

The **BASREC CCS NETWORK INITIATIVE**



Final web report

31.03.2014

*BASREC CCS project phase 3
Regional CCS Expertise Network
2014 -2015
“Transportation and storage of CO₂
in the Baltic Sea Region”*

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Content

| | |
|---|----|
| 1. Background and directives..... | 3 |
| 2. Project structure | 4 |
| 3. Work package 1 – Survey..... | 5 |
| Catalogue of activities..... | 5 |
| Catalogue of actors | 5 |
| Web survey of views on a network..... | 5 |
| 4. Work package 2 – Network design | 6 |
| Network objectives | 6 |
| Topics and themes | 7 |
| Consultative workshop | 7 |
| Network organization | 8 |
| IT functionality | 8 |
| Recommendation..... | 9 |
| 5. Financing forward | 10 |
| 6. Independent CCS Expertise Network..... | 11 |
| Annexes..... | 11 |

1. Background and directives

Carbon Capture and Storage (CCS) is by the European Union considered an essential tool in climate change mitigation. By 2050 CCS could account for up to thirty percent of total, European reductions of carbon dioxide emissions to atmosphere.

CCS is to a large extent dependent on the development of infrastructure for transport and storage of carbon dioxide. The Baltic Sea region forms a natural geographical area for collaboration, with a need to find and exploit regional geological storage and to invest in joint transport infrastructure. Issues such as environmental care, safe transport and storage and public perception are of common, regional interest.

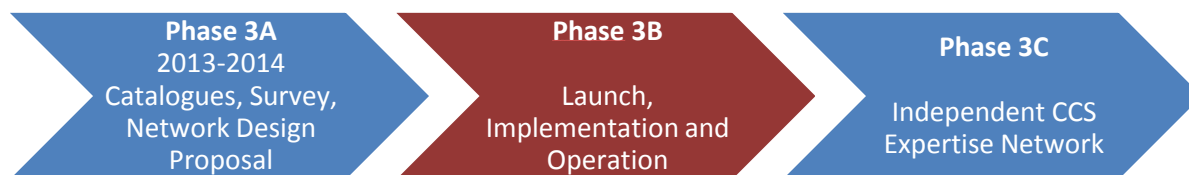
The Baltic Sea states' energy cooperation, BASREC has as the third phase of its CCS initiative, initiated and funded a project to strengthen regional cooperation, through an active CCS expertise network in the Baltic Sea Region. The region's experts, decision makers and stakeholders should benefit from the network, taking its point of departure in CO₂ transport and storage infrastructure development.

The project should identify professionals in universities, research institutes, industry, government agencies and policy makers in order to establish a catalogue of potential network delegates. On-going CCS projects should be listed and categorized in order to detect potential cross-fertilization opportunities through the establishment of this network. The BASREC initiative aims at the creation of a network which can maintain and develop activities over time.

Networking is communication and cooperation between individuals and between organizations and the network is the tool. By networking one can promote development, be efficient, utilize synergies to produce more with less, disseminate information and form clusters. The network is an arena for exchange of knowledge, cooperation, discussion, communication and strengthening of joint planning. The network consists of its members, supported by a coordination unit and an IT platform. This background and these directives have been the approach used for the network project. This final report provides an insight into the project's activities, its proposals and recommendations for a way forward.

2. Project structure

The first phase (3A) of the BASREC initiative for a regional network for CCS expertise ends in March 2014. This closing report describes the recommended option with the second phase (3B), being a transition project, which should enjoy the support from BASREC. The third phase (3C) would be the future network, independent of BASREC.



The project's work plan was structured in the following, sequential work packages, from August 2013 through March 2014:

- WP1 Survey
- WP2 Network design
- WP3 Final report

Work package 1 was aiming at gathering solid background information, as a platform for the network design in work package 2. In the preparations of the design, constructive ideas were obtained through a dedicated workshop and in an interactive process with the project lead country, Norway. The result is compiled in this report and also as a proposal planning paper for the transition phase, 3B. In accordance with the work plan, preparations for the launch have been undertaken, awaiting the final decision in BASREC's GSEO. The BASREC ExCom has in two meetings given valuable guidance and directions for the project finalization.

3. Work package 1 – Survey

Catalogue of activities

The two initial activities involved collecting information, categorizing and listing on-going projects within the CCS field, in the BASREC countries. The result is a catalogue of currently (December 2013) active academic and industrial projects which is attached as Annex 1 to this report. It is notable that Germany and Norway boast broad research portfolios on various aspects of CCS, while some of the BASREC member countries maintain a somewhat less proactive CCS policy. The most frequent research discipline is geology.

Catalogue of actors

The second deliverable is a catalogue of potential network members, being individuals/experts within the different CCS disciplines. As this is a computerized register, it must be utilized within the applicable legislative framework. For the CCS network, the register could be used for distribution of invitations to join the network. When accepting such an invitation, network members would also be required to give their consent for BASREC to maintain their name and contact details on file. Already through the work with the activities catalogue and various other channels, the project has developed a potential membership record with some two hundred entries.

Web survey of views on a network

In order to actually consult the opinion of potential network delegates, an on-line web survey was conducted. More than one hundred addressees in the region were invited to respond anonymously to a questionnaire about the value and validity of a CCS network in the BASREC region and the response rate turned out near fifty percent. The survey is not large enough to make a thorough quantitative analysis but gives interesting guidance.

With ten multiple choice and two open questions, respondents could express their preferences about networking mode, format, purpose, name, fee structure, topics and activity content. The results provided the project with valuable input for the further network design. Annex 2 includes a graphical response analysis. Three statements stand out:

- The network should have a strong connection to policymakers
- The network should have a broad and multi discipline membership
- A key function of the network is for members to have opportunities for actual work cooperation

4. Work package 2 – Network design

The proposed network design is based on information gathered in work package 1, in consultations with the project lead country and the BASREC ExCom and in a workshop in February with six potential network delegates (experts). Essentially, the architecture of the network should comprise a proposal for topics and format that would ultimately support the CCS deployment. The design also includes an internet based network support tool on www.basrec.net, an activity related financing mechanism and tasks for a central, facilitating function. Figure 1 shows a draft design of the network program for the first 18-20 months, pending a final BASREC decision during Q2 2014 and the corresponding, sufficient funding. It is a combination of initiating and driving specific topical expert working groups and efforts to raise funds and plan for the future role of the independent network, to be in operation from 1st January 2016.

Phase 3B – Transition 2014-2015 – Activities (tentative)



| | 2014 | | | 2015 | | | |
|-----------------------------------|---|-------------------------------------|----------|---------------------------------|-------------------------------------|---------------------------------------|----------------------------|
| | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Network development | Web site modification Network initiation | Initial fund raising | | Pursue fund raising | | Prepare launching independent network | Launch independent network |
| CO ₂ storage potential | Plan, prepare, network activity | Initiate activity, consider funding | Workshop | Webinar | | Geological report | |
| CO ₂ transport | | | | Plan, prepare, network activity | Initiate activity, consider funding | Workshop | |
| CCS deployment strategies | | | | | Regional conference | | |

Figure 1

Network objectives

The success of the network is closely related to the formulation of network objectives, which must:

... respond to common ambitions in the field of CCS, between the BASREC countries

... be acceptable to all BASREC countries within its own climate policy

... be ambitious enough to attract the best experts

... be a stretch but realistic enough to stimulate active contribution

Therefore, the following has tentatively been proposed as the network objective, to be re-worked and confirmed in the early stages of the network's own development:

"The CCS expertise network should inform the region's policy makers in matters, essential to the deployment of common, regional infrastructure for transport and storage of carbon dioxide".

Topics and themes

BASREC's direction is that the network should support the deployment of CCS, by focussing on transport infrastructure and geological storage of carbon dioxide. Additional topics to be addressed are those of public perception and legal aspects of cross border transfer of carbon dioxide waste. Therefore, it is suggested to initiate the network on the basis of further geological cooperation around the southern Baltic Sea, where there has been identified large, theoretical potential for geological CO₂ storage in the Cambrian sandstone. International collaboration in this field makes great sense as the geological formations extend regardless of national, territorial borders. Characterizing and exploring geological storage involves high cost as does the injection in the operating phase, why economies of scale are crucial. Today, some parallel, national initiatives are in motion and so a network could contribute to a basis for a regional agreement for this development.

Cross border development of infrastructure for transport of CO₂ is logical, as the specific cost of transport benefits directly from scale effects. A network initiative could engage stakeholders to identify and work on agreements for the difficult issue of ramp-up of regional transport capacity. Transport is expected to be a combination of capital intensive pipelines and more operating expensive ship solutions. Research is pointing to the de-risking effect of shipping for early projects, in being more flexible and less capital intensive. This is the background for placing also the potential opportunities of CO₂ shipping on the network's agenda.

Consequently, the network could bring substantial value to the two aspects of CCS, where collaboration is the basis for scale economies, transport infrastructure and geological storage. Considering the capital employed and the need for governments to mitigate some of the early project risks, this brings forward the third important network topic, strategies for deployment of CCS in the region. There is no guarantee that the network will deliver solutions, but it is obvious that regional synergies form a valid rationale for cooperation. With the diversity among the BASREC countries in terms of CCS research and experience, it should be possible to find and attract suitable competence to support this kind of initiatives. In essence, cooperation spurred through the network, could make the CCS proposition in the Baltic Sea region more plausible. A network of multi discipline expertise from the BASREC member countries could highlight critical research and development areas within the given topics and drive initiatives for international projects in order to both enhance competence and to inform policy makers about matters essential for deployment of CCS.

Consultative workshop

The project invited to a consultative workshop, 3-4th February 2014, the key purpose of which was to discuss network objectives, content and design. To situate the workshop in a context, it should be seen as an advisory or consultative activity within work package 2. An interactive session with in total eight participants including the facilitators, the main focus was placed on discussing network objectives. The workshop stressed the need for a clear purpose and compelling yet realistic objectives, to stimulate active contribution to the network. Joining individuals and organizations must embrace the network's objectives, which must be formulated such that they become good enough glue to capture people's commitment.

The network must deliver benefits to its members, which motivate the allocation of time and costs for participation. These could be defined in short or longer term perspectives but must to a great extent be aligned with the individual's or organization's interests in the field of CCS.

The overall workshop conclusion was that the initiative carries significant interest and that alignment around purpose and objectives is one key to success. With a clear network charter, sufficient funding should be justifiable. The workshop report is attached as Annex 3.

Network organization

BASREC has initiated the establishment of a CCS expertise network and it is suggested for the organization to support the network's initial period of activity, during 2014 and 2015. The intention is then that the network should have reached sufficient momentum and managed to obtain enough external funding, to become independent of the financial BASREC support as from 1st January 2016. The ambitions include forming expertise working groups within one or more of the selected topics. Such initiatives should be facilitated by the network and if required, be supported to seek specific funding for research, studies or project initiatives.

With the use of www.basrec.net, BASREC will both have a surveying responsibility and an opportunity to influence network activities during the limited BASREC ownership period. The deployment of the network is organized as a BASREC project with the ExCom as executive level, until an independent network is established. The network should during the BASREC supervision period take governance and guidance from the project lead country and gradually attract and develop an advisory board.

IT functionality

The network will initially develop sufficient functionality on the BASREC website to

- Invite potential network members to register their interest or membership directly online
- Provide information about the network activities
- Distribute information to a large group of recipients
- Possibly, acquire and integrate a webinar facility

Figure 2 illustrates how the membership registration function could be integrated on the website.



Figure 2

Recommendation

The proposed overall network design offers the best chances to deliver value to the region and gives the network some time to attract participation, prove its efficiency and to serve as a platform for an application for funding of a longer term, independent network. It should be noted that the degree of success is not only correlated to the funds made available, but also to the level of support expressed by the BASREC countries and through the appointed CCS contact persons. Not least important, the network should ultimately, in its independent phase, be placed in the administration of a solid institute with the network ownership depending on the future financial platform and providing additional credibility to the network initiatives.

5. Financing forward

The budget demand will be a direct function of the level of activity generated in and through the network. Central facilitation will be required to catalyse network initiatives, for which work a budget is requested. The funds should primarily be used to support and manage meetings for idea generation within a narrow range of given topics, in the form of on-site workshops, pre-studies, webinars, surveys and other tools. These are essential as arenas for the creation of coalitions or project consortia, strong enough to formulate applications for own specific research and/or pilot project funding. In short, the model is that the network funding pays for website, facilitation and arrangements and members contribute in kind with their own expertise. The budget should also cover some support for finding funds for specific network initiatives. A share of the budget will need to be used for fund raising, both for operations in the actual period 2014-2015 and for the independent network starting latest 1st January 2016. Figure 3 describes the framework inside which the network will be deployed and it also indicates potential funding sources to be approached.

Framework for deploying the network



| 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | |
|--|------|--------------------|------|------|-------------|------|--|------|------|------|------|---------------------------|----------------------|--|
| | LV | DK | LT | NO | DE | RU | FI | EE | PL | IS | SE | | Chair country | |
| | | X CPH | | | X Berlin | | | X | | | X | | Ministerial meetings | |
| The Baltic Sea Region Energy Co-operation BASREC | | | | | | | | | | | | | | |
| EU Baltic Sea Region Programme 2007-2013 | | | | | | | EU Baltic Sea Region Programme 2014-2020 | | | | | | | |
| BASREC CCS INITIATIVE | | | | | 1 | 2 | | | 3 | 3A | 3B | 3C The BSR CCS Network | | |
| NCM | | NORDICCS 2011-2014 | | | | | | | | | | | | |
| NETP/CCS | | | | | | | 1/6 | | | | | | | |
| OTHER ACTIONS AND ACTORS | | | | | | | | | | | | | | |

The more successful the network, the higher the budget demand and vice versa. With a larger membership it must be expected several and more valuable initiatives, which will, to a varying extent, require network support. External financing will, if applicable, be applied for from sources such as the EU programme for the Baltic Sea Region 2014-2020, the Nordic Innovation, the Nordic Council of Ministers or other. It is proposed that BASREC gives its consent to such fundraising and if required also provides a letter of support for the transition.

6. Independent CCS Expertise Network

Through the targeted work with the first year of network activities, the foundation for a wider and independent network should have been laid. The ambition must be to build on the momentum that has been created, through both network wide activities and in the specific work streams. Issues like network governance, technical support systems and content development should be well underway before the next BASREC Ministerial meeting. Also, the funding for the following period after 1st January 2016 should have been secured in order to arrange for a seamless transition from a BASREC initiative into an independent network platform.

The BASREC CCS network initiative should from latest 1st January 2016 be an independent, regional network with its own governance, work plan and budget. The level of success can be measured in the number of active network members and the number of active initiatives. The network membership should ideally be multi discipline with representation of experts from academy, industry and government agencies and could with preference also seek collaboration with other, related networks in Europe, the Nordic countries and globally. The BASREC organization could be seen as the initiator of another productive, regional cooperation.

Annexes

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| Annex 1 | Catalogue of activities |
| Annex 2 | Graphical web survey response analyses |
| Annex 3 | Workshop report |