Incentives and regulatory frameworks influence on CCS chain establishment

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To facilitate and accelerate the development of a CO$_2$ value chain, governments should adopt incentives schemes and/or regulations that encourage stakeholders to initiate CCS and CO$_2$-EOR projects.
CO$_2$-EOR as an early opportunity for CCS deployment:

- Increase state’s revenues, increase energy security, can stimulate the entire CCS chain...
- However, need to create sufficient value for delivered CO$_2$ to justify the costs of capture and transport and subsequently a market for CO$_2$ storage
- Need to mitigate/remove economic and non-economic barriers:
  - Economic barriers; currently not viable? need for financial support?
  - Non-economic barriers: need to build infrastructure, to facilitate/accelerate the granting of permits etc....
The Storage Directive*

Compliance with the EU ETS scheme


**The Environmental Liability Directive (ELD) applies only in narrow circumstances and provides that liability is statute barred after 30 years
Regulations on storage

- Sorting out who will be responsible for what
- Long-term liability is a core issue
- Adapting existing policy to accommodate capture, transport and storage of CO₂
<table>
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<tr>
<th>Regulations for CCS in EOR-operations</th>
<th>Incentives</th>
<th>Description</th>
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<tr>
<td></td>
<td>Earmarked revenues</td>
<td>Earmark additional revenues to the State arising from the increase of oil produced though CO₂ for EOR for further investments in CCS</td>
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<td>Allows to finance the establishment of pipeline infrastructure, research, site selection etc</td>
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<td>Plan for Development and Operation. EOR ready- EOR retrofit</td>
<td>Set as a condition in the POD that CO₂ injection for EOR has been assessed and considered. Require, when applicable, a condition of “EOR ready” for new fields and “EOR retrofit” for existing fields</td>
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New incentive

Are these existing policies or new recommendations?
Financial security and liability

• Improve and clarify the liability regime between actors in the CCS chain
• Directive: each part of the CCS chain is liable to surrender allowances for the part of emissions occurred under their activity (producer, capturer, transporter, storage) = polluter pays principle.
• Challenging in a cross border context as an installation (pipeline or storage) can cross several MS: to which state will the installation (activity) have to surrender allowances in case of leakage? And what is the reliability of detecting leakages?
• The transfer of responsibility does not cover everything: Operators can still incur liabilities from certain sources after transfer and if operator is in fault. The state can also postpone the transfer..
• MS should try to close off some of these uncertainties (provide for ex that the operator’s liability can not be revisited after site transfer)
• Financial security: Commission’s consultants have estimated likelihood of leakage, size etc. And found that for a 54MT 40-year storage site, the cost of FS to operator would be maximum 20 million euros, - or less than 50 cents/tonne.
<table>
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<th>CCS- Liability issues</th>
<th>Recommendations</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Cross border liabilities</td>
<td>Define guidelines for allocation of risk between countries in cross border projects (cross border pipelines, cross border storage sites and ships transporting CO$_2$)</td>
<td>Encourage countries to involve in cross border projects by giving certainties regarding the allocation of EUA in case of leakage.</td>
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<tr>
<td>Long term liability/transfer</td>
<td>Favor the transfer of all liabilities, including liabilities to third parties</td>
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<td></td>
<td>Define mechanism to avoid the delay of transfer to the State</td>
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<tr>
<td>Trust Fund</td>
<td>Establish a Trust Fund to mutualise responsibility of storage operators</td>
<td>To be established either at national of EU level and financed by operators by way of a fee per tonne of CO$_2$ injected.Fund to be used to cover liabilities or expenses not already covered by the financial guarantee and any other liabilities that are excluded from the transferHow relevant is it really?</td>
</tr>
<tr>
<td>Financial guarantee/contribution</td>
<td>Clarify whether the constitution of a Financial Contribution and Financial guarantee are applicable for CCS for EOR</td>
<td></td>
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</tbody>
</table>
If CCS works, CO$_2$-EOR will work!

• The challenge is to find the most efficient measures while avoiding the risk of accumulation of subsidies to fossil fuel and while reducing the financial burden on State’s budgets.
• The ideal would be to have the same incentive scheme applicable to all CCS projects, including CO$_2$-EOR projects at least in the medium and long term.
• If a specific scheme for CO$_2$-EOR is introduced there is a need to limit them in time and to avoid accumulation of subsidies.
Emission credits for CCS

In the long run (2025-2030), it is expected that the price of emission credits and cost of CCS will meet. When this happens, CCS is considered commercially mature.

The ETS regulative was augmented so that CO$_2$ captured and stored is considered not emitted. This gives an incentive to invest in CCS.
Financial support to encourage early movers

- Substantial industrial experience exist for all individual parts of the CCS value chain, but large-scale experience is very limited.
- Demonstration at near-commercial scale is needed to discover and gain financial and technical confidence.
- Learning effect of demonstration program is higher when the demonstration programme is carried out at the European level.

Status:
- NER300: Revenues from auctioning of 300 million emission credits from new entrant reserve earmarked to finance 10-12 demonstration plants.
- 1.05 billion EUR from EU recovery package.
- Structural funds.
- 20% of Norway`s contribution through EEC earmarked for CCS projects.
Improving the Emission Trading System

Reducing the cap, stabilising the price
What do these two lines signify? Need a descriptor for each

Eric Drosin; 08.10.2010
Carbon price floor

EUR/t

2010

2025

EUAs + carbon tax (tax back in fund?)

ECCE
European value chain for CO2
Establish a ‘shadow’ carbon price for power sector without taxing it
Emission Performance Standard

- EPS means setting a maximum amount of CO₂ allowed from power generation or industrial processes
- In effect, this rules out unabated (large-scale) use of fossil fuel
- US: California and Washington state already have EPS, promising results
- A clear, unambiguous, technology-neutral signal to industry and investors

Status:
- The proposal passed the environmental committee of the European Parliament in Oct 08, but only NL and DK supported it in the EC
- Process to introduce it into the Industrial Emissions Directive (regulating large emitters)
<table>
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<tr>
<th>Financial Incentives</th>
<th>Description</th>
<th>Comments/recommendations</th>
<th>Are these existing policies or new recommendations?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current General incentive Schemes applicable to all CCS project</td>
<td>Emission Trading Scheme/ EU subsidies/ States subsidies</td>
<td>Insufficient incentives to encourage wide deployment of CCS. Recommendation to establish incentive schemes common to all CCS projects, including EOR projects, to encourage a wide portfolio of CCS projects. If not politically feasible, specific incentives for CO$_2$ for EOR to be considered as a fall-back for a given time (time to be clearly defined).</td>
<td>Existing policies EU policy National policies</td>
</tr>
<tr>
<td>Additional General incentives to be considered (example)</td>
<td>Capacity Market</td>
<td>Stimulates CCS investments and gives predictability to investors</td>
<td>New Incentive - Adaptation of traditional FCM</td>
</tr>
<tr>
<td>Bonus Malus Schemes</td>
<td>Scheme directed towards CO$_2$ producers. Power plant emitting under a specific norm are rewarded (bonus). Power plant emitting above a specific norm are penalized (malus)</td>
<td>Creates long term predictability for a high price on CO$_2$ emission in the power sector</td>
<td>New Incentive - Suggested by the Netherlands’ CCS task force recommendation</td>
</tr>
<tr>
<td>Reward stored volume of CO$_2$ for permanent storage through delivered CO$_2$ price support</td>
<td>Directed toward storage operators</td>
<td></td>
<td>New incentive</td>
</tr>
<tr>
<td>Specific tax incentives for CO₂ for EOR</td>
<td>Options to consider</td>
<td>Tax exemption/tax reduction</td>
<td>Applicable only for a kick-off period – until sufficient EOR projects have created a market for CO₂ storage. To be reviewed if more general CCS incentives are introduced. Need to avoid accumulation of subsidies. Verify compliance with State aid rules</td>
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<tr>
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<td>Options to consider</td>
<td>Tax exemption/tax reduction</td>
<td>Grant tax exemption or reduction for all oil produced through CO₂ for EOR Alternatively only for a specific volume of oil produced through CCS for EOR</td>
</tr>
<tr>
<td></td>
<td>Period of depreciation</td>
<td>Shorten depreciation time on investments directly tied to the use of CO₂ for EOR</td>
<td>Gives lower taxable income in the period from initial investment to full write down and consequently a lower up-front taxation</td>
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<td>Tax credit</td>
<td>A tax credit could apply to all costs associated with installing the CO₂ flood, CO₂ purchase and CO₂ operating costs</td>
<td>With a tax credit of 15% granted, the remaining 85% of qualifying costs would be depreciated normally</td>
</tr>
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<td>Modification of the tax basis</td>
<td>Base taxation on the achieved oil price in the market place rather than on an averaged fixed price</td>
<td>Enables companies to hedge their production and reduce further risk by selling oil on forwards contracts without being taxed based on a potentially higher average fixed price assessment than actually achieved</td>
</tr>
<tr>
<td>Organisation of the Value chain</td>
<td>Issue</td>
<td>Recommendations</td>
<td>Comments</td>
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<td></td>
<td>Buffer location</td>
<td>Clarify the regime of buffer location to avoid any significant risk of leakage and environmental health risks Clarify Third party access to buffer location</td>
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<td>Vertical integration/ Versus independent TSO</td>
<td>Assess the potential effects of vertical integration on competition. Consider the establishment of independent TSO MS to ensure transparency and non-discrimination in the access to infrastructure (information and condition of access to be published)</td>
<td>Need to avoid situation of ownership structure resulting in competition distortion Independent TSO could manage capacity allocation and coordination of CO2 flows.</td>
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<td></td>
<td>Third party access</td>
<td>Need to clarify the circle of those who are entitled to require access to transport and storage network Clarify access to buffer location Use approach of EU gas legislation Stimulate TPA through the assessment of the PDO</td>
<td>Need for flexible mechanism as infrastructure not yet established. The Norwegian petroleum concession system gives the competent authority the legal basis for stimulate third party access through injunction and prohibition when assessing the POD</td>
</tr>
</tbody>
</table>
Clarity and pre-visibility required from investors
Clear policies
Financial support necessary for at least the first movers
Avoid multiplication of subsidies to fossil fuel
To enable support schemes to be effective, address access to transport and storage network

Thank you for your attention!
Improving the Regulatory Framework, optimizing organization of the CCS value chain and financial incentives for CO$_2$-EOR in Europe

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Abstract

This article provides recommendations for improvements of the regulatory framework that is deemed necessary to facilitate the establishment of CO$_2$ value chains in the near term. The recommendations address liability issues, cross border regulations and emission trading schemes (like EU ETS). Recommendations for an overall organization of the value chain in terms of access rights, trans-boundary transport and storage of CO$_2$ and rules for utilization/capacity allocation are also made.

A range of financial incentives for CCS and CO$_2$ for EOR are reviewed. The article