



# CCS PROJECTS IN THE GLOBAL CONTEXT

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IEA-MOST workshop on Carbon Capture and Storage: Opportunities in energy-intensive industry

Beijing, 16 October, 2012



# THE GLOBAL STATUS OF CCS: 2012

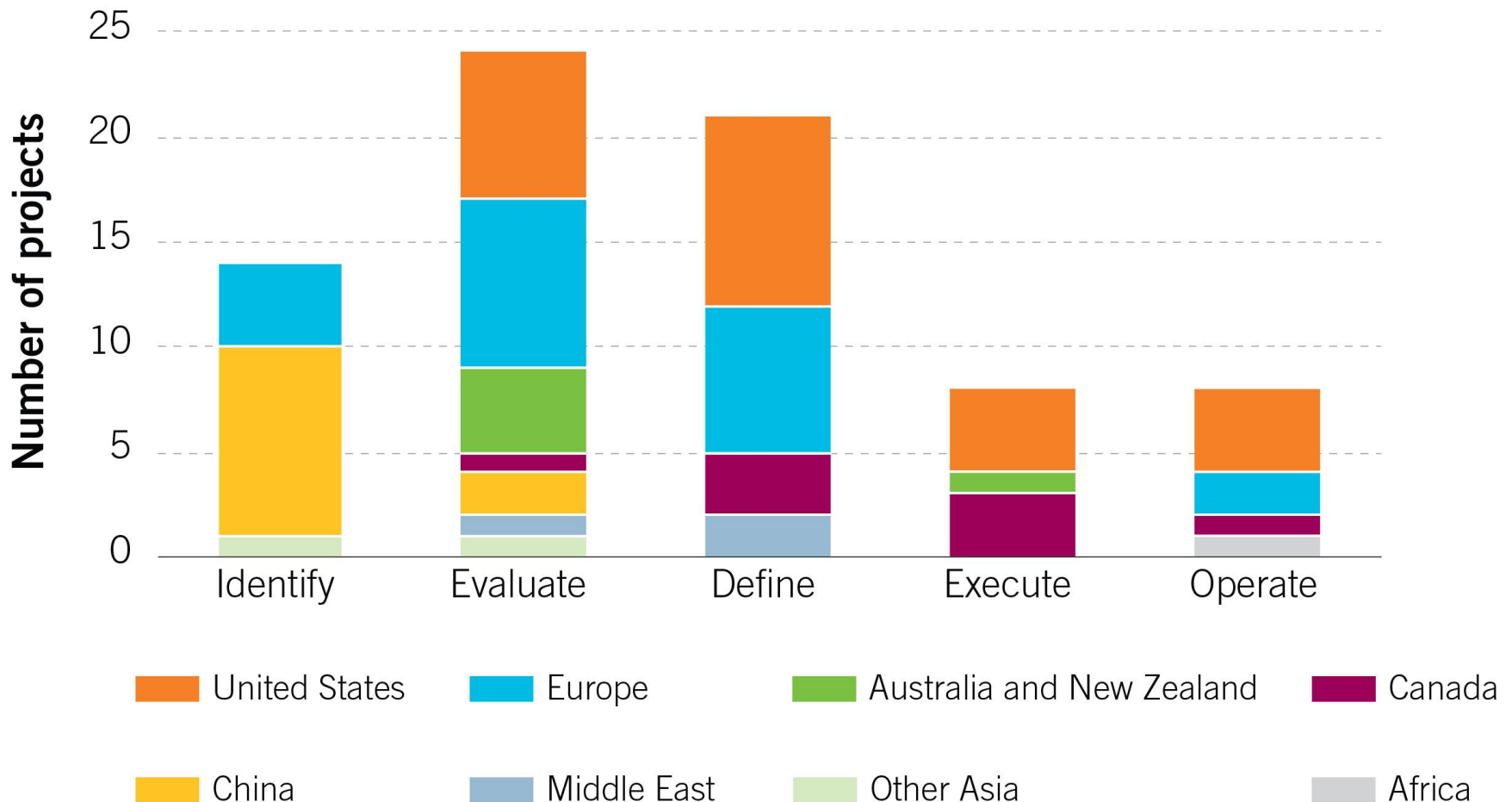


- Comprehensive coverage on the state of CCS projects and technologies
- Progress outlined since 2011
- Challenges and recommendations for moving forward



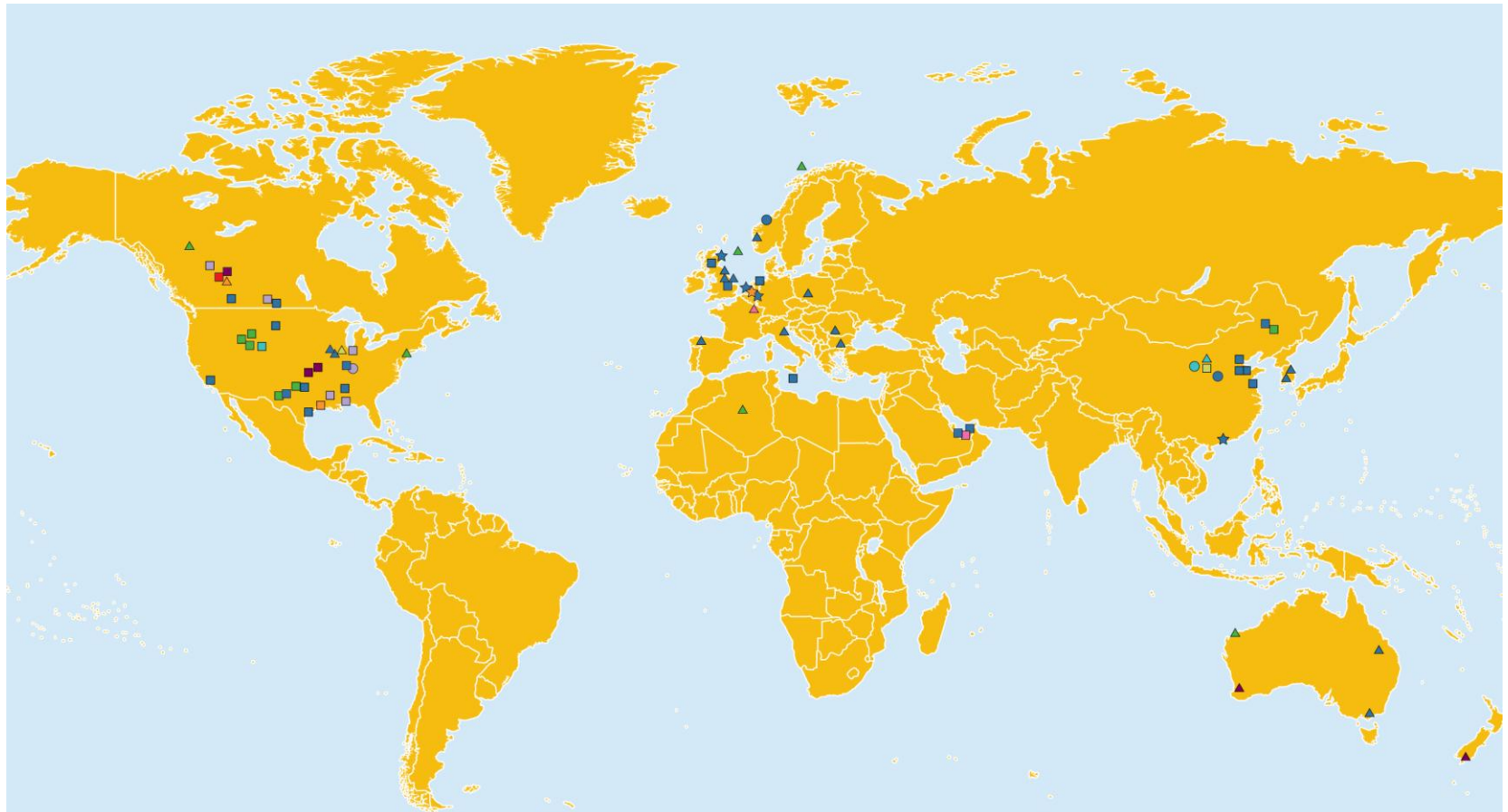
# CCS IS ALREADY HAPPENING

Large-scale integrated projects (LSIPs) by asset lifecycle and region/country





# GLOBAL DISTRIBUTION OF PROJECTS



## LSIPs: GLOBAL

### Industry sector

- |                          |                             |
|--------------------------|-----------------------------|
| ■ Power generation       | ■ Coal-to-liquids (CTL)     |
| ■ Natural gas processing | ■ Chemical production       |
| ■ Synthetic natural gas  | ■ Iron and steel production |
| ■ Fertiliser production  | ■ Oil refinery              |
| ■ Hydrogen production    |                             |

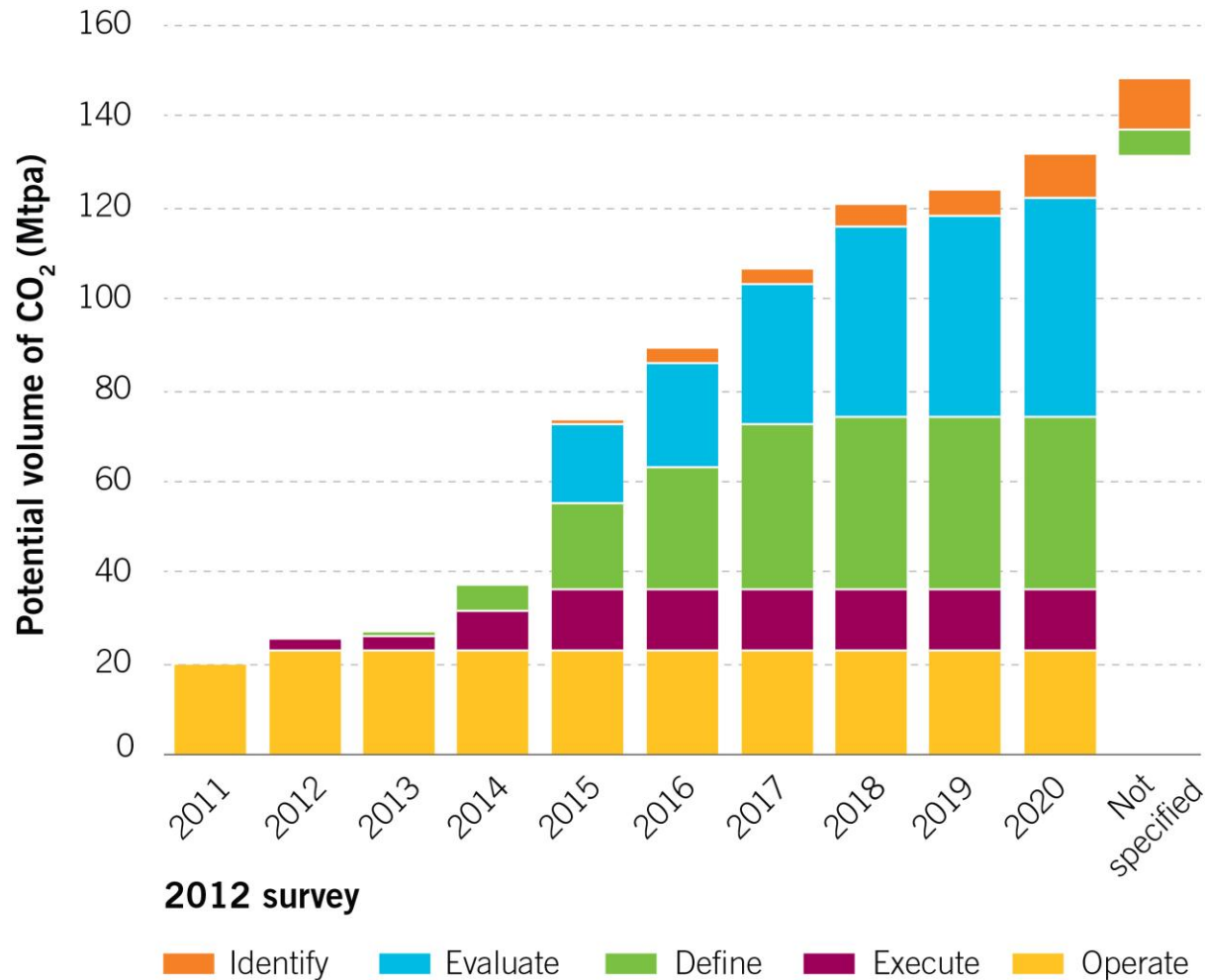
### Storage type

- |  |
|--|
| △ Deep saline formations                       |
| □ Enhanced oil recovery (EOR)                  |
| ☆ Depleted oil and gas reservoirs              |
| ○ Various options considered/<br>not specified |



# SIGNIFICANT STORAGE IS OCCURRING, BUT MUCH MORE NEEDED

## Volume of CO<sub>2</sub> potentially stored by LSIPs





# CCS SCOPE - INDUSTRIAL CO<sub>2</sub> SOURCES

The only real mitigation option for some industries



## Gas Processing to Remove Reservoir CO<sub>2</sub>

- Relatively low additional cost for capture



## Coal or other gasification for Chemicals or Liquids

- Low additional cost for capture – likely higher cost than gas



## Coal and Gas Electricity (Power) Generation

- High capture cost and capital cost



## Steel and cement plants

- High capture cost and capital cost



## Bio-fuels plus CCS (potential for negative emissions)

- Range of capture costs



# INDUSTRIAL PLANTS PREDOMINATE IN ACTIVE LARGE SCALE INTEGRATED PROJECTS

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Only 2 of 16 are in the power sector

## 8 operating projects:

- 6 natural gas processing plants
- 1 fertiliser plant
- 1 synthetic natural gas plant

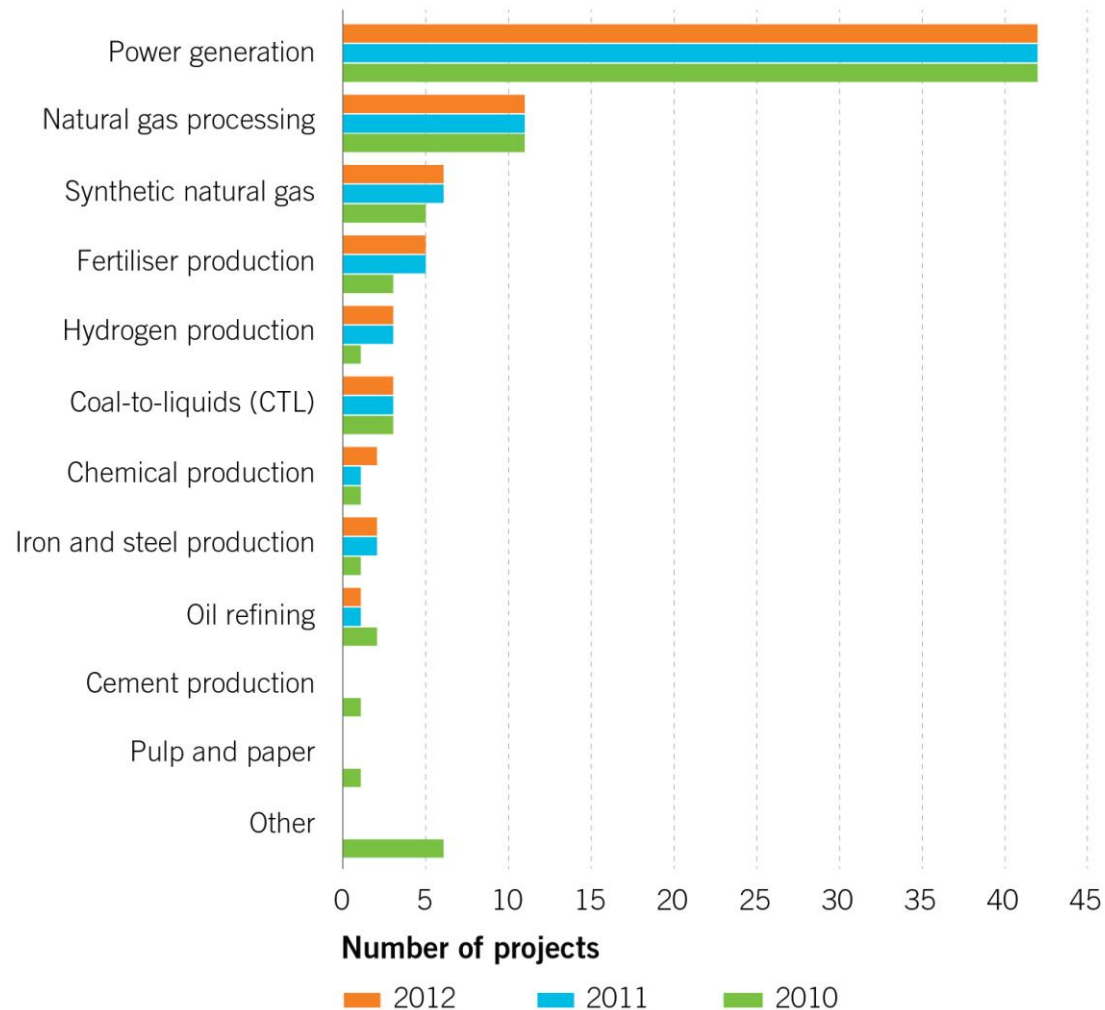
## 8 projects under construction (Execute):

- 2 electricity generation plants
- 2 natural gas processing plants
- 2 hydrogen plants
- 1 fertiliser plant
- 1 ethanol plant



# CONTINUING DOMINANCE OF POWER GENERATION AMONG PLANNED PROJECTS

## LSIPs by industry sector and year

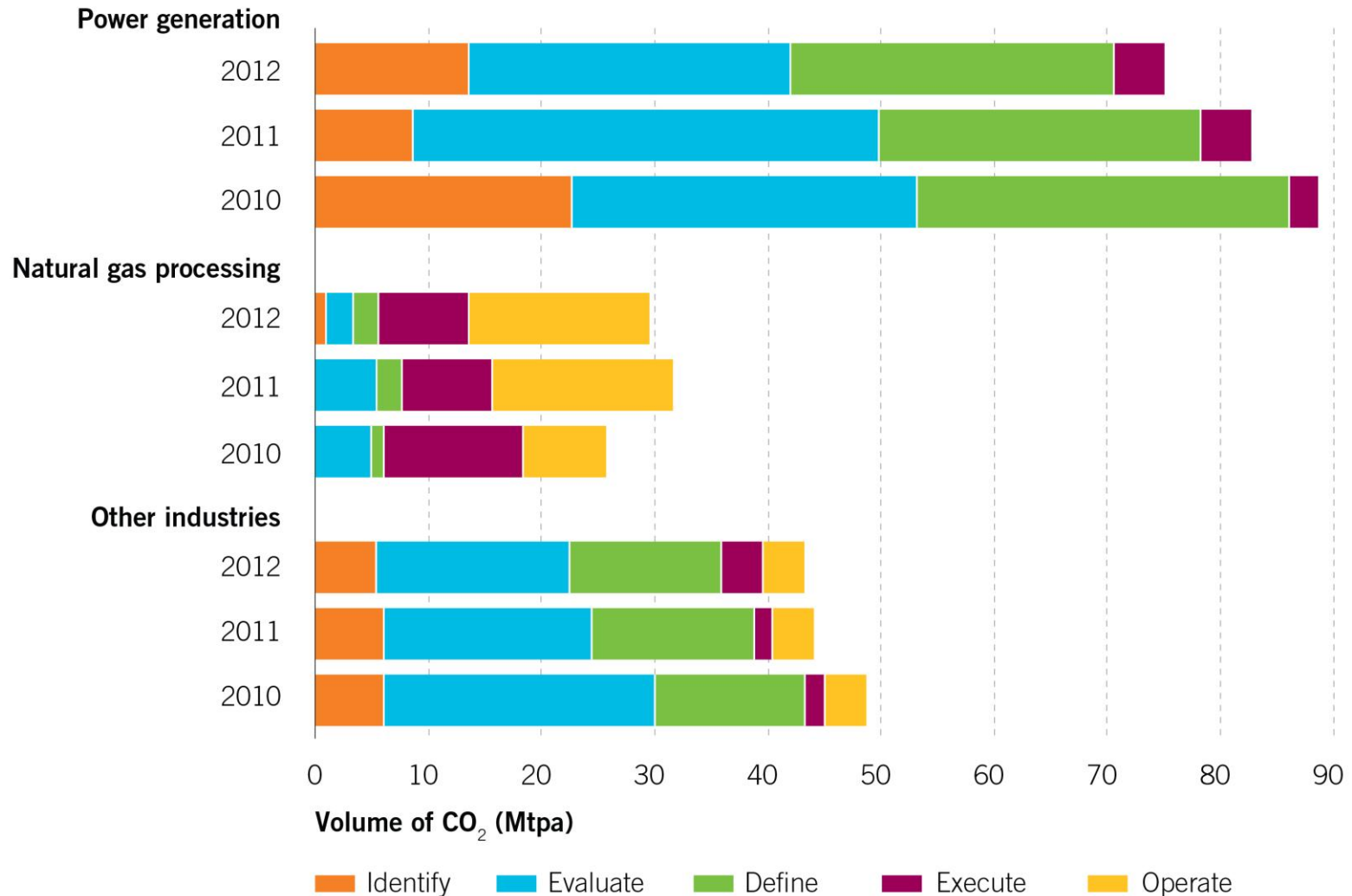






# INDUSTRIAL CCS VERY IMPORTANT IN TERMS OF STORAGE VOLUMES

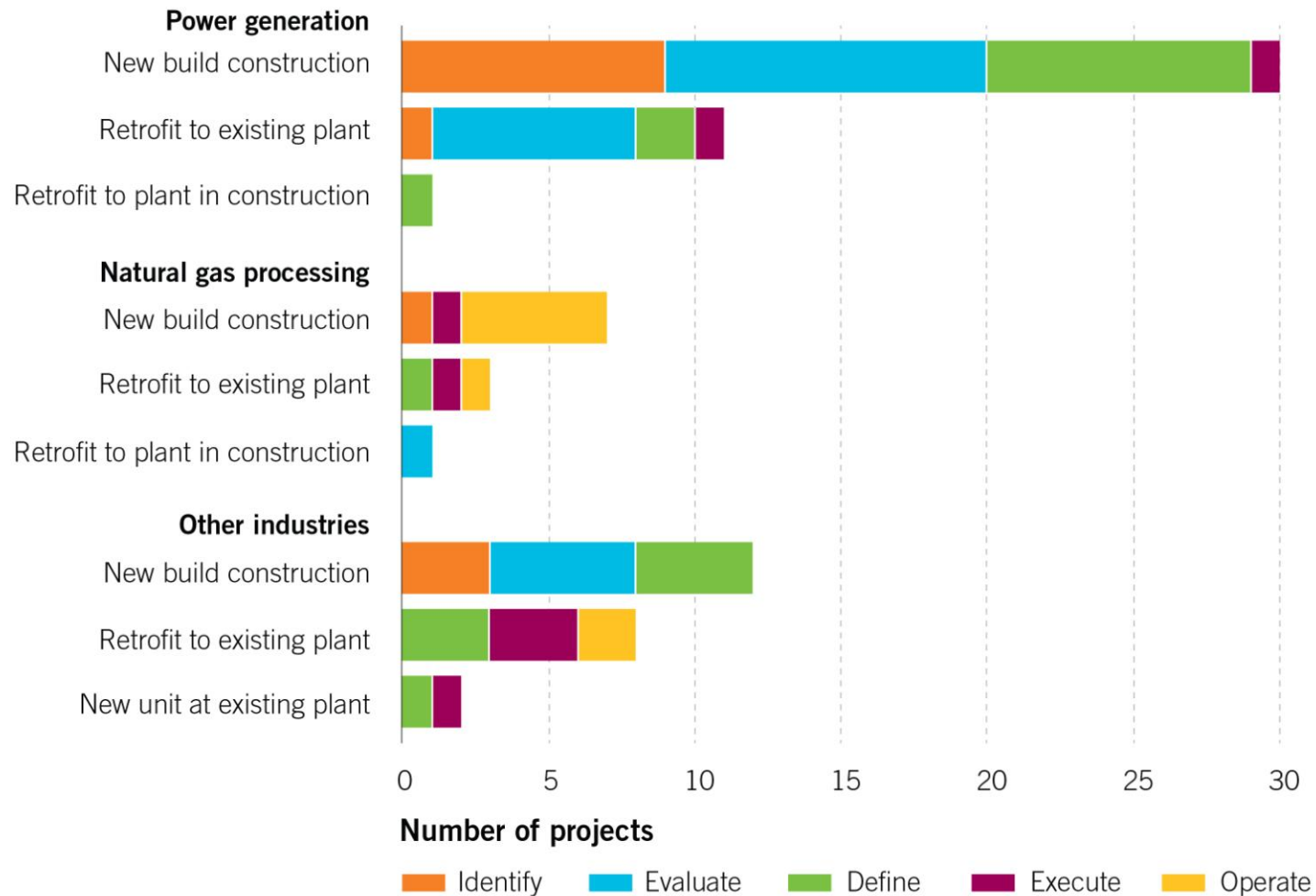
Volume of CO<sub>2</sub> potentially captured by industry sector and year





# NEW BUILD PROJECTS BECOMING MORE PROMINENT

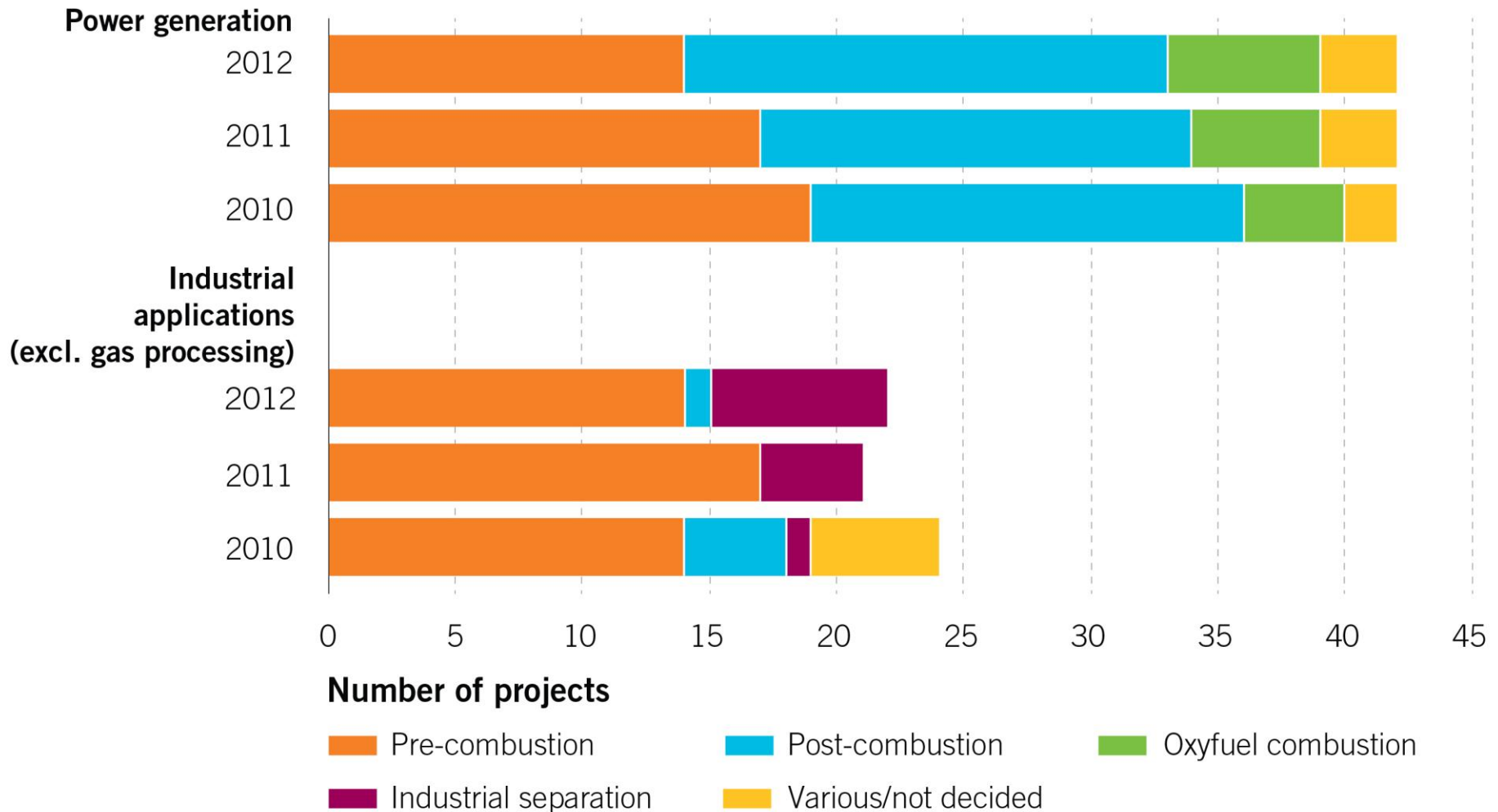
## LSIPs by industry sector and project structure





# POST-COMBUSTION IS NOW THE MOST WIDELY CHOSEN TECHNOLOGY IN POWER GENERATION

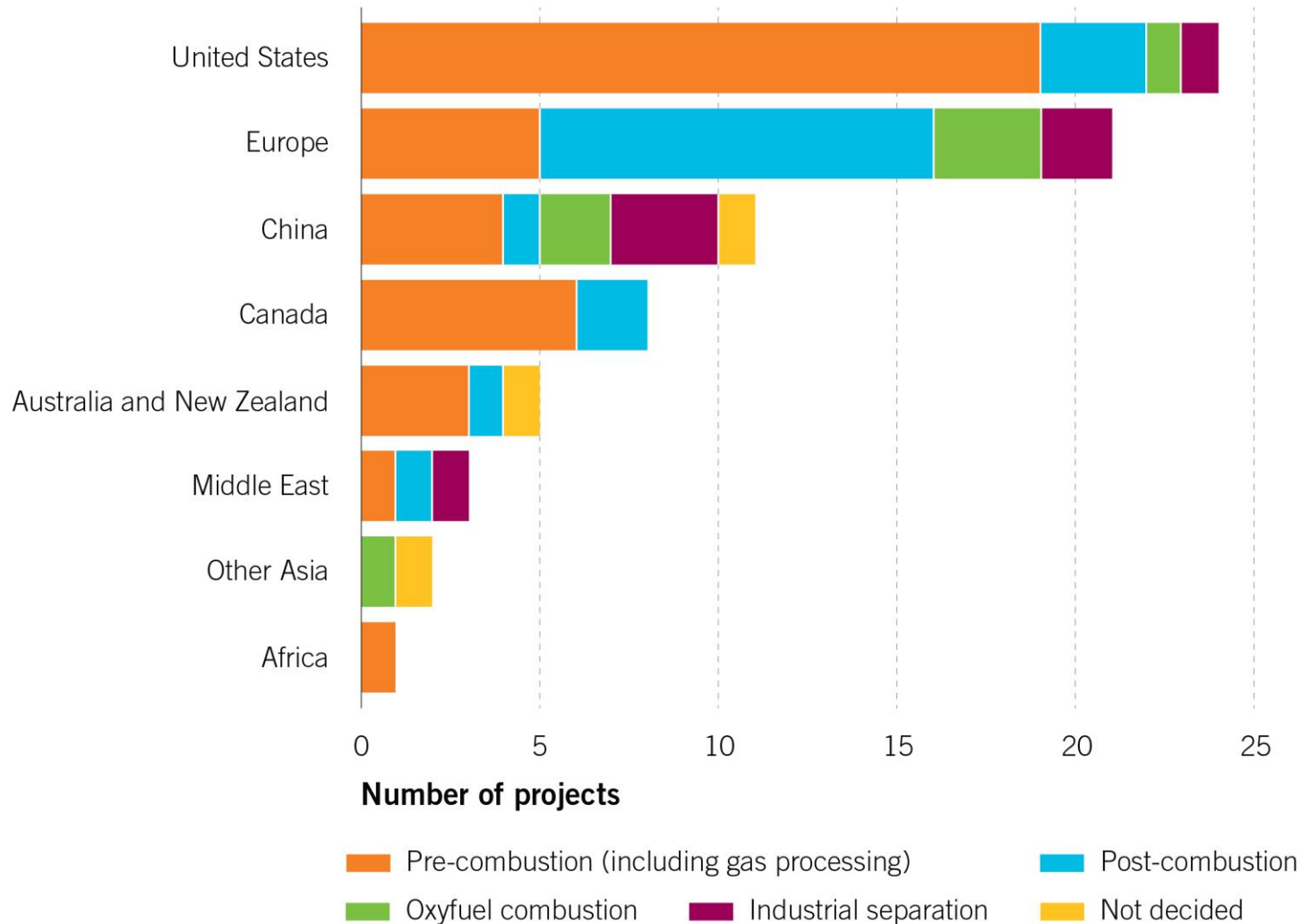
## LSIPs by capture type and industry





# PRE-COMBUSTION CAPTURE MOST FREQUENTLY CHOSEN IN MANY COUNTRIES

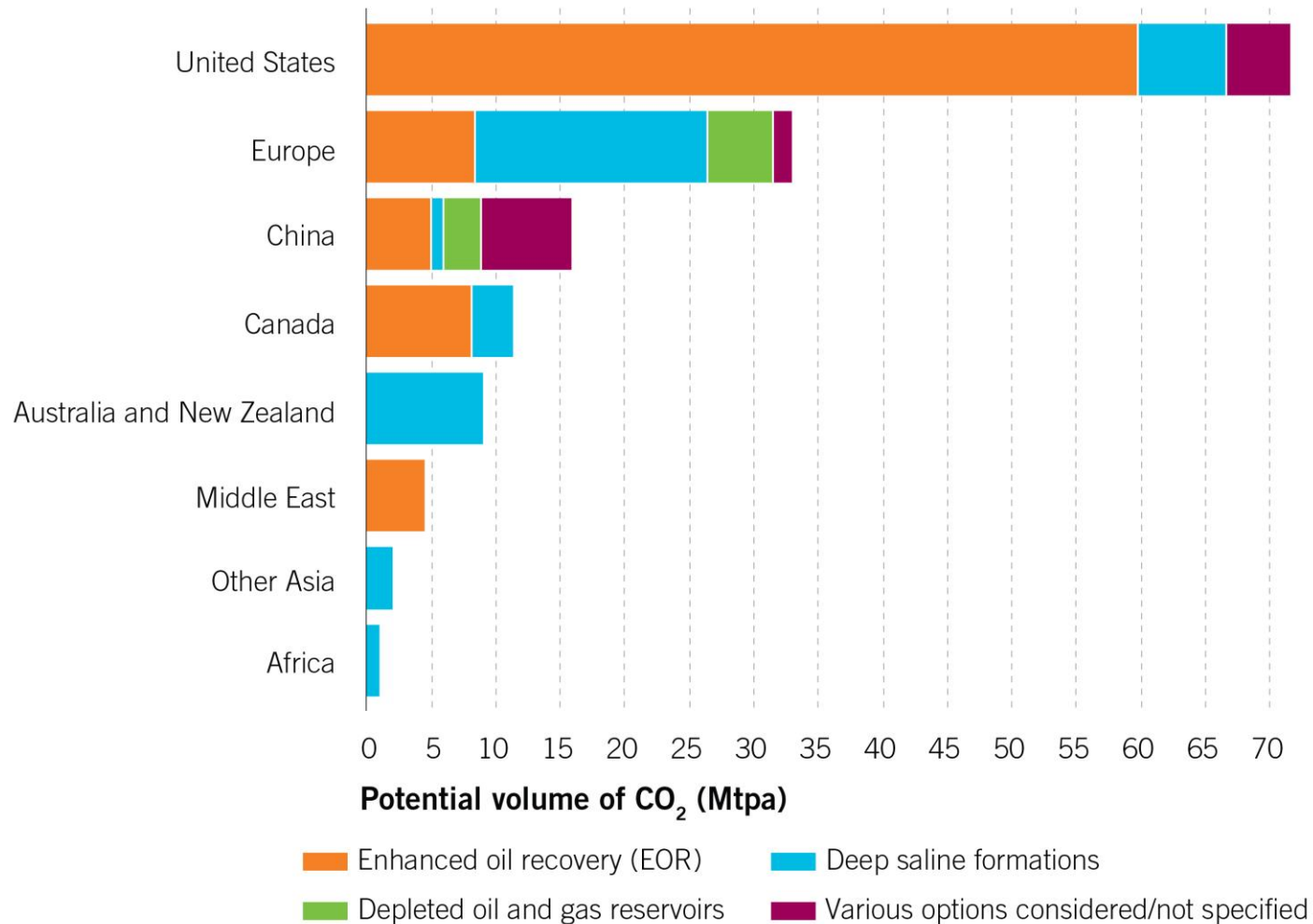
## LSIPs by capture type and region





# ENHANCED OIL RECOVERY BECOMING IMPORTANT IN SOME REGIONS

Volume of CO<sub>2</sub> potentially stored by primary storage type and region





# **BARRIERS MUST BE OVERCOME TO REALISE THE BENEFITS OF CCS**

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- Storage site selection and characterisation is a lengthy and costly process.
- Early storage exploration is critical for many projects to proceed.
- Majority of perceived risk in CCS projects is often associated with storage.
- Public understanding of CCS remains low.
- Need to bring down the costs of CO<sub>2</sub> capture through technology developments and demonstration.



# KEY MESSAGES

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## The Global Status of CCS: 2012

1. Action is needed now to ensure CCS can play a vital role in tackling climate change
2. CCS is already contributing, but progress must be accelerated
3. Slow progress but important developments
4. Encouraging policy support but more required
5. Barriers must be overcome to realise the benefits of CCS
6. Reducing the cost of technology through demonstration projects is vital
7. Acceleration of CCS depends on collaboration and knowledge sharing

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