GLOBAL CCS INSTITUTE

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CCS Progress – Demonstration Projects – State of play

Trondheim, 15 June 2011

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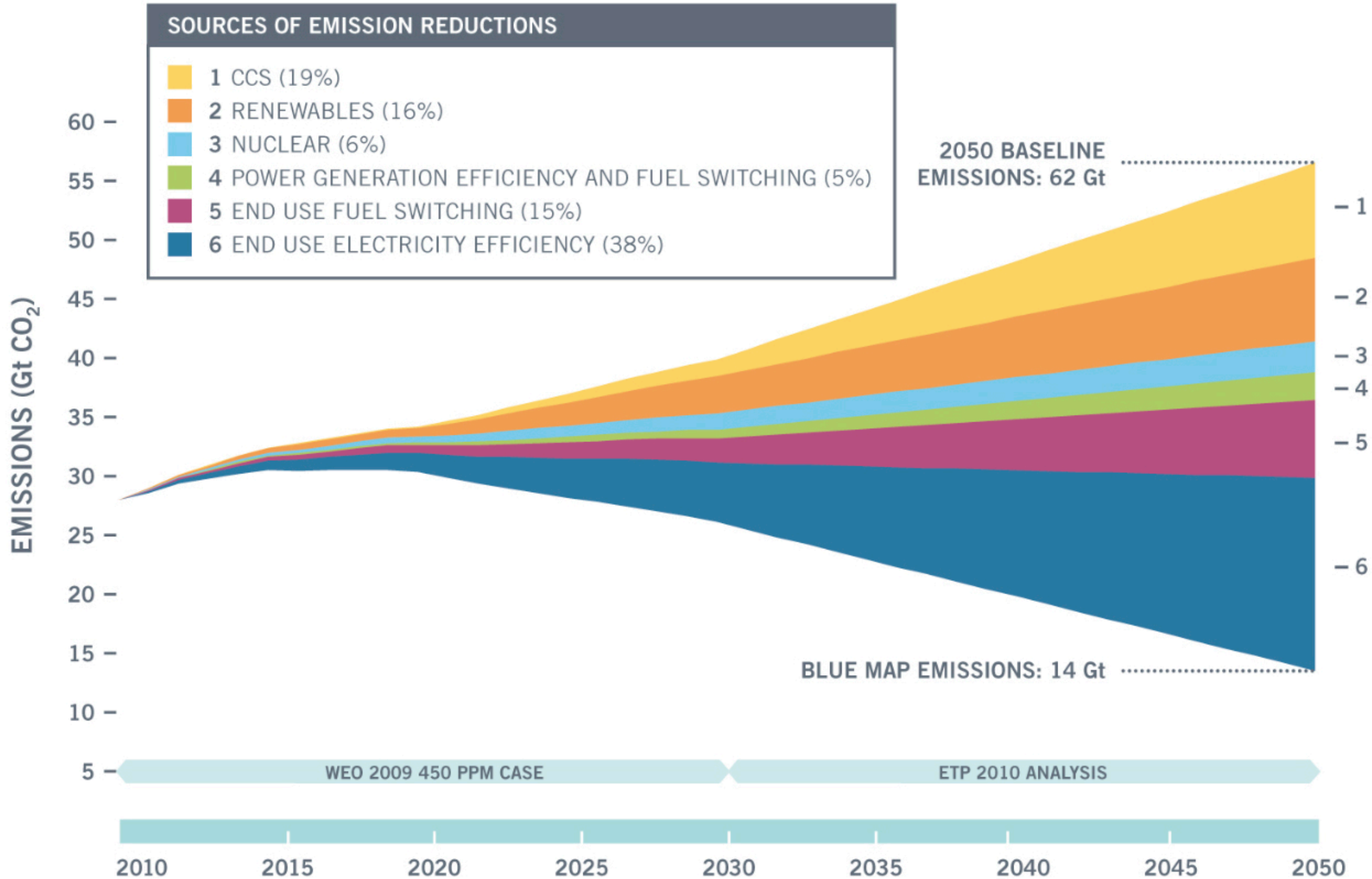
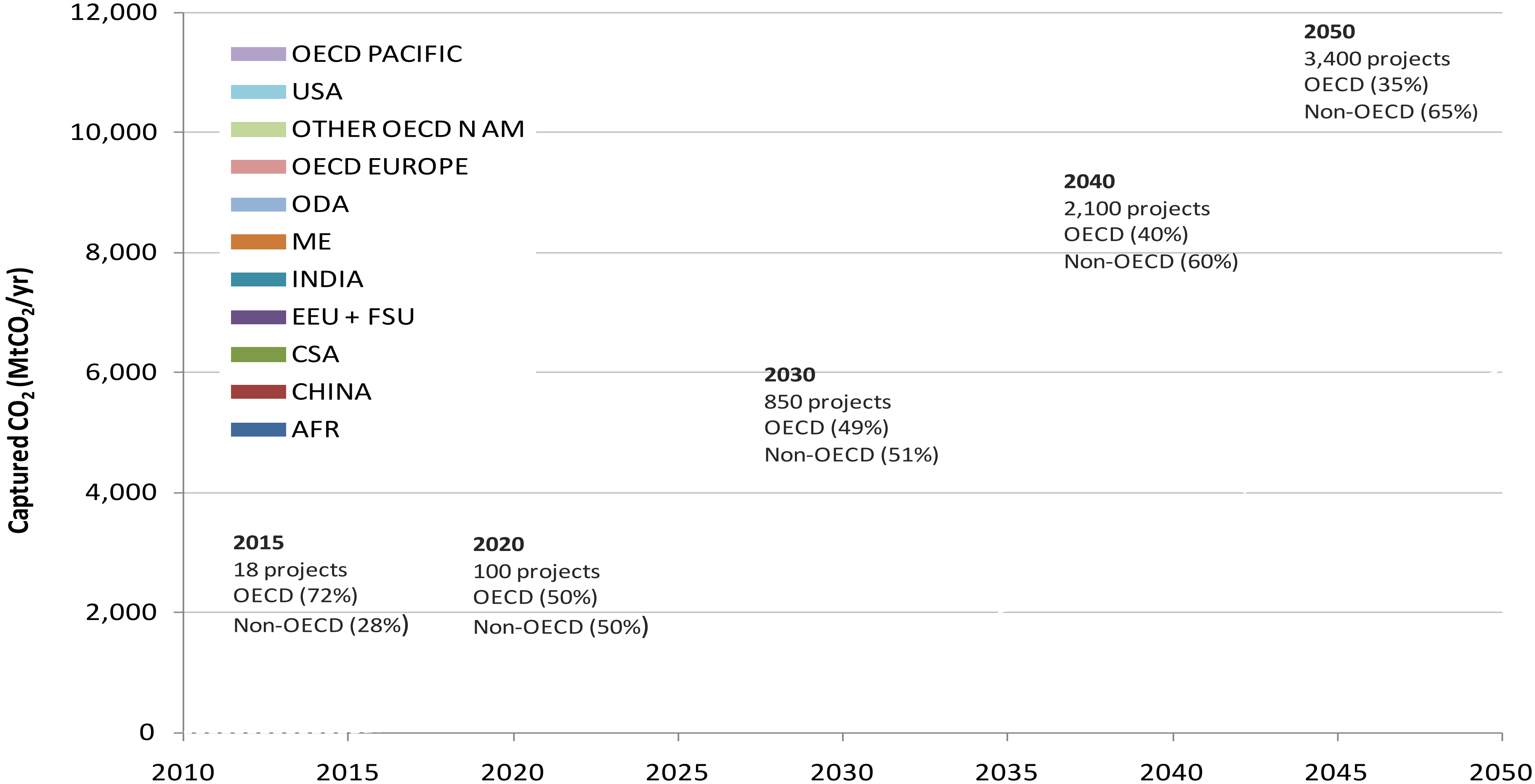
THE IEA BLUE MAP – CCS PROVIDES ~20% CO_2 MITIGATION BY 2050



Source: IEA Energy Technology Perspectives (2010) Scenarios and Strategies to 2050.

ACCELERATING PROJECT DEVELOPMENT

An IEA view - Based on CCS Roadmap



GLOBAL CCS INSTITUTE

To accelerate the development and deployment of CCS globally

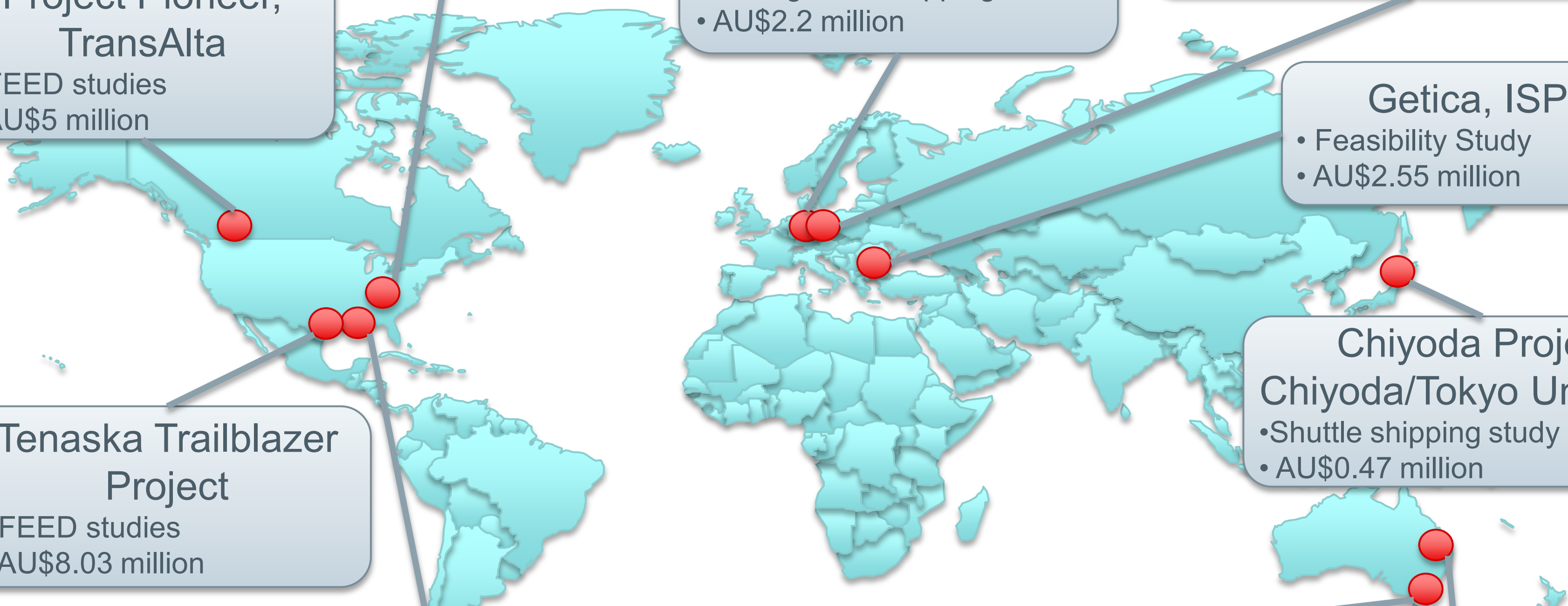
so that CCS plays a significant role in reducing GHG emissions

1. **ASSISTING PROJECTS**
   - Bridging between demonstration efforts
   - Developing project-specific solutions for early movers

2. **SHARING KNOWLEDGE**
   - Sharing real experiences, filling knowledge gaps and building capabilities

3. **FACT-BASED ADVOCACY**
   - Increasing awareness of CCS
   - Informing and influencing policy
   - Advancing financing solutions and risk regimes

INSTITUTE SUPPORTED PROJECTS



American Electric Power, Mountaineer
- FEED studies
- AU$4 million

Rotterdam CCS Network Project, RCI
- Storage and shipping studies
- AU$2.2 million

ROAD Project, Maasvlakte CCS
- FEED studies & execution planning
- AU$5 million

Project Pioneer, TransAlta
- FEED studies
- AU$5 million

Getica, ISPE
- Feasibility Study
- AU$2.55 million

Chiyoda Project, Chiyoda/Tokyo University
- Shuttle shipping study
- AU$0.47 million

Tenaska Trailblazer Project
- FEED studies
- AU$8.03 million

Tenaska/Entergy Nelson 6 CCS Project
- Development studies
- AU$825,600 (Phase 1)

CarbonNet, Victorian Government
- Commercial and Planning studies
- AU$2.3 million

Callide Oxyfuel Project, OPTL*
- Transport and CO_2 injection studies
- AU$1.83 million

* Letter of Intent

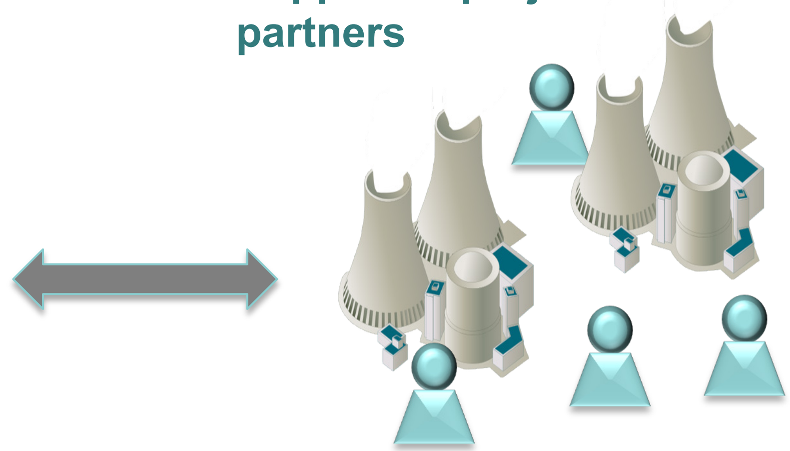
4 in North America, 3 in Europe, 2 in Australia, 1 in Japan. Commitment from the Institute ~ AU$32.2 million

ASSISTING PROJECTS - BENEFITS

In addition to reports and case studies, the agreements with Projects will also include:

- participation in technical panels and workshops;
- key Project personnel available for interviews; and
- involvement on the Institute's digital platform.

Supported projects and partners



Benefits come from knowledge and learning from and into Australia

RECENTLY RELEASED PRODUCTS

A review of existing best practice manuals for carbon dioxide storage and regulation (April 2011)

Accelerating the uptake of CCS: Industrial use of captured carbon dioxide (April 2011)

Tenaska Trailblazer reports (April 2011):

- Deep saline sequestration study;
- Steam turbine configuration and sizing report;
- Carbon Capture Plant Layout Optimization;
- CO_2 technology selection process;

Communication and Engagement Toolkit for CCS Projects (March 2011)

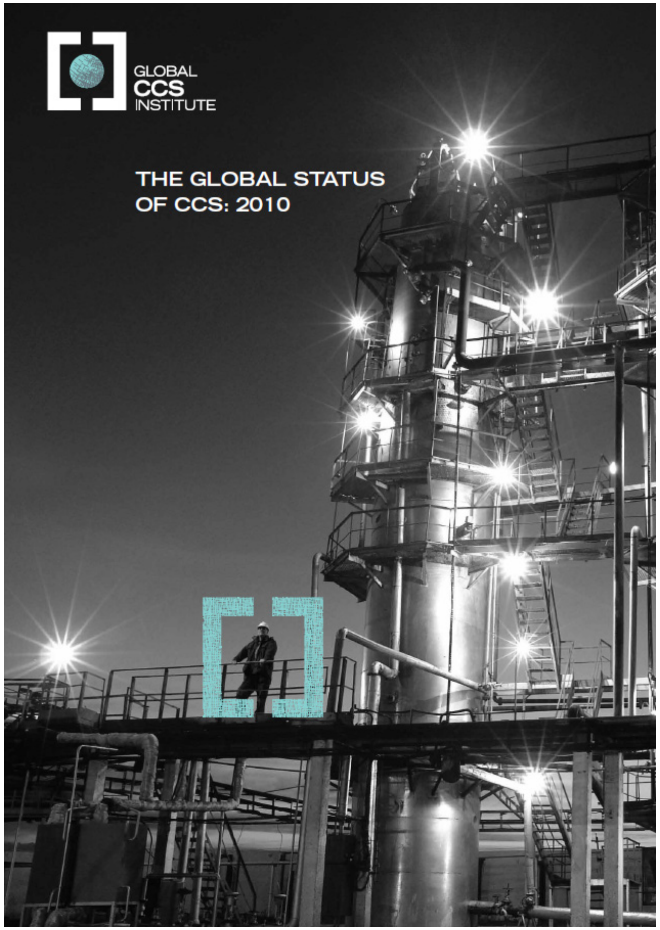
Economic Assessment of Carbon Capture and Storage Technologies: 2011 Update (March 2011)

CCS Regulatory Test Toolkit (February 2011):

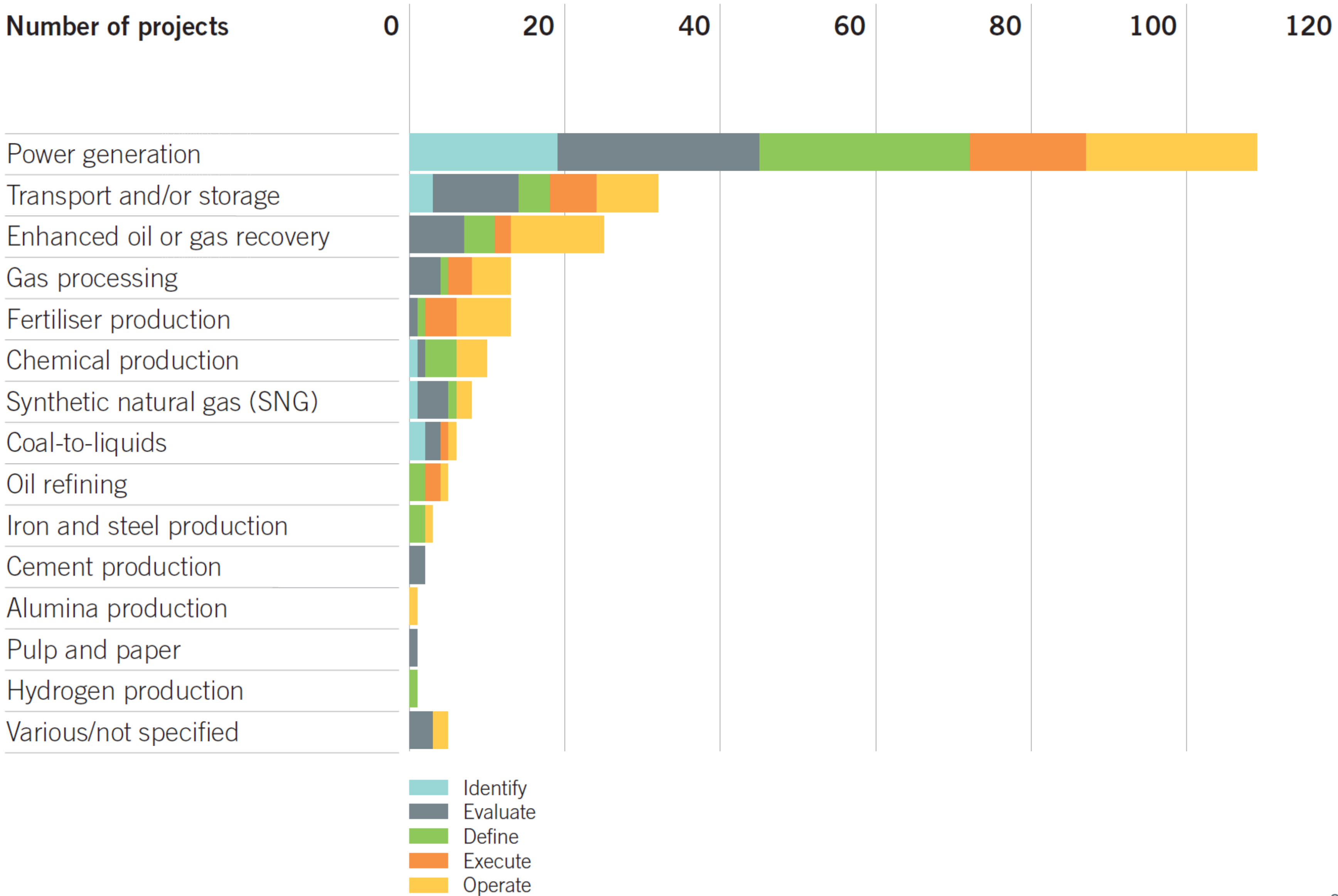
All reports supported or authored by the Global CCS Institute.

GLOBAL STATUS OF CCS – 2010 REPORT

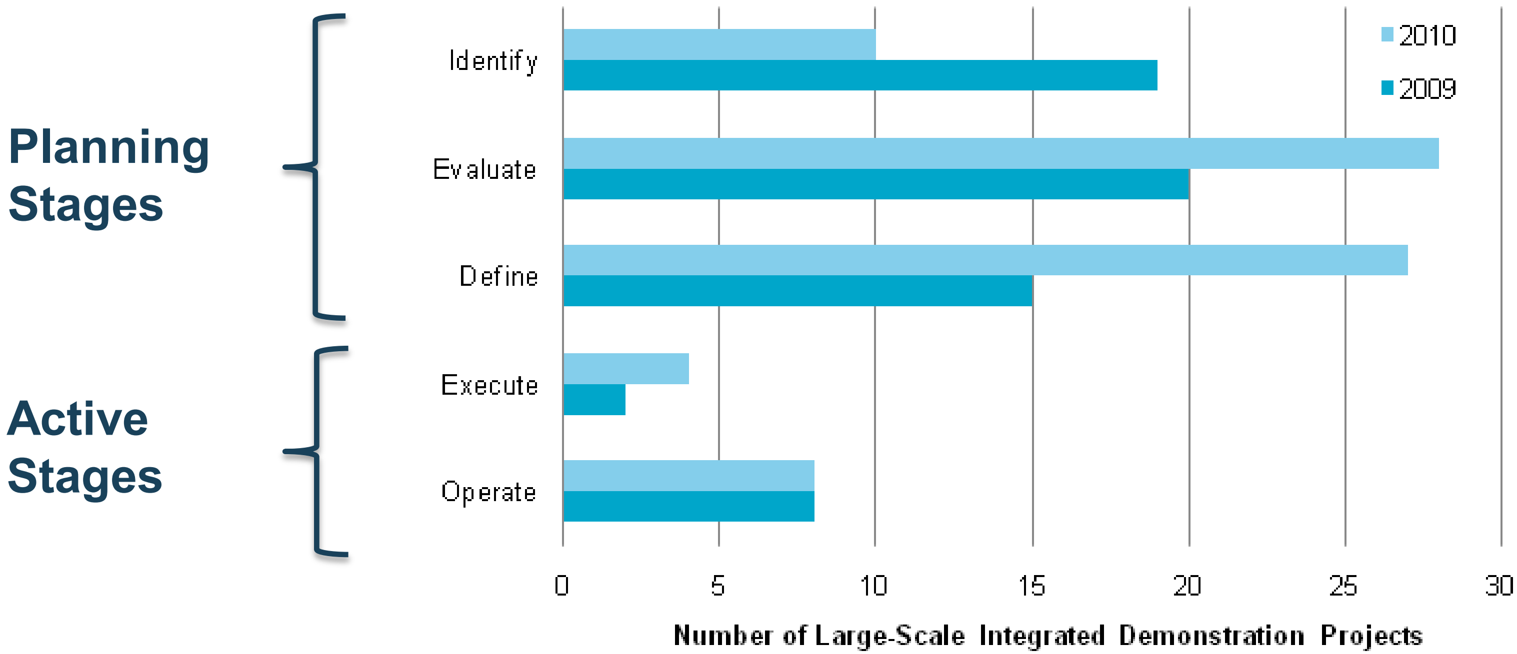
- Government Funding
- CCS Projects
- CO_2 Storage
- CO_2 Networks
- Legal and Regulatory Developments
- CCS Costs
- Knowledge Sharing Initiatives
- Public Engagement



234 ACTIVE PROJECTS: BY SECTOR, STAGE

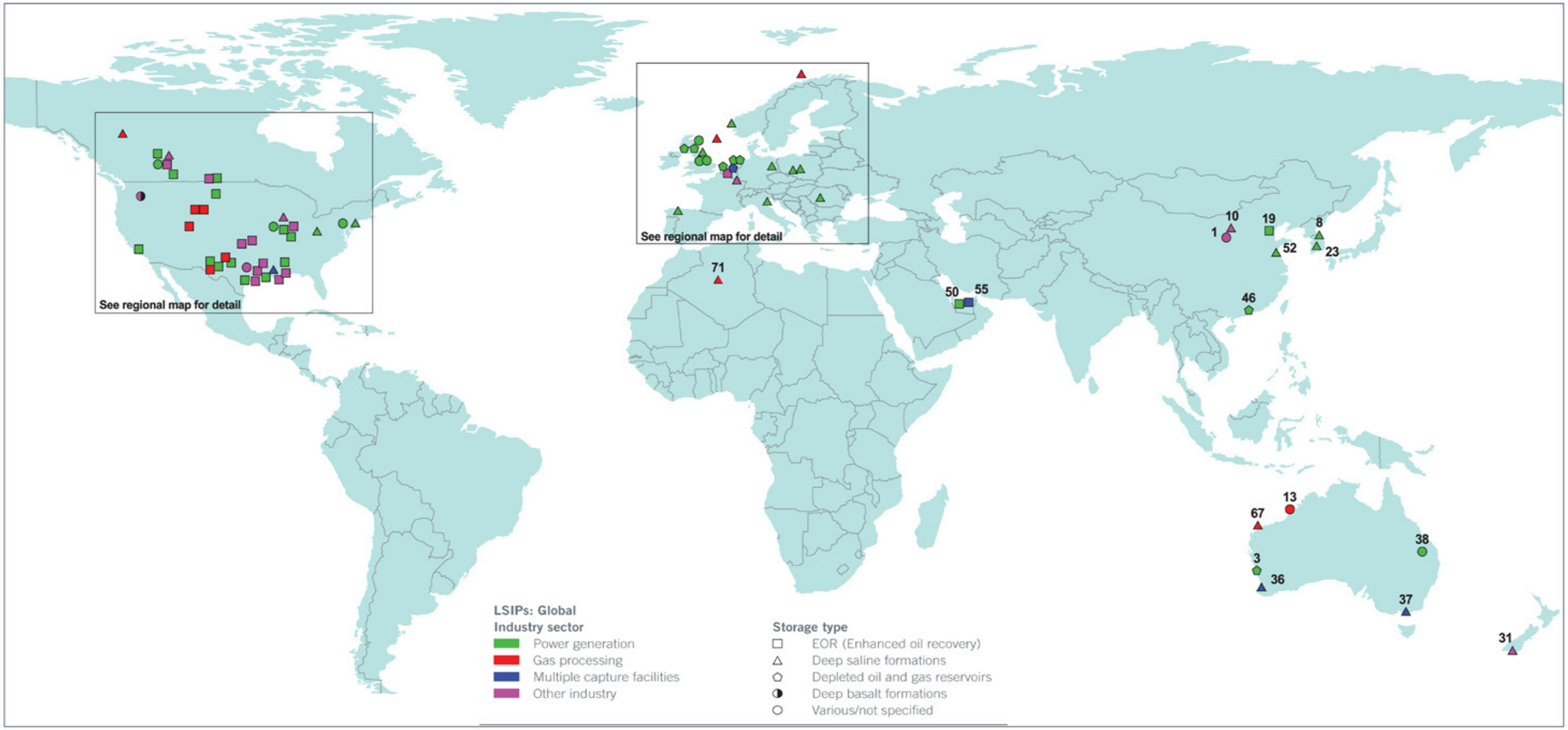


CHALLENGES FOR CCS – PLANS BUT FEW ACTIVE PROJECTS

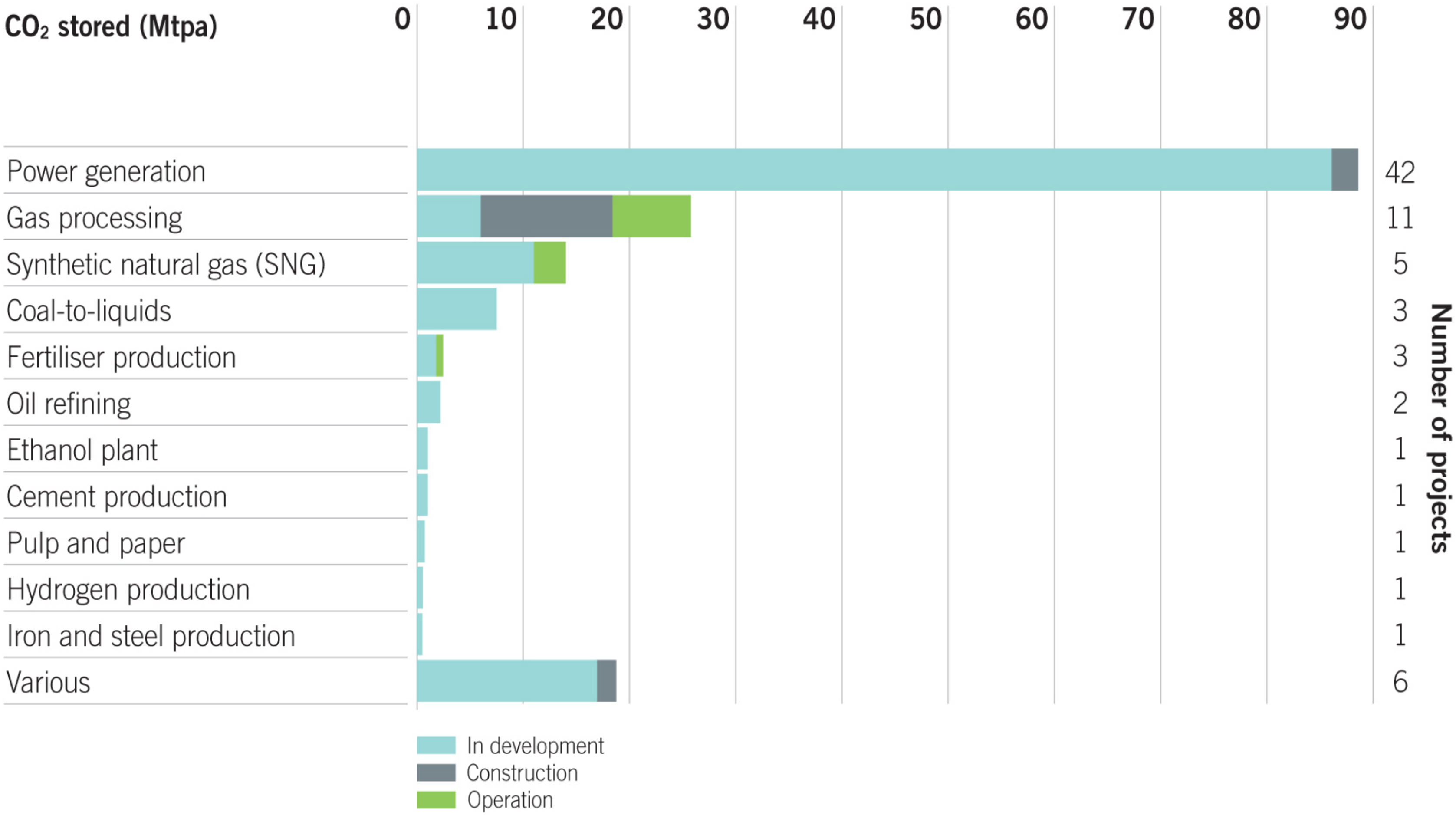


- Since 2009, 63 large-scale integrated projects (LSIPs) have been newly identified, but 37 LSIPs were delayed or cancelled. Overall, 77 LSIPs among the total 234 projects.
- All eight of the operating LSIPs and further four in the execute stage are linked to the oil and gas sector.

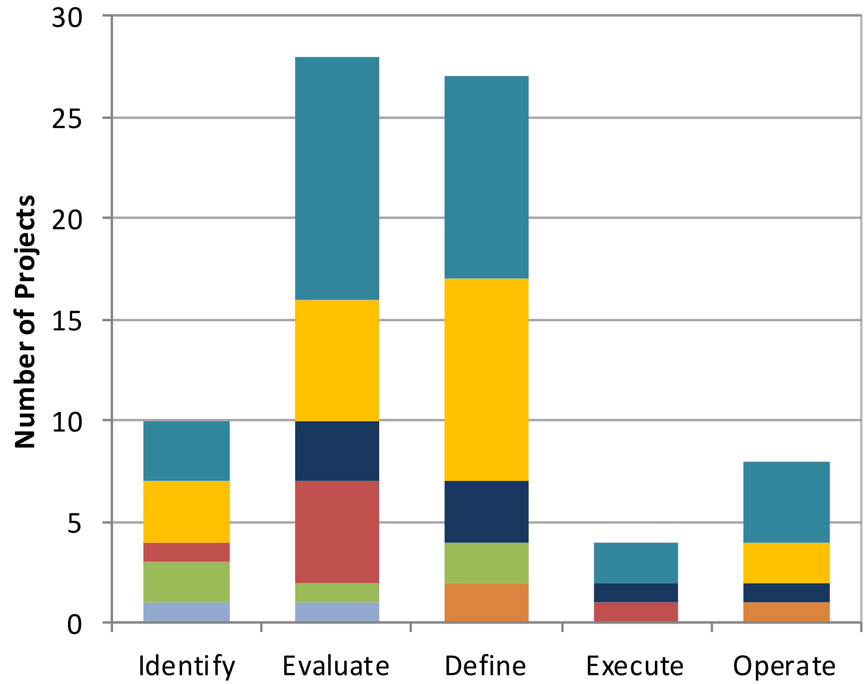
77 LSIPS BY INDUSTRY SECTOR, STORAGE TYPE AND LOCATION



LSIPS BY SECTOR

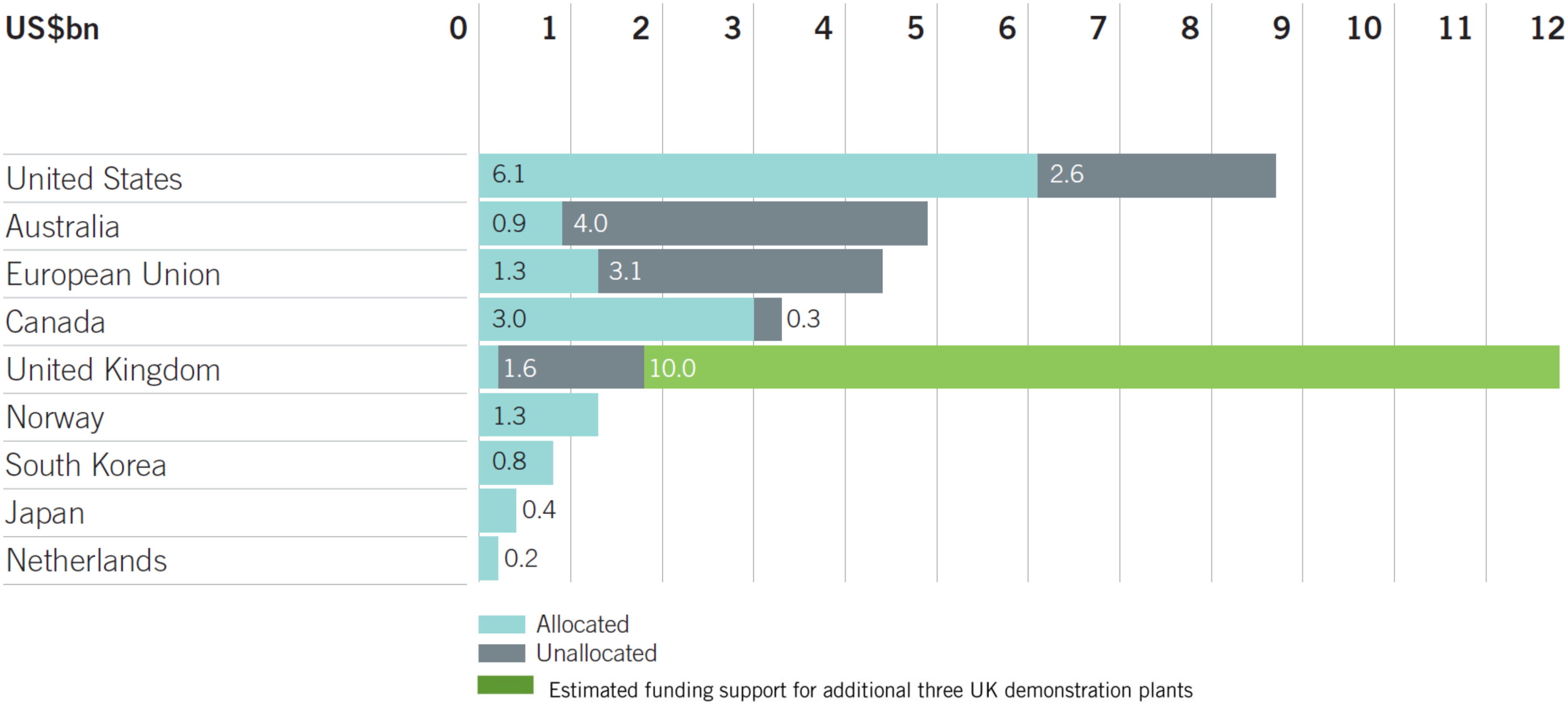


LISPS BY ASSET LIFECYCLE



	Identify	Evaluate	Define	Execute	Operate	
USA	3	12	10	2	4	
Europe	3	6	10		2	
Canada		3	3	1	1	
Australia and New Zealand	1	5		1		
China	2	1	2			
Middle East and Africa			2		1	
Asia (excl. China)	1	1				
Total 2010	**10**	**28**	**27**	**4**	**8**	**77**
Total 2009	19	20	15	2	8	64

Public funding support commitments to CCS by country



GLOBAL STATUS: LESSONS LEARNED

- CCS is primarily a policy/commercial issue, not a technical issue
  - Projects getting stuck at Financial close:
    - Lack of value proposition (even EOR is not sufficient)
    - Costs of CCS
  - More work required on policy and regulatory regimes
- Developers have better alternatives (given current value proposition and incentives)
- Onshore storage faces significant public acceptance issues
- Storage characterisation takes time and money

EUROPEAN SNAPSHOT

- Robust number of projects – Solid package of NER300 bids;
- The UK and the Netherlands are the most active;

But

- Clear political support is limited to a small number of countries;
- Onshore storage faces significant public acceptance issues;
- Renewed interest in gas (without CCS) for electricity generation;
- Limited effort on industrial CCS;
- Transbounday CO2 movement – liability, limitations and leverage;

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