GLOBAL CCS INSTITUTE

GLOBAL STATUS OF CCS:
2014 A WATERSHED PERIOD FOR CCS

CCS International Symposium for Low Carbon Society, Japan Ministry of Environment

Clare Penrose, General Manager Asia Pacific
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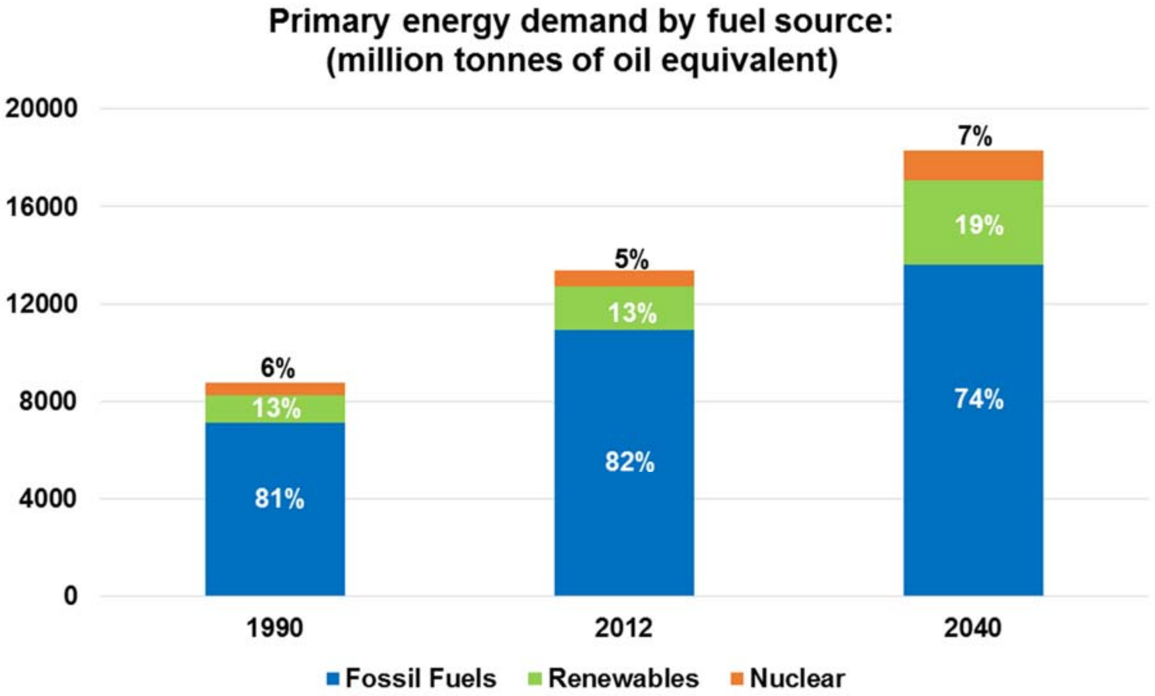
The Global CCS Institute

- We are an international membership organisation.
- Offices in Washington DC, Brussels, Beijing and Tokyo. Headquarters in Melbourne.
- Our diverse international membership consists of:
  - governments,
  - global corporations,
  - small companies,
  - research bodies, and
  - non-government organisations.
- Specialist expertise covers the CCS/CCUS chain.

THE CASE FOR CCS

Fossil fuel demand growing and reserves robust



Fossil fuel proved reserves:

6 trillion barrels of oil equivalent

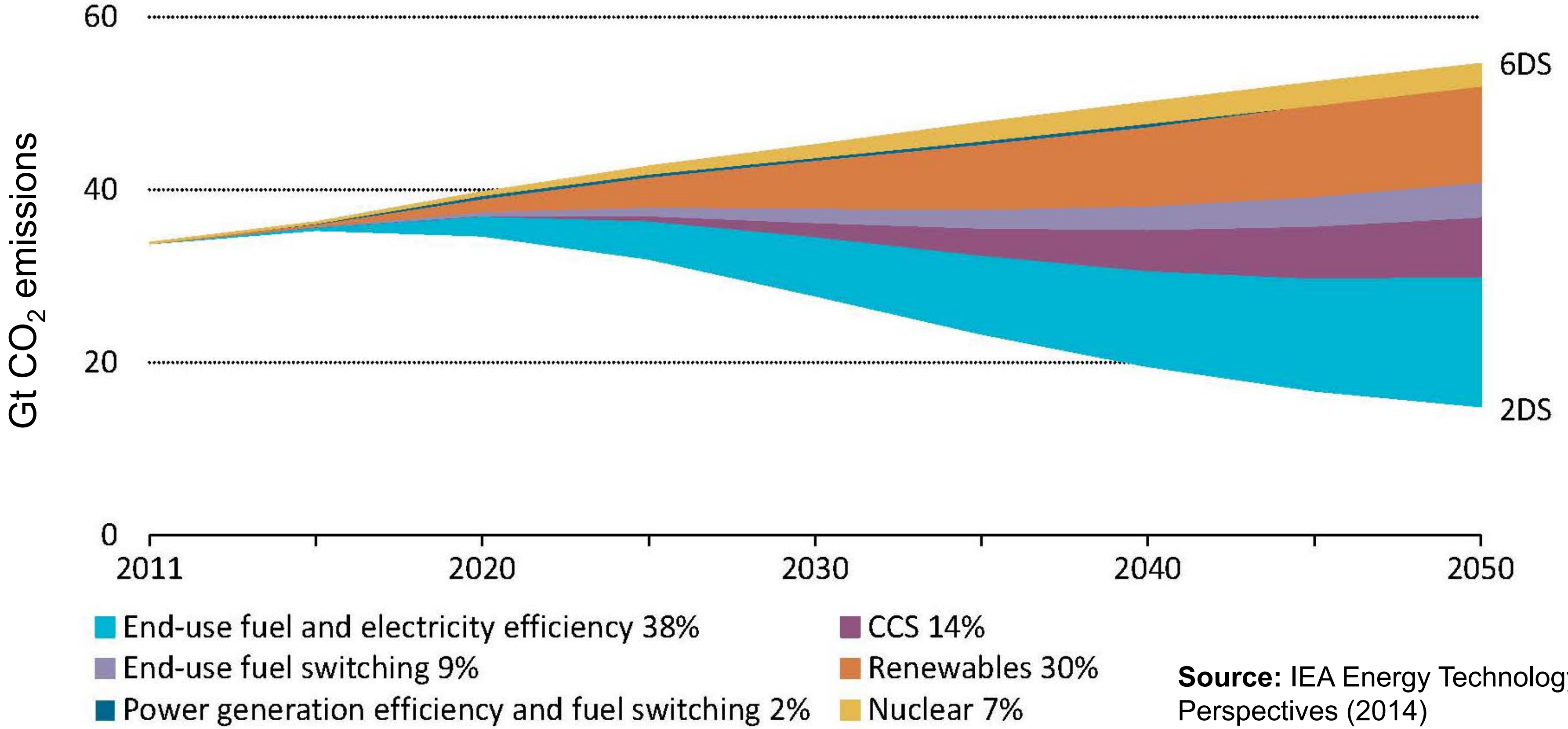
Reserves to production ratio:

~75 years

Source: *IEA World Energy Outlook*, 2014 (New policies scenario)

Source: *BP Statistical Review of World Energy* 2014

CCS is a vital element of a low-carbon energy future

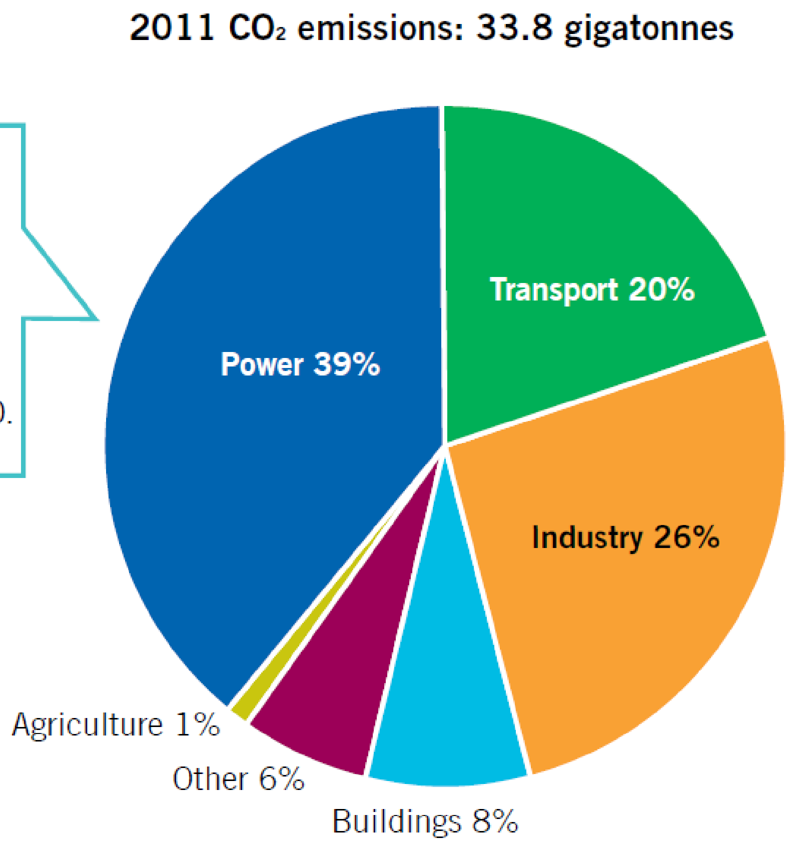


Source: IEA Energy Technology Perspectives (2014)

A transformation in how we generate and use energy is needed

CCS key solution for power sector emissions reductions and is necessary in reducing industrial emissions

CCS should play a key role in curbing CO_2 emissions from fossil-based power generation, potentially reducing the overall cost of power sector decarbonisation by around US$2 trillion by 2050.



CCS is the only option available to reduce direct emissions from industrial processes at the large scale needed in the longer term.

Data source: *IEA Energy Technology Perspectives* (2014)

Mitigation cost increases in scenarios without CCS

Percentage increase in total discounted mitigation costs (2015-2100) relative to default technology assumptions – median estimate

2100 concentrations (ppm CO_2eq)	no CCS	nuclear phase out	limited solar/wind	limited bioenergy
450	138% 4	7% 8	6% 8	64% 8

Symbol legend – fraction of models successful in producing scenarios (numbers indicate number of successful models)

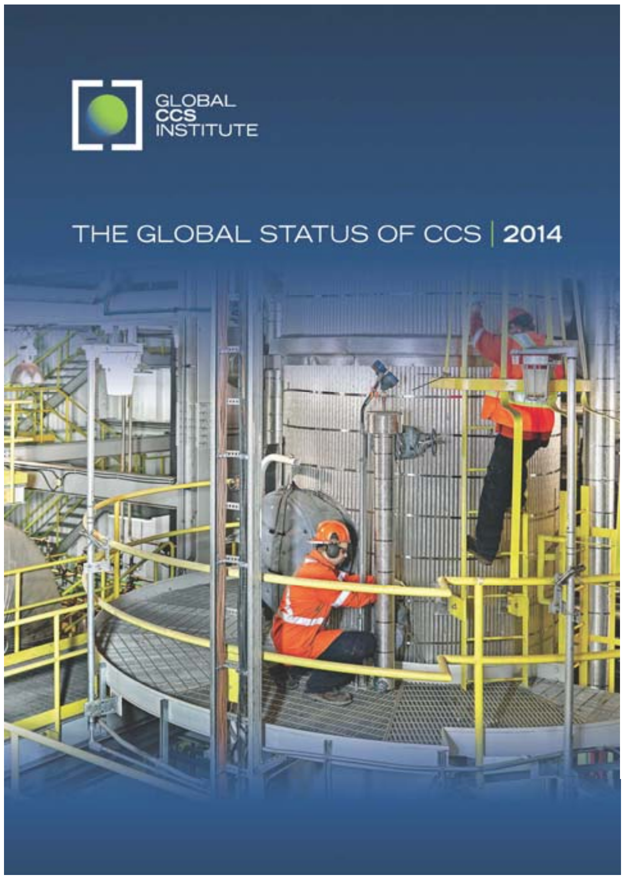
- All models successful
- Between 80 and 100% of models successful
- Between 50 and 80% of models successful
- Less than 50% of models successful

Source: *IPCC Fifth Assessment Synthesis Report, November 2014.*

GLOBAL STATUS OF CCS PROJECTS

The Global Status of CCS: 2014

The *Global Status of CCS: 2014* – Institute annual publication



This year's report:

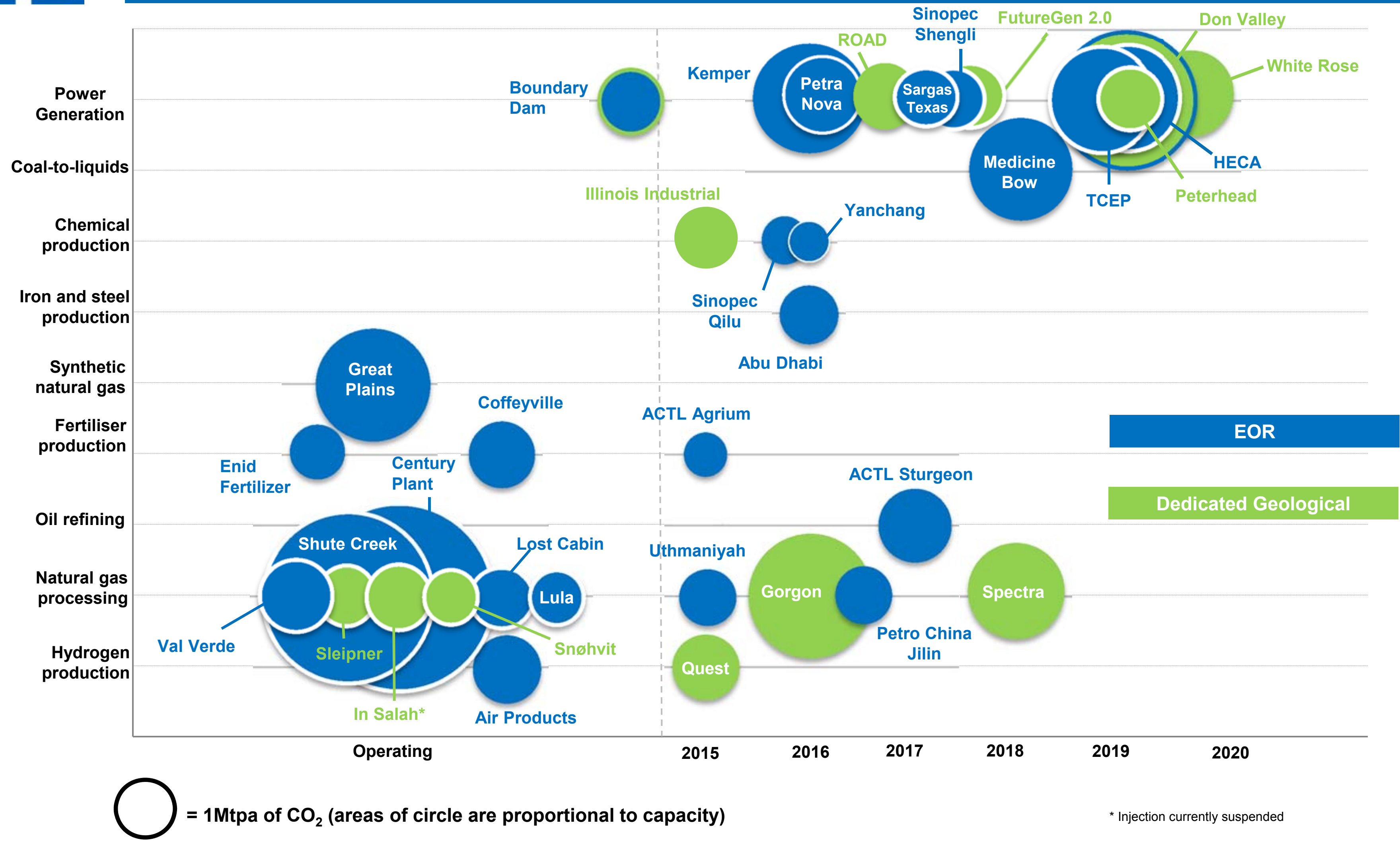
- Provides a comprehensive overview of global and regional developments in large-scale CCS projects, in CCS technologies and in the policy, legal and regulatory environment.
- Introduces and links to project descriptions for around 40 lesser scale 'notable' CCS projects.
- Makes recommendations for decision makers.
- The full report is available online, including supporting resources and data

Large-scale CCS projects by region or country

	Early planning	Advanced planning	Construction	Operation	Total
Americas	5	6	6	10	27
China	7	4	-	-	11
Europe	2	4	-	2	8
Gulf Cooperation Council	-	-	2	-	2
Rest of World	4	-	1	1	6
Total	19	14	9	13	54

North America, China and UK (with 5) have the most projects

Actual and expected operation dates for projects in operation, construction and advanced planning



2014-2015 is a watershed period for CCS – it is a reality in the power sector and additional project approvals are anticipated

Pathway to CCS deployment

New horizons	Realising the portfolio	Widespread deployment
Decisions made at start of decade are now bearing fruit	Ensure conditions are supportive for projects in advanced planning	Decisions and actions required now to lay policy, legal and infrastructure foundations for post-2020 project portfolio
2010 – 2015	**2016 – 2020**	**2020 →**

2014 and 2015 are watershed years for CCS

DEVELOPMENTS IN POLICY, LEGAL AND PUBLIC ENGAGEMENT ACTIVITIES

Global Legal & Regulatory Developments

- Several early-mover jurisdictions have reported that their legal and regulatory models for CCS are complete
  - Recent focus in some of these jurisdictions is on reviewing their models
  - There is a challenge in the absence of project-specific experience, it remains difficult to assess the success or otherwise of legislation.
- There is some progress globally on deploying more CCS legislation, as further jurisdictions seek to introduce models
  - These jurisdictions are focusing on the essential elements for domestic legal and regulatory frameworks;
  - Significant interest in the experiences of regulators in the early-mover jurisdictions.

Global Legal & Regulatory Developments (continued)

- Institute conducts annual survey Large Scale CCS projects views on legal and regulatory developments

- Large scale projects have different views around the world as to whether the current legal and regulatory model in their jurisdiction supports a final investment decision:
  - Pre-existing legal and regulatory frameworks for EOR activities provide some experience, but not complete certainty
  - Other jurisdictions lack complete regulatory models

- The survey once again reveals projects view a number of continuing issues as ‘unaddressed’ in their domestic legal and regulatory models. Unaddressed issues include:
  - Standards to account for the transboundary movement of CO_2;
  - Issues associated with long-term liability and financial security.

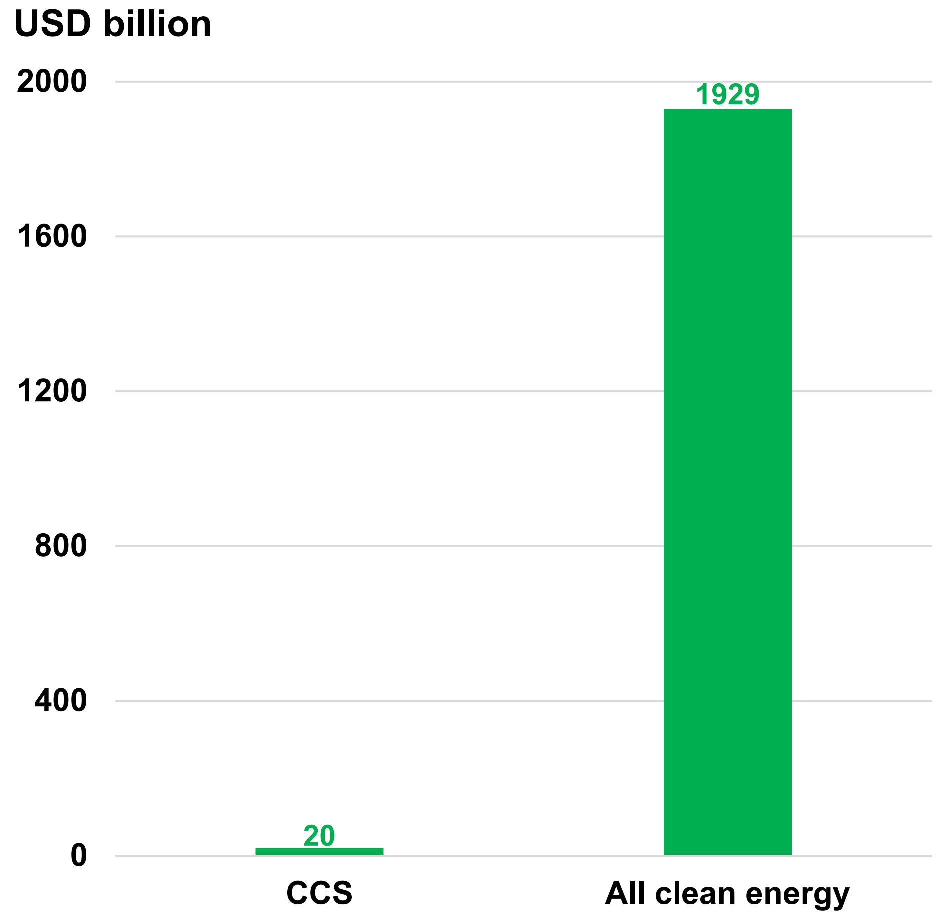
Policy developments

- Supportive policies are gaining momentum
- USA: emissions standards for generators, substantial government funding programs
- UK: CCS £1billion competition, Contract for Difference; emissions standards for coal generators
- Europe: reviewing ETS/ carbon pricing, including extension of NER300 funding for low emissions projects
- China: peak emissions before 2030; joint CCS project with US; national emissions trading to commence from 2016
- UN: pledges to Green Climate Fund surpass $10 billion
- Expect announcements from other countries, e.g. revised national mitigation targets, in the lead up to Paris COP21

Strong policy drives investment

- Scale of renewables investment is instructive
- CCS has not enjoyed commensurate policy support
- EOR has provided impetus in North America
- Policy parity is essential
- How do we get CCS onto a similar curve?

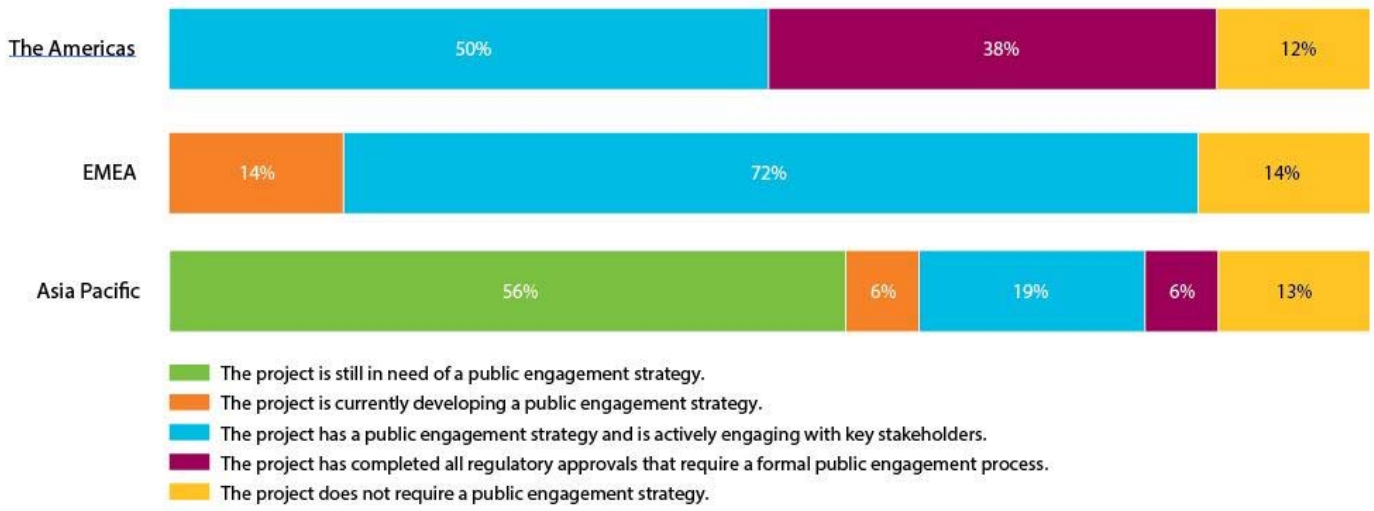
Clean energy investment between 2004-2013



Data source: Bloomberg New Energy Finance as shown in IEA presentation "*Carbon Capture and Storage: Perspectives from the International Energy Agency*", presented at National CCS week in Australia, September 2014.

Status of public awareness

Status of public engagement strategy development by region



"Communication is critical to any CCS project. Even where CCS awareness is high, many CCS projects - successful and failed - have received negative attention. Strategic outreach and engagement is necessary for ensuring CCS projects have support."

Petroleum Technology Research Centre (PTRC), 2014. *Aquistore - CO2 Storage at the World's First Integrated CCS Project,* Pg. 113.

Recommendations for decision makers

- Strong, sustainable emission reduction policies that give investors confidence to invest in CCS are needed for longer-term deployment. These policies must be technology neutral.

- Programs that encourage the exploration of significant storage resources are needed to give storage certainty and support timely deployment.

- Substantial emissions reductions are required in non-OECD countries - focused effort is required to increase project activity in these economies.

- CCS is the only technology that can achieve large reductions in CO_2 emissions from industries such as iron and steel and cement. Urgent attention must be given to policies that incentivise deployment of CCS in such industries.

Call to action for 2015

It is time to move the agenda forward:

- CCS in the power sector is now a reality
- We now have 50% more projects than at the start of the decade
- Next generation CCS needs decisions now
- We must all take today’s messages and promote CCS
- Challenge is not technology – it is policy and support
- CCS community must build on recent successes

OUR CALL TO ACTION IS TO
ACCELERATE CCS AROUND THE WORLD

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