge Taskforce

- The report's key conclusions were:
 - i. There should be at least two CCUS clusters operational in the UK by the mid-2020s
 - ii. That a Regulatory Asset Base (RAB) model should be established for CO₂ infrastructure
 - iii. Delivery of CCUS should be prioritised through the creation of CCUS clusters in industrial centres
- Supported by four headline messages:
 - i. The need to recognise the CCUS opportunity and the urgency of acting now in order to deliver CCUS at scale, at lowest cost.
 - ii. CCUS can unlock value across the economy to enable low carbon industrial products, decarbonised electricity and gas, a hydrogen economy, greenhouse gas removal, and new industries based around utilising CO2.
 - iii. The need for viable business models to move the technology to a sustainable commercial footing.
 - iv. That the Taskforce believe that CCUS can already be deployed in clusters at a competitive cost.
- Conclusions and messages supported by short, medium and longer-term recommendations which Government will consider and respond to

CCUS Deployment Pathway

"We will build on the success of the Offshore Wind Cost Reduction Taskforce and convene a CCUS Cost Challenge Taskforce to deliver a plan to reduce the cost of deploying CCUS. This will then underpin a <u>deployment pathway for</u> <u>CCUS in 2018, setting out the steps needed to meet our ambition of deploying CCUS at scale during the 2030s, subject</u> <u>to costs coming down sufficiently</u>. This will include looking at the options for permanent storage of carbon dioxide domestically as well as elsewhere via international shipping." Clean Growth Strategy, 2017

- We will continue to work proactively with the Taskforce members as we draft the Deployment Pathway, which will be published before the end of 2018.
- The Deployment Pathway will set out the steps that need to be taken by industry and Government in order to:
 - Reduce costs of deployment, to enable cost-effective deployment at scale during the 2030s
 - Enable informed decisions to be made from the late 2020s onwards on whether to deploy CCUS at scale during the 2030s.

Review of delivery and investment models for CCUS

"Following the advice from the Parliamentary Advisory Group on CCS, the Government will review the delivery and investment models for CCUS in the UK to understand how the barriers to deployment can be reduced, and how the private and public sectors can work together to deliver the Government's ambition for CCUS." Clean Growth Strategy, 2017

- The review aims to:
 - Identify possible delivery and investment frameworks to support cost effective deployment of CCUS and support cost reductions
 - Recommend an appropriate CCUS delivery and investment framework for the UK;
- Will include work under three themes:
 - CCUS in industry and the need to develop an industrial carbon capture incentive mechanism;
 - CCUS in power, in particular the role of CCUS in power sector decarbonisation; and
 - CO2 infrastructure (pipelines and storage facilities), in particular how this can best be financed and deployed.
- Will include how each theme can work together.
- Government will consult on its preferred approach in 2019.

Improving our understanding of the cost of shipping CO₂

- Aims of the project are to explore potential role for shipping as a lower cost transport solution:
 - Estimate capital (capex) and operational (opex) costs of shipping CO2 from terminals at specific UK locations and at a range of scales to geological CO2 storage sites in the UK, and elsewhere; and
- Identify the circumstances (scales/capacity/locations/time) in which shipping costs may represent value for money in the UK relative to fixed pipelines.
- Project led by Element Energy (UK) with TNO (Netherlands) and Polarkonsult, Brevik Engineering and SINTEF (Norway)
- Will complete by end September 2018 and findings will inform the review of delivery and investment models for CCUS and the deployment pathway

Engaging with CCUS projects

"We will work with the ongoing initiatives in Teesside, Merseyside, South Wales and Grangemouth to test the potential for development of CCUS industrial decarbonisation clusters." Clean Growth Strategy, 2017

 Welcome the development of CCUS proposals from across the UK and happy to discuss project concepts with developers



CCUS Council

"We will set up a new Ministerial-led CCUS Council with industry to review our progress and priorities. Through the CCUS Council we will also monitor costs and deployment potential with the option of revising our deployment path accordingly." Clean Growth Strategy, 2017

- The primary forum for engaging the CCUS sector on key strategic issues to enable the Government's ambition for CCUS to be achieved
- Co-chaired by Minister for Energy & Clean Growth, Claire Perry and James Smith, former chair of Carbon Trust and comprised of over 20 members with representation from the oil and gas sector, the CCUS industry, academia, NGOs, and the finance sector.
- The Council will:
 - Advise on CCUS progress and priorities;
 - Review the work of the CCUS CCTF and the Government's implementation of the CCUS CCTF's plan delivered to Government;
 - Monitor CCUS costs and deployment potential (including on the Government's ambition for deploying CCUS at scale during the 2030s)



Energy & Clean Growth Minister @claireperrymp chaired the first meeting of the Council on Carbon Capture Utilization and Storage (CCUS). The council will offer specialist advice to government, review progress of our new approach to CCUS and commitments made for #CleanGrowth



8:53 AM 29 Jan 2018

Delivery theme 2: Collaborate with international partners to drive down the cost and accelerate deployment of CCUS

International collaboration

"We will work with industry and other governments to drive down the cost and accelerate deployment of CCUS." Clean Growth Strategy, 2017

- We are co-leading the Carbon Capture Challenge under Mission Innovation along with Saudi Arabia and Mexico.
- We are members of the United States led CCUS initiative under the Clean Energy Ministerial.
- We continue to work with the North Sea Basin Taskforce, Carbon Sequestration Leadership Forum and IEA GHG programme.
- We work with the Oil and Gas Climate Initiative and are keen to engage with other private sector initiatives.
- We are keen to strengthen bilateral engagement with other leading CCUS countries including the United States, Norway, Canada, Australia, United Arab Emirates and Saudi Arabia.

UK/IEA CCUS Summit and "Accelerating CCUS: A Global CCUS Conference to Progress CCUS", Edinburgh

- CCUS Summit hosted by Claire Perry and Fatih Birol on 28 November 2018. Will gather world energy leaders from governments and industry to discuss concrete actions to scale up CCUS globally.
- Accelerating CCUS: A Global CCUS Conference will take place between 28-29 November:
 - 28 November: half-day event, hosted by UKCCS Research Centre on the research and innovation priorities for CCUS and how to improve knowledge sharing of existing CCUS projects. This will be followed by a networking dinner and reception.
 - 29 November: one day event, hosted by UK Government and Global CCS Institute on the pivotal role of CCUS. This will be followed by a networking reception.
- These invitation-only events, will gather speakers, delegates from governments, industry and academia, and leading experts from around the world. The conference will discuss the value of CCUS, explore business models, and the future of CCUS technologies whilst seeking practical solutions and actions to accelerate the deployment of CCUS globally.
- Invitations for Global CCUS Conference will be issued shortly.
- Further details on Conference at: <u>https://www.gov.uk/guidance/uk-carbon-capture-and-storage-government-funding-and-support</u>

UK's International CCUS Programme

- Since 2012, our international CCUS programme has **invested £70 million** to support the development and deployment of CCUS in emerging economies and developing countries
- Funds are used to support capacity building activities, CCUS Centres of Excellence, feasibility studies and **pilot CCUS projects**
- **£35 million** is provided through the Asian Development Bank's CCS Trust Fund to support activities in Indonesia and China
- **£35 million** is provided through the World Bank's CCS Trust Fund to support activities in South Africa and Mexico. This includes a £10 million extension approved in 2017
- Possible future work with Asian Development Bank includes:
 - Engaging with additional countries such as Bangladesh, India, Vietnam and Kazakhstan
 - Currently funding a US \$1 million feasibility study of CCUS in Pakistan
 - Focusing on CCUS in industry alongside the power sector

Delivery theme 3: Invest in CCUS innovation to support cost reduction and deployment in the UK

Delivery theme 3: Investing in CCUS innovation

"Swe will spend up to £100 million from the BEIS Energy Innovation Programme to support Industry and CCUS innovation and deployment in the UK." Clean Growth Strategy, 2017

£4.4m to <u>1st round of Accelerating CCS Technologies</u>, led by Norway and involving 8 Member States. Designed to accelerate the deployment of full chain CCS (projects now underway).

£5m to <u>2nd round of Accelerating CCS Technologies</u>, led by Norway and involving same countries as first round with addition of France and United States. Projects to start in April 2019.

£20m <u>Carbon Capture & Utilisation Demonstration</u>, aiming to demonstrate CCU at industrial sites and de-risk and develop capture technologies.

£15m **<u>open call on CCUS Innovation</u>**, for projects that can reduce the cost of CCUS. Due to open for applications in July.

Accelerating Carbon Technologies Programme

- Ambition of the 11 countries is to fund multi-lateral research and innovation projects to support the development of CCUS.
- First ACT Call led to 8 projects starting in autumn 2017.
- Second ACT call was published 4 June 2018 with a budget up to €30 million – closing date 12 September 2018 (full proposals by 1 March 2019)
- Will also be ACT Open Call further details published Q4 2018
- Further information: <u>http://www.act-ccs.eu/</u>







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Accelerating Technologies

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New ACT Call

Brian Allison

The UK ACT Lead UK Department for Business, Energy and Industrial Strategy

ACT – Accelerating CCS Technologies

- 11 countries cooperating
- Joint calls
- Knowledge sharing
- 8 ACT projects started 2017
- New call June 2018 up to € 30 M









DOE

ACT Calls

- ACT Call 2016
- ACT Fixed Call 2018
- ACT Open Call 2018
- ACT Call 2020



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ACT Ambition

• International cooperation as a tool for accelerated commercialisation of CCS technology



Norcem Cement (Norway)



ACT ACORN (UK)



Petra Nova (USA)



8 ACT projects started 2017

Project	Activities	ACT, M €	Norway	Netherlands	UK	Germany	Romania	Switzerland	Spain	Turkey
ALIGN	Chain integration, clusters	14.5	х	X	Х	Х	Х			
ELEGANCY	Chain integration, hydrogen	8.9	X	х	х	Х		х		
PRE-ACT	CO2 storage, pressure handeling	4.5	X	х	х	Х				
ACORN	Full chain CCS / infrastructure	2.0	х	х	Х					
DETECT	CO2 storage, risk assessment	2.0		Х	Х	Х				
ECOBASE	CO2-EOR SouthEast Europe	1.2	X	х			х			х
GASTECH	Gas switching technology	1.7	X	х			х	х	х	х
3D-CAPS	3D printed sorbents	1.5	Х	X			х			

- Total budget for 8 projects: € 50M
- ACT support: € 36M

more info at <u>www.act-ccs.eu</u>





www.act-ccs.eu

New ACT Calls 2018

Two ACT Calls

- <u>ACT Fixed Call</u>
 - Published 4 June 2018
 - Phase 1: Pre-proposals. Due date for applications 12 September 2018
 - Phase 2: Full proposals by 1 March 2019
 - Wide thematic CCUS call
- <u>ACT Open Call</u>
 - No deadline for applications
 - Will be published Q4 2018





The ACT Fixed Call

- The call is available at the ACT web site: http://www.act-ccs.eu/calls/
- Partners from at least 3 ACT countries
- Appendix 1 is important requirements from each country
- Open for large (>€ 3 M) and small projects (<€ 3 M)
- 3 year projects starting around September 2019. UK project cost need to be completed by 31 March 2021
- Large projects should address high TRL. All projects should advance TRL





TRL – Technology Readiness Level







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Call Budget

Participating country	Funding organisation	Available budget (€ million)
France	The French Agency for the Environment and Energy Management (ADEME)	0.5
Germany	Forschungszentrum Jülich GmbH, Projektträger Jülich (FZJ/PtJ)	1-6
Greece	General Secretariat for Research and Technology (GSRT)	1.5
The Netherlands	Rijksdienst voor Ondernemend Nederland (RVO)	4
Norway	The Research Council of Norway (RCN) and Gassnova SF (GN)	3-6
Romania	Executive Agency for Higher Education, Research and Innovation Funding (UEFISCDI)	1
Spain	Ministry of Economy, Industry and Competitiveness – State Research Agency (MINECO-AEI)	0.45
Switzerland	Swiss Federal Department for the Environment, Transport, Energy and Communications (DETEC)	1
Turkey	The Scientific and Technological Research Council of Turkey (TUBITAK)	0.5
United Kingdom	Department for Business, Energy and Industrial Strategy (BEIS) (indicative at current exchange rate €7.4 million)	6.5 (£ million)
United States	Department of Energy (DoE) (indicative at current exchange rate €1.7 million)	2 (US\$ million)
Total		22.05-30.05



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Important Advice

- Read Appendix 1 to the Call Text carefully!
- Appendix 1 contains country specific rules that all applications must follow

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ACT Project Structure

- Projects funded by ACT must:
 - be an international project
 - contain clearly specified national sub-projects





National Contact Points

Contact persons	Organisation	Name	e-mail	Phone		
France	ADEME	Aïcha El khamlichi	Aicha.elkhamlichi@ademe.fr	+33 241208225		
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		Annette Weiß	a.weiss@fz-juelich.de	+49 2461 61 9025		
Greece	GSRT	Paraskevi Afentaki	pafe@gsrt.gr	+30 2107458112		
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		Darin Damiani	darin.damiani@hq.doe.gov	+1 202 287 5282		
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		Hannah Lord	hannah.lord@beis.gov.uk	+44 300 06 85547		



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Knowledge Sharing

- ACT is more than just single projects
- The ACT funded projects can learn from each other
- The ACT projects should together with the ACT consortium lead to accelerated CCS deployment
- Everybody should focus on communication of results to CCS stakeholders, industry, and decision makers





Time Schedule – ACT Fixed Call

- 4 June: Call published
- 12 September 2018: Deadline for submission of pre-proposals
- November 2018: The best pre-proposals will be invited to submit full proposals
- 1 March 2019: Deadline for submission of full proposals
- Summer 2019: Earliest date for starting new projects





Submission System

- ACT applications must be submitted to the Research Council of Norway (RCN) via the designated electronic submission system
- Only the lead partner of each should submit
- The deadline for "Phase 1" is 12 September 2018 at 13:00 CEST
- Please note that pre-proposals will be rejected if the application is not received by this deadline
- Start early with uploading the application. At least one day before the deadline. There is a lot of information that has to be uploaded.
- All budget data in the application must be in <u>euro</u>.



Evaluation Procedures

- Pre-proposals will be assessed by the national funding agencies
- Full proposals will be evaluated and ranked by external experts. A common decision on funding will then be made by the involved funding agencies.
- Evaluation criteria: Excellence, Impact, Implementation
- The criteria will be weighted equally.
 - Scoring from 0 to 5
 - Threshold for individual criteria: 3
 - Overall criteria: 10



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ACT Open Call

- Will be published Q4 2018
- Ambition: new projects with high industrial involvement
- Ambition: new projects that address Mission Innovation PRDs
- Participating countries: Germany, Norway, Switzerland, UK, USA
- Do not wait for the ACT Open Call. If good applications to the ACT Fixed Call there might not be any money available for the ACT Open Call





Recommendations

- Read the Call Text
- Read appendix 1 with the UK National Requirements
- Make sure your application is relevant in all participating countries
- Make sure all relevant national contact persons are contacted
- State aid guidelines must be followed





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- Joint calls
- Knowledge sharing
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- New call June 2018 up to € 30 M









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