

## CCS Commercialisation – Threats & Opportunities

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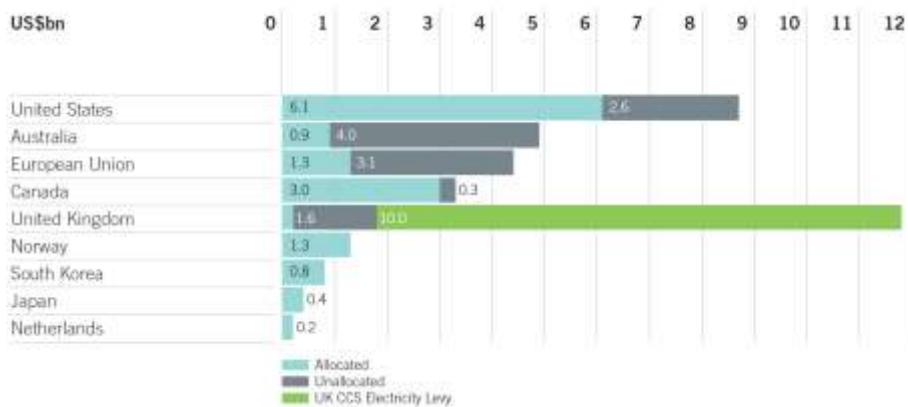
## GLOBAL STATUS OF CCS: 2010



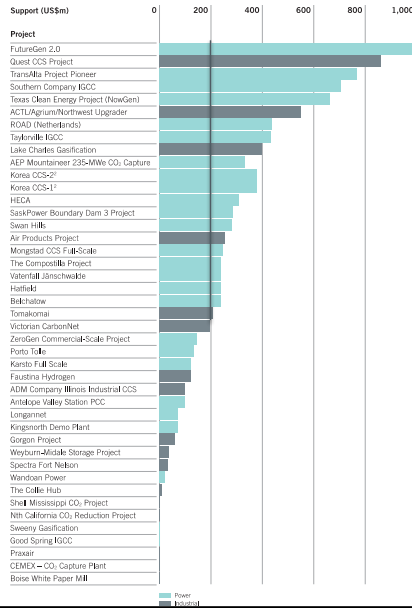
## CCS POLICY FRAMEWORKS GOVERNMENT ACTIONS

- Accelerating innovation and CCS development:
  - demonstrate safe, secure, long term storage of CO<sub>2</sub>
  - understanding and improving large scale CCS
  - increasing R&D
  - sharing lessons learnt
  - developing legal and regulatory frameworks
  - improving public awareness and consultation

### PUBLIC FUNDING SUPPORT COMMITMENTS TO CCS BY COUNTRY - US\$25-40 BILLION

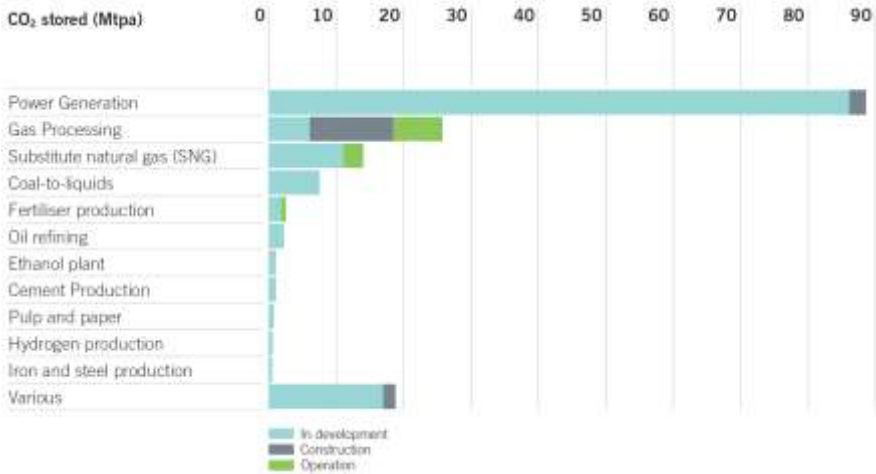


### PUBLIC FUNDING ALLOCATED TO LARGE PROJECTS – US\$12 BILLION COMMITTED



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### LSIPs: POTENTIALLY STORED CO<sub>2</sub> PER ANNUM BY INDUSTRY SECTOR (77 ACTIVE LSIPs)



## INSIGHTS INTO STATUS OF CCS

- In a demonstration phase, not a deployment phase
  - Only one large scale integrated project in construction in power industry
    - Southern Company (Plant Ratcliffe) , Mississippi, USA
    - IGCC with Pre-Combustion Capture
- Global governments at funding allocation stage
  - Competitive process (large number projects competing)
  - Time consuming
- Costing more than estimates made 2-3 years ago
- Demonstration project deployment
  - Possibly ~20 projects operating by 2020 (policy expectation was for operation by 2015)

## INSIGHTS INTO CCS HORIZON

- Demonstration program will take 10-15 years to complete
  - Time is needed for learning outcomes to influence commercial project options
- Governments committed to demonstration program
  - Understand performance / cost, required regulatory frameworks, project management of different parts of CCS chain, primarily in power sector
  - Understand “what it takes” to prove long term safe storage of CO<sub>2</sub>
- Outcomes of demonstration phase drive technologies configuration for commercial deployment

## CCS THREATS & OPPORTUNITIES POLICY FOCUS

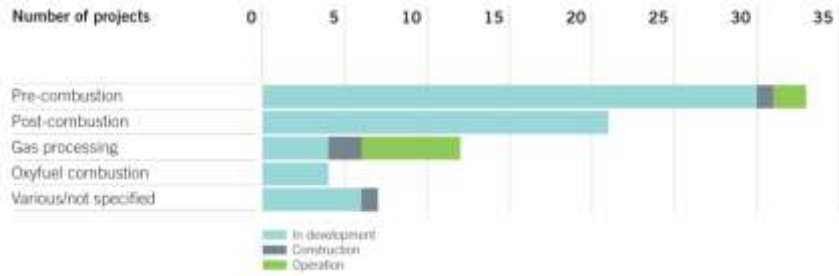
- Level of government funding affects innovation and commercial deployment timing
- Carbon pricing (longer term) in key countries influences private R&D spending and commercial deployment timing
- Mitigation stringency and timing influences cost and rate of deployment
- Environmental policy drivers (SO<sub>x</sub>, NO<sub>x</sub>, RO<sub>x</sub>) can influence power plant technology choice (IGCC, Oxyfuel)
- Window for CCS commercialisation is wide, but it is a competitive low-emissions technology space

## CCS THREATS & OPPORTUNITIES TECHNOLOGY FOCUS

- Deployment cost / risk split
  - Cost is primarily in Capture component
  - Risk is perceived to be stronger in Storage component
  - Achieving Storage certainty is time-intensive
  - Opportunity to pre-invest in Storage certainty to reduce impact on Capture deployment timing (but who takes the pre-investment risk)
- Water requirements for Post Combustion Capture
- Pre-Combustion Capture technology advances
  - Potential for significant cost reduction, improved performance, simplification in power industry deployment
  - Potential to influence choice of power plant technology
- CO<sub>2</sub> monetisation through re-use
  - Regional impacts important rather than global, still limited
  - EOR, bauxite residue carbonation, concrete curing, ECBM, chemicals

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## LSIPs BY CAPTURE TYPE



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