



Chinese Stakeholders' Perceptions on Demonstrating CCS

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Content

- Comparisons with previous surveys
- Methodology and Demographic Information
- Perceptions of CCS and Climate Change
- Views on Developing the First CCS Demonstration Project
- Financing Issues
- Conclusions

WP5.2 Objectives : understand *Chinese stakeholders' positions on CCS, perceived requirements for a demonstration project, and longer term deployment needs*

Comparisons with previous CCS Stakeholders Surveys in China

- BP/DTI CCP2 communications in 2006 (Reiner et al, 2007) – Long term deployment
- EPRG survey in 2007 (Liang, 2008) – Institutional framework
- CAPPCCO consultation in 2008 (Reiner and Liang, 2008) – Long term deployment and perceptions on making new plants CO₂ Capture Ready
- Semi-structured Interview by HIT in 2008 (Liang and Wu, 2009) – Long term deployment opportunities and incentives
- STRACO2 consultation in 2008 (ACCA21, 2009) - understand potential technology and policy preference, and potential financial resources
- NZEC consultation in 2009 – Understand the potential technical, regulatory and financial for CCS demonstration projects in China

Research Methodology Summary

Q Design

- Design path dependent Chinese-language and English questionnaire
- Test questionnaire (with support from CCS experts, and colleagues)
- Revise according to feedbacks (e.g. adding introduction of CCS terms)

Survey

- Online survey via www.CaptureReady.com
- Face-to-face interviews (including follow-up sub-sample interviews)
- Revisit some of stakeholders to receive feedbacks and comments

Analysis

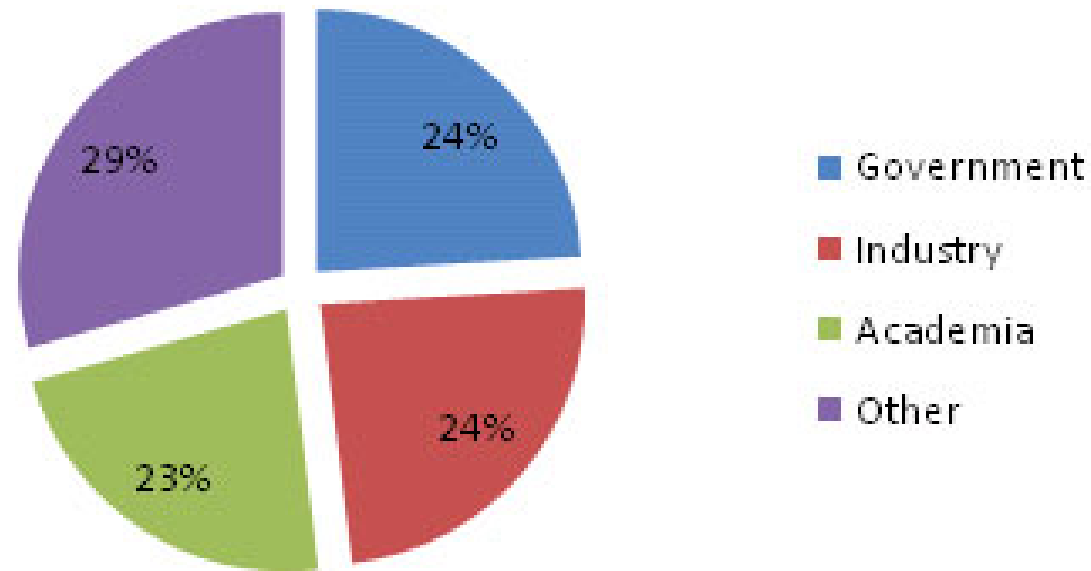
- Quantitative assessment (comparative and correlation analysis)
- Qualitative assessment (narrative research, comparative analysis)
- Behavioural and institutional framework analysis

Distribution of respondents by region or province

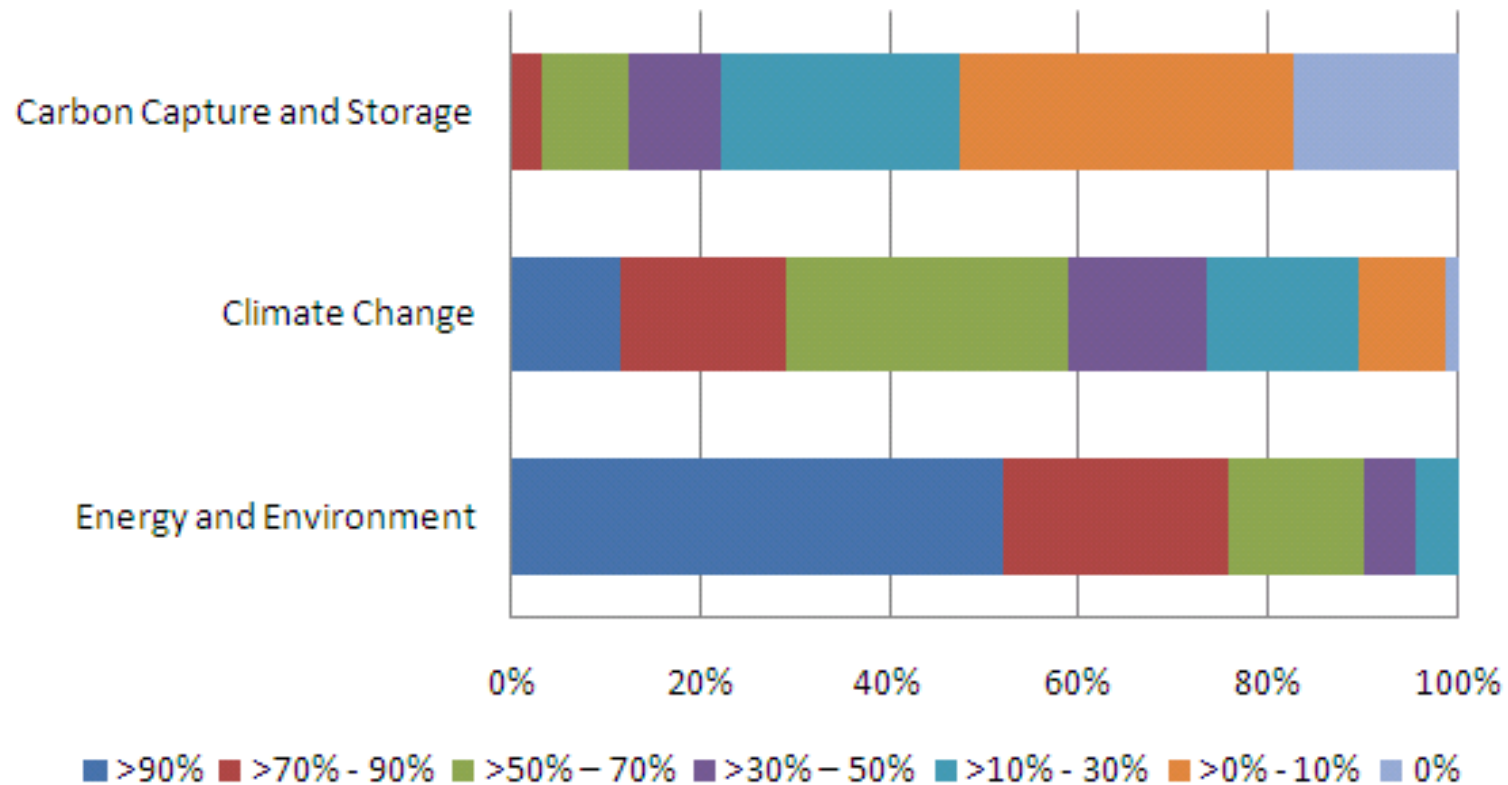
- 140 respondents (55% response rate)
- Online: 131, Interview: 31 (22 follow-up)
- 65% of respondents outside of Beijing
- 2 Regions with more than 10 respondents
- **Beijing: 49 (53% response rate)**
- **Guangdong: 16 (61% response rate)**



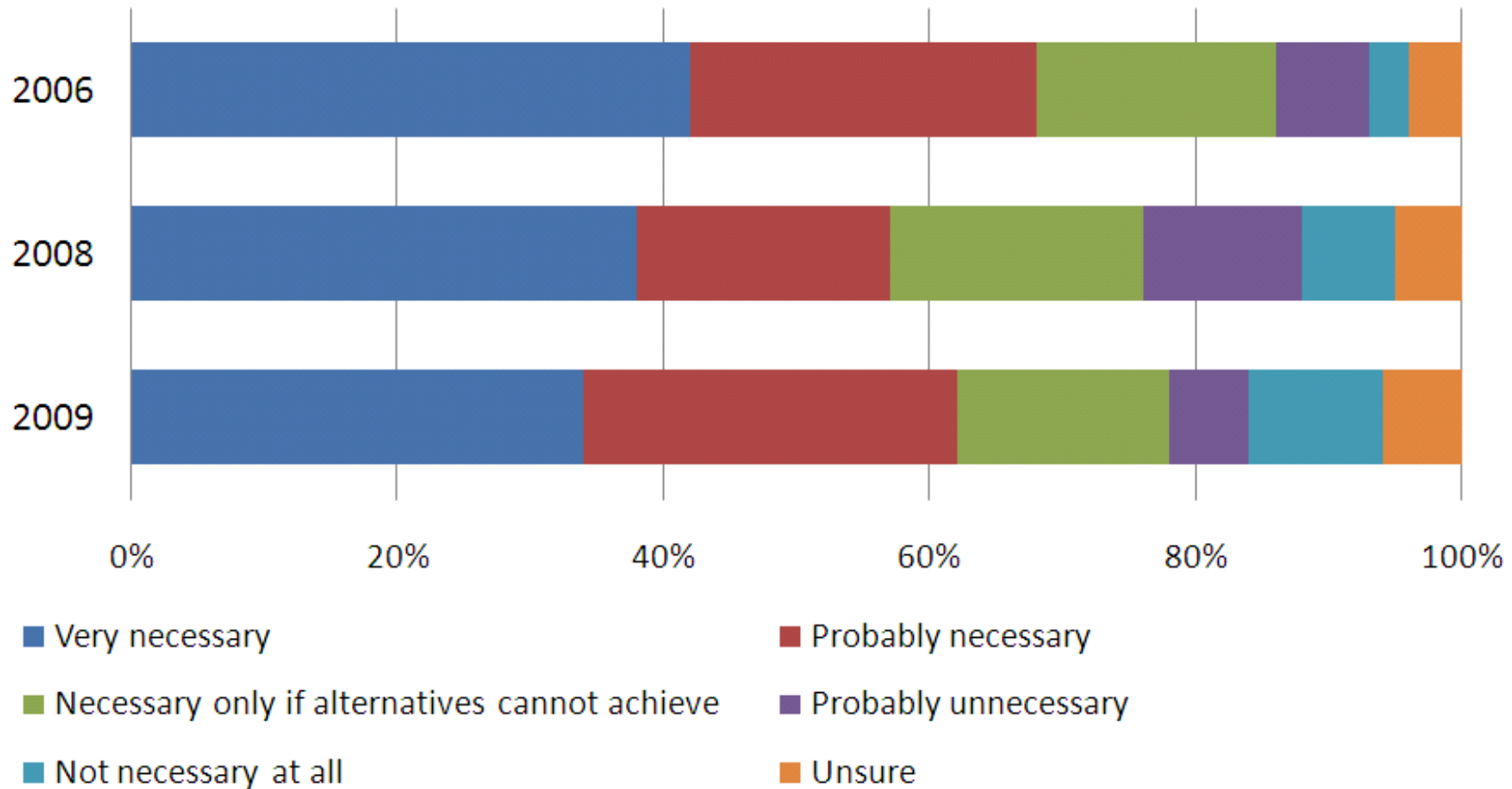
Distribution of responses by type of institution



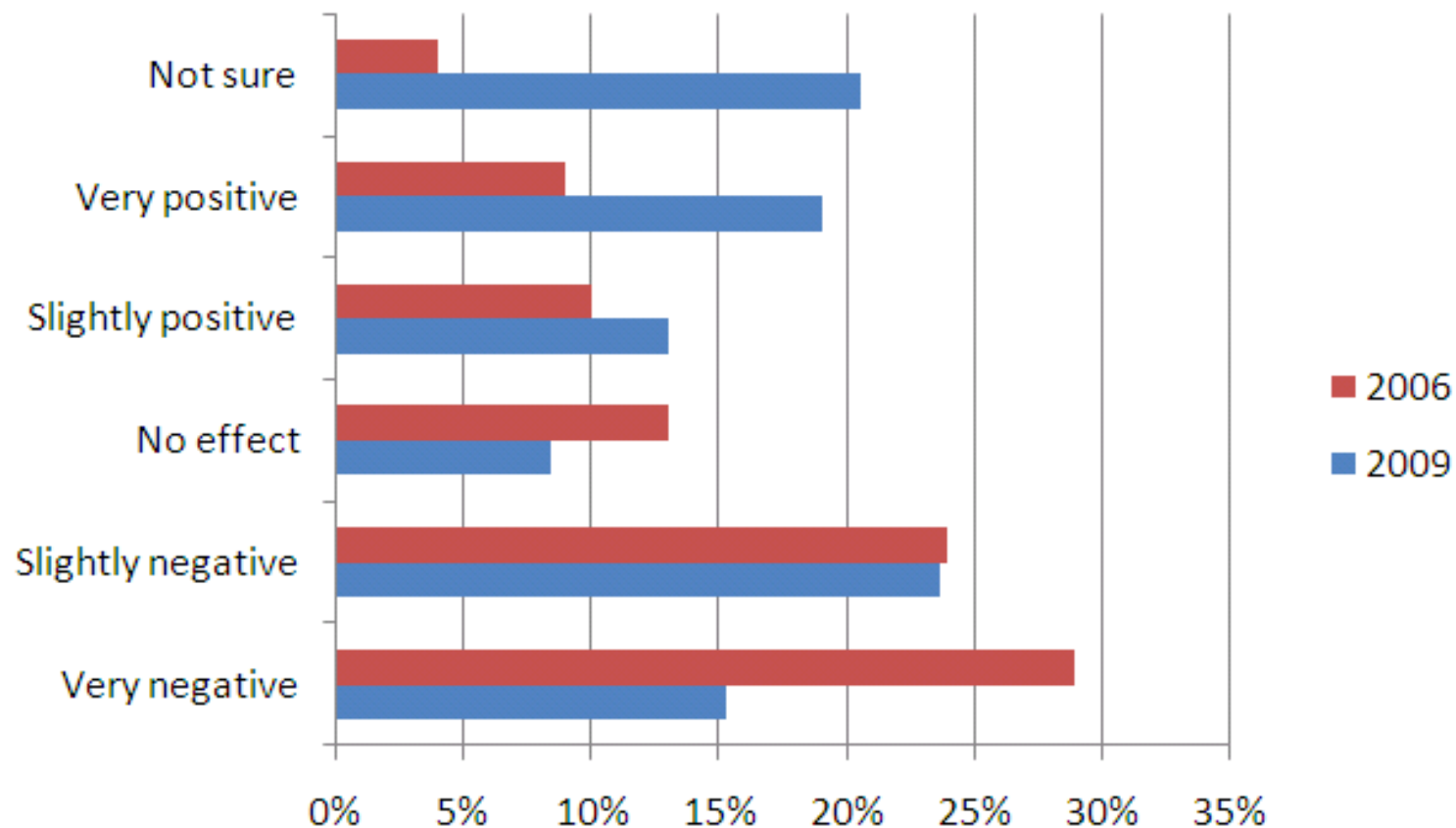
Claimed average working time spent on 'Energy and Environment', 'Climate Change' and 'Carbon Capture and Storage'



Importance of CCS in deep cut of GHG emissions

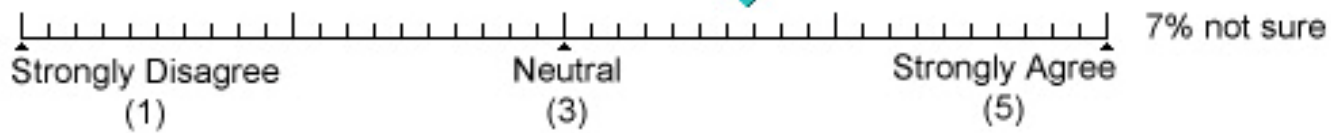


Perceived impacts of large-scale deployment of CCS on China's energy security in the long term (2006 versus 2009)

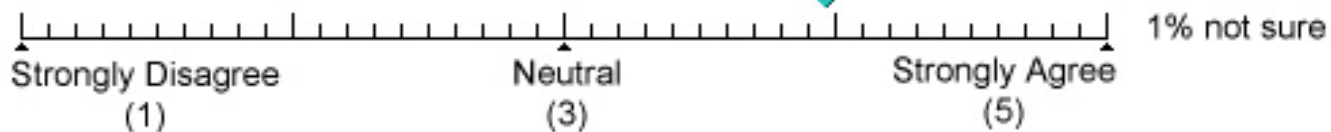


Perceived benefits of developing CCS demonstration projects in China

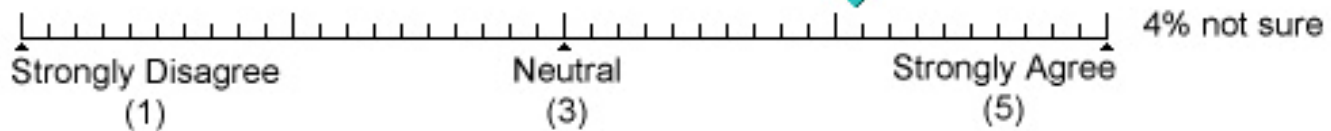
Create advantages for power equipment vendors and manufacturers in China



Demonstrate the efforts of the Chinese government in combating climate change and therefore improve its international image



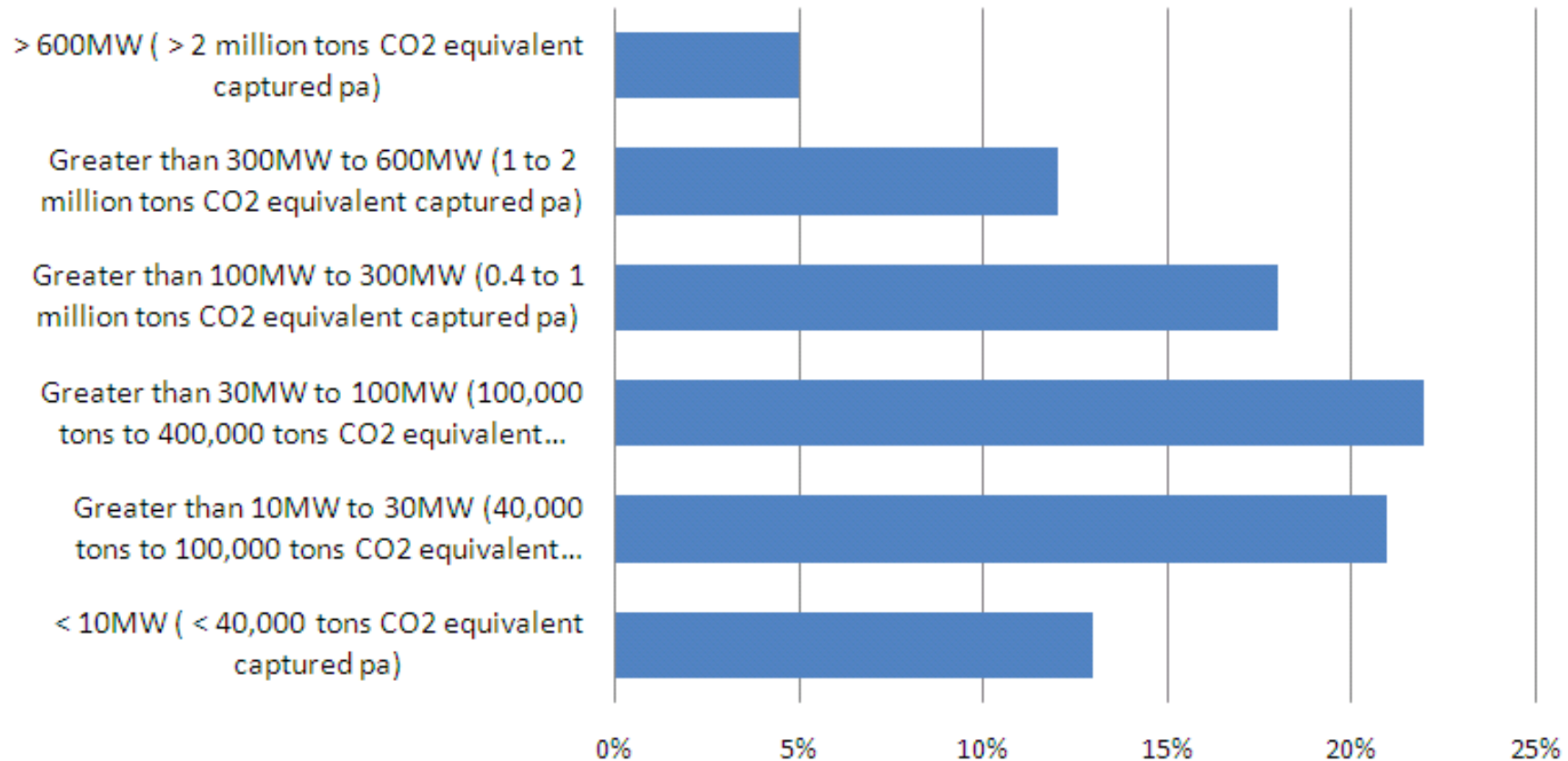
Create an advantage for Chinese power companies investing CCS technologies



Attract foreign investment

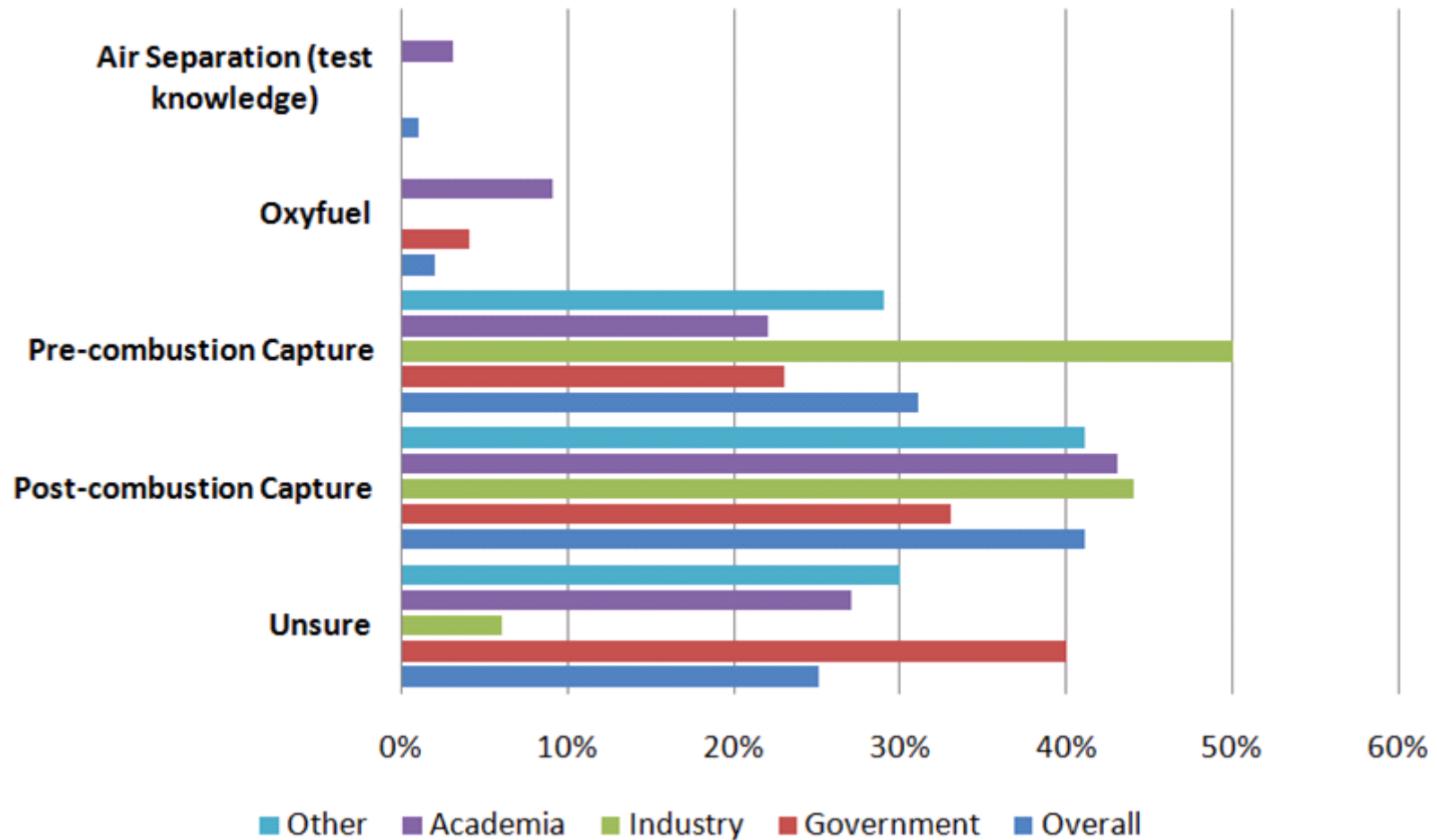


Preferred scale of first commercial scale CCS project in China



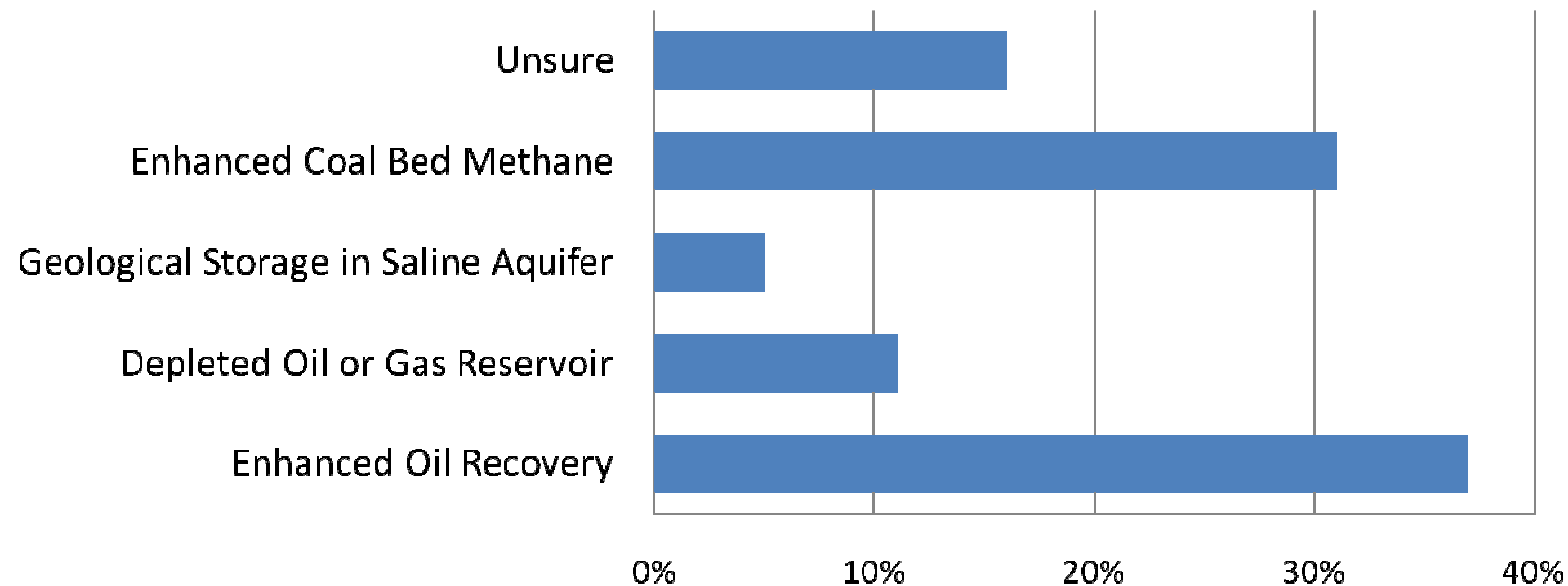
Less than 3% selects unsure

Capture Technology Preference in First CCS Demo in China

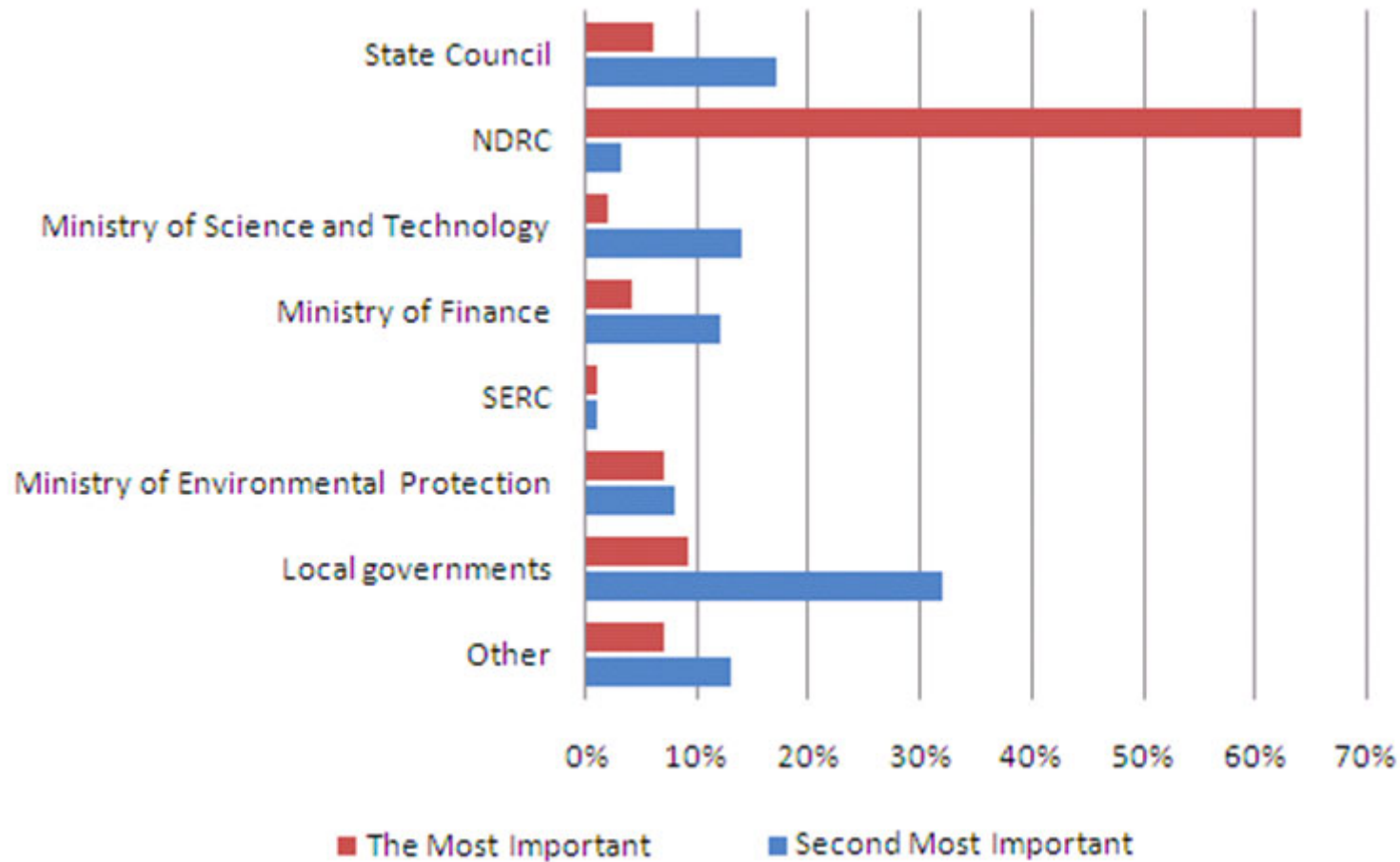


Preferred storage method for first demonstration project in China

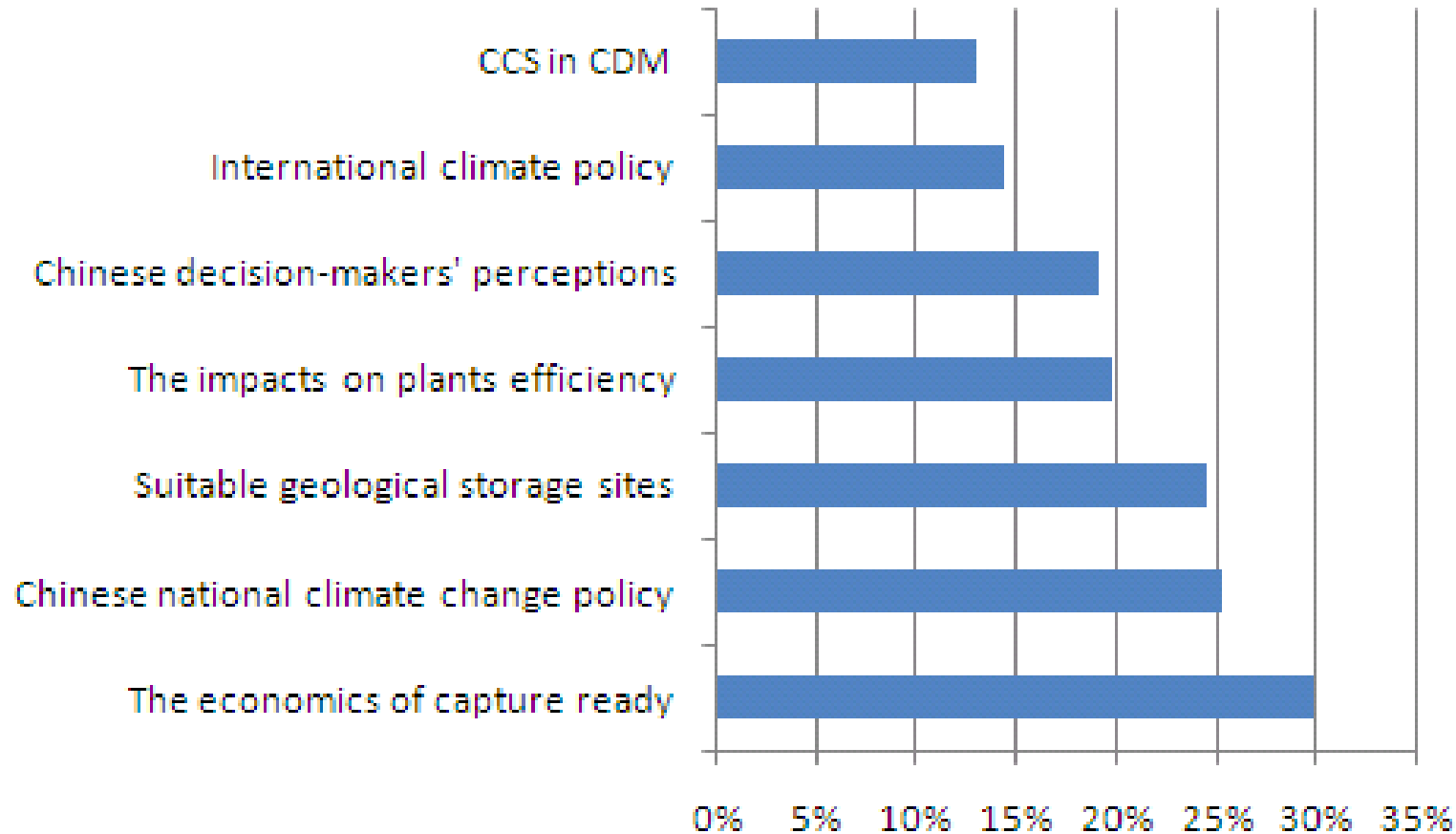
(Stakeholders are presented explanations of each storage method based on IPCC CCS Special Report alongside the question)



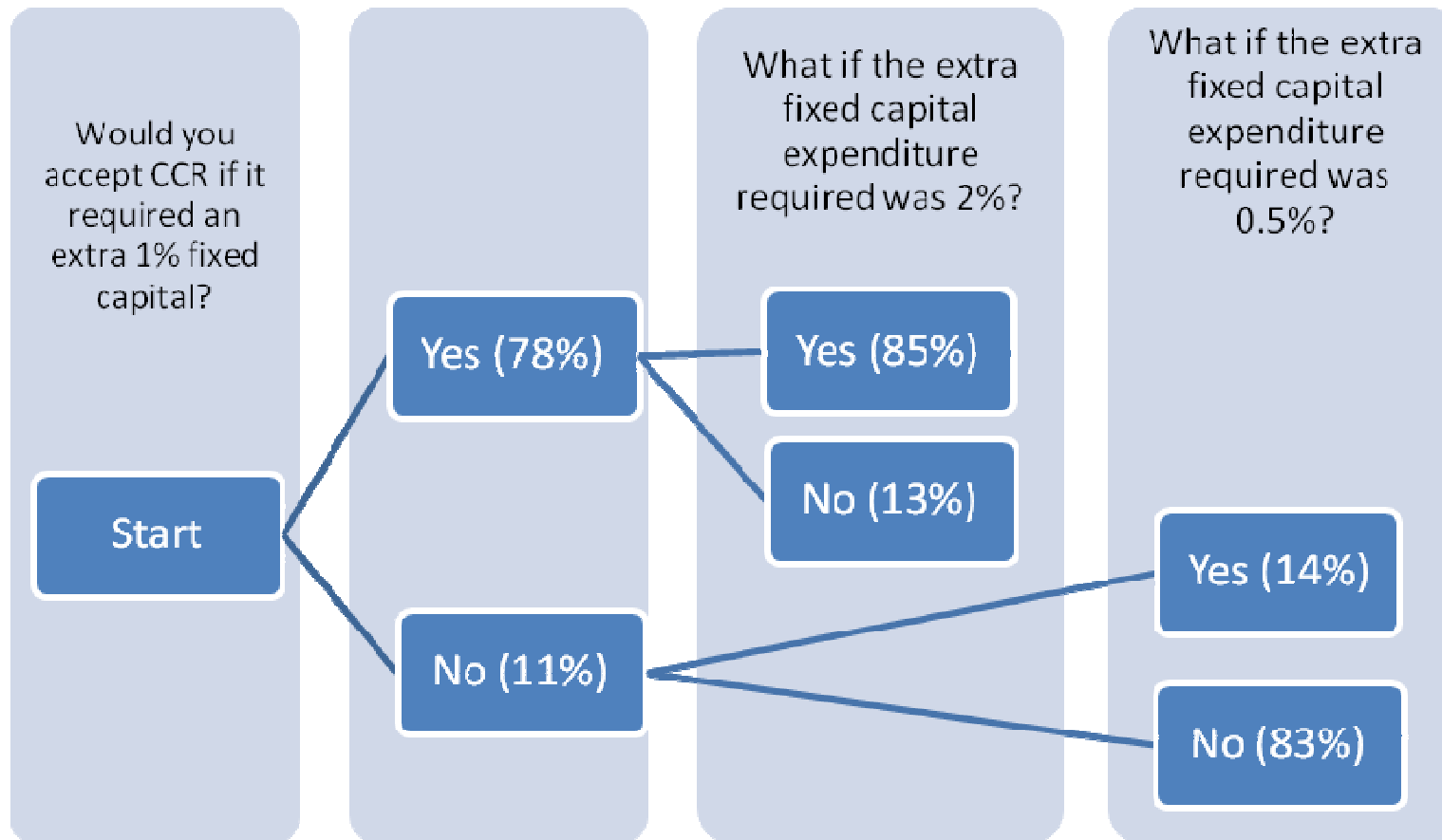
Importance of Institutions in Authorising a CCS Demonstration Plant



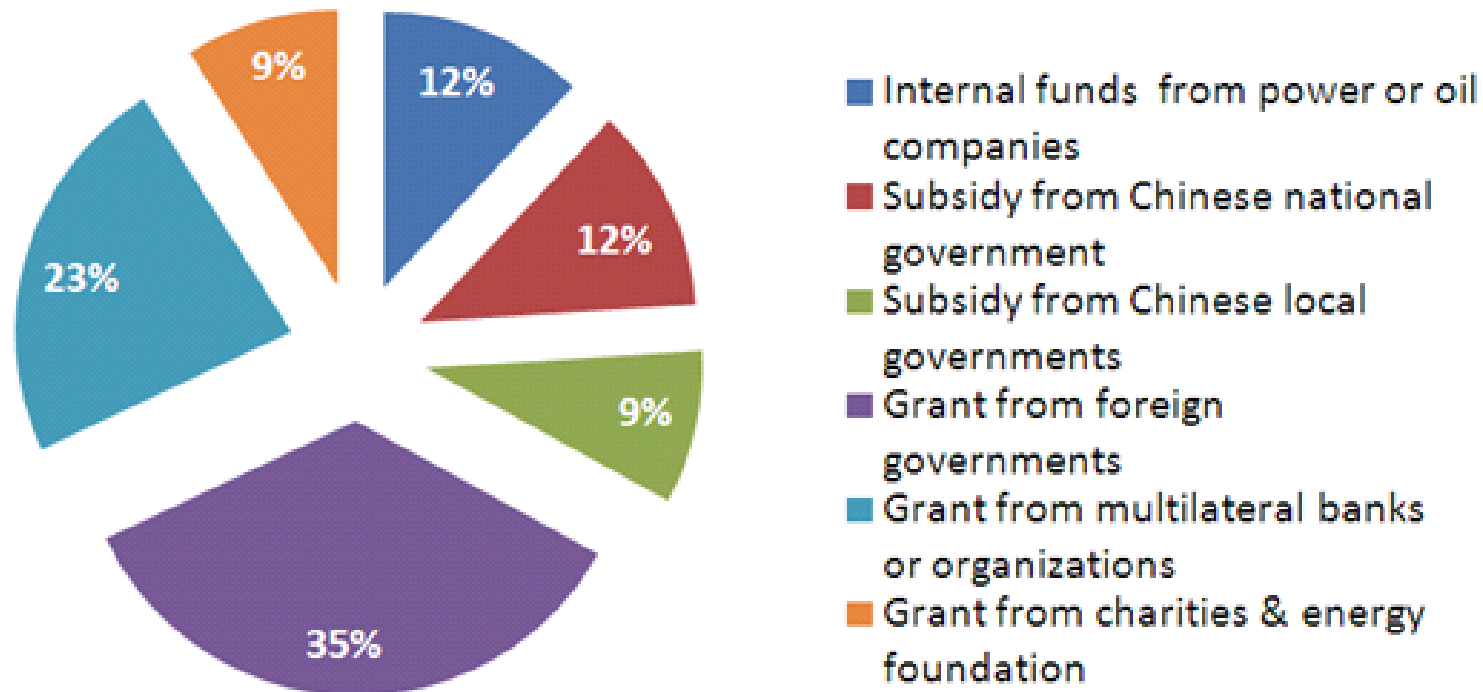
Factors influencing new plants CO₂ capture ready

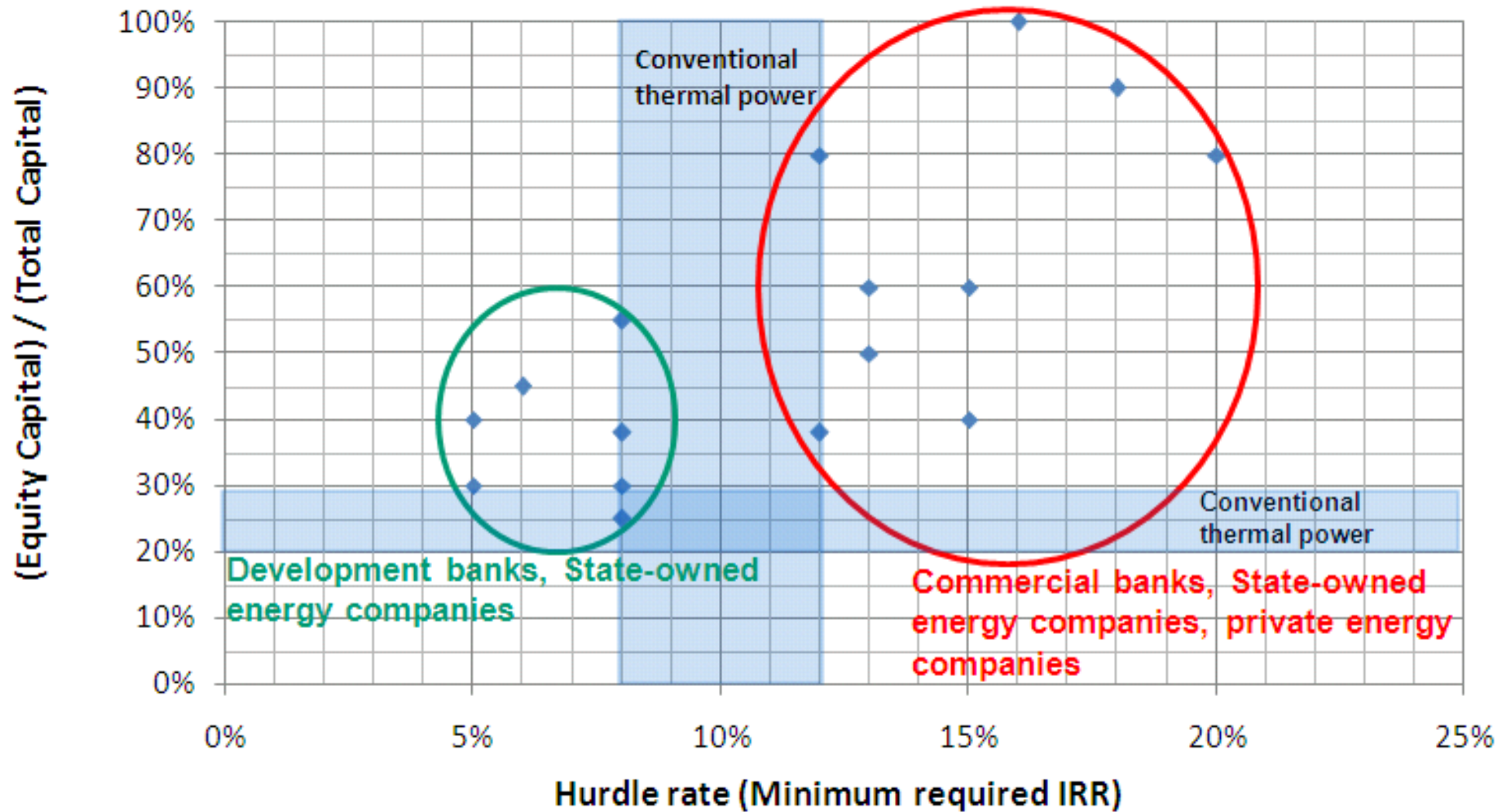


Acceptable costs of CCR in China
 (stakeholders are presented with the IEA CCR definition alongside questions)



Desired mix of sources for the additional equity capital investment needed for capture facilities (Assuming a 600MW Coal-fired power plant in China) - based on the average of responses from 16 CFOs, commercial bankers and energy specialists at development banks





Extra firm-wide investment risks created by CCS vs. conventional coal power

(Survey of 16 CFOs, commercial bankers and energyspecialists from development banks)

Internal Operational Risk		External Operational Risk		Market Risk	Credit Risk
People	Processes	External	Physical		
Employee collusion/fraud	Accounting error	Legal ✓	Fire	Fuel price ✓	Fuel supplier ✓
Employee error ✓	Capacity risk	Outsourcing	Physical security	Electricity price ✓	Electricity buy-side
Employee misdeed	Contract risk ✓	Political ✓	Terrorism ✓	Steel price	CERs/CO2 buy-side ✓
Employee liability	Miss-selling/suitability	Regulatory ✓	Theft	Cost of labour	Governments
Employment law	Product complexity ✓	Stable supply	Natural disaster ✓ <small>(e.g. earth quake and typhoon)</small>	Carbon price ✓	Banks
Health and safety ✓	Project risk ✓	Tax		Oil/gas price ✓	
Industrial action	Reporting error				
Lack of knowledge/skills ✓	Settlement/payment error				
Loss of key personnel	Transaction error				
	Valuation error				

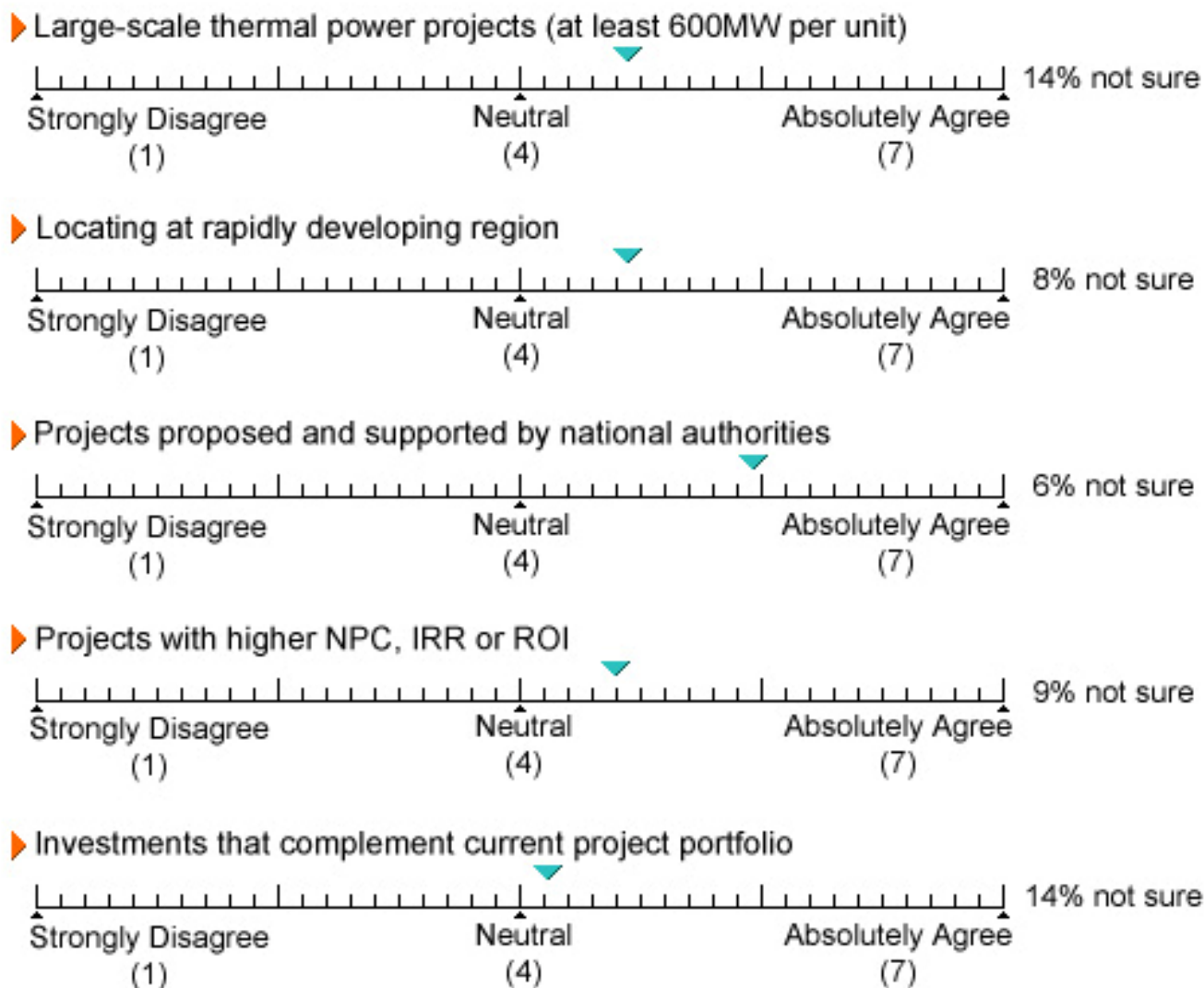
Stakeholders are provided all options in the table and the table design refers to the format of British Bankers' Association Survey

Meaning of Symbols and Highlights:

- ✓ - Identified by at least one stakeholder in the survey
- Light pink box - Identified by more than 25% and less than 50% of stakeholders
- Medium pink box - Identified by more than 50% and less than 75% of stakeholders
- Dark pink box - Identified by more than 75% of stakeholders

Rating of criteria in justifying good power generation projects implied by past-experience

Question: To what extent are you decisions based on past experience with the following criteria in judging good investment?



Main Findings & Conclusions

- Fewer stakeholders were concerned with the energy penalty of CCS relative to 2006
- There was no consensus on the scale of first CCS demonstration
- The economic performance and Chinese national policy are perceived as most influential factors in making new plants CO₂ capture ready
- 2/3 of stakeholders claimed 2% extra fixed capital costs to make new plants CCR would be acceptable
- Most stakeholders perceived demonstrating CCS would create advantages for Chinese companies to invest in CCS technologies and demonstrate Chinese government's effort in combating climate change

Main Findings & Conclusions (Cont.)

- More support for post-combustion capture than pre-combustion capture in the first demonstration plant, but slightly more industrial respondents prefer pre-combustion capture
- EOR and ECBM receive overwhelming support for first CCS demonstration project
- Commercial CCS demonstration projects may require substantial financial support from foreign government and development banks
- A lower leverage should be considered if commercial loans are required in financing CCS projects; development bank specialists and state-owned power companies might accept a much lower hurdle rate than commercial bankers or private power companies

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We welcome any comments or feedback

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