CARBON CAPTURE AND STORAGE

International Energy Agency

Driving CCS deployment in industry

Presentation to the 5th CCS Regulatory Network meeting

Paris, 18 June 2013

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International Energy Agency

Outline

- CCS in industrial applications
  - A reminder of the importance
  - What is needed to drive deployment?
- Technology and demonstration
  - Where do we stand today?
  - Setting realistic goals
- Policies for deployment
  - Industry and power have different challenges
  - Trade exposure
  - Support mechanisms need to be tailored
- Recommendations

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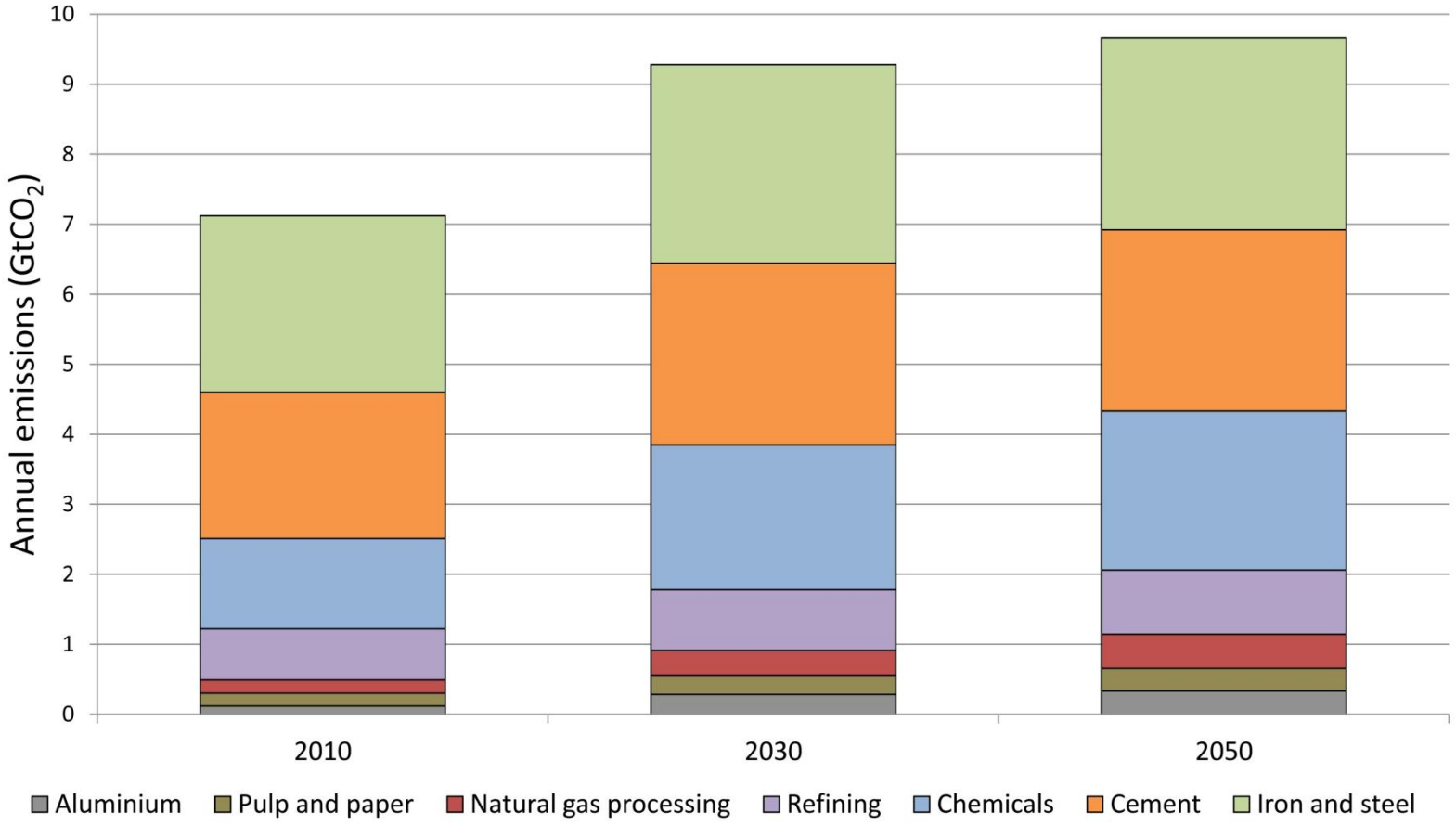
Cement/steel/refining/chemicals: 20% of global CO_2



CCS is the only known option to fully decarbonise many these sectors

Source: IEA ETP 2012 4DS, incorporating recent policy pledges

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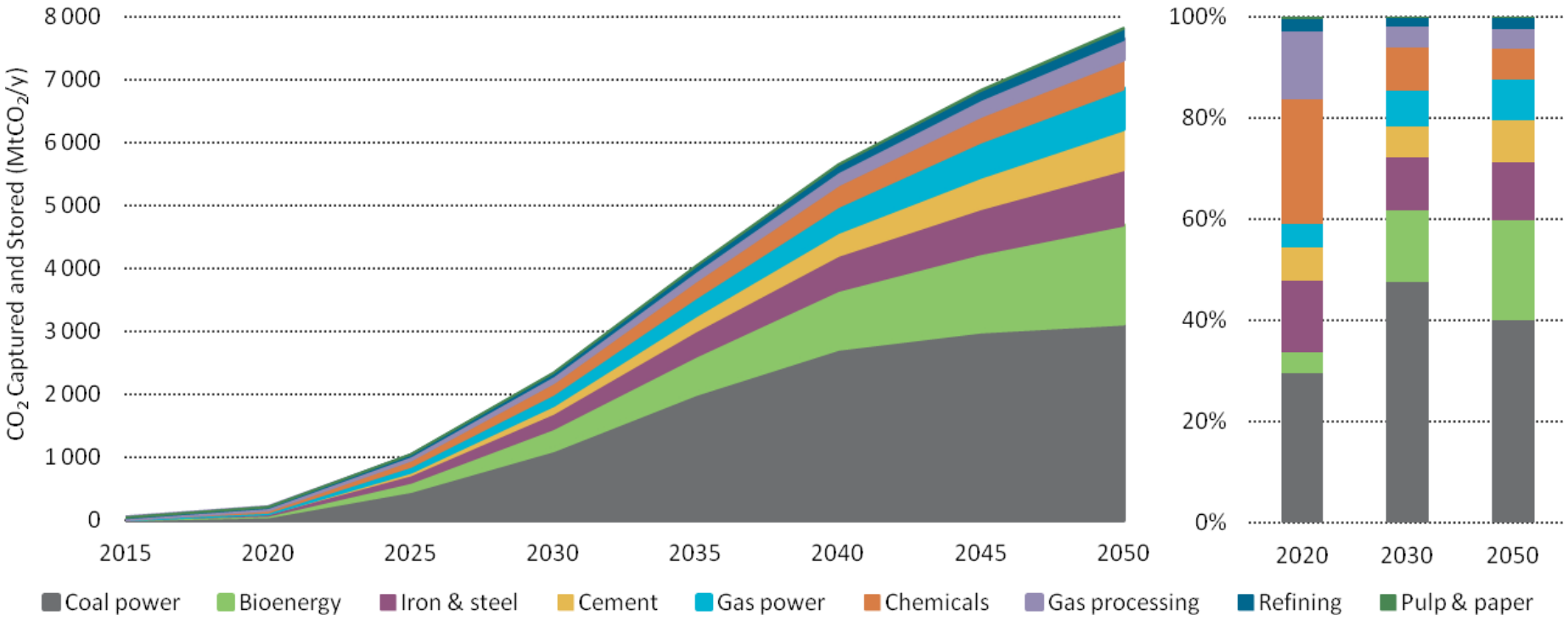
In the 2DS, 45% of stored CO_2 is from industry



All existing major projects today are in industrial applications: gas processing, chemicals and refining. This shows where the low-cost opportunities are.

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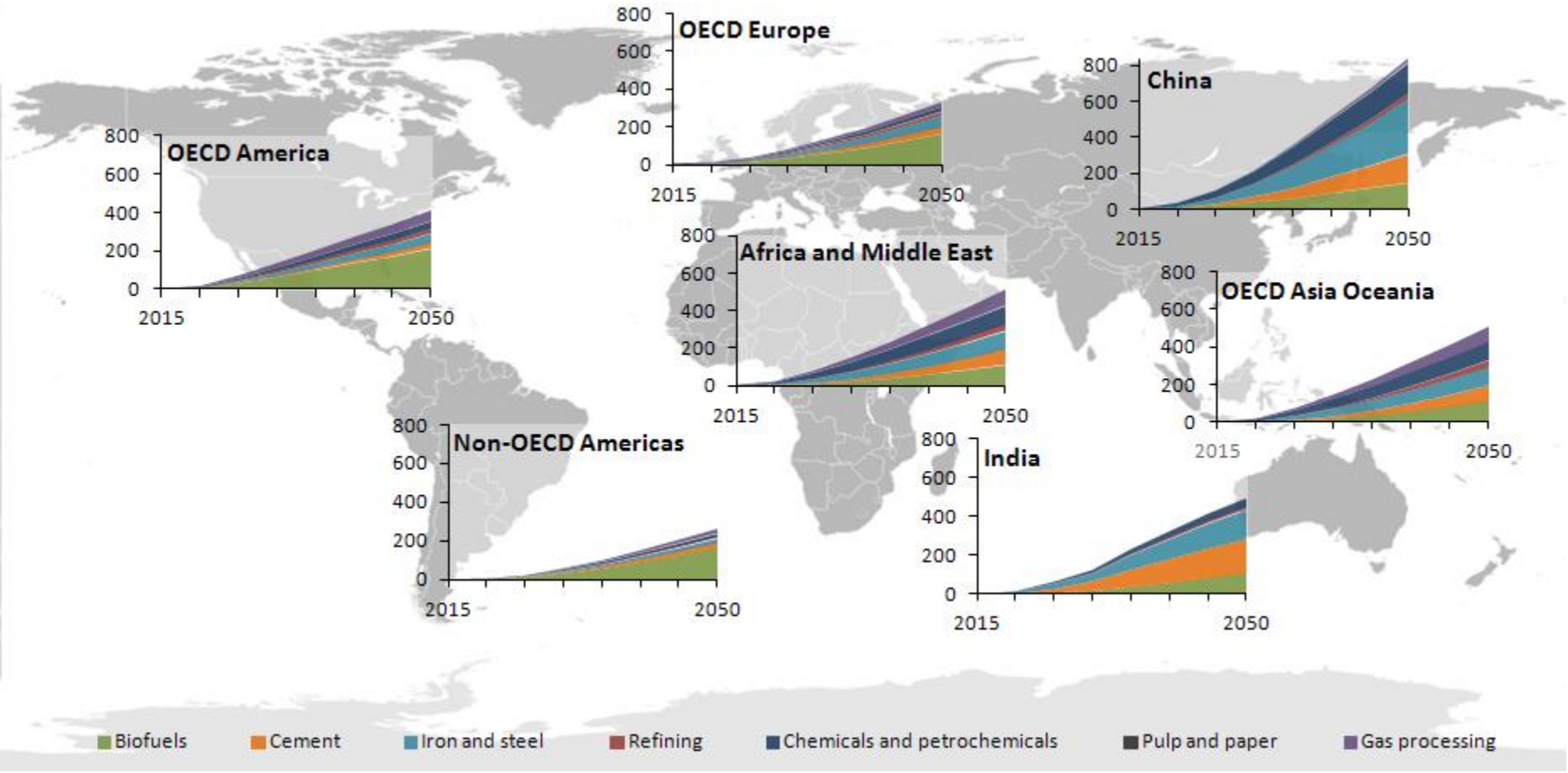
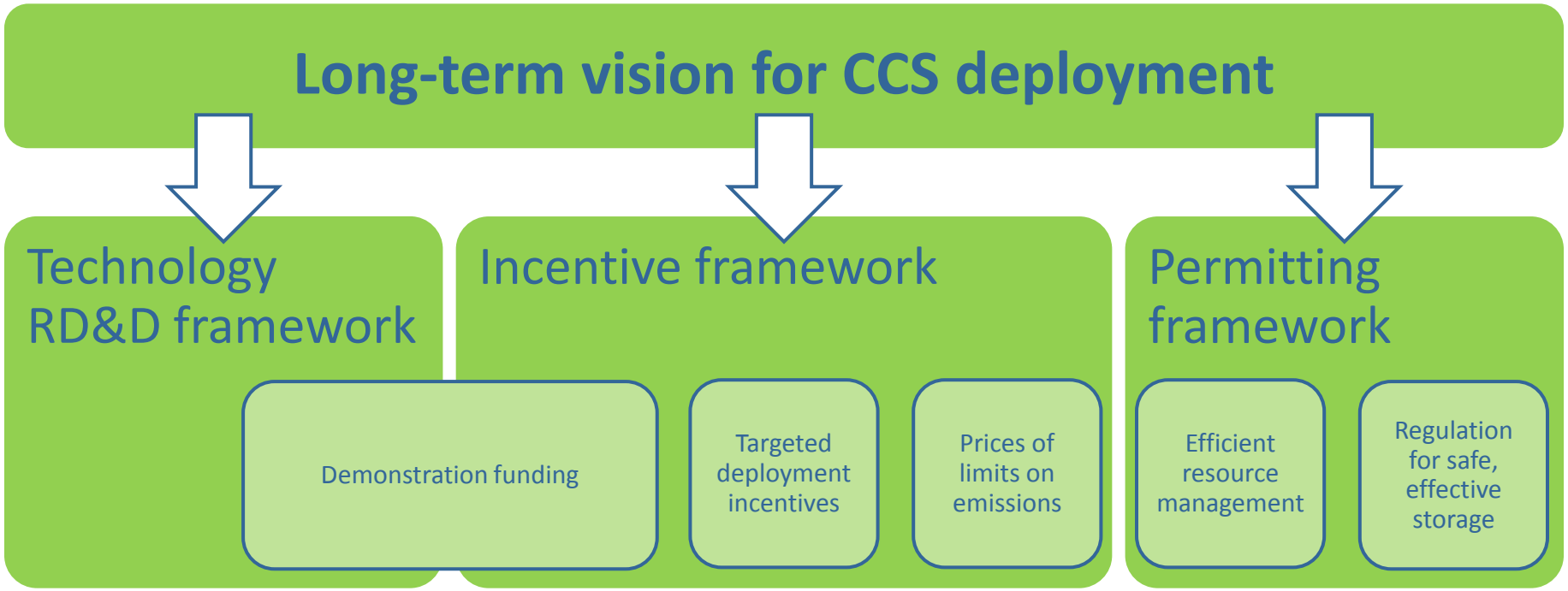
Different regions have different patterns in the 2DS



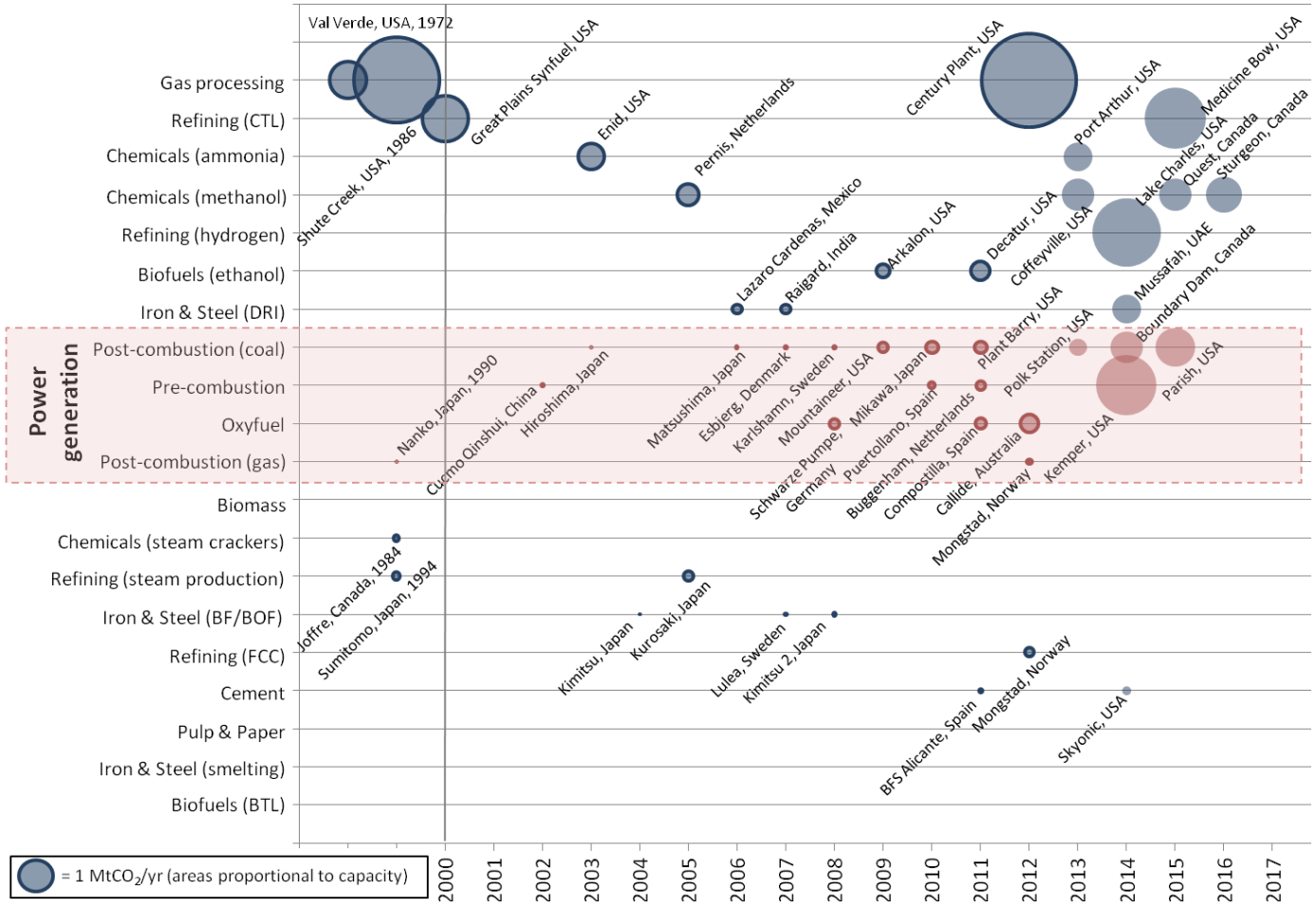
Source: IEA CCS roadmap 2013, forthcoming

What is needed to drive deployment?



All parts of the policy puzzle must be in place if CCS is to excel, starting with a clear vision for the future for CCS

Technology: where do we stand today?



There is a worrying lack of projects to advance technology for sectors such as steel and cement

Source: IEA report to the Clean Energy Ministerial 2013

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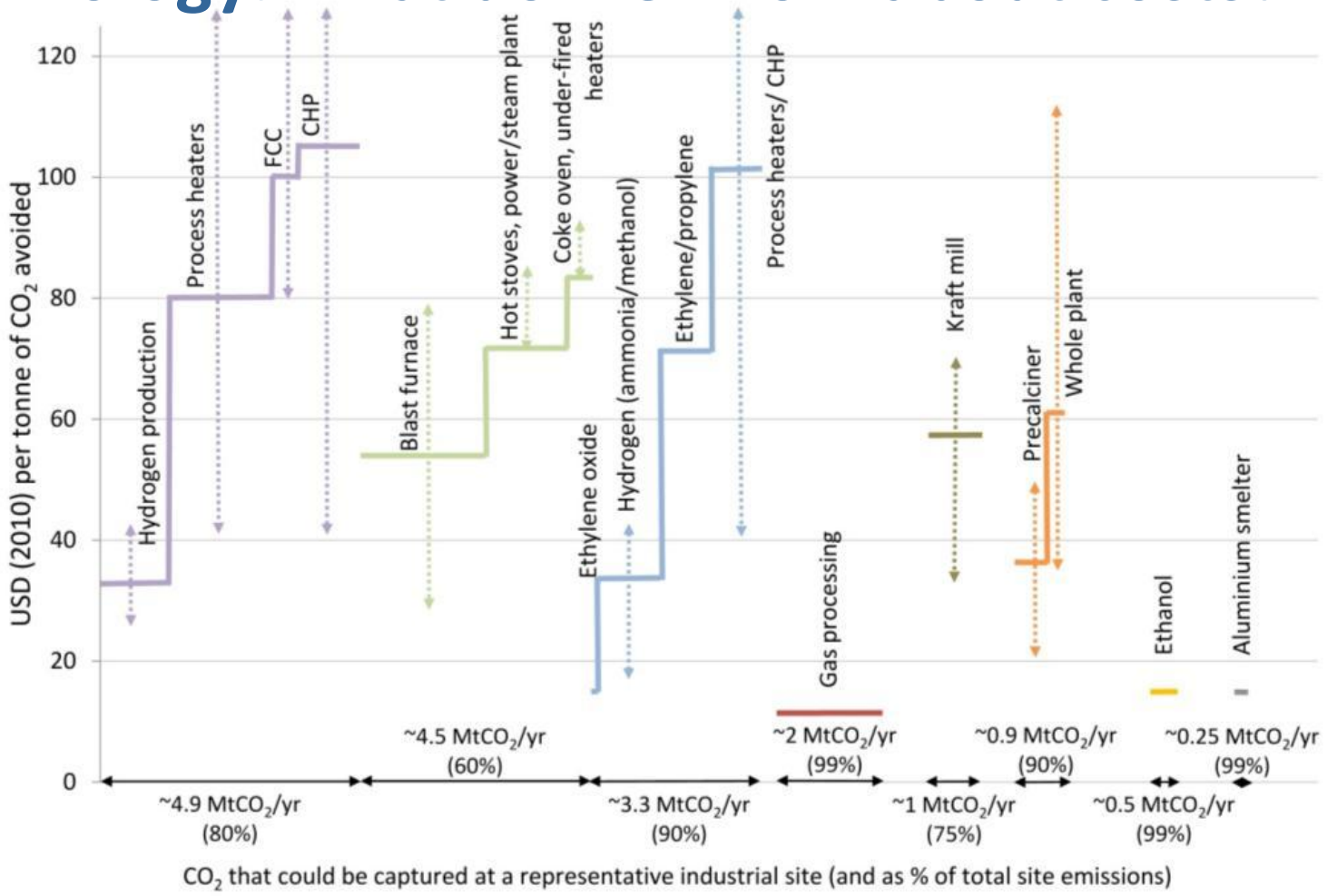
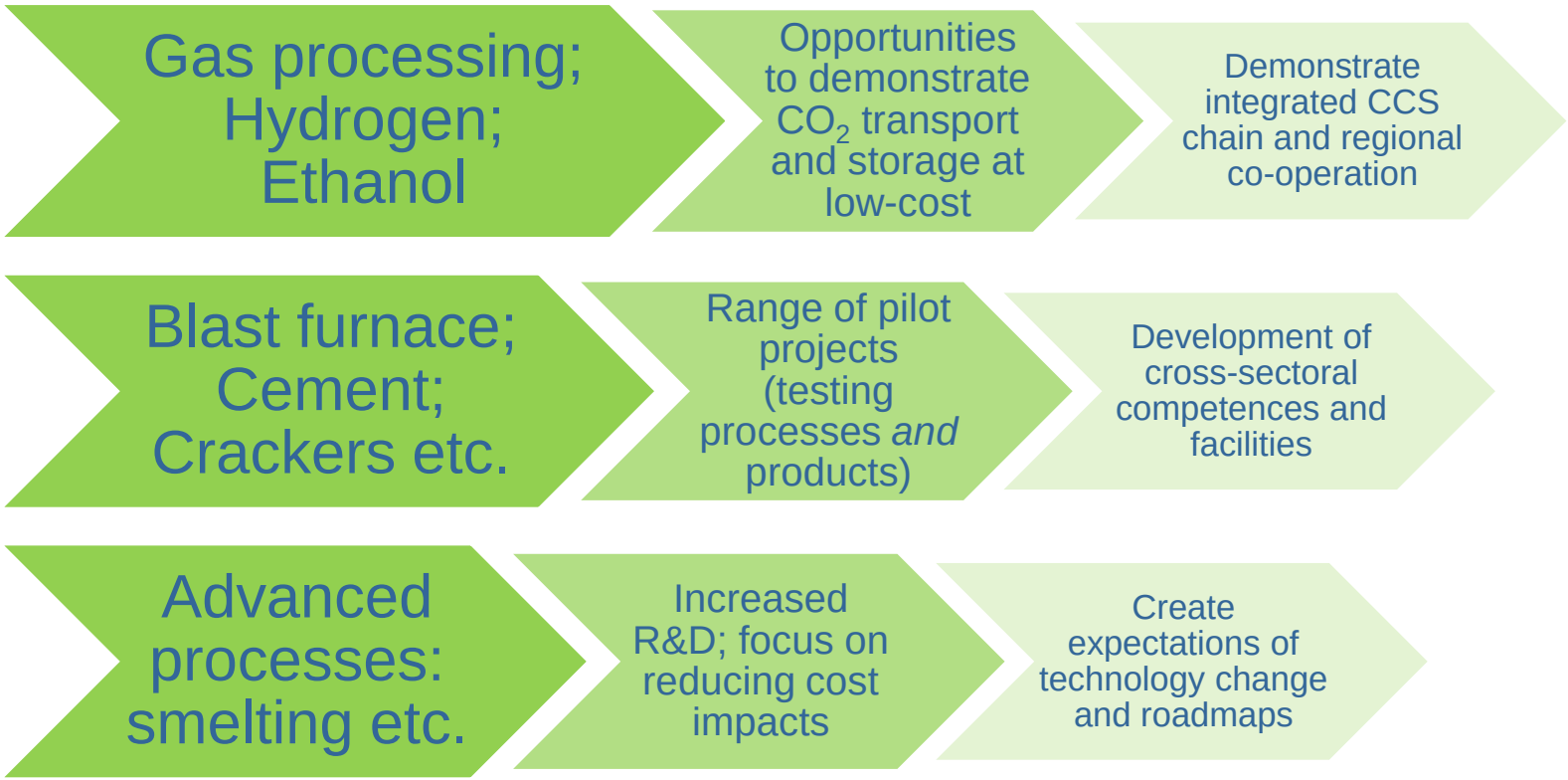
Technology: what do we know about costs?



Cost estimates vary widely between sites and within sites. Consensus is still evolving.

Source: IEA report to the Clean Energy Ministerial 2013

Technology: near-term needs



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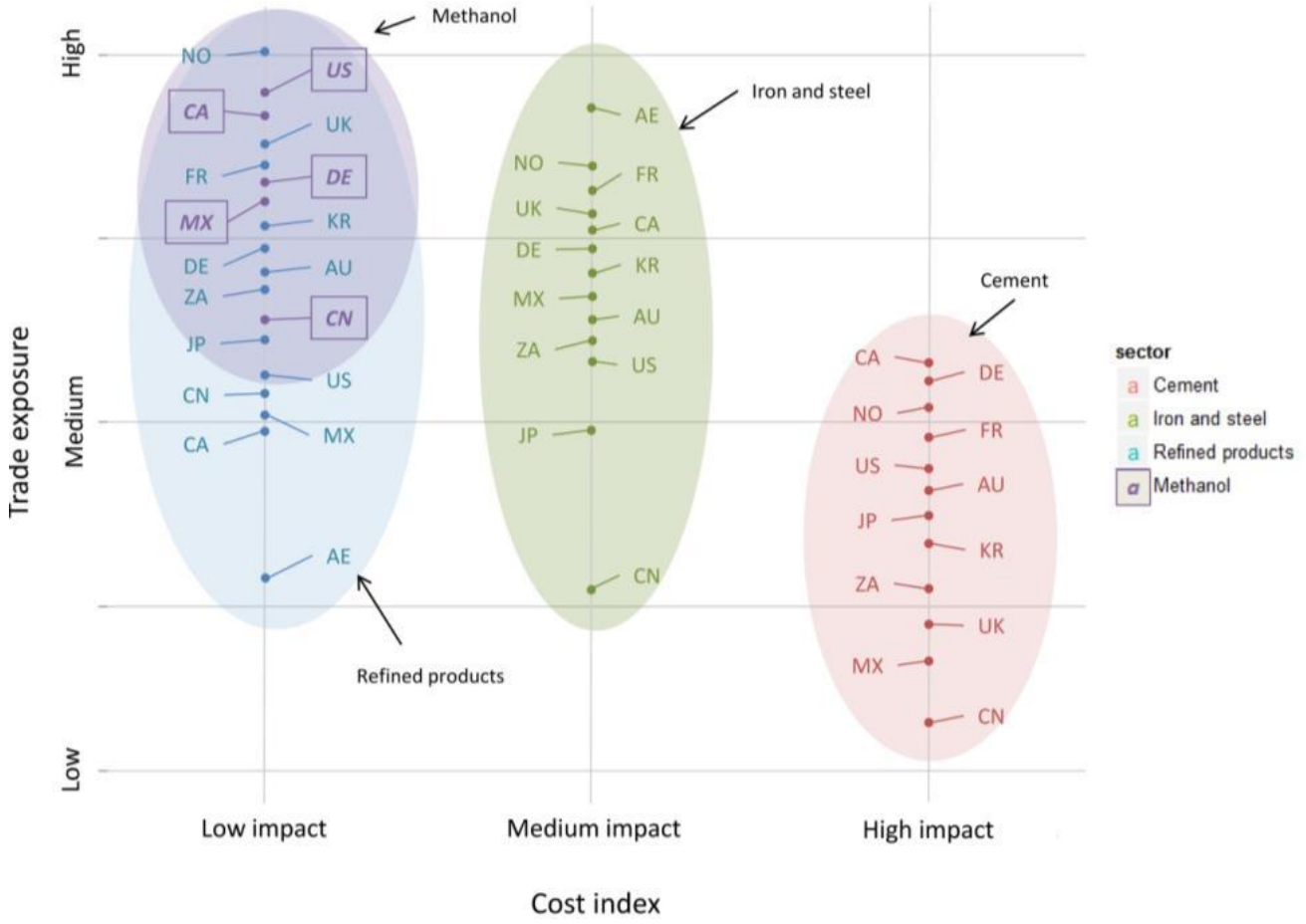
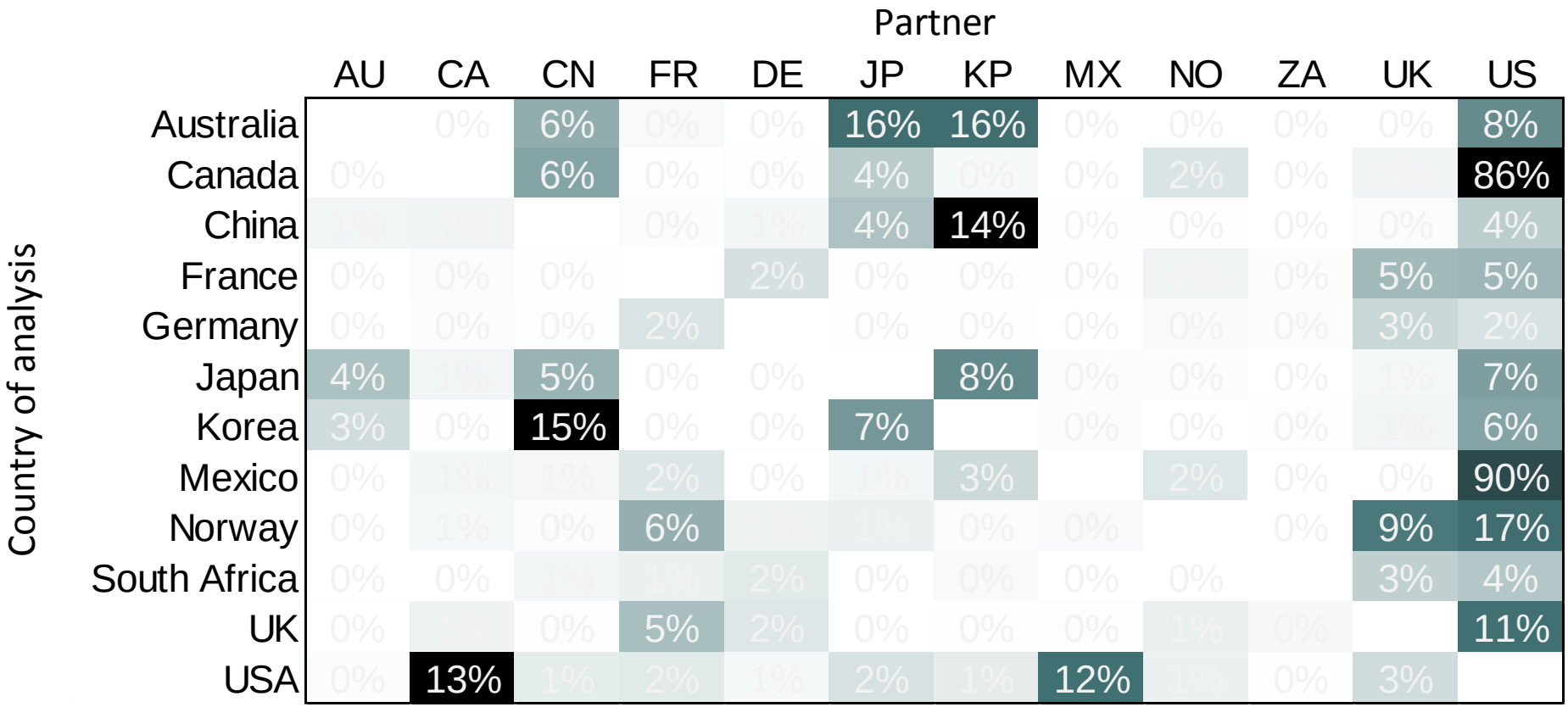
Why is progress challenging in these sectors?



No easy-wins. Industries with less exposure to trade are those with high additional costs of CCS

Source: IEA report to the Clean Energy Ministerial 2013
Cost index: impact of adding CCS to the production cost of a unit of output

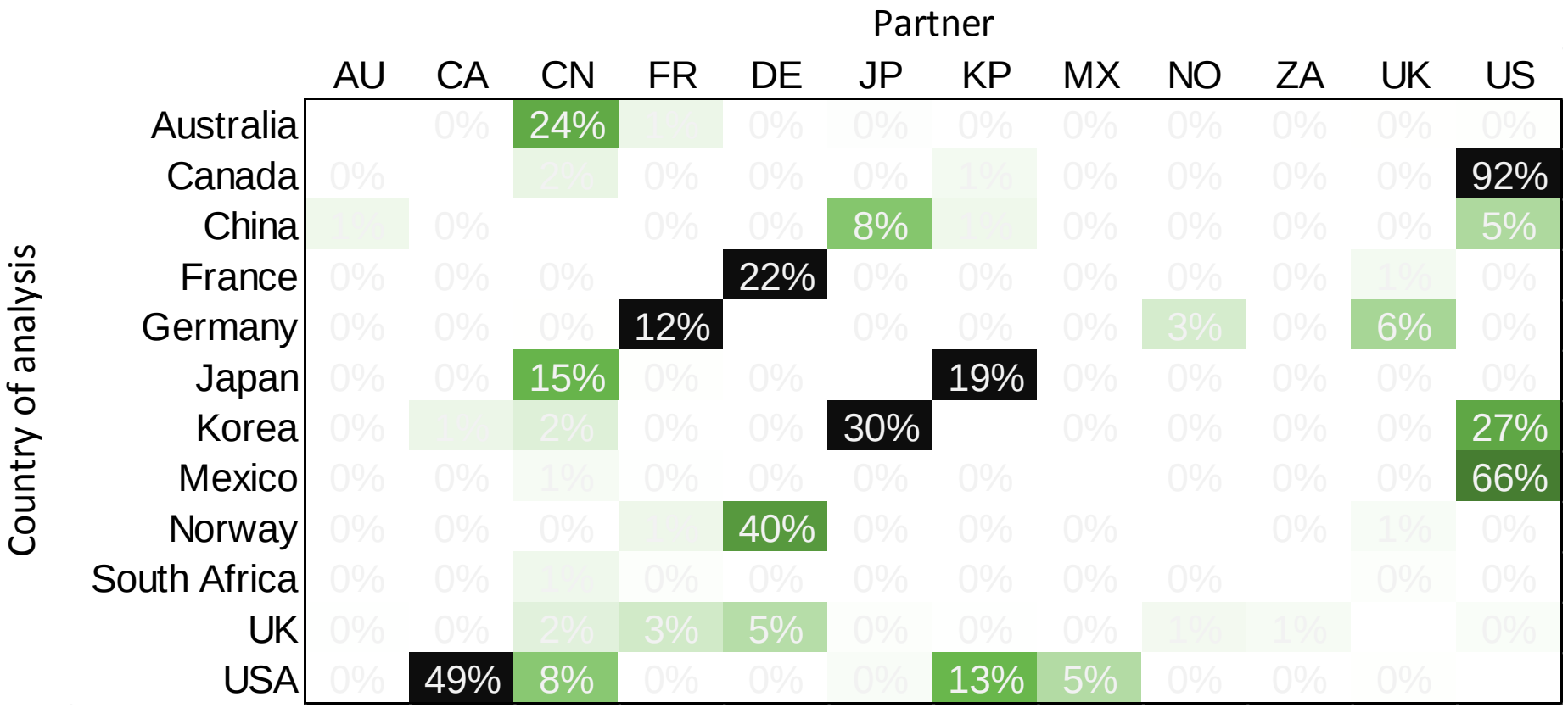
The benefits of cooperation: cement



Percentage indicates fall in trade exposure for the row country if policy was coordinated with the column country. Black indicates that the two countries are each others' most beneficial partner

Source: Vivid Economics

The benefits of cooperation: cement



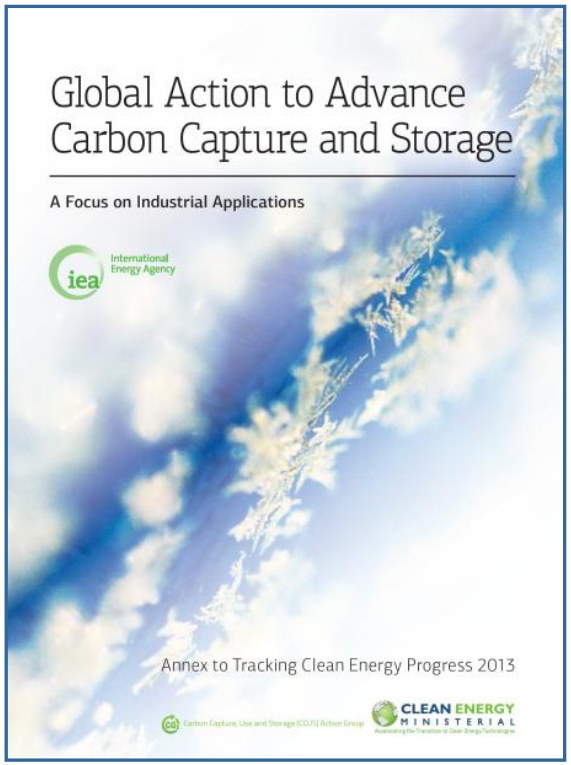
If countries work together on developing CCS policies for trade-exposed sectors, negative impacts and, potentially, subsidies, can be limited

Source: Vivid Economics

An approach to policymaking

- **Objective:** enable financing to flow to large-scale CCS projects with sufficient assurance of revenue such that carbon leakage and competitiveness concerns are mitigated.
- Good policy options are likely to:
  1. be cross-sectoral (reduce emissions at lowest cost)
  2. place delivery risk on projects (place CCS into a competitive market context)
  3. provide a continuous marginal incentive (potential to achieve beyond an EPS)
  4. be quantity-based (preferable where costs are unknown)
  5. share costs between public and private sector on the basis of trade exposure
- Different options depending on level of trade-exposure
  - Trade-exposed sectors/countries:
    - Government could hold reverse-auctions for fixed amounts of stored CO_2, transferring cost to private sector over time
  - Less trade-exposed sectors:
    - Feebates, portfolio standards are options. Depends on uniformity of traded product.

Recommendations to CEM governments



1. Commit public funding to ~10 pilot and demo-scale projects in cement, steel etc.
2. Support projects according to their contribution to knowledge (not immediate CO_2 emission reductions)
3. Incorporate CCS in forward-looking industrial strategies
4. Address competitiveness concerns of sectors in global competition
5. Better exploit synergies between sectors
6. Involve all industry sectors in actions to advance CCS

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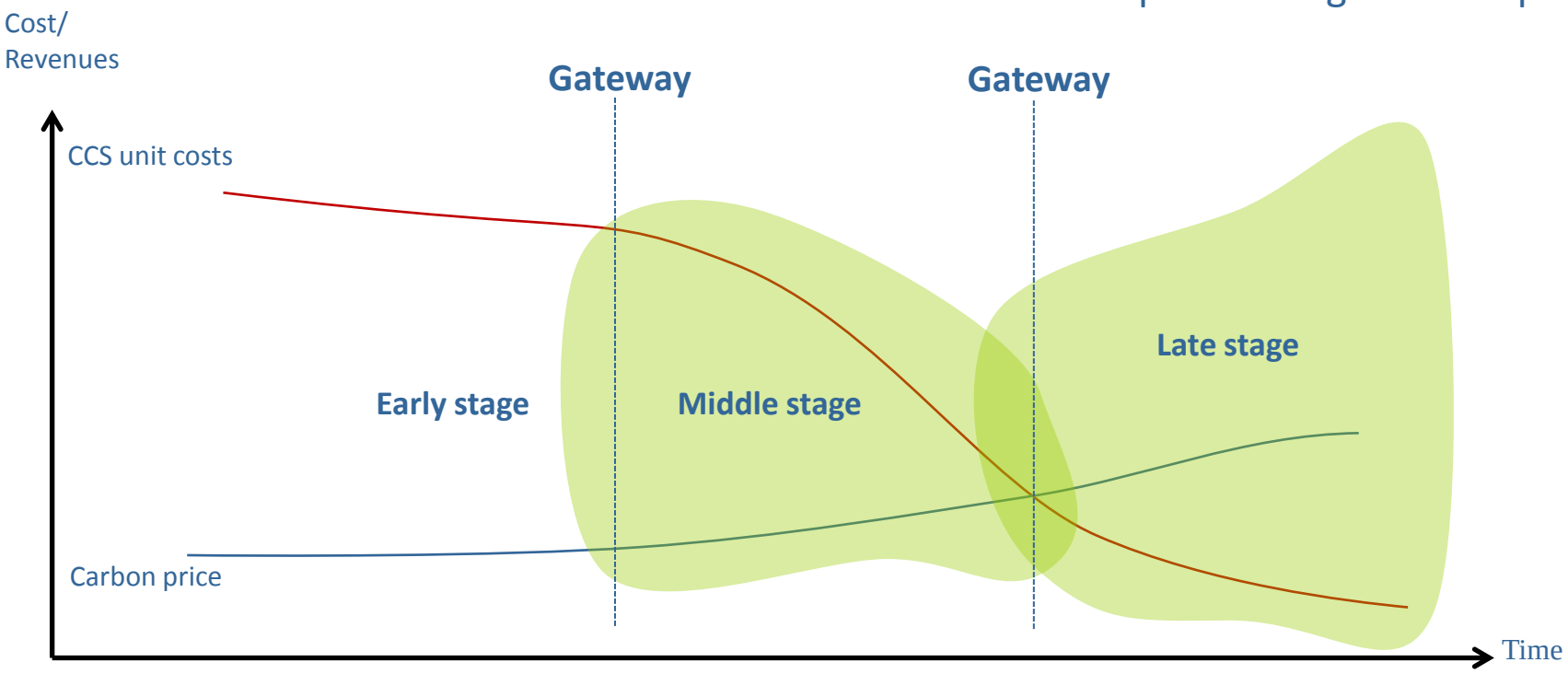
Thank you for your attention

Stepwise technology development is key to policy

As in the power sector, CCS policy in each industrial sector will pass through several phases



Initially, costs of CCS will be far higher than any (implicit or explicit) carbon price. Different policies are required for each stage, and defined gateways will be necessary to transition between them

Source: Vivid Economics