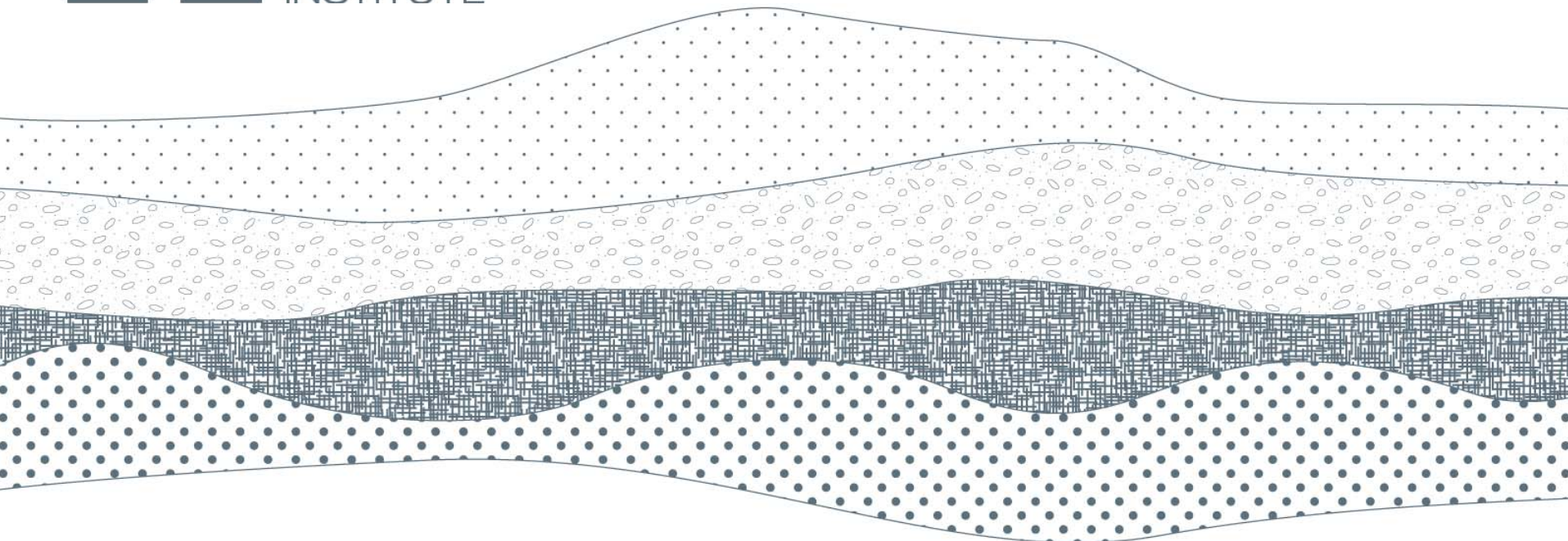




GLOBAL
CCS
INSTITUTE



Nick Welch

North America Representative

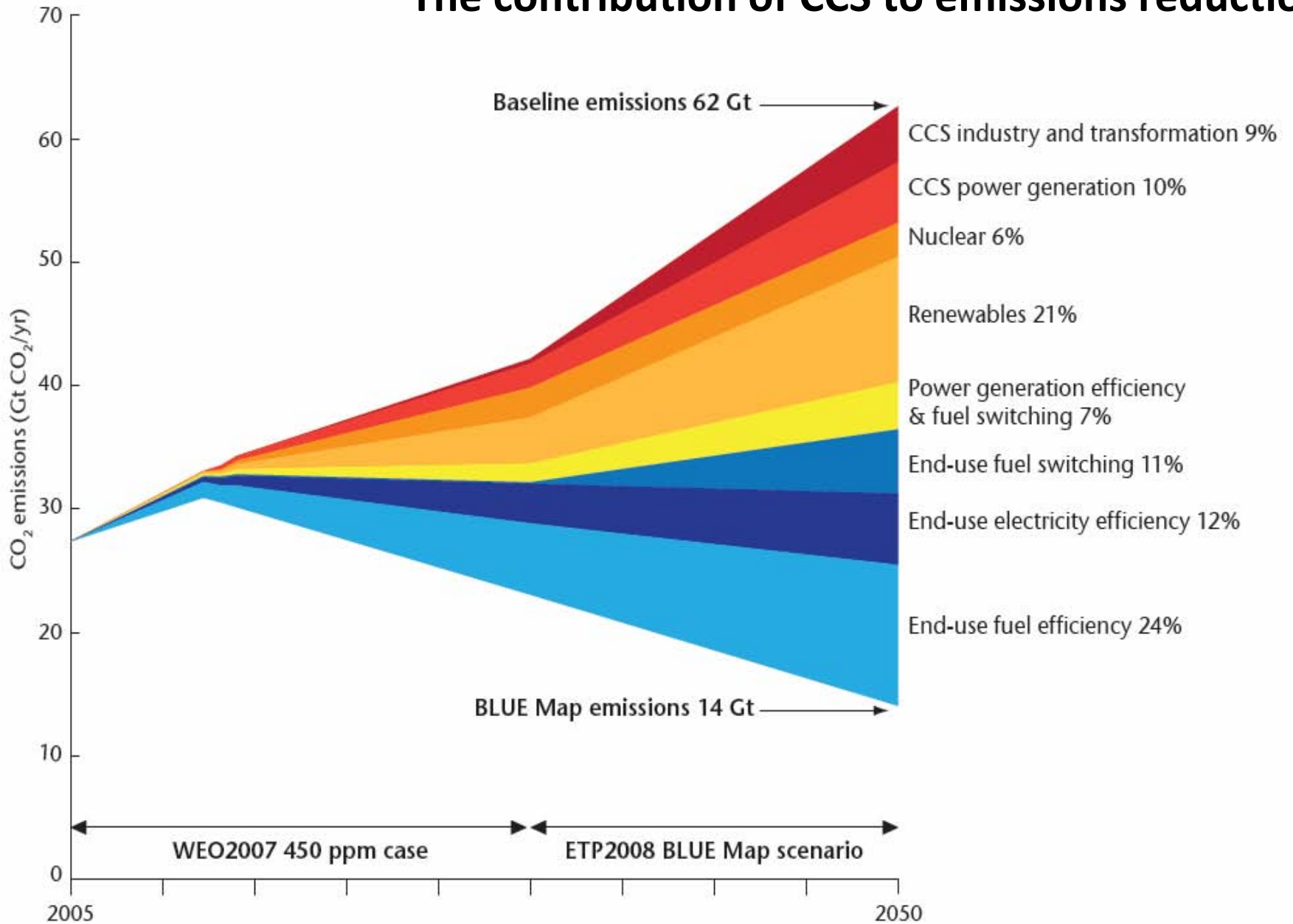
Global CCS Institute

EPRI 2010 Global Climate Change Research Seminar 18th May 2010

Overcoming Barriers to Deployment of CCS

WWW.GLOBALCCSINSTITUTE.COM

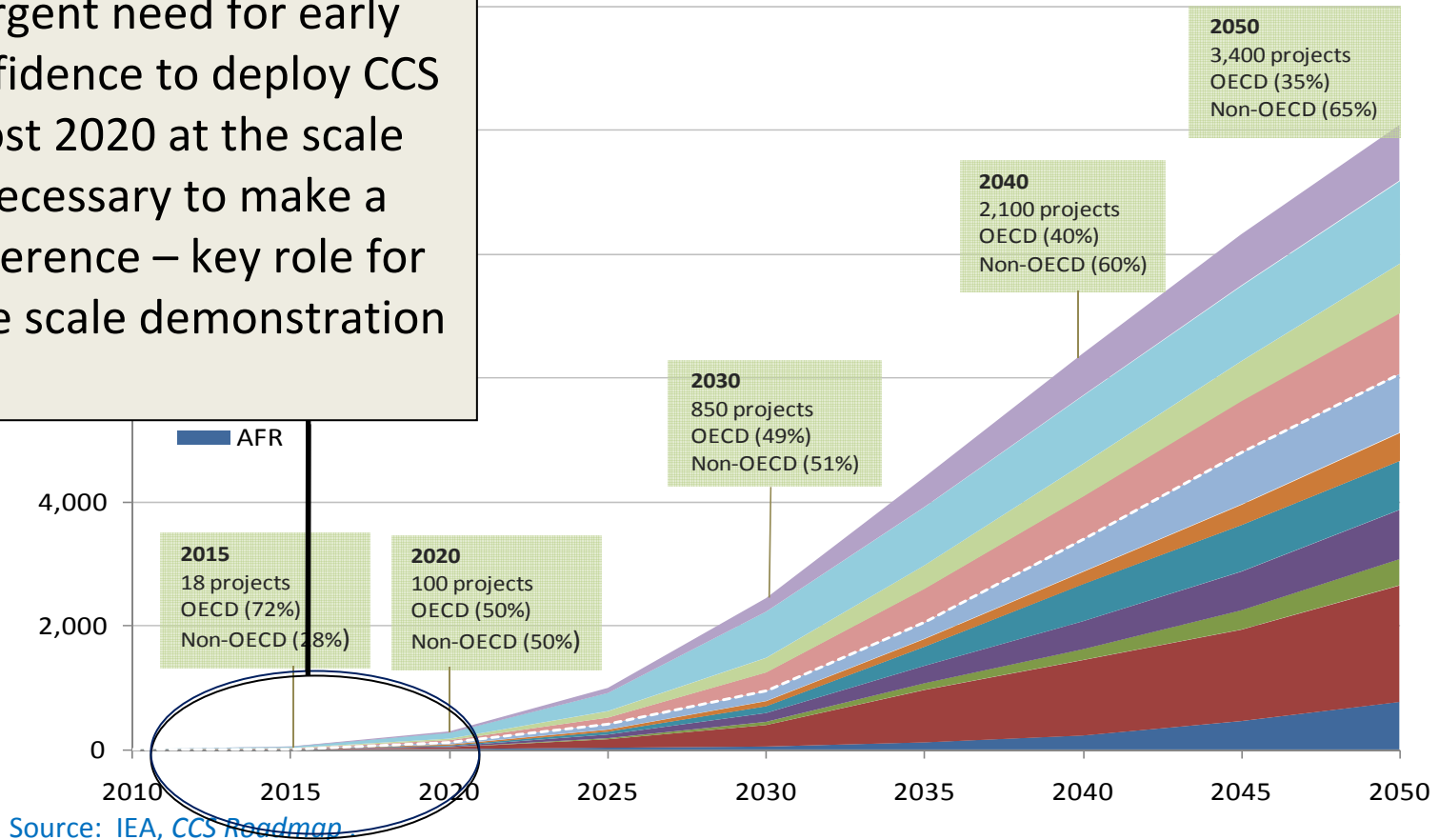
The contribution of CCS to emissions reduction



CCS: A Roadmap to 2050

Urgent need for early confidence to deploy CCS post 2020 at the scale necessary to make a difference – key role for large scale demonstration

Captured C

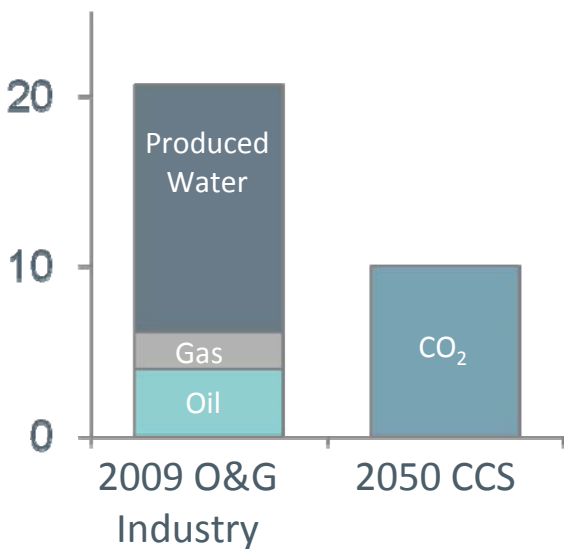


Required developments to make CCS a reality

Infrastructure and technology

... to handle 2050 flowrates equal to half of current oil industry flowrates

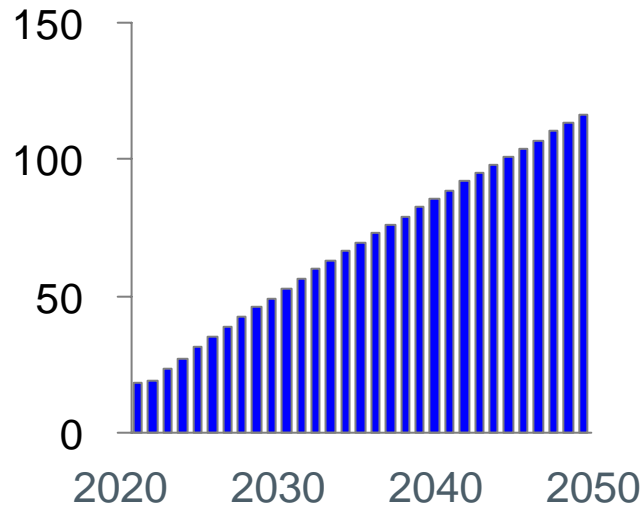
Flowrate (Gt/yr)



Funding and financing

... to cover the US\$2-3 trillion of additional capex

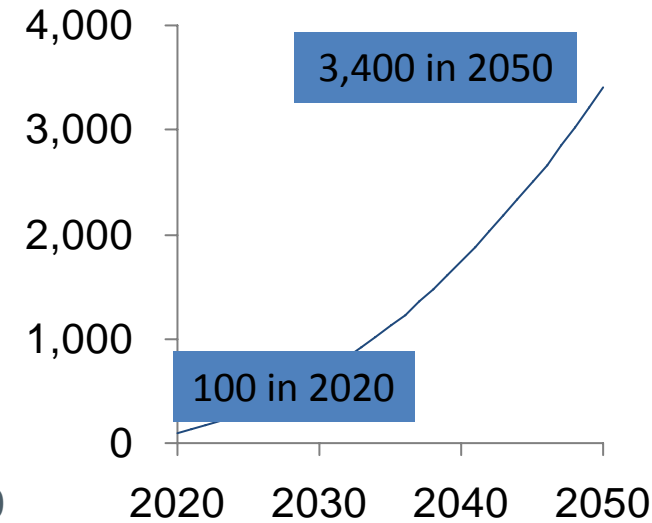
US\$billion invested pa



Capacity and knowledge

... to deliver average 110 full-scale projects pa

Projects



Notes: O&G industry mass flowrates: $(0.25\text{Tbpd}_{\text{water}} * 160 * 365) + 3928.8 \text{ Mto} + (3065.6 \text{ bcm gas}) * 0.7\text{kg/t} = 20.6\text{Gt/yr}$; Learning rate of 8%
 Source: BP; Strategic Analysis of the Global Status of CCS; GlobalData "Global Oil and Gas Capital Expenditure Outlook"; IEA; "Global Onshore and Offshore Water Production"

Global CCS Institute Strategic Framework

OVERARCHING OBJECTIVE

“To accelerate the broad deployment of commercial CCS”

Regional Profiles and Global Services

ENABLING STRATEGIES

Policy/Regulatory

Financial/Commercial

Public Awareness

Technical

Capacity Building

PROJECTS STRATEGY

Strategic Analysis of Projects

Project Support Program

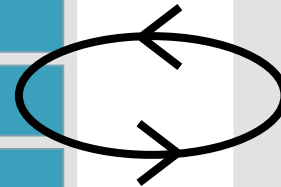
Thematic Focus Groups

Knowledge Sharing

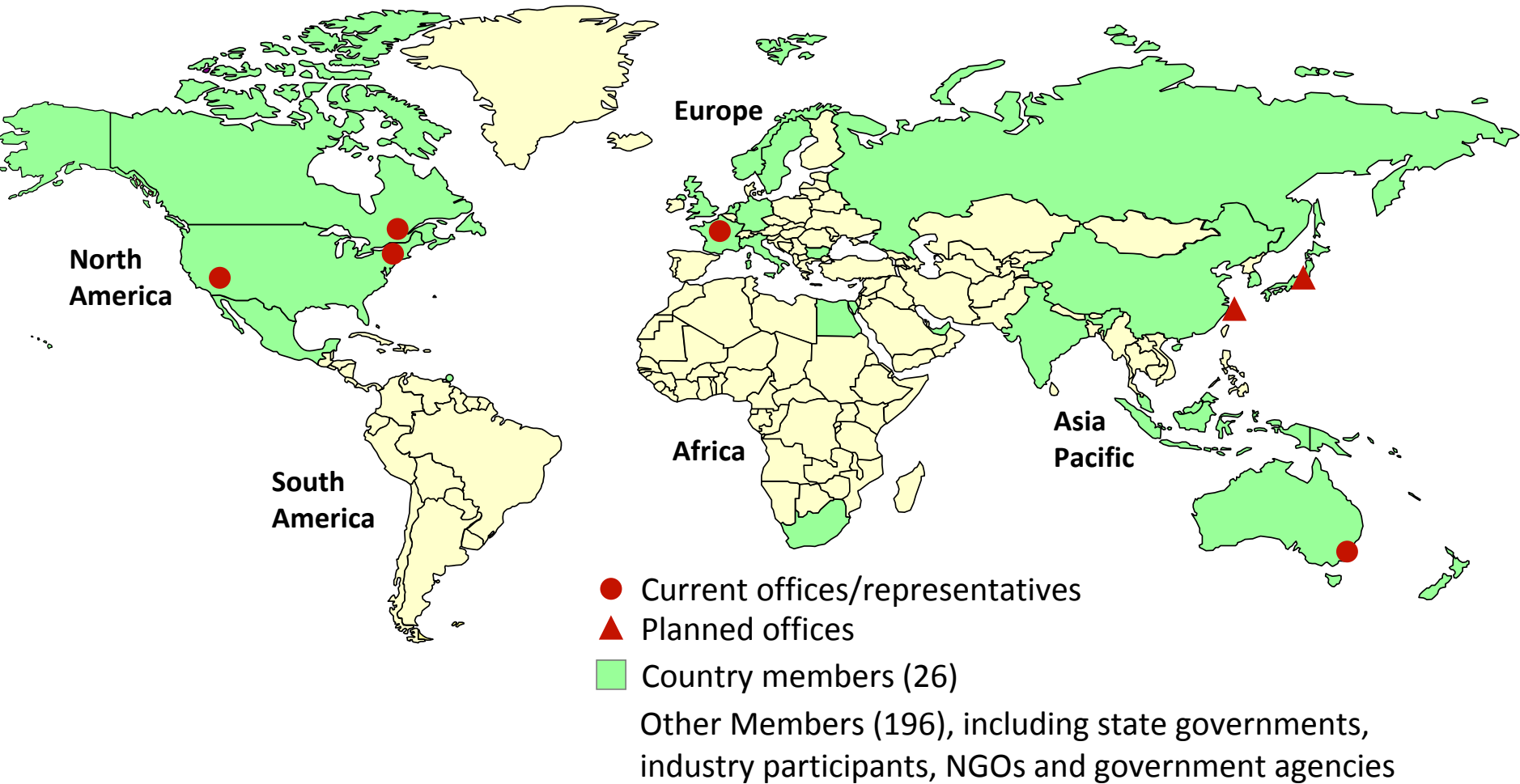
MEMBERS

Services Model

Member Charter



The Institute's membership and presence



Projects Strategy composed of three elements

1

Strategic Analysis of Projects

- Maintain a comprehensive, global view of project progress and challenges

2

Project Support Program

- Directly support member activities which address key project barriers

3

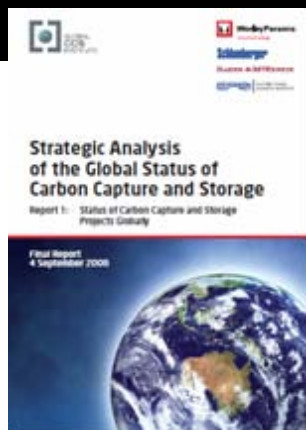
Thematic Focus Groups

- Facilitate knowledge sharing between project proponents in order to promote best practice

Two core workstreams for Strategic Analysis of Projects

Projects Database and Analysis

- Maintain comprehensive, accessible database which tracks status of all CCS projects
- Develop annual 'report card' on advancement of CCS projects
- Analyse and report on project barriers and drivers

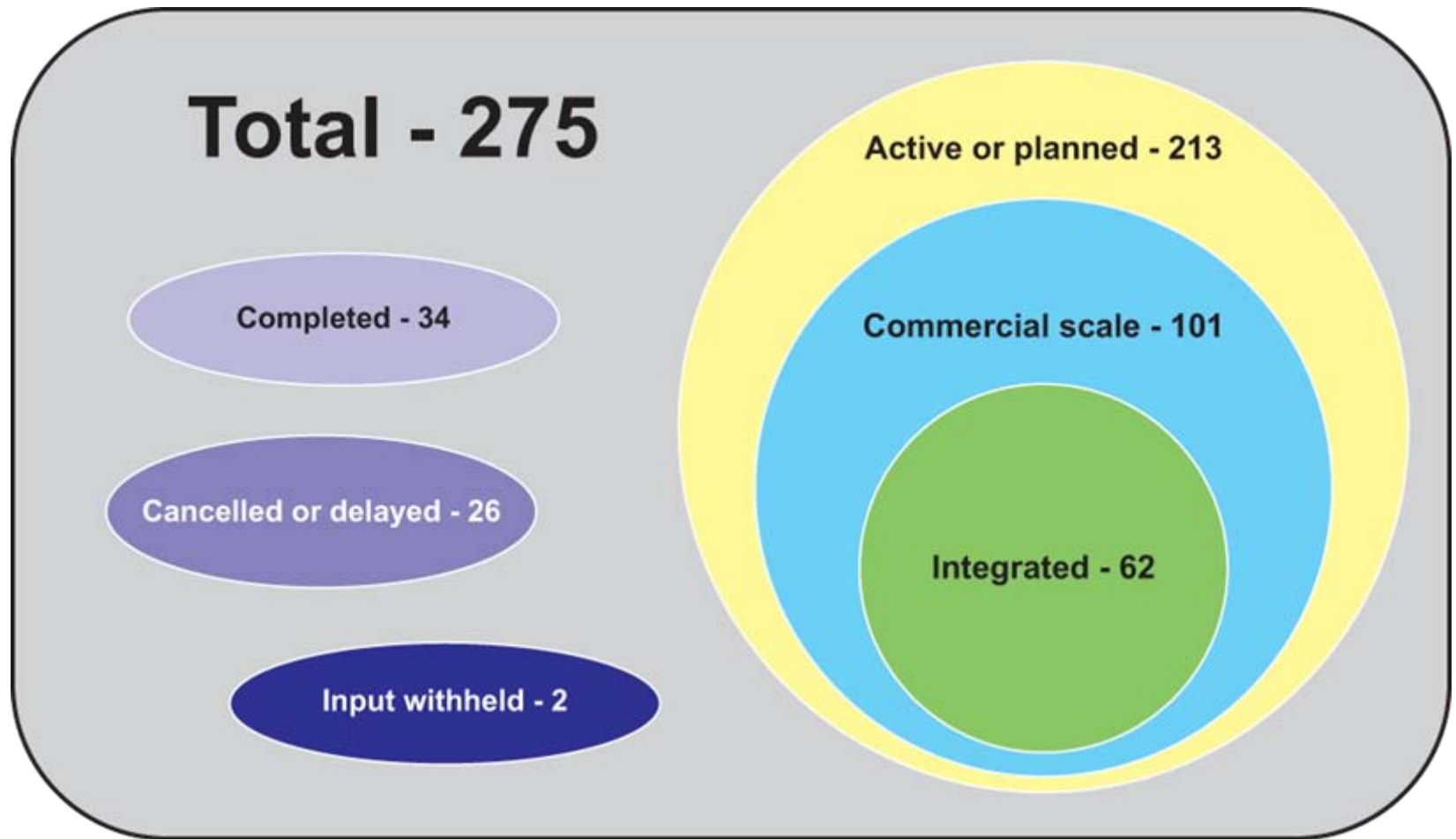


Ideal Portfolio

- Keep view of comprehensive portfolio with range of projects necessary to prove broad CCS deployment
 - across geographies, technologies, industries
- Compare Ideal Portfolio and Projects Database to identify gaps in project deployment



STATUS OF CCS PROJECTS WORLDWIDE



Prepared for the Global CCS Institute by WorleyParsons

62 commercial scale integrated projects

Ideal Portfolio of CCS projects

	Industry and Capture	Transport	Storage
26 projects overall	Power Generation Pre-combustion 4 Oxy-combustion 6 Post-combustion 7 Iron & Steel 3 Cement 3 Other Industries 3	Point to point pipeline onshore 1 Point to point pipeline offshore 1 Backbone pipeline – cluster 1 Long distance ship – port-to-offshore site or port-to-port 1 Cross-border pipeline 1	Structured deep saline aquifers 1 Unstructured deep saline aquifers 1 Depleted oil field 1 Depleted gas field 1 Oil field for EOR 1 Gas field for EGR 1
		Including 5 solutions	Including 6 configurations
	Minimum of 26 projects	+ Diversification principles to populate projects beyond this number	

Different combinations needed for confidence

CCS Project Strategy: focus of funding and resources

Project Lifecycle

Project Generation
and Feasibility

Examples of Targeted Funding activities

- Fund pre-feasibility or feasibility studies
- Fund contractors to add capability or capacity

**Early stage and
new projects**

Local Support

- Fund the collection of safety data
- Fund bespoke benchmarking or similar studies to provide objective fact base for public / government advocacy

**Advanced
projects**

FEED

- Fund specific elements within FEED projects
- Fund of specialist contractors

Large Scale Financing

Construction and Operation

Key:



Global CCS Institute focus



Out of scope

CCS project support: initial tranche response

- Over 50 applications for support
- Targeting specific barriers on specific projects
- Initial concepts and new projects
- Approximately 500m A\$ requested over next 5+ years
- Budget level ~50mA\$/year for 3 years
- Rolling call process for proposals

Project support strategy will address an urgent need

Four preliminary Focus Group themes identified for member feedback

Stakeholder Engagement

- Current thinking and new approaches to practically address stakeholder engagement at the project level

Storage – MMV

- Cost effective and practical approaches to give certainty of permanent and safe storage

Technology Scale-up

- Challenges in scaling up capture equipment to commercial levels

The Hub Concept

- Common challenges and potential solutions for the development of CCS Hubs

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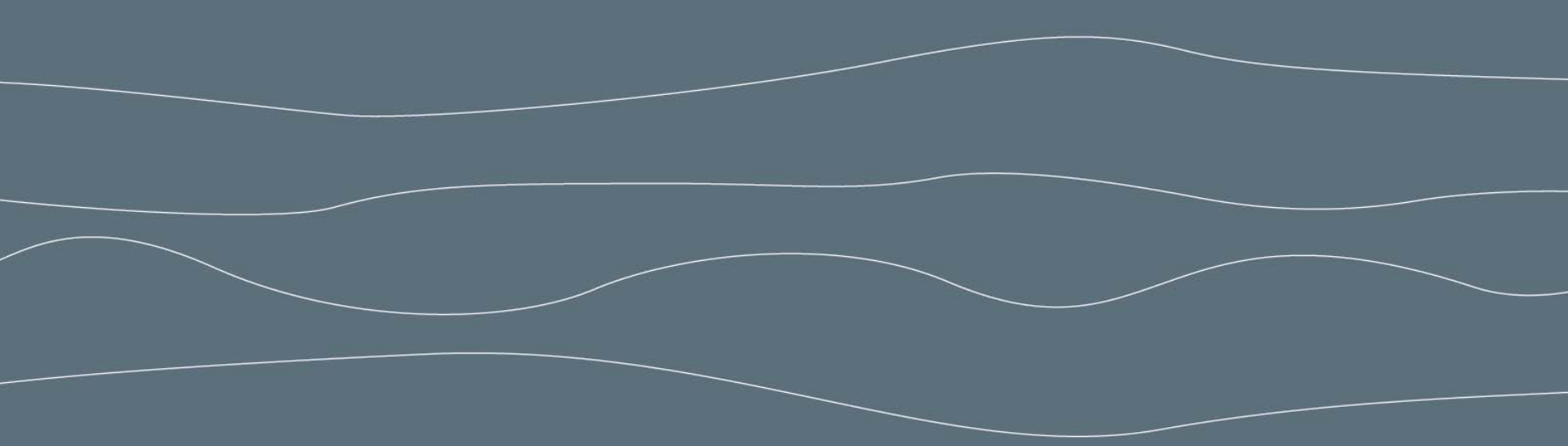
Uncertainty on the most effective funding models

Range of mechanisms in place for early projects

Jurisdiction	Program	Funding model	
 Alberta	Alberta CCS Fund	Capital Grant	Opex subsidy
 Australia	CCS Flagships	N/A (to be negotiated)	
 EU	European Energy Program for Recovery	Capital Grant	Sequestration payment
 Norway	Gassnova	Govt Equity	
 UK	CCS Demonstration Competition	Capital Grant	CFD
 USA	Clean Coal Power Initiative Round Three	Capital Grant	Opex subsidy

A range of work is ongoing globally around financial issues

Organisation type	Organisation (e.g.)	Activity description
Intergovernmental organisation	IEA, CSLF	Issues identification through workshops
MDB	World Bank	(Proposed) Financial options development
Industry body	World Coal Institute	Issues identification through workshops
	ZEP	Funding structure recommendations
NGO	The Climate Group	Issues identification through structured interviews
	Clinton Climate Initiative	Financial structure development for specific projects
Research organisation	IEA GHG	Evidence provision for CDM discussion
	Universities, CO2CRC	Research on various cost/financing aspects
Private company	New Energy Finance	Green energy funds database compilation
	Consulting Firms	Cost and economic reports development



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