

European CCS Project Network

ZEP Response to Draft Qualification Criteria

Heinz Bergmann, Chair of ZEP CG

Sustainable Fossil Fuels Working Group, 15 September 2009

ZEP's General View of the CCS Network



In principle, ZEP supports the proposed concept of a Network for CCS demonstration projects:

- Share knowledge and identify best practices
- Gain public confidence in the feasibility and safety of CCS
- Provide a common EU identity
- Promote CCS, the EU's leadership and the potential for cooperation with third parties/countries

BUT...

Questions



- What is the role of the Network for EEPR, NER 300 and non-funded projects?
- Are NER 300 projects required to share any additional knowledge?
- What is the minimum requirement for Network participation? Will it be open to all European projects that fulfil qualification criteria?
- Will non-European projects be asked to join the Network?
- Who will receive what kind of information?
- When will the Network start?

Comments on Qualification Criteria (1)



Commitment to start of operation

- Not 2015, but 2015-18, or perhaps generally open
- Later projects may not receive funding but are desirable as well

Unit size

- Large enough to allow next step after demonstration to be full commercial scale

FEED

- Feasibility study, design specifications, FEED or similar studies
- Clarify level of detail required if no FEED study is available

Comments on Qualification Criteria (2)



Work breakdown structure

- Level of details varies between different procurement strategies e.g. general contractor
- Aggregated level is sufficient

Cost estimate

- CAPEX and OPEX for capture, transport and storage on an aggregated basis, +/- 30-50%

Performance data

- Average performance data for capture and compressor, average and max. flow rates for transport and storage
- Performance to calculate incremental costs per tonne/CO₂ or MWh

Energy consumption

- Expressed as energy consumed per MWh or tonnes/CO₂ stored

Comments on Qualification Criteria (3)



Financial commitment

- The contribution of project developers, Commission and Member States to the overall financial plan should remain confidential until after NER 300 project selection and the finalisation of contracts

Storage site screening

- Show that suitable storage and the necessary evaluation is expected to be available at the envisaged date of commission of the CCS project
- The screening process will take years and should have been started, but not necessarily finished, when the Network application is submitted

Exclusion/resignation from Network

- Knowledge that a project may have contributed should not remain totally with the Network for continued sharing
- In the case of exclusion, all submitted data that is not publicly available should be deleted from Network websites. In the case of resignation, additional data may be further shared.

Comments on Knowledge Sharing (1)



Principles

- Share significantly above minimum legal requirement, e.g. to obtain permits
- Share knowledge on a reciprocal basis with the EU and developed countries
- Distinguish between stakeholders: Contributors to the demo programme, Non-contributors, Research Institutes, Government/EU, Public/NGOs
- Distinguish between categories of knowledge and levels of detail – Detailed, Medium, Aggregated
- Provide full transparency (especially on environmental impact and safety), while ensuring stakeholders only receive the information they need
- Aggregate technical and commercial information sufficiently to protect supplier-specific knowledge and ensure competition

Comments on Knowledge Sharing (2)



Categories of knowledge

- **Technical Set-up & Performance**, incl. reliability, CO2 captured, performance, CO2 purity, incremental fuel demand; electricity, heat & cooling demand; key in-/outputs & design
- **Cost Levels**, incl. CAPEX/OPEX and incremental costs per unit of performance
- **Project Management**, incl. lessons learned in legislation, stakeholder management; planning; and within the consortium/project group
- **Environmental Impact**, incl. the effectiveness of reducing CO2 emissions per unit of electricity & any possible environmental impacts from CO2 storage
- **Health and Safety**, incl. significant incidents/near misses in disturbed operation; monitoring & resolution systems to track safety; health issues in regular operation

Comments on Knowledge Sharing (3)



Ensuring the rapid diffusion of IP

- Applicants should commit to a *Deployment Plan*
- Develop a *global CCS Patent Library*

Sharing know-how – while maintaining the incentive to invest

- Hold *regular joint workshops* to allow ‘live’ interaction between experts (*for Contributors only*)
- Technology owners may share more detailed engineering insights under a *Non-Disclosure Agreement* with non-competing parties (*for Contributors and Research Institutes only*)
- All Contributors should complete a *standardised report (available to all)*.

Disseminating information as widely as possible

- Use a broad range of communication channels, e.g. website, Visitors’ Centre for every project, annual and milestone reports etc.

Conclusion



- The CCS Project Network should be open to as many EU and international projects as possible
- It should carry out knowledge sharing for EEPR and NER 300 funded projects
- Knowledge sharing should be on a reciprocal basis with the EU and developed countries
- The level of shared information must distinguish between different groups of stakeholders: Contributors to the demo programme, Non-contributors, Research Institutes, Government/EU and Public/NGOs
- Commitment to start project operation should not be fixed at 2015
- The financial contribution of project developers/EC/Member States should be confidential until after NER 300 project selection and contracts are finalised
- The Network should start its work after the selection of EEPR projects

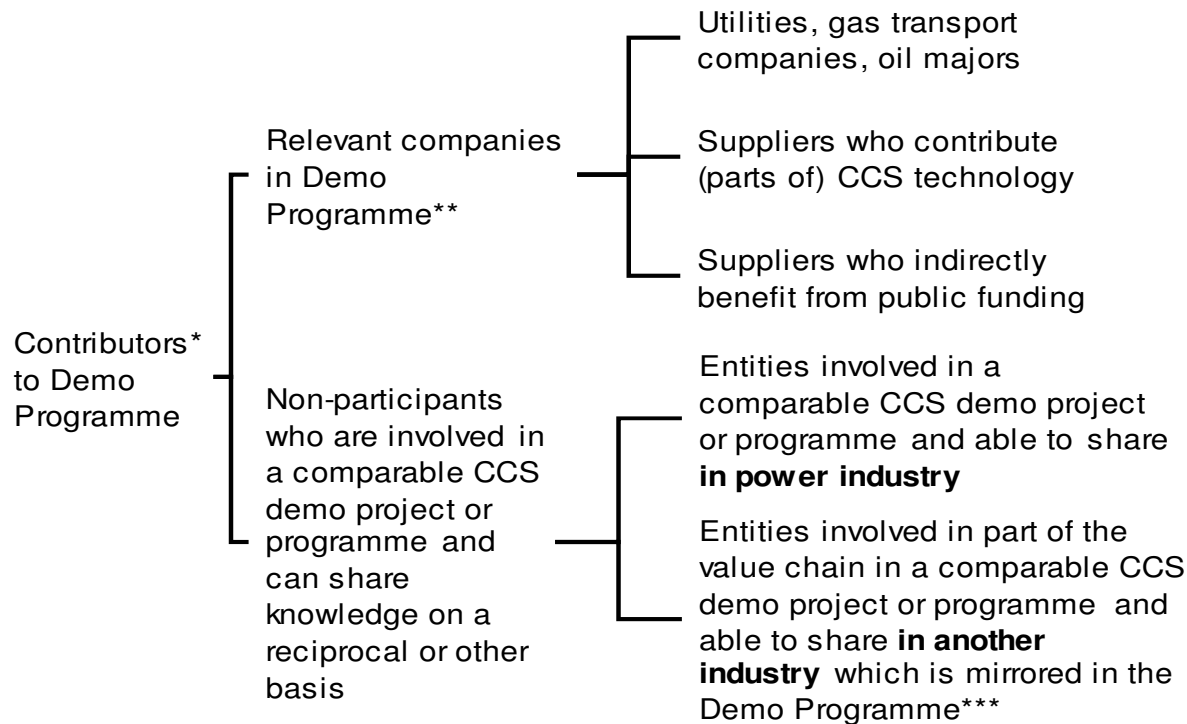
BACK-UP

Knowledge sharing: 5 groups of stakeholders



	Definition	Examples
Contributors to Demo Programme	<ul style="list-style-type: none"> Participants contributing to knowledge development in Demo Programme <ul style="list-style-type: none"> – With direct role in project – Without direct role in project 	<ul style="list-style-type: none"> Utility building power plant with CCS Equipment manufacturer supplying technology Oil company storing CO₂ CCS network in the U.S.
Non-contributors	<ul style="list-style-type: none"> Companies that do not contribute to the demo programme, but have a commercial stake in CCS 	<ul style="list-style-type: none"> Companies without existing knowledge on CCS to share (or not willing to share with the Demo Programme) Future potential players
Research Institutes	<ul style="list-style-type: none"> Research Institutes who can contribute to building further knowledge on CCS (not necessarily involved in the Demo Programme) 	<ul style="list-style-type: none"> Research Institutes currently active in CCS Research Institutes with a future interest in CCS (and relevant background knowledge so they can contribute relevant knowledge)
Government/EU	<ul style="list-style-type: none"> Paying and non-paying governments at different levels: European, national, regional/local 	<ul style="list-style-type: none"> European Commission National Parliament Municipalities, local political parties
General Public/ NGOs	<ul style="list-style-type: none"> Public /NGOs highly interested in Demo Programme Public directly impacted by Demo Programme General public with average interest for CCS 	<ul style="list-style-type: none"> Environmental NGOs Communities living close to capture or storage site, or CO₂ transportation Local interest groups

Knowledge sharing: definition of a Contributor



*Includes EU, non-EU and developing countries **Excludes suppliers of standard, non-CCS related parts

***E.g. if a steel mill is part of the Demo Programme, other steel companies can be treated as Contributors if they contribute relevant knowledge reciprocally

Technical Set-up and Performance



Detailed

Parameters per technology building block for capture, transport and storage

**EXAMPLE (CAPTURE)
Air Separation Unit (ASU)**

- Input
- Output
- Design and range of operating conditions
- Performance and process data, e.g. start-up/shut-down conditions and losses

EXAMPLE (STORAGE)

- Design includes storage characterisation
- Performance includes pressure distribution over time and extension of the CO₂ plume and injection rate (total + per well)
- Transient performance, e.g. stabilisation of plume behaviour from dynamic to steady state; exceptional events include pipe or well failure, earthquake

Medium

Overall performance – split by capture, transport and storage

- Average performance over time (capture and compressor only)
- Average and maximum flow rates (transport and storage only)
- Average availability over time – per step in the value chain (i.e. capture, transport and storage separately) and for entire chain
- Full load capture rate (capture only)
- Part load operation performance (capture only)
- Transient performance of overall system: start-up and shut-down time and losses
- Electricity demand (per unit of output)
- Heat demand (per unit of output)
- Cooling demand (per unit of output)
- Questions for further research on capture, transport and storage

Aggregated

How well does each technology perform?

- Reliability/availability of chain; hours operated
- CO₂ captured
- % increase in fuel demand

What are the key areas for future research?

Source: ZEP

Cost Levels



Detailed

- Further details on costs are not required by stakeholders (costs per step of the value chain give sufficient information to take decisions; for specific investment plans, quotations may be obtained)
- Any sharing of cost information will also be subject to applicable competition laws

Medium

Investment costs*

- Capture
- Transport
- Storage

Operating cost*

- Capture
- Transport
- Storage

Performance knowledge

- required to calculate costs per tonne/ MWh as detailed in
- Environmental impact (abatement, medium level)
 - Technical performance (electricity produced, aggregate level)

Aggregated

- What is the incremental cost per tonne of CO₂ avoided and per MWh of clean electricity produced?
- What is the total cost per MWh of clean electricity produced relative to a reference plant with that technology?*
- What are the investment costs per demo project?
- What are the operating costs per demo project?
- How much are these cost quotations due to specific Demo Programme requirements (e.g. higher frequency monitoring)

* For all cost information, a split needs to be made between costs any CCS project would incur and additional costs due to specific Demo Programme requirements

** Information on incremental cost per MWh of clean electricity produced per plant could potentially be included confidentially in a tender

Source: ZEP

Project Management



Detailed

Legislation and permitting

- Facts on application process: steps, roles and time-frame
- Key issues and learnings, including implications for the project (e.g. later start, different size/design)

Public and NGOs: stakeholder identification and communication process

- Approach: categories identified, means used, roles
- Timing of sharing and involvement
- Key issues and learnings, including resolutions applied to solve issues

Planning

- Key milestones and interdependencies
- Key issues (e.g. delay due to unexpected interdependencies)
- Recovery planning in case of delay
- General solutions to reduce planning and execution time

Interaction with governments and authorities

- Main bodies involved and roles
- Approach used
- Key issues encountered and resolution

Consortium/project group

- Parties involved in the project
- Roles per party
- Governance model for the project

Risk allocation

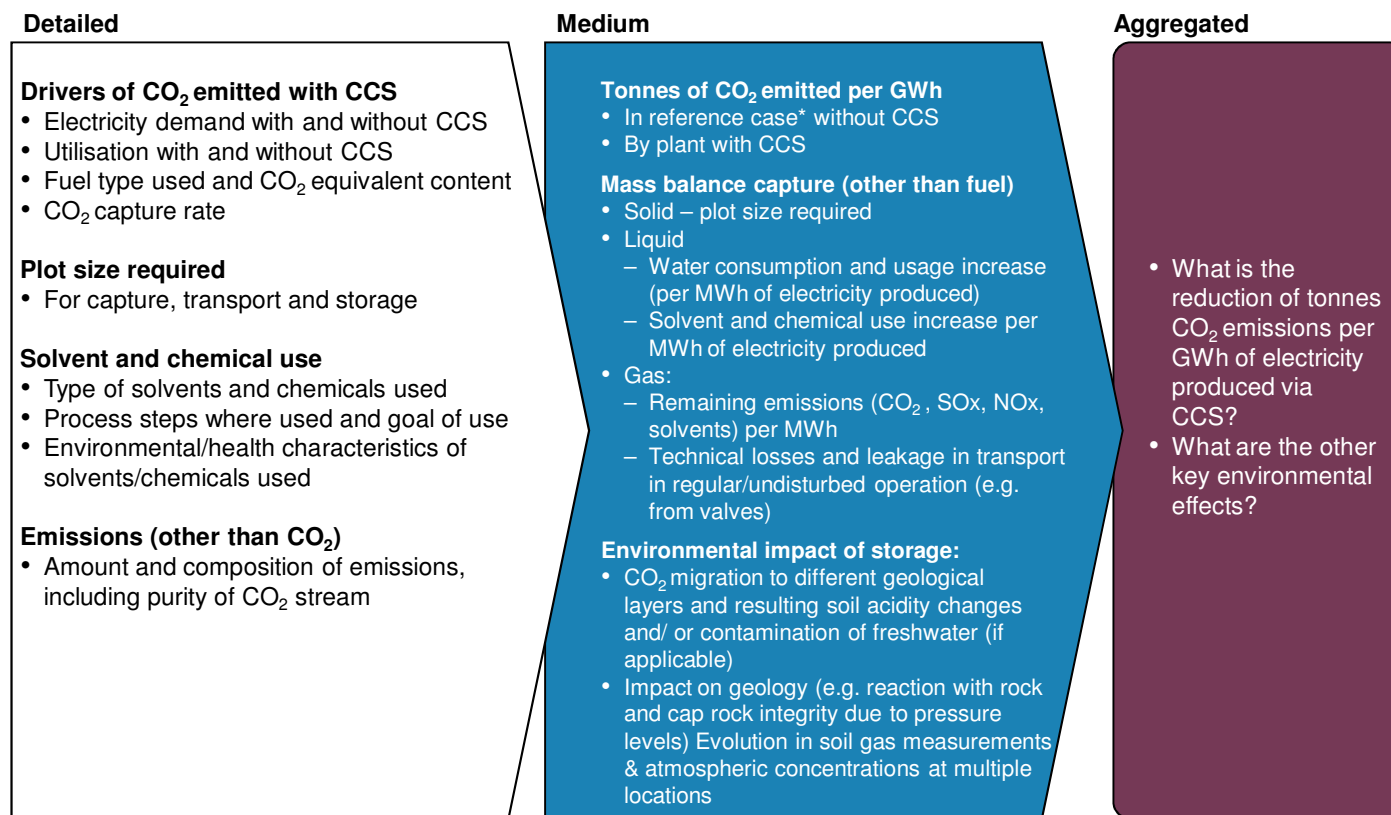
- Role of government agencies/regulators – full details and text of agreements
- Network of project ownerships, partnerships, contracts and relationships
- List of all main contracts, agreements and parties, with overview of roles and list of advisers engaged
- Describe financing arrangements and (qualitatively) risk allocations (risk matrix)

Aggregated

What are the key lessons and pitfalls encountered in:

- Legislation and permitting
- Public and NGO stakeholder management
- Planning
- Government interaction
- Organisation of consortium/project group

Environmental Impact



* Reference case which is comparable to the CCS demo project with respect to capacity, combustion/electricity generation technology and fuel type

Source: ZEP

Health and Safety



Detailed

Monitoring system (prevention)

- Equipment: number and size of monitoring wells; IT systems used; monitoring instrumentation in capture plant/transport system
- Personnel: number and level of people employed
- Procedures: variables tracked; frequency of tracking; limits at which action is taken; general safety procedures and protocol for application, verification and calibration of monitoring technology

Issue resolution system

- Equipment: description of safety equipment
- Personnel: number and level of safety personnel; job descriptions
- Procedures in case of leakages/other issues
- Practical learnings from incidents (e.g. ideas to improve procedures)

Medium

Safety incidents in disturbed operation

- Location
- Output
- Impact
- Cause of incident
- Resolution measures taken
- Key learnings

Health issues in regular/undisturbed operation

- Overview of operational health issues (e.g. hazardous substances or situations, including chemicals used – see also Exhibit 10)
- Description of potential impact per issue

Near misses

- Parameters for safety incidents

Measures taken for future prevention

Aggregated

What has been the number of incidents per hour operated*?

* Exact metric used for time operated will differ per step in the value chain, e.g. for capture, this could be full-load operation

Knowledge sharing: who receives what?

Difference between sharing among Contributors and Non-contributors lies in the form: where Contributors have access to interactive expert peer group sessions and may share detailed engineering insights under a NDA, Non-contributors simply receive standardised formats.



- Detailed Aggregated
- Levels of detail needed
- X Not relevant and subject to applicable competition laws
- Subject to IP Rights or competitive constraints
- Participant able to share

