Executive Summary

Growing importance of carbon capture, utilisation, and storage in the transition to decarbonisation.

The development of carbon capture, utilisation, and storage (CCUS) has always been closely aligned with the energy and environment circumstances of the time. Since the adoption of the Paris Agreement in 2015, many have come to realise that we need to rely on CCUS technology to achieve the 1.5-degree scenario or even the 2-degree scenario. This is not only true for the major world economies and corporations that began to announce 'net-zero' ambitions as early as 2050 but also for Association of Southeast Asian Nations (ASEAN) countries. At the 3rd East Asia Energy Forum (EAEF), it was pointed out that CCUS is 'particularly crucial' as it is a technology that can contribute to the energy transition of ASEAN countries in meeting the goals of the Paris Agreement whilst allowing for a supply of affordable energy to meet the growing energy demand (ERIA, 2020).

CCUS has become something that attracts not only policy importance but also commercial interest. Whilst some predicted that the coronavirus disease (COVID-19) will shift the policy focus away from the climate change agenda, it has, in fact, played a role of reinforcing climate change response measures. Numerous developed countries have pledged substantial budget for economic stimulus through 'green recovery' and significant investment in CCUS technology development with the view towards commercialisation and international cooperation. As also discussed at the 3rd EAEF, there is also growing interest from the private sector for deploying CCUS in the ASEAN region.

CCUS technology is well proven in most cases, whilst further enhancement for carbon removal technology is needed to bring down its cost and create a sustainable value chain.

Carbon capture from industrial sources with high carbon dioxide (CO_2) concentrations, such as power plants, chemical plants, oil refineries, and steel plants, is an already proven technology, and, in most cases, its implementation is dependent upon not on its technical feasibility its but policy and/or financial capabilities. The transport and storage of CO_2, likewise, also have good track records even though the long-term storage of CO_2 for the purpose of containment and the accounting of quantity of CO_2 stored for the purpose of meeting emissions reduction targets are still limited. CO_2 removable from low-concentration sources, such as direct air capture from the atmosphere, requires more pilot cases to prove its effectiveness and cost performance. In terms of utilisation, utilising the captured CO_2 to create value-added products, such as hydrogen and synthetic fuel, is being planned and demonstrated around the world. In addition, the creation of a value chain of the captured CO_2 is likely to greatly contribute to the commercialisation of CCUS activities through the generation of profits, which will, in turn, lead to further technological development.

Hub and cluster business models with an industrial development approach to match national policies.

A hub and cluster model is said to be a type of business model that can solve the problems of the high-risk and high-cost nature of CCUS by allocating the risks amongst various parties and reducing costs via shared infrastructure. Additionally, as already seen in some countries, a hub and cluster model can also play a role in new industrial development, such as CO_2 storage services for several emitting industrial facilities in Norway, the hydrogen economy for industrial hubs planned in the United Kingdom, and synthetic fuel production in the Netherlands, etc. Whilst many countries in Asia are also planning for COVID-19 recovery plans as well as second nationally determined contributions, engaging with the hub and cluster model of CCUS and involving the industrial sector may contribute to both economic and climate goals.

The creation of a hub and cluster model in ASEAN and East Asia needs extensive collaboration and capacity building through a regional platform.

ASEAN and East Asia comprise a diverse area with some common issues. Most countries are highly vulnerable to climate change and need immediate action but lack capacity. At the same time, there are government institutions as well as the private sector with applicable technologies. As seen in European case studies, the hub and cluster model is most effectively done through international collaboration. Through the creation of a common platform, efforts can be aggregated to explore potential storage sites as well as providing fora to discuss practical issues through capacity building, such as legal and policy frameworks, technology applicability, and business model, as well as financing options most relevant to the region.

Introduction

The report consists of four chapters. Chapter 1 covers global policy development with an emphasis on climate change. It discusses the historical trend where CCUS first started as a measure to boost oil production in the time of an oil crisis and is now being increasingly promoted as a measure to tackle climate change issues. It also covers the trend in increasing investment by governments as CCUS is often promoted as an economic development vehicle.

Chapter 2 discusses the technologies required for CCUS for each segment: the separation and capture of CO_2, transport, utilisation, and storage. It introduces and explains the technical outline and discusses their application in ASEAN and the East Asia region. Chapter 2 reveals that most technologies involved in CCUS are proven and can be applied to ASEAN and East Asia even though consideration must be made to account for the long-time storage of CO_2 if CCUS is implemented as part of a carbon credit

scheme. It also covers new technologies that have attracted attention, such as direct air capture which removes CO_2 from the atmosphere, leading to negative emissions.
Chapter 3 describes business model case studies of some early-start projects with a focus on the hub and cluster model. It introduces the advantages of such a business model and some of the pre-existing conditions that have contributed to the early-start projects. It also discusses its development potential in ASEAN and East Asia.
Chapter 4 explores the view towards creating a regional CCUS network in ASEAN and East Asia and its expected function for further promoting CCUS development in the region. It introduces discussions held at the CCUS panel session at the 3rd EAEF by key stakeholders comprising representatives from ASEAN governments, academia, multilateral development banks, the private sector, international organisations, and financial institutions, and the outputs referring to the need for a regional platform to further facilitate regional collaboration and capacity building to develop a workable CCUS business case in ASEAN.