



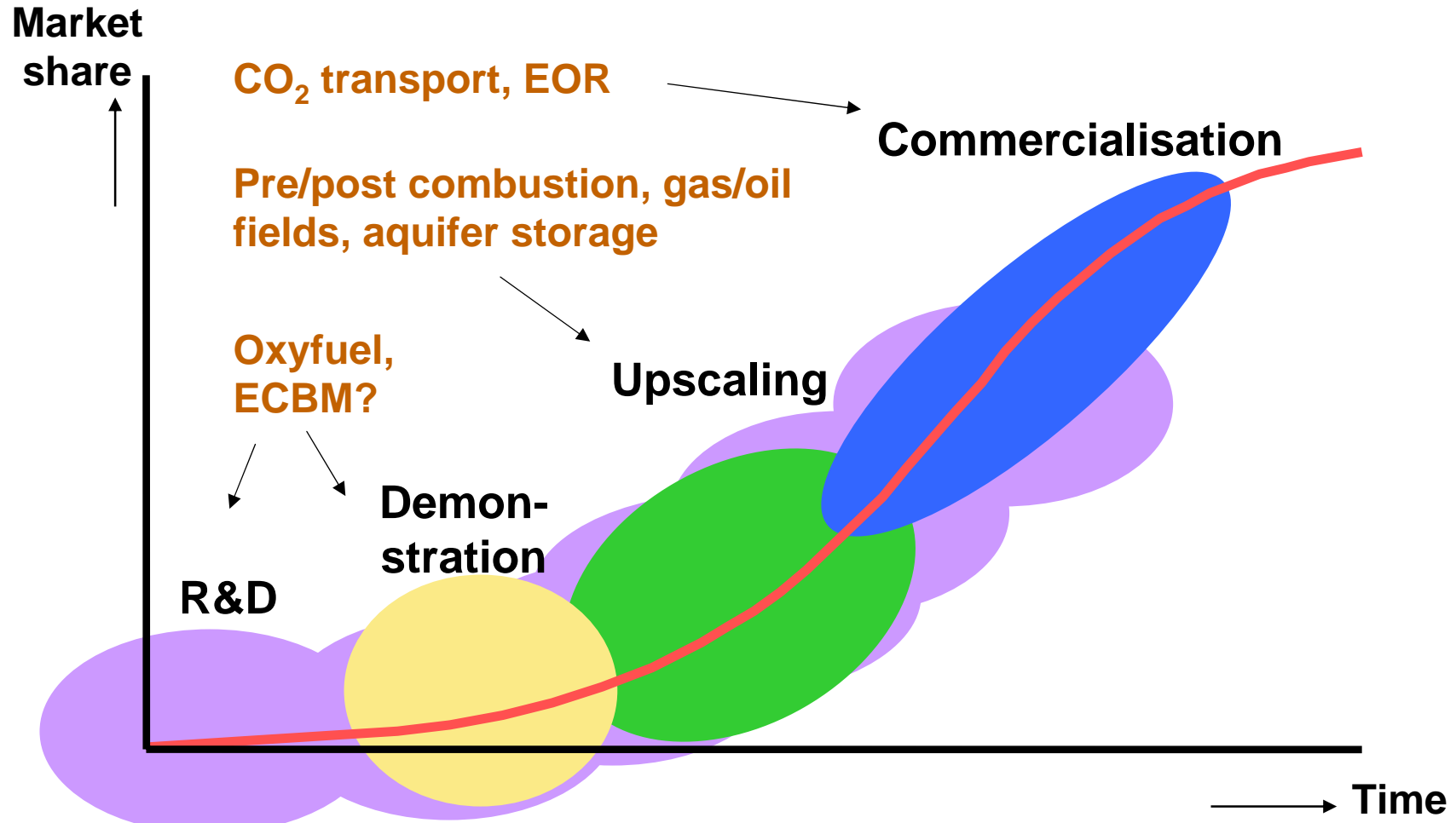
Energy research Centre of the Netherlands

Incentivising CCS in the EU

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Appropriate policy for innovation phase?



EU Emissions Trading Scheme

- Cost-effective instrument, if strong incentive given
 - However, if EUA prices remain low:
 - Preference for low-cost abatement options
 - Innovation market failure
 - ETS unlikely to lead to CCS deployment
- Need for complementary policies

Complementary policies

- Public financial support (most likely MS level)
 - Investment support
 - Feed-in subsidies
 - CO₂ price guarantee
- Low-carbon portfolio standard with tradable certificates (most likely EU level)
- CCS obligation (EU level)
- (Public-private partnerships)

Investment support

- Early demonstrations, pipeline network
- Most likely MS level, any sector
- Environmentally effective
- Reduction of financial uncertainty for operator
- Government has influence on investment decisions
- Possibly high costs
- Poor incentive for further innovation or cost reduction

Feed-in subsidies

- Widely applied to promote renewables towards commercialisation
- Most likely MS level, usually power sector
- Environmentally effective
- Reduction of financial uncertainty for operator
- Poor incentive for further innovation or cost reduction
- Risk of overshooting target and high costs

CO₂ price guarantee

- Buy CCS-generated EUAs at fixed price (high enough to set of CCS)
- Most likely MS level, any sector
- Environmentally effective
- Reduction of financial and CO₂ market uncertainty for operator
- Poor incentive for further innovation or cost reduction

Low-carbon portfolio standard

- Source minimum % of power from specified sources
- May be combined with tradable certificates
- Applied for renewables in some MS and US States
- EU level, power sector
- Environmentally effective if target is strong
- Incentive for further innovation and cost reduction
- Risk for operator (technological, financial, and availability of storage)
- Complex and administratively challenging

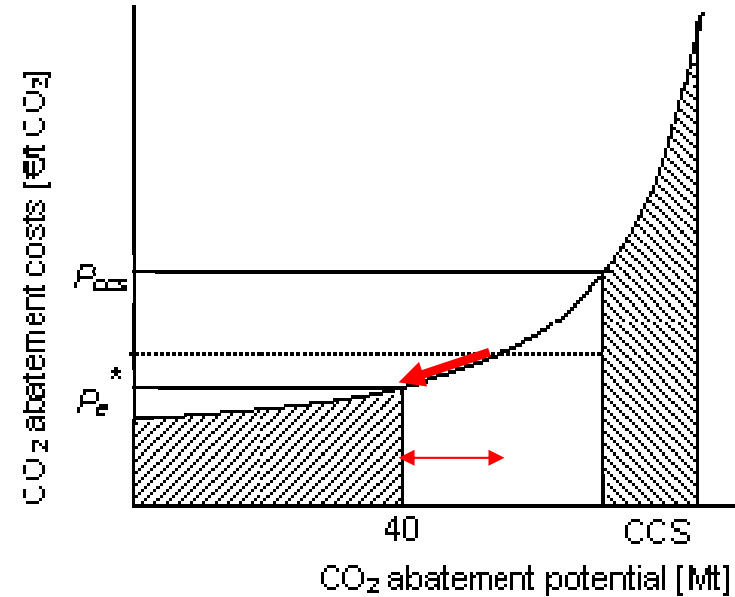
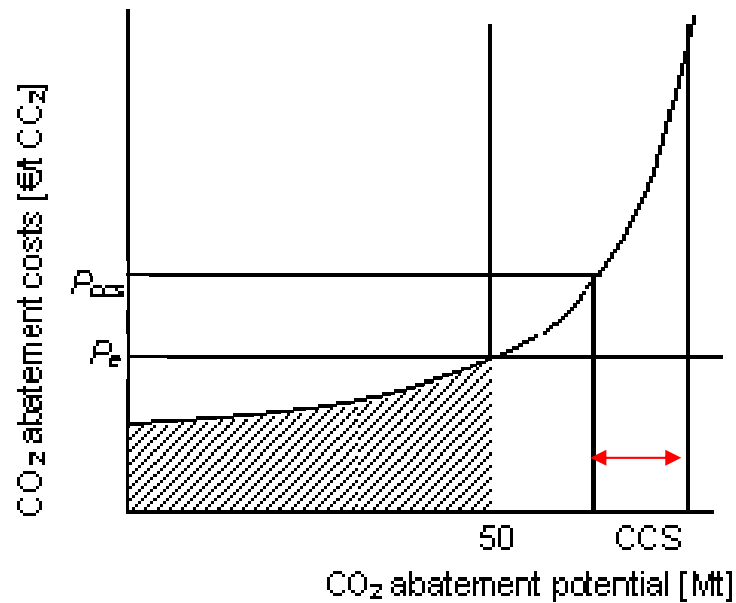
CCS obligation (2020 →)

- Also e.g. retrofit (2020-2040), capture ready (2012→)
- Targeted sector: power and/or other point sources
- EU level, any sector (but likely power sector)
- Environmentally effective
- Strong incentive for further innovation and cost reduction
- Easy to monitor and determine compliance
- Risk for operator (technological, financial availability of storage)

Public private partnerships

- Not enabling full CCS,
- Potentially useful for realising pipeline infrastructure
 - if there are efficiency gains on supra-MS scale
 - if it is beyond interest individual industries or projects
- Possible analogues to Trans-European Energy Networks

Interaction additional incentives ↔ ETS



Interaction additional incentives ↔ ETS (ctd)

- MS incentives small scope; less market impact
- *Any* additional instrument will reduce demand for EUAs and lower CO₂ market price *unless* cap is lowered accordingly

→ *Lower cap in MS*

→ *New entrants: no allowances*

Other interactions

Renewable energy:

Diversion of resources + attention

→ *% renewables contingent on CCS implemented*

Innovation:

Cost reduction discouraged

→ *Portfolio standard, obligation*

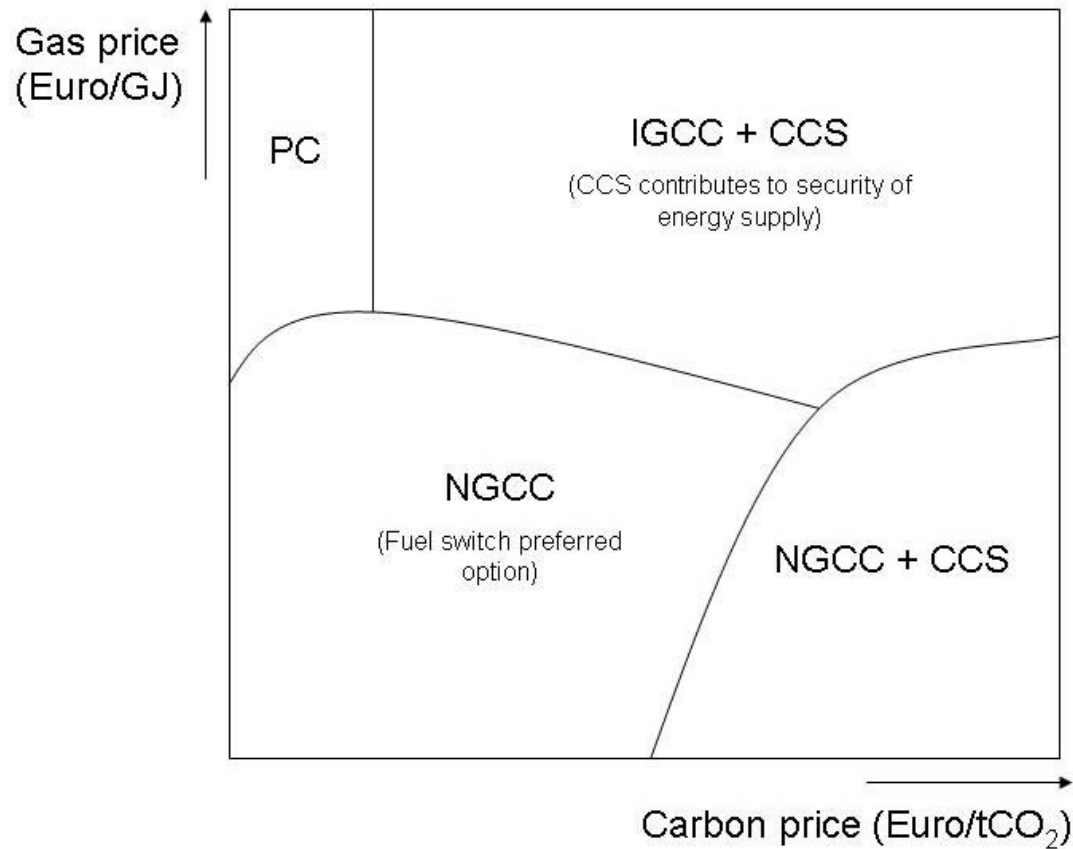
Electricity market:

Technical reasons for placing CCS as baseload option,
however O&M cost lead to higher electricity price

Security of energy supply:

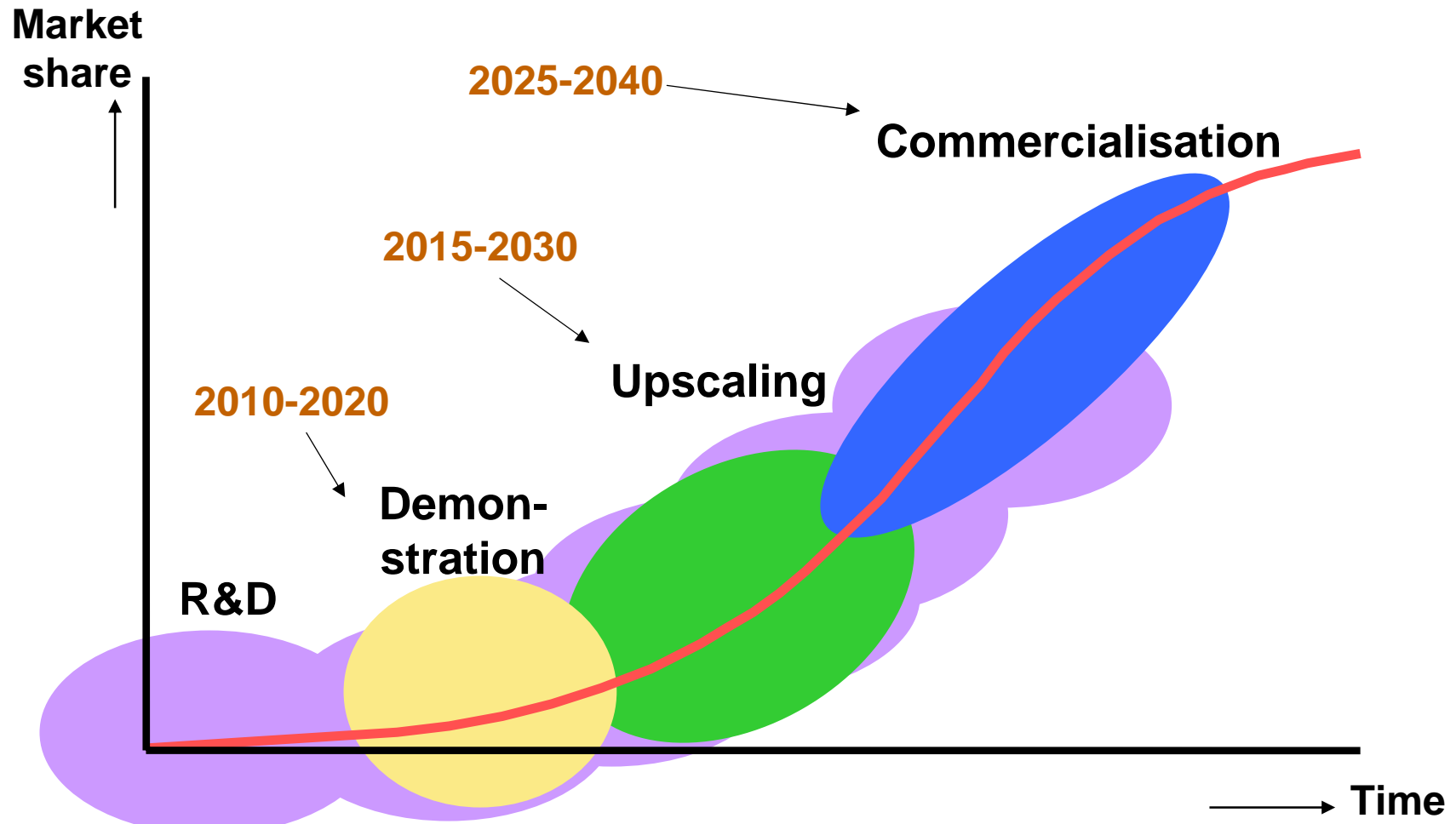
CCS only contributes if gas prices spur a shift to coal, and CO₂
prices are high enough for CCS

Impact CCS → security of supply



(Damen 2007)

Timing of policies



Timing of policies

| | Demonstration | Up-scaling | Commercialisation |
|---------------------------------|---------------|------------|-------------------|
| | 2010-2020 | 2015-2030 | 2025-2040 |
| ETS (weak) | Yes | Yes | Yes |
| ETS (strong) | Yes | Yes | Yes |
| Investment support | Yes | No | No |
| Feed-in subsidy | Yes | Yes | No |
| CO ₂ price guarantee | Yes | Yes | No |
| Portfolio + certificates | No | Yes | Yes |
| Obligation | No | Yes | Yes |

Multi-criteria analysis

| | Effectiveness | Risk + cost burden | Consistency | Feasibility (NGO view) |
|---------------------------------|---------------|--------------------|-------------|------------------------|
| ETS (weak) | - | 0 | + | + |
| ETS (strong) | + | + | + | +/- |
| Investment support | + | - | 0 | - |
| Feed-in subsidy | + | - | 0 | - |
| CO ₂ price guarantee | + | - | 0 | - |
| Portfolio + certificates | + | + | 0/- | +/- |
| Obligation | + | + | 0/- | + |

Conclusions

- ETS cost-effective incentive for CO₂ reduction, however market failures and low prices may hinder CCS deployment
- Additional incentives needed to advance large-scale CCS deployment
- MS policies may tend to divert resources from renewables, place financial risk with national governments and do not provide incentives for innovation
- EU-wide structural policies preferable, possibly complemented by MS policies in demonstration phase
- Revision of State Aid rules required
- Interaction with ETS requires cap adjustment

Remaining questions

- What is the most efficient way of building CO₂-transport infrastructure in the EU?
- Where would an obligation leave EU countries without much CO₂ storage potential?
- How would companies deal with costs of obligation – transfer to consumers, or pay?
- Is it technically possible to have peak-load CCS only?
- Can a CCS-proof renewables policy be designed?

Thank you

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