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International opportunities for Dutch organisations in the CCS value chain

TNO innovation for life

Agenda

Summary of study

Conclusions and recommendations

Discussion

Summary of Study

Management summary: introduction

Introduction

- This report presents the results of a study mapping the Dutch carbon capture and storage (CCS) ecosystem and international opportunities for CCS

Project background and goal

- The Netherlands is a frontrunner in CCS development and there might be opportunities to build a new Dutch industry aimed at the export of CCS technology, services, and knowledge
- The goal of the project is to explore these opportunities for CCS as a new Dutch export industry

Approach

- An overview was created of organisations in the CCS space that are either Dutch or non-Dutch with an active presence in the Netherlands
- A literature review was done for the mapping of international opportunities. Four criteria and a regional approach were used for the assessment (see on the right). Within regions, individual countries were also considered
- Conclusions and recommendations are based on the mapping of the (Dutch) organisations and the international opportunities

Criteria for evaluation of international opportunities

1. Subsurface knowledge and CO_2 storage potential
2. Available CO_2 sources (point-sources, heavy industry, power sector, BECCS, and DAC)
3. CCS policy and regulation
4. Market development & public perception

Regions

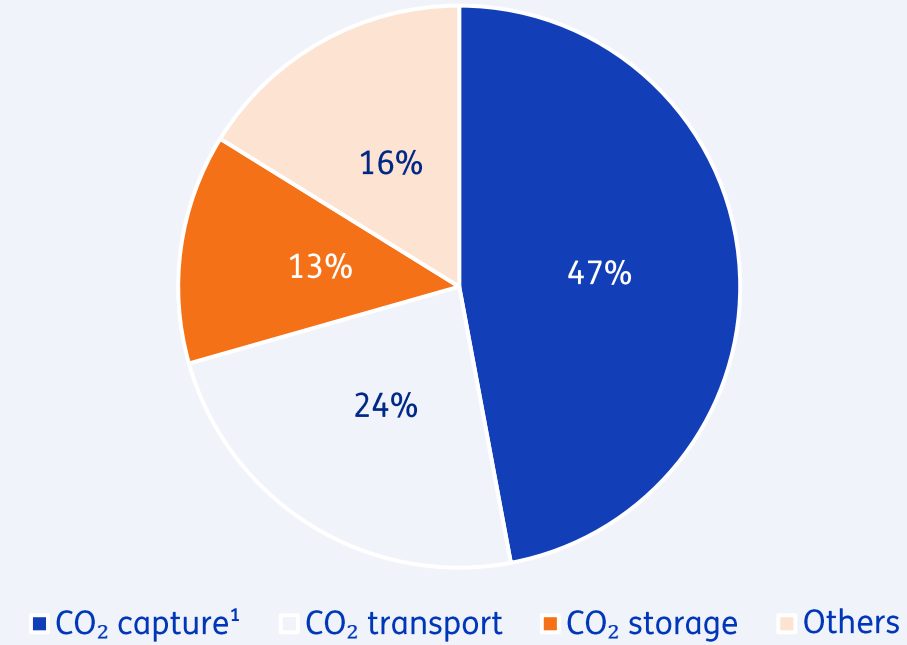
- Europe (Western, Central and Eastern, and Southern)
- Asia
- Middle east
- Northen Africa
- Southwestern Africa
- Australia
- Americas

Management summary: The Dutch CCS ecosystem

Dutch CCS ecosystem

- The Dutch CCS ecosystem considered includes both Dutch organisations and international organisations active in the Netherlands
- Over 60 organisations currently active in the Dutch CCS ecosystem were identified, covering the entire CCS value chain with a particularly strong representation in CO_2 capture (see figure). NB: the list of companies is not exhaustive
- The CCS ecosystem is dynamic. There are (new) players entering the market and other players exiting the market
- Some organisations act in several parts of the value chain (e.g., Shell is both a solvent provider and a store operator)
- These organisations are a mix of SMEs (~35%), governmental and non-governmental organisations (~5%), and large multinational corporations (~60%). They include established players and newcomers
- There are already different CCS ecosystems in place, such as CATO (Dutch CCS R&D network), Taskforce Negative Emissions (TNE), CCU alliance, etc., but collaboration on (business) opportunities and projects is limited within these ecosystems

Number of organisations in the Dutch CCS Ecosystem by value chain section



1) includes companies providing technology for CO_2 capture (e.g., solvents, sorbents, cryogenic, etc.), components, engineering, procurement, and contracting (EPC). Also includes CO_2 capture on ships, CO_2 capture at biogas upgrading, direct air capture (DAC), and direct ocean capture (DOC)

Management summary: International opportunities

International market opportunities

1. **CO_2 storage potential** is large in almost all regions. The potential is more limited (but still significant) in Southern Europe, more uncertain in Northern Africa (Egypt) and public information is limited in the Middle East

2. All regions have large **potential for CO_2 capture** from point-sources, such as hard-to abate sectors (cement, lime, etc.) and heavy industries (e.g. steel, (petro-)chemical, etc.). Power and energy sector opportunities are less well documented. Short term opportunities for BECCS and DACCS development projects are largest in more developed markets (Western Europe, Canada, US, Australia, MENA for DACCS). On the longer-term, opportunities for BECCS and DACCS implementation projects could be large on a global scale. Opportunities for more niche applications such as capture from ships and DOC are less certain based on available literature

3. **CCS policy and regulations** are well-developed in the more developed markets (Western Europe, Canada, US, Australia). Regulatory frameworks for CCS are in development in the rest of Europe, Asia, MENA, and Brazil. Only Mexico and Southwestern Africa lack development in this area

4. **CCS markets are most developed** in regions with the most developed regulatory frameworks, including China. This includes the presence of more developed market projects for BECCS and DACCS. In many of the other regions there is significant activity in terms of the development of new (pilot and commercial) projects

The regions are grouped in three categories:

1. **Developed markets** with well-developed policy frameworks and operational CCS projects (Western Europe, Canada, US, and Australia), with high quantity of opportunities but also competition due to established local ecosystems. These markets also demonstrate best opportunities for BECCS and DACCS developments on the short term

2. **Developing markets** (Central, Eastern, and Southern Europe, Asia, MENA, and Brazil), with lower competition than in developed markets but with higher policy uncertainty

3. **Markets with long-term opportunities** (Southwestern Africa and Mexico) and higher uncertainty on the short term

Conclusions and recommendations

Management summary: conclusions and recommendations

Conclusions

- The Netherlands has a well-established CCS ecosystem with over 60 companies active along the entire CCS value chain
- There are already different CCS ecosystems in place, but they either focus more on innovation and knowledge exchange or cover only part of the value chain. Collaboration on (business) opportunities and projects is limited within these ecosystems
- Global opportunities for exporting CCS technologies, services, and knowledge from Dutch organisations are significant, but they vary per region

Recommendations

- Verify the findings of the study with the organisations in the Dutch CCS ecosystem, e.g., through CATO network
- Start initiatives to grow the collaboration in the Dutch CCS ecosystem from knowledge sharing to business collaboration. Understand the challenges and how the network can be supported to grow its business internationally
- Select a few companies and countries from this quick-scan to do a deep-dive on the opportunities. This may include the uniqueness of the company offering and potential market share, together with the expected CCS developments in the country
- Initiate conversations with organisations such as NL Works on how export opportunities for the Dutch CCS industry can be created. At a later stage also governmental involvement (e.g., Ministry of Foreign Affairs) could be explored

DISCUSSION

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Menti Meter questions

1. What do you think of the study and conclusions?
    a. Interesting and support conclusions
    b. Not new, and no need to build CCS business platform
    c. Don't know yet
2. OPEN question: What do you miss regarding the study?

    Discuss input from the group (word cloud)

3. Would there be value for you in setting up a CCS business platform?
    a. Yes
    b. No
    c. Don't know
4. What would be the value of such a business platform?
    a. Word Cloud
5. What do you expect from a coordinated collaboration effort? (examples of activities)
    a. Word Cloud
6. What do you think are the biggest challenges?
    a. Word Cloud

Workshops

Objective: to develop action plan

Set-Up:

Four poster sessions with volunteers who take notes, moderate discussions and request input

Poster 1: Goal: What do we want to achieve?

Poster 2: Activities: What should we do and organize?

Poster 3: Organization: how should we organize ourselves?

Poster 4: AOB: Other ideas

Questions or suggestions? Get in touch!

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