

THE ROLE OF POLICY INSTRUMENTS ON DEPLOYMENT OF CARBON CAPTURE AND STORAGE TECHNOLOGIES IN TURKEY

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Overview

Carbon Capture Utilization and Storage (CCUS) technologies are vital elements for the European Union (EU) to achieve its carbon neutrality targets alongside the rest of the world. However, deployment of these technologies is not at the desired pace and requires a rapid acceleration through the support of policy instruments. Turkey, as an EU candidate country, also develops strategies to align with the decarbonization efforts of the rest of the world, yet still has not deployed or developed any CCUS related projects. Considering the fossil fuel intensive power generation of Turkey, as well as large amounts of natural gas imports, CCUS technologies can be integral components of decarbonization of Turkey's economy. Additionally, considering the potential costs associated with the EU's recent Carbon Border Adjustment Mechanism, CCUS technologies can be essential for export intensive sectors such as the cement industry. Therefore this study aims to explore the perception of CCUS technologies in Turkey across various stakeholders, as well as the ideal policy instruments for large scale deployment of them.

Methods

Research adapted a mixed method approach, which included qualitative and quantitative analysis as well as primary and secondary data collection. A combination of survey, multi criteria decision making (MCDM) assessment and interviews were executed. In order to explore the mechanisms associated with the deployment of technology, stakeholders of the process should be taken into account. Therefore, this research targeted decision makers across the cement, oil and gas (O&G), and power sectors, as well as public sector, academy and other sectors (consultancies, finance, etc). Through an online survey consisting of 30 questions, participants were asked about their CCUS perceptions; as well as barriers, drivers and timeline for CCUS deployment in Turkey. Furthermore, industry sector participants were asked about their preferred policy instrument for CCUS investment. On the other hand, participants from public sector were given a set of criteria that can be used for CCUS policy design and asked to prioritise them. These criteria were industry acceptance, track record, economic impact and GHG reduction potential.

Since the primary aim of this research was to decide which policy instruments were ideal for CCUS deployment in Turkey, a MCDM assessment was applied. That enabled selecting the ideal instrument quantitatively. Data input for MCDM involved secondary research as well as survey results. Although there are several MCDM methods, this study adopted TOPSIS method, due to its practicability and track record in public policy decision making and sustainable energy technologies & resources selection. Finally, results of the survey and the MCDM were discussed with six decision makers of the cement, oil and gas, academy and public sectors through semi-structured interviews to explore the role and value of CCUS in Turkey.

Results

After remaining active for four work weeks, the online survey study concluded with 82 responses from cement, oil and gas, power, public, academy & NGOs and other (consultancy, finance) sectors. Considering the profile of the participants, 62% of the them had more than 10 years of sectoral experience, 68% of them had master's or above level of education, 70% of them were from middle or above levels of management, and 74% of them claimed to have an average or higher level of CCUS knowledge.

CCUS perceptions questions showed that 76% of participants strongly agree or agree that CCUS technologies should play a role in decarbonization of Turkey's economy. On the other hand, only 18% of the participants strongly agree or agree that the Turkish government already utilizes policy instruments to promote actions on climate change. Another key finding was the significantly higher levels of "unsure" responses given by the public sector participants. Another significant finding was about low perceived safety of geological carbon storage in Turkey, with only 18% of participants strongly agreed or agreed that "In the context of Turkey, geological carbon storage is safe".

While lack of policy instruments has been identified as the most significant barrier to CCUS deployment in Turkey, green growth is considered as the primary driver. High investment costs have been selected as the second most important barrier, but as highlighted in interviews, costs would decrease as policy instruments are implemented. In terms of drivers, the first choices of industrial participants (cement, O&G and power sector) were the highest for green growth, as interview participants also emphasized the importance of CCUS for survival and growth of the industries. The most frequent first choice amongst public sector participants was energy security, in line with the government's current policies on exploration of natural resources. 43% of participants responded that CCUS technologies should be deployed in Turkey by 2030, while 21% responded that it should be deployed by 2025. 37% of survey participants stated that deployment should take place by 2040 or they should not be deployed.

When public sector participants asked about the importance of the criteria given for CCUS policy instrument design, 42% of them selected track record as the most important criteria. 25% selected economic impact, 25% selected GHG reduction potential and only 8% selected industry acceptance as the most important criteria to take into consideration while designing a policy mechanism for CCUS deployment. From the private sector point of view (cement, O&G, power and others sectors), the most preferred policy instrument was capital subsidies, closely followed by operational subsidies and carbon pricing. In fact, a significant majority of industrial sector participants (cement, O&G, power) consistently selected capital subsidies as their most preferred policy instrument.

The MCDM assessment indicated that the ideal policy instrument for CCUS deployment in Turkey is operational subsidies, with a score of 0.68, closely followed by regulatory standards and capital subsidies (Figure 1). Considering 1.0 as the highest score possible, the ideal policy measure to utilize is a combination of subsidy and regulations/obligations-based policy framework. Due to its very low track record and associated low GHG reduction potential score, carbon pricing scored 0.05. As carbon prices increase, that scene might change in the future.



Figure 1 Results of the MCDM assessment

Five of the six interview participants stated that a hybrid approach with a combination of carrot and stick mechanisms would be the best way to deploy CCUS in Turkey. High level industry executives emphasised the importance of regulatory standards and obligations alongside with subsidies. On the other hand, a senior government official addressed a major bottleneck in CCUS policy making as lack of human resources and experience.

Conclusions

The purpose of this study was to explore the role of policy instruments on deployment of CCUS technologies in Turkey, as well as stakeholder perception of that technology. Survey responses, results of the MCDM assessment and stakeholder interviews indicated that the ideal policy instrument for CCUS deployment in Turkey is operational subsidies, closely followed by regulatory standards and capital subsidies. Further discussions with interview participants revealed that a set of hybrid policy instruments can be a better solution. It is also observed that carbon pricing-based market mechanisms are by far the least ideal solutions, owing to their low track record score and high criteria weights for the track record score, provided by Turkish policymakers. Regarding the Government's current works on developing an Emissions Trading System (ETS) mechanism, this study suggests that ETS is unlikely to support the deployment of CCUS Technologies in Turkey. Additionally, level of CCUS understanding in the public sector was observed to be significantly lower than the rest of the survey participants. Therefore, a National CCS Institute is recommended to be established to build the required knowledge and human capacity, as well as leading the national CCUS deployment agenda, with a focus on delivering the first CCUS project by 2030.

Selected References

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