CCUS Hubs and Clusters

John Gale
General Manager
IEA Greenhouse Gas R&D Programme
(IEAGHG)
IEAGHG’s remit is to assess the role that technology can play in reducing greenhouse gas emissions from the power and industry sectors.

IEAGHG provides independent technical advice.
CCUS Progress

• 21 large-scale CCS projects in operation or under construction globally (GCCSI)
  • CO₂ capturing 40 Mtpa.
  • Concern that CCUS project pipeline is slowing
• The IEA reported at the CEM in 2016 that:
  "progress is falling short"
  "Industry and governments need to make significant investment in projects and technology development to get CCS on track to meet the 2DS target”.
• The EU Zero Emission Platform advised to EU that:
  • The key to delivering CCS is the development of CCUS infrastructure
  • Drive the creation of sustainable economic zones,
  • Deliver the least cost decarbonisation route for Europe,
  • Generate new jobs and boost economic prosperity
The Hubs and Cluster concept

Formation of separate Transport & Storage Organisation

Source: Global CCS Institute
Understanding Hub and Cluster Development

- The most successful hubs and clusters are those based on the use of CO₂ for EOR
- The main risks for hubs and clusters are commercial, not technical
- Hub clusters will likely require substantial, i.e. 50% or more, government support.
- Pre-investment by Government to generate investor interest e.g. for capture plant is essential
- A major obstacle in early years is maintaining a core organisation which is able to carry a CCUS cluster project forwards.

Source: http://www.ieaghg.org/docs/General_Docs/Reports/2015-03.pdf
Developing the Business Case

• New study completed to address key questions
  • What are the key economic and business related issues with hubs and clusters, including private investment
  • Identify the role governments can play in accelerating their deployment

• Principles:
  • Separates Capture from Transport and Storage (T&S) investment
  • Focus on Industrial CCUS (also applicable to power and mixed industry/power cases)
  • Investigated 4 different business models that allow industrial emitters to remain competitive
  • Focused on Europe but also considered applicability in North America, Europe, China, Australia
Creating the climate for investment

• Four enablers that need to be addressed
  • Addressing the carbon leakage issue
    o High carbon prices do not drive production to less regulated/low cost base markets
  • Creation of a market that is attractive to prospective investors
  • Public-private sector risk sharing
    o Storage and Loan guarantees, grants for storage development, grants to reduce external financing needs
  • Decoupling the CCUS business chain
    o No single organisation willing to manage full CCUS chain
    o De-linking allows all parties to focus on core strengths
    o Four different business cases for T&S infrastructure.
Four Options Considered

1. Government-owned transport and storage infrastructure
   - Government establishes a public transport and storage (T&S) company
   - T&S company can be privatised at later date

2. A Regulated Asset Base (RAB)
   - Model is used to enable fully privatised delivery of the project.
   - An independent market regulator would need to be set up with government funding;
Four Options Considered

3. Existing infrastructure
   - Use existing infrastructure (which may either be government owned or regulated).
   - Or join an existing “anchor” CCUS project provided the infrastructure was built oversized;

4. CO$_2$-EOR
   - Only if active oil fields exist in the region
   - Most common option for currently operating projects
   - May not be a long-term solution
Model Outcomes & Applicability

• For the European case
  • Four models give a total investment of £75-110/t of CO2 abated
  • Costs to Government in range £29-53/T CO2 abated.

• Key conclusion: If the right market conditions are established then a public private partnership can be created that reduces Government investment in T&S infrastructure

• For other regions – at least one model might be relevant or features of different models can be combined
Summary

• CCUS Hub and Cluster development is key to increasing global CCUS deployment to meet Paris target of below 2degree.

• IEAGHG work has shown that business case examples can be developed that enable both public and private sector investment in hubs and clusters.

• There is no “one fits” all business case model but several examples and combinations of features of models can be combined to best suit regional conditions.