Minimum requirements for the implementation of EU CCS demonstration projects

European Technology Platform for Zero Emission Fossil Fuel Power Plants
A stable, long-term framework must be in place to create strategic alignment for CCS

- ZEP supports EU CO$_2$ reduction targets of 20% by 2020 (aspiring to 30%) and 60%-85% by 2050
- This must be reflected in the energy policy targets of Member States
- Key requirements for the development and implementation of CCS are:
  - Suitable geological conditions for CO$_2$ storage
  - Implementation of the Storage Directive in Member States
  - A sound business case
  - Public and political support

*Industry is willing to develop and implement CCS as a critical carbon mitigation technology if all requirements are fulfilled*
Key milestone in project development is the Financial Investment Decision (FID)

- FID is the final step for authorising capital expenditure with the consent of shareholders, in accordance with the corporate governance rules of investors/privately-owned companies
- Each CCS demo project requires capital expenditure of several 100 million up to 1 billion+ Euros and additional operating costs; plus financial obligations for CO₂ storage
- FID requires a sound business case (incl. all costs and deadlines), profitability analysis and risk evaluation
- Financial aid criteria for integrated CCS projects have a substantial influence on FID
Prerequisites for FID (1)
Legal Framework, Engineering, Permits, Contracts

- **National Legal Framework** for CO₂ capture, transport and storage in place
  - must be established prior to preparation of approval
  - is the basis for the approval process
  - storage liability must be clarified, including requirements for any monitoring and remediation fund (financial security)

- **Construction and operation permits** for all elements of the CCS value chain obtained – capture, transport and storage

- All **project contracts** ready to sign/final

- **Cost estimate with 10% accuracy** for capex and opex

- **Commercial arrangements** between project partners in place

<table>
<thead>
<tr>
<th>Engineering Phase</th>
<th>Scouting</th>
<th>BoD (PDP); Pre-Engineering</th>
<th>BDP; Basic-Engineering</th>
<th>EPC-Front-End; Project-Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy of cost estimate at end of phase</td>
<td>± 30 - 40 %</td>
<td>± 30 %</td>
<td>± 20 %</td>
<td>± 10 %</td>
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Prerequisites for FID (2)
Financing, Risk Assessment

- **Financing** is a crucial element of any demo project. **Financial closing must be reached**, taking into account the following boundary conditions:
  - **Revenues**: the development of the new low-carbon electricity market is immature and still uncertain
  - **Contingencies**: there are no reference cases for CCS demo projects which can give an indication of possible contingencies
  - **Subsidisation**: demo projects will incur high additional capital/operating costs & risks and therefore need funding (national and EU), based on viable regulations, e.g. project developer needs clarity on force majeure provisions

- **Risk Assessment**
  - Identification and evaluation of risks for the project developer (incl. a comprehensive risk mitigation strategy) must be set up prior to FID
  - Commodity risks for fuel, CO₂ allowances, wholesale power must be assessed
  - Member States and the Commission should be encouraged to share in as many risks as possible, e.g. future regulatory change for a particular project
### Required time scales – Example*

**CO₂ transport by pipeline**

**CO₂ storage onshore in deep saline aquifers**

**Assumptions at FID:**

- Permits for power plant, pipeline and storage site have been granted
- Funding scheme secured 2 months before decision – at the latest
- No major investments have been made

**Before FID:** Timeline is determined by **pipeline** and **storage**

**After FID:** Timeline is determined by **power plant (capture)**

*Time is running out if demo projects to be operational by 2015 – as mandated by EU Heads of State*

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*given time scales may vary depending on project-specific conditions

**preparation of approval can only start if storage site has been located*
Conclusion

- CCS is the single biggest lever for reducing CO$_2$ emissions – by 20% by 2050 (IEA)

- Industry is willing and able to demonstrate CCS at large-scale, but each project will incur significant costs and risks

- In order to assess the risks involved in storing CO$_2$, and establish a permitting procedure, a national regulatory framework must be in place

- Timing of the regulatory framework will determine engineering and approval schedules up until FID; legal disputes during the subsequent construction phase cannot be ruled out

2015 target for the implementation of EU CCS demo projects is achievable – but only if national regulatory frameworks are in place by end 2010 at the latest