

## *The Need for Strategic Environmental Assessment for Carbon Capture and Storage in Japan*

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### **Introduction**

The Paris Agreement came into force on 4 November 2016. This agreement, for the first time, brought all nations together to share the responsibility of combatting climate change and adapting to its effects (UNFCCC 2016). In order to achieve the target of keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels, there has been wide discussion about Carbon Capture and Storage (CCS) considered as one of the significant approaches to mitigating a large amount of CO<sub>2</sub> from the global atmosphere (GCCSI 2016a; and Streck et al 2016). However, the current status of the world has yet to be widely demonstrated at a commercial scale, and CCS implementation has still been low (UNECE 2016). It is a key challenge for nations and investors to understand the technology and benefits, and governments are responsible to prepare for a relevant policy framework for CCS. This paper aims at reporting a part of the progress under our nationally funded research project, which is to develop a comprehensive policy and legislative framework for commercialising CCS in Japan. This paper specifically suggested that a Strategic Environmental Assessment (SEA) would play a significant role in assisting Japan's future framework. Firstly, this paper will describe the significance of a CCS policy and programme and SEA for CCS. It will then review Japan's context by addressing the current status of CCS deployment, and issues under the current legislation applicable to CCS. This will conclude this paper.

### **CCS Policy and Programme**

In terms of a CCS policy, it is essential to analyse the social, environmental and economic aspects, which enable us to contribute to reducing the Greenhouse Gas (GHG) emissions at the national level. The policy also needs to achieve a low carbon society with middle and long-term vision (IEA 2012). These will reduce the GHG emissions by promoting/implementing CCS, but also the technology will create a cleaner coal-fired power system, and/or bioenergy with CCS (IRENA 2013). IEA-GHG (2007) acknowledged that CCS deployment would potentially create: direct and/or indirect impacts on environmental, economic and social aspects in conjunction with short, middle, long term and permanent influences; and cumulative impact, secondary effect and/or incidental impact. Thus, it is essential to conduct a review process such as an Environmental Impact Assessment (EIA) on each CCS project to identify any significant environmental issues during the permit process. SEA is a similarly structured

approach to EIA but considers a policy and regulatory decision for implementing multiple projects. Thus, both EIA and SEA are significant processes when considering CCS deployment.

### **The Significance of SEA for CCS**

SEA has already been adopted and implemented in a number of countries, including the European Union (EU) countries, the United States and Canada. The EU enacts the SEA Directive, providing a basis of SEA framework applied to plan /programme making. SEA is a part of EIA and provides an opportunity for a country to assess environmental impacts at the planning stage. Both EU-EIA and EU-SEA Directives are individually enacted under the EU legislation. A result from SEA helps EIA to enable an efficient process and information transparency. However, although the EU-CCS Directive requires a process of EIA, it does not refer to the SEA in its requirements. CCS projects are key developments under energy policies, thus a comprehensive approach to making a decision is unavoidable. Therefore, CCS should be reviewed by both EIA and SEA (IEA-GHG 2007). The United Kingdom (UK) government has followed the basis of the Directives for its national activities, and SEA has been included with CCS, as one of the key development areas for the national practice.

The UK government is committed to the reduction of GHG emissions by 80% on 1990 levels by 2050, as implemented in the *Climate Change Act 2008*. The UK was also involved in the Paris Agreement. Energy production is a major source of GHGs, and the UK has faced a key challenge for developing energy and climate change policies to meet their legally binding UK targets and internationally agreed goals. To achieve those, the government intends to increase energy supply from renewable sources, cleaner coal, biomass or gas-fired power stations and nuclear energy. The government acknowledged that cleaner coal and those fired power stations incorporated with CCS would significantly contribute to achieving its policy outcomes. The National Policy Statements for Energy also target almost all the possible opportunities for renewable energy projects for the country's benefit (e.g. CCS, gas storage and oil and gas pipelines) (DECC 2015).

Most recently, the UK Department of Energy and Climate Change (DECC) prepared an 'environmental report' as part of its Offshore Energy Strategic Environmental Assessment [OESEA] programme. OESEA3 is implemented under *Environmental Assessment of Plans and Programmes Regulations 2004* (the SEA Regulations), which apply to any relevant plan/programme relating either solely to the whole or any part of England, or to England and any other part of the UK. OESEA3 assessed a draft plan/programme to hold further offshore leasing/licensing for renewable energy, oil & gas, hydrocarbon gas and CCS and associated infrastructure (DECC 2016).

### **CCS Project Scheme in Japan**

Japanese government submitted Intended Nationally Determined Contributions (INDCs) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2015. Japan decided the GHG reduction target of 26% by 2030 below 2013 level, ensuring consistency with its energy mix, set as a feasible reduction target by bottom-up calculation, with concrete policies, measures and individual technologies taking into adequate consideration, *inter alia*, technological and cost constraints, and set-based on the amount of domestic emission reductions and removals assumed to be obtained (MoFAoJ 2016). The government also targets an 80% reduction of GHG emissions by 2050. To achieve this, the government estimate shows that we will need to rely on introducing innovative technologies including CCS, innovative structural material, and/or artificial photosynthesis (Oshiro and Masui, 2014).

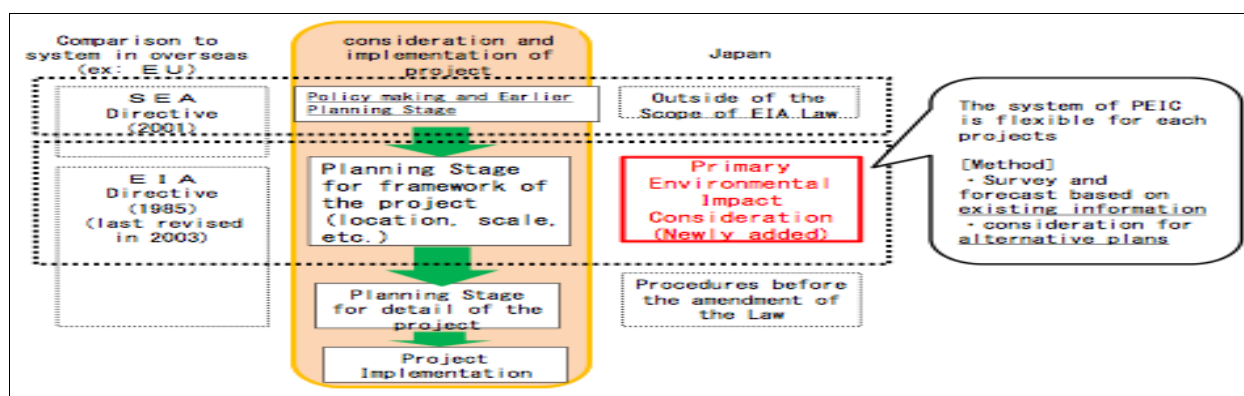
With regard to the potential of CCS in Japan, the existing boring data showed the potential storage capacity of approximately 5.2 billion t-CO<sub>2</sub> for relevant reservoir and 150 billion t-CO<sub>2</sub> in total value (Ito, 2008). Thus, as a key technology to contribute to meeting Japan's GHG reduction target, the government intends further research in order to commercialise CCS deployment by 2020, including a range of geological research on research development of large-scale CCS pilot projects and carbon separation/capture technologies, safety assessment, and storage site selection. The government also acknowledged that CCS Ready can further create cleaner coal fired power with the reduction of environmental impacts (METI, 2014). Currently, the Tomakomai CCS Demonstration Project has been endorsed by Japan's Ministry of Economy, Trade and Industry (METI) since February 2012. The project aims to demonstrate an overall CCS system from capture to storage as a basis for commercialising CCS from 2020. It intends to inject 100,000 tonnes or more of CO<sub>2</sub> per annum in the first two reservoirs located at the depths of approximately 1000 - 3000m, under the seabed of the offshore area of Tomakomai Port over the period 2016-2018 (Japan CCS Co., Ltd 2016).

From the legislative perspective, the amendment of 'the Act on Prevention of Marine Pollution and Maritime Disaster' in 2007 considers the future CCS. In particular, this law only requires security for 'injection and storage' and 'closure and post-closure'. Furthermore the law only accepts an operator for a licence of 'storage' and/or 'waste' up to maximum 5 years, thus it has not yet considered the long-terms management after post-closure including transfer of site closing and security, and long-term liability (Nakamura 2007; and GCCSI 2016b). There is a need for an appropriate energy and climate policy in order for Japan to commercialise the technology. In this regard, it is important to set a specific target indicating how much reduction of CO<sub>2</sub> emission CCS can contribute, and to establish a comprehensive legal framework (i.e. long-term management and liability) (IEA 2012).

### Issues of SEA for CCS Plan/ Program in Japan

In Japan, the EIA Law was amended in April 2011. The law provides an opportunity to review significant environmental impacts for multiple development plans at the early stage, involving consultation processes by the responsible minister, related authorities and the public. The results help in decision-making, which enables prevention and/or reduction of any potential environmental impacts (MoE 2012). However, the law does not provide a comprehensive framework such as SEA, which is widely implemented in a number of countries especially among EU members. SEA does not only aim at considering the environmental aspect, but also social and economic aspects at the planning stage (Yanagi, 2011). In particular, the UK's SEA often applies to plan/programmes but also policies. As mentioned previously, the UK's OESEA3, has considered a number of specific energy policy and plan/programmes including CCS. Such a system has yet to be available under Japan's law. The table 1 shows the comparison of EIA & SEA Framework in EU and Japan.

Table 1: Comparison of EIA & SEA Framework in EU and Japan



(Source: Ito 2014 )

In order to implement CCS in Japan, the relevant data will be collected to select the most specific and appropriate storage sites. Furthermore, it is important for us to consider: the characteristics of CCS sites and operations; environmental, economic and social effects in conjunction with short, middle and long-term, and secondary, cumulative and synergistic effects of the implementation of the plan. As the government has recognised CCS as one of the significant tools to attain Japan's GHG mitigation target (Japan CCS Co., Ltd 2016), it is thus necessary for the government to make the right policy decision for implementing CCS by conducting a high level discussion at the earliest possible time. CCS provides a beneficial opportunity for considering the impacts of climate change and energy security. Therefore, SEA applied for CCS will be a significant tool to assist a relevant policy decision in Japan.

SEA provides a process, which helps us to select the relevant programme and the alternatives and to make a strategic decision-making at the planning stage. OESEA3 has considered a list of significant impacts, which are potentially affected by the draft plan/program and the alternatives for CCS operations. This process has thus been implemented to specify a list of impacts, and to review a potential impact by managing environmental conservation control, publication and public consultations as requested for the final decision in the future (DECC 2016). Table 2 below shows the evaluated receptor for EIA/SEA in the Act on Prevention of Marine Pollution and Maritime Disaster in Japan compared with the UK's SEA, based on the criteria under the OESEA3.

Table 2: Comparison of Evaluated Receptors in CCS between SEA in the UK and the Act on Prevention of Marine Pollution and Maritime Disaster in Japan/ Yanagi, Komatsu and Nakamura 2017

<u>UK Offshore Energy Strategic Environmental Assessment</u>	<u>Act on Prevention of Marine Pollution and Maritime Disaster in Japan</u>
<i>Evaluated Receptor in SEA/ELA</i>	
Biodiversity, habitats, flora and fauna	Biodiversity, marine flora and fauna (Not evaluated)
Geology, substrates and coastal geomorphology	(Not evaluated)
Landscape/seascape	(Not evaluated)
Water environment	Water/Seabed environment
Air quality	(Not evaluated)
Climate and meteorology	(Not evaluated)
Population and human health	(Not evaluated)
Other users, material assets (infrastructure, other natural resources)	Other users
Cultural heritage, including architectural and archaeological heritage	(Not evaluated)
Conservation of sites and species	(Not evaluated)
Interrelationships of the above	(Not evaluated)

The table clearly shows that EIA under the current legal framework in Japan relevant to CCS deployment, therefore has yet to be sufficient to evaluate the long-terms and secondary, cumulative effects by CCS as well as technical and social aspects as those listed in SEA such as the UK SEA. Given this, the circumstances leave a key challenge for making a comprehensive CCS framework in Japan. Although other legal aspects such as security and long-term liability still need to be developed, addressing those issues through a relevant SEA could assist in a better framework in order to commercialise CCS deployment in Japan.

## **Conclusion**

Given this, there is an urgent need for a SEA system in Japan, which will play a significant role in establishing a comprehensive policy, legislative and regulatory framework to commercialize CCS in Japan. SEA enables not only avoiding and reducing any significant risks of the CCS plan, program and/or policy, but also enables making the most efficient way to implement and promote CCS in Japan.

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