



Strategic Analysis of the Global Status of Carbon Capture and Storage

Report 3: Country Studies
Japan

Final Report



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1. Executive summary

From a policy perspective, the Japanese government has emphasized the importance of using and developing CCS technology in a number of international fora. The government's support for CCS projects and technology, along with current efforts to create the enabling regulatory framework to allow the commercial deployment of CCS technology in Japan is seen as part of meeting these international commitments. However Japan's review of its own domestic legal framework in light of the needs posed by commercialization of CCS in the near future, is still in its infancy.

Current government efforts to revise the Japanese legal system to facilitate CCS projects, and financial support for research, development and demonstration projects in the area of CCS are also a result of Japan's commitment to CCS. The Government's *Action Plan for Building a Low Carbon Society*, released in 2008, aims to:

- reduce the costs of CO₂ separation and capture to around 2000 yen per tonne by 2015;
- reduce the costs of CO₂ separation and capture to around 1000 yen per tonne by 2020;
- begin a large-scale CCS project early in 2009; and
- work toward making CCS projects and technology accessible and possible to implement on a commercial scale by 2020. This is to be done through, amongst other things, improving monitoring and environmental impact assessment capabilities and revision of legislation and regulations as required.

The Ministry of Economy, Trade and Industry has indicated that the government plans to deploy CCS technology as one of the means to meet its long term CO₂ emission reduction target. The Ministry of Economy, Trade and Industry's CCS Research Group has been asked to make recommendations regarding the policy issues surrounding the implementation of CCS, and examine the changes and revisions required to existing domestic legislation to facilitate large scale CCS. As a result of work to date, the Research Group has drafted guidelines, currently tentatively known as *Desirable Safety and Environmental Standards for the Implementation of CCS*.

The Japanese government has and continues to invest in research and development of CCS related technology and pilot projects.

2. Glossary

Building Standards Act	Building Standards Act, Law No.201 of 1950 (Kenchiku kijyun hō)
Clean Coal Power R&D Co. Ltd	<i>Kuriin kōru pawā kenkyūjyo</i>
CCS Technology Research Group	Carbon Capture and Storage Technology Research Group, Industrial Science and Technology Policy and Environment Bureau, Ministry of Economy, Trade and Industry (<i>Nisanka tanso kaishū/choryūgijyutsu kenkyūkai</i>)
Climate Change Policy Law	Law Concerning the Promotion of Efforts to Combat Global Warming (<i>chikyu ondaka taisaku no suishin ni kan suru hōritsu</i>)
Coast Act	Coast Act, Law No.101 of 1956 (<i>kaiganhō</i>)
Fishing Port and Ground Improvement Act	Fishing Port and Ground Improvement Act, Law No.137 of 1950 (<i>gyokō gyojyō seibihō</i>)
Gas Business Act	Gas Business Act, Law No.51 of 1954 (<i>Gasu jigyōhō</i>)
General Environmental Technos Co., Ltd	<i>kankyō sōgō tekunosu kabushiki kaisha</i>
General High Pressure Gas Safety Rules	Implementing Rules of the High Pressure Gas Safety Act which set out the standards which must be applied in the operation of gas pipelines (<i>Ippan kōatsu gasu hoan kisoku</i>)
High Pressure Gas Safety Act	High Pressure Gas Safety Act, Law No.204 of 1951 (<i>Kōatsu gasu hoan hō</i>)
IGCC	Integrated Gasification Combined Cycle (<i>sekitan gasuka fukugō hatsuden</i>)
ISTPEB	Ministry of Economy, Trade and Industry's Industrial Science and Technology Policy and Environment Bureau (<i>sangyo gijyutsu kankyōkyoku</i>)
Japan CCS Survey Corp.	<i>Nihon CCS chōsa kabushiki kaisha</i>
JCOP	Japan CO ₂ Geosequestration in Coal Seams Project
JPY	Japanese Yen
Kyoto Protocol	Kyoto Protocol to the <i>United Nations Framework Convention on Climate Change</i> , opened for signature 11 September 1997 2303 UNTS 148 (entered into force 16 February 2005)
Land Expropriation Law	Compulsory Purchase of Land Act, Law No. 219 of 1951 (<i>tochi shūyōhō</i>)

London Convention	<i>Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter</i> , as modified by the Protocol of 1996, opened for signature 29 December 1972, 1046 UNTS 138 (entered into force 30 August 1975).
Marine Pollution Act	Act Pertaining to the Prevention of Marine Pollution and Maritime Disaster, 1970, Law No.49 of 1970 (<i>kaiyō osen oyobi kaijyō saigai no bōshi ni kansuru hōritsu</i>)
Marine Resources Development Promotion Act	Marine Resources Development Promotion Act, Law No.60 of 1971 (<i>kaiyō suisan shigen kaihatsu sokushinhō</i>)
Maritime Traffic Safety Act	Maritime Traffic Safety Act, Law No.115 of 1972 (<i>kaijyō kōtsū anzenhō</i>)
METI	Ministry of Economy, Trade and Industry (<i>keizai sangyō shō</i>)
Mine Safety Act	Mine Safety Act, Law No.70 of 1949 (<i>kōzan hoanhō</i>)
Mining Act	Mining Act, Law No 289 of 1950 (<i>kōgyōhō</i>)
MITI	(Former) Ministry of International Trade and Industry (<i>tsūshō sangyō shō</i>)
MOE	Ministry of Environment (<i>kankyō shō</i>)
Natural Parks Law	<i>Shizen kōen hō</i>
NEDO	New Energy and Industrial Technology Development Organisation (<i>dokuritsu gyōsei hōjin shin enerugii sangyō gijutsu sōgō kaihatsu kikō</i>)
Nibutani Dam case	<i>Nibutani Dam decision</i> (Judgment of the Sapporo District Court 27 March 1997, 1598 <i>Hanrei Jihō</i> 33)
Petroleum and Combustible Natural Gas Resources Development Act	Petroleum and Combustible Natural Gas Resources Development Act, Law No.162 of 1952 (<i>sekiyu oyobi kanensei tennen gasu shigen kaihatsu hō</i>)
Poisonous and Deleterious Substance Control Act	Poisonous and Deleterious Substance Control Act, Law no.303 of 1950 (<i>dokubutsu oyobi gekibutsu</i>)
Act on Port Regulations	Act on Port Regulations, Law No.174 of 1948 (<i>kōsokuhō</i>)
Act on the Protection of Fishery Resources	Act on the Protection of Fishery Resources, Law No.313 of 1951 (<i>suisan shigen hogohō</i>)

Regulations on Shipping and Storage of Dangerous Substances	Implementing regulations under the Ship Safety Law (<i>kikenbutsu senpaku unsō oyobi chozō kisoku</i>)
Research Group	(the ISTPEB) Carbon Capture and Storage Research Group (<i>Nisanka tanso kaishū/choryū kenkyūkai</i>)
RITE	Research Institute of Innovative Technology for the Earth (<i>zaidan hōjin chikyū kankyō sangyō gijyutsu kinkyū kikō</i>)
Ship Safety Law	Law No.11 of 1933 (<i>Senpaku anzen hō</i>)
SCCL	Soil Contamination Countermeasures Law (<i>Dojyō osen taisakuhō</i>)
Tokyo ETS	The mandatory emissions trading scheme which will be implemented in the Tokyo Metropolitan Area from 2010.
UNDRIP	<i>United Nations Declaration on the Rights of Indigenous Peoples</i>

3. CO₂ pricing

3.1 Mandatory cap and trade schemes

Japan currently has one cap and trade system which will become mandatory for some businesses in the Tokyo Metropolitan area from 2010, as discussed below. This system is yet to include substantive rules and provisions regarding the use by participants of CCS technology to meet CO₂ emission reduction targets.

The Tokyo Prefectural Government has enacted legislation introducing a cap and trade emissions trading scheme that will come into force from April 2010 within Tokyo prefecture. The system concentrates regulation specifically on large scale emitters, with the less than 1% of all businesses in the Tokyo Metropolitan area who will be bound by the regulations representing approximately 40% of total CO₂ emissions in the city. Unlike the two voluntary schemes implemented by the national government, the Tokyo ETS will be mandatory for businesses in the Tokyo Metropolitan area with workplaces that emit large amounts of CO₂ (defined as use of fuel, heat and/or electricity equivalent to 1,500 kilo-litres of crude oil per year), who will have a legal obligation to reduce the amount of emissions, either by achieving actual reductions in the use of CO₂ emitting fuel, energy, heat etc, or by purchasing emissions allowances from other participants.

As the Tokyo ETS aims to reduce actual CO₂ emissions in the greater Tokyo area, the new rules announced in April 2009 for the Tokyo ETS exclude (for the time being) the use of Kyoto credits in that scheme.

3.1.1 Fossil fuel extraction facilities

The Tokyo ETS will affect over 300 workplaces in the Tokyo Metropolitan area in its first year of operation. While the Tokyo ETS does not exclude fossil fuel extraction facilities, in reality these are unlikely to be found in the Tokyo Metropolitan area.

3.1.2 CCS-specific incentive provisions

There are currently no CCS specific incentive provisions in the Tokyo ETS scheme.

3.2 Non-mandatory emission reduction schemes

Japan currently has two voluntary CO₂ emission cap and trade systems, and a voluntary industry initiative for CO₂ emission reduction, run by the Japan Federation of Economic Organizations (*keidanren*). These systems are however yet to include substantive rules and provisions regarding the use by participants of CCS technology to meet CO₂ emission reduction targets.

THE JAPANESE MINISTRY OF ENVIRONMENT VOLUNTARY EMISSIONS TRADING SCHEME (MOE ETS)

Under the MOE ETS, which has been in operation since 2005, participants voluntarily agree to reduce their CO₂ emissions (agreeing targets with the government) and are allocated Japan Allowances (JPAs). The MOE ETS is conducted in accordance with the regulations, guidelines and rules prepared by the MOE.

No sectors are excluded from the MOE ETS; the MOE decides on the participants from among the companies which respond to its annual invitation. Currently however, there are very few participants in the scheme, with a total of 222 companies participating over the four years from 2005 to the end of 2008, and 81 companies participating in 2008. Participants in the MOE ETS are freely allocated JPAs, and in exchange for participation they receive certain subsidies from the government for the development and installation of CO₂ emission reduction equipment.

In order to achieve their reduction targets, participants are allowed to trade JPAs with other participating entities. There are also no limits on the use of Kyoto credits in the MOE ETS, but Non-Kyoto credits from international trading schemes may not be used. The government has established and continues to manage an electronic registry of JPAs which participants may access through the internet. JPAs can be banked, but borrowing is not permitted.

Although participation in the MOE ETS is voluntary, the government closely monitors the results. If agreed reduction targets are not achieved, the government may order scheme participants to return subsidies they have received for the development of CO₂ emission reduction equipment.

THE JAPANESE GOVERNMENT TRIAL ETS (THE TRIAL ETS)

In October 2008 the Japanese Government started a trial domestic ETS which is implemented in accordance with the 29 July 2008 Cabinet Decision "Action Plan for Building a Low Carbon Society". A domestic credit market is also being implemented on a trial basis.

The Trial ETS is currently limited to CO₂ of energetic origin. No sectors are excluded from the Trial ETS. Participants can be an individual facility, a company, or a group of companies. The number of participants was 528 as of 10 February 2009.

Under the Trial ETS, target-holding participants will be set a specific target to reduce emissions. Target holding participants can set their target for one or more years during the period from 2008 – 2012 and can select either a target for the total amount of emissions or a target for emissions per product unit.

Participants in the Trial ETS that have selected a target for total emissions may receive emissions allowances during the target year, at their option. Target holding participants that opt to receive emission allowances during a target year can sell their emission allowances before the end of a relevant target year, but must maintain at least 90 percent of the total allowances allocated to them. Under the Trial ETS, banking and borrowing of allowances will be allowed for participants with multiple target years.

The government is preparing to establish and manage a target achievement verification system for emission allowances for the Trial ETS. Participation in the Trial ETS is completely voluntary, and for the time being there will be no penalties for any participant that fails to achieve its target reduction in emissions.

JAPAN FEDERATION OF ECONOMIC ORGANIZATIONS SCHEME (THE KEIDANREN SCHEME)

The Japan Federation of Economic Organizations (*keidanren*) has announced voluntary environmental action plans, where participating industry sectors have formulated plans for the reduction of CO₂ emissions and the acquisition of Certified Emission Reductions, Emission Reduction Units, and (from overseas) Clean Development Mechanism and Joint Implementation projects. These action plans merely set out voluntary goals for each sector and do not provide specific goals for individual entities.

3.2.1 Acceptance into mandatory cap and trade schemes

There is nothing to prevent actual reductions in CO₂ emissions realised as a result of efforts to meet targets in the voluntary *keidanren* or the MOE ETS or Trail ETS schemes from being used toward realisation of emission reduction obligations for a workplace that is subject to the mandatory Tokyo ETS scheme.

3.2.2 Sectoral coverage; inclusion of CCS

The above voluntary schemes are open to all sectors and any industry, provided the business in question applies and is accepted as a participant in the scheme by the regulating government authority. These systems are however yet to include substantive rules and provisions regarding the use by participants of CCS technology to meet CO₂ emission reduction targets.

3.3 CO₂ taxation schemes

There is currently no CO₂ tax or CO₂ capital gains tax in Japan.

In 2005, the MOE announced a proposal for the introduction of an “environmental tax” applicable to gas, fuel, electricity generated from fossil fuels etc, commensurate with the level of CO₂ emissions they generate. By increasing the costs of consumption of such energy sources, the proposed tax aimed to increase incentives to reduce energy use and to purchase energy-saving consumer products and automobiles. The tax revenue gained would then be used to fund measures to combat global warming. However, the proposal was strongly resisted by industry groups, and is yet to be acted on or implemented through legislation.

The government has also considered amending the Law on Petroleum and Coal Tax, so as to increase gasoline taxes. The income generated from the tax imposed on gasoline under the Law on Petroleum and Coal Tax (previously the Petroleum Tax Law) has been used to date to build roads. However, recent proposals have suggested introducing an “environmental tax” aspect to existing gasoline excises. The aim is to both reduce the consumption of gasoline (by increasing its price) and to use the income generated towards funding of environmental protection measures. This proposal to amend existing taxes has been floated as an alternative to the above proposal of introducing a new CO₂-tax style “environmental tax”.

In the current politically and economically unstable domestic environment however, the idea of a CO₂ tax or introducing an environmental aspect to gasoline excise appears to have been put on the back burner of political and public debate.

3.4 Indirect cost imposition: renewable energy schemes

3.4.1 Portfolio energy standards

A law recently passed by the Diet which was promulgated on 8 July 2009 and will come into force within 2 years of promulgation (planned application from 2010), imposes obligations on “specified” energy providers¹ and petroleum and gas providers (which supply energy at levels to be set by cabinet order) to meet targets for the use of renewable energy and non-fossil fuels. The Act is known as the

¹ “Specified” energy providers are defined as those energy providers, as listed in a cabinet order, for whom i) the use of non-fossil fuel energy sources is technologically possible and ii) the promotion of use of non fossil fuels is deemed particularly necessary.

Law Concerning the Promotion of Efficient Use of Fossil Fuels and the Use of Non-Fossil Fuels by Energy Providers.

Obligations imposed under the legislation include:

- the obligation to expand the use of renewable energy sources such as solar and nuclear energies, to more than 50 percent by the year 2020 (electricity providers);
- the obligation upon power companies to purchase unused solar energy from homes and businesses with solar panels at approximately twice the price of non-renewable energy (approximately 50 yen/kW), with the price to gradually reduce over time for the next 10 years;
- the obligation to utilise bio-fuel and bio-gas (petroleum and gas companies);
- the obligation to use petrol and natural gas efficiently (petroleum and gas companies); and
- reporting requirements regarding efforts to meet the above obligations.

Enforcement Mechanisms include:

- administrative recommendations, where the measures implemented to meet the above obligations are “markedly inadequate”; this is determined in light of evaluation criteria to be established/published by the Economy, Trade and Industry Minister;
- administrative Order to implement measures to meet the above obligations, where measures are not implemented after an administrative recommendation;²
- standard Administrative rights to request a report or carry out an on-site inspection in conjunction with issuing administrative recommendations or orders;
- criminal penalty sanctions of fines of up to JPY1 million (US\$10,000) for breach of administrative orders to implement measures to increase use of renewable energy, or to take measures for more efficient use of fossil fuels; and
- fines (up to 500,000 yen) for failure to submit reports on measures taken, failure to report or submission of a false/misleading report requested in conjunction with an administrative recommendation or order, or refusing onsite inspection.

3.4.2 Feed-in tariffs

On 24 February 2009 Japan’s Minister of Economy, Trade and Industry announced that the government plans to implement a “Japanese version of the Feed-in Tariff System” seen in Germany and elsewhere. Under this system, power companies will purchase the unused solar energy of households and businesses which currently have or install solar energy panels in the next 3-5 years at approximately twice the price of non-renewable energy (approximately 50 yen/kW), with the price to gradually reduce over time for the next 10 years. The METI is now in discussions with power industry representatives, in order to work out details of the system’s design.

The Feed-in Tariff scheme is not expected to have a significant impact on the power or energy industry, however, as the Feed-in Tariff will not be available to energy providers themselves for solar energy that they produce.

² Failure to implement recommended measures must be “without legitimate reason”, and the views of the Advisory Committee on Energy and Natural Resources must be heard first. See also <http://www.meti.go.jp/press/20090317001/20090317001.html>.

The scheme has been included in the *Law Concerning the Promotion of Efficient Use of Fossil Fuels and the Use of Non-Fossil Fuels by Energy Providers* which was passed by the Diet in June 2009, and promulgated on 8 July 2009 (see above). The METI has the support of the Federation of Electric Power Companies of Japan and if the Bill is passed, hopes to implement the system domestically from 2010. Commentators have suggested these measures are the centrepiece for the Liberal Democratic Party's plans to develop a "Japanese-version Green New-Deal", ahead of the Japanese general election to be held by 10 September 2009.

3.5 Greenhouse gas emission and energy use reporting schemes

3.5.1 Reporting on Greenhouse Gas Emissions under the Climate Change Policy Law

In Japan, the national Climate Change Policy Law requires businesses emitting more than a certain specified volume of GHG to report annually to the government on the emissions volume for each workplace. Consolidated national reports are then publicly released by the Minister of Energy and the Minister of Economy, Trade and Industry.

The Climate Change Policy Law covers all Kyoto Protocol GHGs; CO₂ (excluding CO₂ generated by the use of energy), methane (CH₄), N₂O, hydrofluorocarbons (HFCs), polyfluorocarbons (PFCs) and sulphur hexafluoride (SF₆), and applies to any entity emitting a significant volume of GHGs regardless of business sector.

ENTITIES LIABLE TO REPORT

Under the Climate Change Policy Law, reporting requirements are dependent on the volume of GHG emissions of a liable entity. The volume of emissions is calculated with reference to energy use and the Law imposes an obligation on entities which emit a "large volume" of GHGs. What constitutes an entity which emits a "large volume" is defined in the Law on the Rational Use of Energy, as follows:

For CO₂ generated by the use of energy:

- designated energy management facilities with an amount of energy use equivalent to 1,500 kl or more of crude oil per year. These are divided into:
 - type 1 (Energy use equivalent to 3,000 kl or more of crude oil per year) and
 - type 2 (Energy use equivalent to 1,500 kl to 3,000 kl of crude oil per year);
- designated transport companies possessing over 200 trucks/300 railroad freight cars; and
- designated courier companies with total mass of couriered goods (including own goods) exceeding 30 million tonnes per year.

For CO₂, CH₄, N₂O, HFCs, PFCs and SF₆ not generated by the use of energy:

- companies which emit over 3,000 tCO₂-e per year of any type of GHG.

REPORTING OBLIGATIONS

Legal liability for reporting sits with the "business operator" (*jigyosha*) of the workplace subject to the reporting obligation. A workplace (*jigyosho*) is defined as a place where administrative or business related activities are carried out as one business unit, such as an office, factory or store. Under a

revision to the Climate Change Policy Law that will become effective on 1 April 2009, businesses over a certain size will be required to aggregate and report emissions at the business entity or franchise level. Under the revisions, reporting at the business entity and franchise operation level will commence from 2010. Target emission benchmarks for each industry are also expected to be introduced as part of these changes.

Entities to which the law applies are obliged to start calculating the volume of GHG emissions from 1 January 2009 and to report it from 2010. The report will be submitted to the responsible minister, who then notifies the MOE and the METI of the reported items and the total reported volume of emissions. Liable entities which violate their reporting obligations may be subject to an administrative penalty of up to JPY 200,000.

Under the Climate Change Policy Law, if a liable entity's business interests may be damaged by disclosure of the quantity of its GHG emissions, it can request that its reported data be kept confidential. Also, if the relevant government minister approves such request, the company can submit its report to the MOE and METI without back-calculating specific emissions figures. The public report would contain the same information.

3.5.2 Reporting on Energy Saving under the Law on the Rational Use of Energy

Under the Law on the Rational Use of Energy, companies engaged in the transportation business and companies which need to transport their products are required to:

- prepare and submit an energy saving plan; and
- periodically report on the amount of energy use and the implementation of energy saving measures.

Under revisions to the Law on the Rational Use of Energy which came into effect in April 2006, a notification must be made to the competent administrative agency regarding energy saving measures when a building with floor space of 2,000 square meters or more, including residential buildings, is newly constructed, added to, or subject to large scale renovations or refurbishment. Regular reports must also be made to the competent agency regarding the maintenance status of the building concerning which the notification was made.

Further amendments to the law promulgated in May 2008 will extend this obligation to notify of energy saving measures upon construction or renovation, and the obligation to report regularly on maintenance status, to certain small/medium scale residences and buildings (as defined in Article 75 – see 5-120 below) from April 1 2010. Notifications under the Law on the Rational Use of Energy may be used as notifications under the Climate Change Policy Law, and vice versa.

Under the same law, offices and factories over a certain size are required to manage and report on energy usage. This is currently done on a per workplace (jigyosho) basis, which is defined in the legislation as a place where administrative or business related activities are carried out as one business unit, such as an office, factory or store.

However, under amendments to the law which will come into effect between April 2009 and April 2010, the reporting requirement will change to a per entity basis, and will also cover franchise chains, with all stores of a franchise being treated collectively as one entity.

All entities which consume energy equivalent to 1,500 kilolitres (kl) of oil in any year must submit a "Report on Energy Consumption" and a periodic report (Law on the Rational Use of Energy, Art 15).

The “Report on Energy Consumption” is a report on the current status of energy use, while the periodic reports are intended to report in a consolidated fashion on actual annual results and provide disaggregated data on emitting facilities (Law on the Rational Use of Energy, Art 7-2.)

If an entity is designated as a “Type 1 Designated Energy Control Factory”, it must submit a “Plan for Mid to Long Term on Efficiency Measures” to the Minister of Economy, Trade and Industry and the minister of any other ministry that regulates its business. Under amendments to the Law on the Rational Use of Energy, entities which are designated a “Specified Business Entity” as a result of their reported energy usage at the business entity or franchise level for April 1 2009 to March 31 2010 must submit a “Plan for Mid to Long Term on Efficiency Measures” from April 2010 onwards.

3.5.3 Reporting under the Tokyo Metropolitan Government System

In 2008, the Tokyo Municipal Government amended the Tokyo Municipal Environmental Protection Ordinance (*Tokyo-to kankyō kakuho jyōrei*) and the Global Warming Countermeasures Policy, under that ordinance, to introduce an obligation on businesses with over a certain energy/petroleum consumption to reduce their total volume of GHG emissions. The coverage of the Tokyo scheme is the same as that under the Climate Change Policy Law. That is, it applies to businesses in all sectors which equal or exceed the energy/petroleum consumption benchmark.

Under the Tokyo Municipal ordinance, reduction obligations apply to owners of workplaces that use fuel, heat and electricity equivalent to 1,500 kilo-litres or more of crude oil per year. Such owners must submit and publicly announce plans and progress reports on the reduction of CO₂ emissions from the use of fuel, heat or electricity. Sanctions such as warnings, publication of the names of offenders and fines are planned for workplaces which do not report, or do not meet their reduction targets. Although the main focus is a reduction in actual emissions by each workplace, the Municipal government is also introducing an emissions trading scheme (ETS), discussed below, which businesses can utilise to meet their reduction targets.

The crude oil equivalent amount is calculated using the following formula:

$$[\text{volume of fuel used}] \times [\text{calorific value per unit of fuel used (specified for each type of fuel)}] \times [\text{crude oil equivalent calorific value (uniform 0.0258)}].$$

3.6 Legislation Enacted To Give Effect to International Treaties or Conventions relating to CCS, Including Pollution

Japan has amended the domestic *Act Pertaining to the Prevention of Marine Pollution and Maritime Disaster of 1970* (Marine Pollution Act) in order to comply with its international obligations under the *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972* (London Convention). As part of this process, in May 2007 Japan implemented further amendments to the Marine Pollution Act, in order to reflect the 2006 amendments to the 1996 London Protocol, which allowed storage of CO₂ under the seabed from 10 February 10. The Marine Pollution Act amendments reflect the London Convention amendments, which regulate sequestration of CO₂ streams from CO₂ capture processes in sub-seabed geological formations. As a result, Japan now has detailed provisions regulating the sub-seabed sequestration of CO₂, including:

- a requirement to apply and obtain approval for the “disposal” of CO₂ in the sub-sea bed from the Environment Minister; (Article 18-8-1-2)
- a requirement to prepare and submit a CO₂ disposal implementation plan, which clarifies:

- the length of time the disposal will take (not to exceed 5 years);
- the amount and characteristics of the CO₂;
- the estimated amount of CO₂ already disposed of at the given site;
- where and how the CO₂ will be disposed of;
- proposed measures to prevent and contain any damage caused to the marine environment by dumping;
- a detailed plan regarding monitoring of any pollution arising from dumped CO₂;
- standards which must be met in order to receive approval from the Environment Minister to dispose of the CO₂, which include:
 - a finding that the disposal method meets the required standards;
 - a finding that there is no other appropriate means to dispose of the CO₂;
 - a finding that the applicant is fit to competently dispose of and monitor the CO₂ after disposal, in accordance with the implementation plans submitted, including having sufficient financial and technical capabilities;
- submission of details regarding the post-injection closure procedure, within the implementation plan;
- regulation of sites which may be used for sub-seabed CO₂ sequestration (no record of previous seismic activity, easily monitored, a site where pollution prevention measures are easy to implement, etc.); and
- requirements to submit a “sub-seabed disposal prior assessment” as part of the application to the Environment Minister for approval to sequester CO₂. This assessment must include a list of survey items for a latent marine environment impact assessment, the results of the pre-disposal impact assessment, the predicted extent and nature of environmental damage or changes which may result from CO₂ escaping into the ocean, and related documentation.

4. Existing CCS initiatives

4.1 Introduction

4.1.1 Policy Supporting CCS Technology Deployment

From a policy perspective, the Japanese government has emphasized the importance of using and developing CCS technology in a number of international forums. These statements include the G8 Energy Minister's Joint Statement in Aomori Japan on 8 June 2008 (G8 Energy Ministers, 2008) and the *G8 Hokkaido Toyako Summit Leaders' Declaration* stressing the critical role of CCS in tackling climate change and energy security and strongly supporting the launch of 20 large scale CCS projects by 2010 by cooperation and financial support. The government's support for CCS projects and technology, and current efforts to create the enabling regulatory framework to allow the commercial deployment of CCS technology in Japan, is seen as part of meeting these international commitments (METI, 2008).

Current government efforts to revise the Japanese legal system to facilitate CCS projects, and financial support for research and development and demonstration projects in the area of CCS are also a result of Japan's commitment to CCS in the *Action Plan for Building a Low Carbon Society*, released as a Cabinet Decision on 29 July 2008. The plan is the blueprint for implementation of the "Vision for a Low Carbon Society" announced by the Prime Minister ahead of the G8 summit held in Toyako, Japan in July 2008. The *Action Plan* refers to the government's aims to:

- reduce the costs of CO₂ separation and capture to around 2000 yen per tonne by 2015;
- reduce the costs of CO₂ separation and capture to around 1000 yen per tonne by 2020;
- begin a large-scale CCS project early in 2009; and
- work toward making CCS projects and technology accessible and possible to implement on a commercial scale by 2020. This is to be done through, amongst other things, improving monitoring and environmental impact assessment capabilities and revision of legislation and regulations as required.

To this end, the government announced its aims to begin basic CCS research in 2008, verification experiments in 2013, and apply CCS technology in steel works to cut emissions from this source by approximately 30 percent by 2030, provided cost efficiency permits (Cabinet Secretariat, 2008).

METI has indicated that the government plans to deploy CCS technology as one of the means to meet its long term CO₂ emission reduction target, outlined in the above *Vision* and *Action Plan* as a world-wide 50 percent reduction of 2005 GHG emissions by 2050, and reductions of 60-80 percent by Japan (Cabinet Secretariat, 2008). The government plans to deploy CCS technology, together with improvements in the efficiency of thermal power generation to contribute a 12 percent reduction in GHG emissions, toward this target.

4.1.2 Development of Legislation to Support Deployment of CCS Technology

Japan is working toward the substantive use of CCS technology to capture and store CO₂ from 2015 onwards. With this goal in mind, in addition to trial projects, in 2006 the METI Industrial Science and

Technology Policy and Environment Bureau (ISTPEB; *Sangyo gijyutsu kankyōkyoku*) established a CCS Research Group. This group has been asked to make recommendations regarding the policy issues surrounding the implementation of CCS, and examine the changes and revisions required to existing domestic legislation to facilitate large scale CCS. The Research Group issued its mid-term report late in 2007, and plans to continue to examine practical, legislative and policy issues as they arise during implementation of the large scale government backed CCS project from 2009 (preliminary site surveys are underway but the site is yet to be publically announced), with the aim of working with experts to find solutions to these issues, in time to prepare the Japanese policy and legislative landscape for large scale implementation of CCS activities from 2015.

The Research Group's deliberations have been divided into two working groups, one on safety standards for the implementation of CCS, and the other for securing the safety of long-term CO₂ storage. As a result of work to date, the Research Group has drafted guidelines, currently tentatively known as *Desirable Safety and Environmental Standards for the Implementation of CCS*, which have been released for public comment.³ These standards are intended only to guide implementation of the government's large-scale CCS project over the next few years, and as a reference point for those embarking on commercial CCS projects. Those engaged in commercial projects are expected however to develop more comprehensive standards and internal rules, taking into account the particularities of the site where the CCS will be carried out (METI, 2008a). Further, the Research Group has indicated that upon the future commercialization of CCS, the issue of ensuring the highest level of safety when implementing CCS projects should be revisited in Japan, taking into account the latest developments in this area at the time in various other countries (METI, 2008a).

As part of its work, the Research Group is also considering existing legislation and regulations in Japan which may affect CCS projects, and the amendments to these existing laws which may be required. The fruits of the Research Group's deliberations to date, including its consideration of the applicability and adequacy of Japan's existing legal framework and regulatory scheme, for the implementation of CCS projects, forms the basis of the discussion of existing general policy and legislation with applicability to CCS.

The Research Group has also examined developments and existing legal framework relevant to CCS in the EU, the United Kingdom, Norway, America, Australia and Canada, in an attempt to understand global trends and gain awareness of legal and policy mechanisms which may be of reference value to Japan (METI, 2008).

4.2 Acreage releases

The CCS Research Group has deliberated the development of a framework for, and the legal basis of, permits for sub-surface CO₂ sequestration, given the national government's rights over this sub-surface space. Discussions with ISTPEB officials have confirmed however that the details of this system are yet to be finalized (METI Official, 2009).

³ For further information relating to these guidelines see the following website in Japanese <http://search.e-gov.go.jp/servlet/Public?CLASSNAME=Pcm1010&BID=595209010&OBJCD=&GROUP>

4.3 Government or government-business research facilities

4.3.1 New Energy and Industrial Technology Development Organization (NEDO)

NEDO is a research and development think-tank established by the Japanese government in 1980, originally to develop new oil-alternative energy technologies. NEDO fulfils a number of functions within Japanese climate change policy, such as the purchase of Kyoto Protocol Emission Reduction Credits for the Japanese government, and the provision of subsidies to industry for new energy development initiatives.

NEDO's role in the facilitation and support for CCS research, development and technology demonstration includes being the commissioning and funding body for the total CCS system feasibility study at the coal gasification power plant in Iwaki city (see below), and the commissioning body for the RITE CO₂ sub-seabed sequestration project (with government subsidies originally from MITI, now METI)

4.3.2 Research Institute of Innovative Technology for the Earth (RITE)

RITE is a foundation (*zaidan hojin*) and an incorporated body for special public interest promotion established in 1990 by the Japanese government, to carry out research and development relevant to environmental preservation. With the original aim of assisting the government in achieving its "New Earth 21" 100 year plan to clean up the natural environment, the think tank, which receives approximately 55 percent of its funding from government sources, has been subsidized by METI to carry out the demonstration testing of aquifer geological injection and storage in Nagaoka city at a gas field owned by Teikoku Oil, and a sub-seabed CO₂ sequestration pilot project which began in 1997 and is still ongoing.

4.4 Government funding

The Japanese government has and continues to invest in research and development of CCS related technology and pilot projects. In the 2009 financial year, the government's investment budget totals 107.7 billion yen, which includes:

- the commission of a new demonstration project in collaboration with thermal power stations, for the separation and geo-sequestration of CO₂ through injection into an aquifer 1,000 meters below ground;
- research and development of CCS safety assessment techniques, ocean sequestration marine environment impact assessment techniques, sequestration potential surveys and monitoring developments in other countries;
- the Iwaki City trial project (mentioned below);
- financial support for the Callide Oxyfuel Project in Queensland, Australia, to demonstrate CO₂ capture using oxyfuel combustion, combined with CO₂ storage; and
- financial support for a new survey into a CO₂ EOR pilot project at a Chinese coal power station (METI, 2008).

4.4.1 Mapping and data collection and sharing

The MOE currently publishes information regarding conditions conducive to CO₂ injection and closure in the sub-seabed and on land, in order to facilitate private industry's selection of CO₂ sequestration sites. This information is based upon consideration of geological data on sub-seabed stratum, or land geological formations, information on tides etc.

Data collected by RITE as part of its CO₂ sub-seabed sequestration project is also shared with three national and two international institutes who are collaborating on the project. The injection demonstration tests being carried out at Iwanohara, Nagaoka City, Niigata Prefecture, with subsidies from the METI (see below) also aim to collect the following data and technical knowledge, which is to be used to enable commercial-scale geological storage from 2015:

- to obtain scientific knowledge which enables geological storage in Category B aquifers;
- survey of potential CO₂ geological storage capacity in Japan;
- to ascertain data on safe CO₂ storage conditions by monitoring CO₂ injected into aquifers 1,100 meters below ground;
- to confirm the cost effectiveness of geological storage capacity through cost analysis;
- to verify that stable geological storage is possible;
- the development of safety assessment methods; and
- to provide a road map for solving technical problems.

Data and knowledge collected to date in this project has also been utilised by the ISTPEB Research Group as a point of reference when drawing up their *Desirable Safety and Environmental Standards for the Implementation of CCS*, and has been made publically available as "case study" data as part of the public release of these guidelines.

4.4.2 Research, development and commercialisation

RITE CO₂ SUB-SEABED SEQUESTRATION PROJECT

RITE has been involved in sub-seabed sequestration research and development and demonstration projects, with subsidies from METI's predecessor, since 1997, distributed via NEDO. This research has been carried out in collaboration with America's MIT, and the Norwegian Institute for Water Research, as well as a number of other national research institutes and public universities and laboratories (RITE, 1997).

The target of the first 5 years of research and development (Phase I, 1997-2001) was a macroscopic behavioural study, an analysis of CO₂ behaviour behind the release nozzles, and predictions and investigations of biological impacts. RITE also developed prediction technology for CO₂ behaviour in the ocean, and in 2007, began work on technology to evaluate the impact of CO₂ on the marine ecosystem. The project is currently in phase two (2002-2011) (RITE, 2008).

YUBARI PILOT PROJECT, YUBARI CITY, HOKKAIDO

The Yubari pilot project at the southern part of the Ishikari coalfield of Hokkaido, officially known as the Japan CO₂ Geosequestration in Coal Seams Project (JCOP), is Japan's first CO₂ storage field trial in coal seams. General Environmental Technos Co., Ltd. (*Kankyō Sōgō Technos K.K.*) have been

commissioned to steer the project, working in collaboration with other companies, universities, research institutions, the Japan Coal Energy Center and RITE, with project subsidies from the METI, between 2002-2007.

The study aimed to develop technology that utilises the characteristics of coal to adsorb injected CO₂ collected from a large emission source such as a power plant. Coal releases methane when adsorbing CO₂, which can then be recovered and used as an energy source. Following a micro-pilot and two multi-well CO₂ injection tests between May 2004 and October 2005, a three-stage N₂ flooding test was performed in 2006 to evaluate the effectiveness on improving well injectivity.

The project team also aimed to collect basic data on CO₂ injection and improve monitoring technology to assess safety and environmental impacts, with the focus of the demonstration test being the overall system in practical situations. The General Environmental Technos Co., Ltd will also look into possibilities for technology transfer to developing countries with rich coal resources and applicability to the Kyoto Protocol's Clean Development Mechanism (CDM) and Joint Implementation (JI) projects. Among the Japanese coalfields, the Ishikari coalfield in Hokkaido is the biggest, holding 50 percent of Japan's CO₂ sequestration potential as currently assessed.

COMBINED IGCC AND CCS FEASIBILITY STUDY, IWAKI CITY, FUKUSHIMA

Clean Coal Power R&D Co. Ltd, a legally incorporated research facility established by 10 power companies is currently implementing a large scale Integrated Gasification Combined Cycle (IGCC) pilot project in Iwaki city, Fukushima. The Iwaki site is ideal for a combined IGCC and CCS project, because of the extensive offshore *Iwaki-oki gas field* located in the Joban Basin, approximately 60km from the power station.

In July of 2008, the Japan CCS Survey Corp was commissioned to carry out a study of the feasibility of implementing a total CCS system, from the separation and capture to the transport and sequestration of CO₂ produced at the Iwaki city coal gasification power plant where the above IGCC project is taking place. The commissioning entity is the government research institute, NEDO.

4.4.3 Technology demonstration and early deployment incentives

CCS EQUIPMENT INSTALLATION AND OPERATION

NAGAOKA CO₂ INJECTION PILOT PROJECT, IWANOHARA TEST SITE, NAGAOKA CITY, NIIGATA PREFECTURE

Demonstration testing and follow up monitoring has been carried out at the Minami-Nagaoka Gas Field owned by Teikoku Oil, in Nagaoka City, Niigata since April 2000.

The project is being implemented by the CO₂ storage research group of RITE. The project utilises underground natural gas storage technology, to store 10,400 tons of CO₂ injected into an aquifer at a depth of 1,100 meters below ground in the period between July 2003-January 2005.

Following installation of the injection facility in financial year 2003, monitoring and simulation studies were carried out through to the end of 2006. Related research and development carried out in conjunction with this demonstration testing includes the safety assessment of CO₂ geological storage, fundamental studies on the assessment of seal performance and reservoirs for CO₂ storage, an assessment of the impact of earthquakes on CO₂ geological storage (possible as a result of the

Chuetsu Earthquake which took place in Niigata Prefecture, approximately 20 km away from the Iwanohara site), the advancement of technology to monitor CO₂ leakage under the seabed, and risk assessment. This research is intended to contribute toward development of safety assessment criteria for CCS projects and clarification of issues relevant to the promotion of CCS. The project is one of the demonstration tests being utilised by the ISTPEB's CCS Research Group to clarify issues relevant to large scale CCS projects, which may require further legislative and policy provision, in preparation for implementing large scale projects from 2015. For further information see RITE's English website and Annual Report (RITE, 2008).

2009 LARGE-SCALE CCS DEMONSTRATION PROJECT

Japan CCS Survey Corporation (*Nihon CCS Chōsa Kabushiki Kaisha*) has been commissioned by METI to carry out a CCS demonstration project in 2009, and is currently carrying out preliminary surveys of a number of potential sites. Details of the actual site to be used are yet to be publically announced (METI Official, 2009). This project is part of Japan's efforts to meet its commitment, made as part of the G8 at its thirty third meeting in Hokkaido in July 2008, to support the launch of 20 large-scale demonstration CCS projects world-wide by 2010.

Within Japan, this project will also be used as a test site for the METI Industrial Science and Technology Policy and Environment Bureau's (ISTPEB) CCS Research Group to uncover and resolve the practical issues surrounding implementation of CCS, which still need to be addressed with further enabling of legal and regulatory frameworks, in the lead up to the commercialization of deployment of CCS technology around 2015

OTHER EARLY DEPLOYMENT INCENTIVES

METI is currently considering the promotion of participation in early opportunity CCS projects, through use of economic incentives, for companies which are competitive in this area. The details of this plan are however yet to be worked out (METI Official, 2009).

4.5 Government-business joint ventures

Case study: Combined IGCC and CCS Pilot Project, Iwaki City, Fukushima

Clean Coal Power R&D Co. Ltd, a legally incorporated research facility, established by 10 power companies, is currently implementing a large scale Integrated Gasification Combined Cycle (IGCC) pilot project in Iwaki city, Fukushima. In July of 2008, the government research and development think tank NEDO commissioned the Japan CCS Survey Corp to carry out a CCS feasibility study at the Iwaki city coal gasification power plant, with the intent of combining CCS technology with existing IGCC technology, in order to develop a cutting edge zero emission coal gasification power project. The project is billed as part of Japan's efforts toward reducing its CO₂ emissions by 60-80 percent by 2050, in accordance with former Prime Minister's commitments in his "vision for a low carbon society". These efforts, in turn, are part of Japan's "Cool Earth 50" initiative, which proposes a global goal of halving GHG emissions by 2050.

The corporation commissioned to carry out the CCS aspects of this project, Japan CCS Survey Corp. (*Nihon CCS Chōsa Kabushiki Kaisha*) is a private industry collaborative

effort, financed by 29 companies including eleven power companies, six petroleum suppliers, two petroleum development companies, five engineering companies (including Nippon Steel Engineering Co. Ltd), two steel manufacturers, one cement company, Mitsubishi Corporation trading company and Mitsubishi Gas Chemical Company. The aim of the founding members is to combine their existing resources for research, development and commercialization of CO₂ separation, capture, transportation and storage.

Japan CCS Survey Corp has been commissioned to study the feasibility of implementing a total CCS system, from the separation and capture to the transport and sequestration of CO₂ produced at the plant, with NEDO funding of JPY2.3 billion.

4.6 Taxation incentives

There are currently no taxation incentives specifically for the purposes of CCS technology related research and development, or for CCS project development.

Existing tax incentives available from the MOE for the development of technology to combat global warming apply to energy saving equipment, and are therefore unlikely to be applicable to the development of CCS technology (RITE, 2007).

4.7 Liability for failure to capture

This issue is yet to be considered in depth by the ISTPEB's CCS Research Group, and METI officials have confirmed details regarding legal liability for failure to capture CO₂ for sequestration are yet to be worked out (METI Official, 2009).

5. Capture of CO₂

5.1 Introduction

The ISTPEB's CCS Research Group has reviewed the existing laws and regulations applicable to the capture and storage of CO₂ in Japan, together with information and data from existing demonstration and pilot projects such as the Iwanohara Test Site mentioned in 4.4.2 above, for the purposes of creating its Desirable Safety and Environmental Standards for the Implementation of CCS to guide implementation of the government's large-scale CCS project from 2009 onwards. In this context, the Research Group concluded that, at least for the purposes of implementing this demonstration project, the capture of CO₂ will be sufficiently covered by the below mentioned existing laws and regulations in Japan. The views of an industry environmental safety specialist, put before the Group, also suggested that as a general rule, collection and transportation of CO₂ would be adequately covered by existing laws and regulations (METI, 2007).

It should be noted however that the Research Group has indicated that its conclusions are preliminary only, for the purposes of implementing the above large-scale government CCS project, and that the Group has emphasised that the issue of regulation of CCS projects should be revisited at the time of commercialization in Japan.

5.2 General policy and legislation with applicability to CO₂ capture

5.2.1 Licencing Requirements

Under the High Pressure Gas Safety Act, Law No.204 of 1951 (High Pressure Gas Safety Act),⁴ every work site with facilities dealing with the production of over one hundred cubic metres of liquefiable or compressible gas per day (except for facilities supplying liquefied petroleum gas products, including butane for gas meters etc) must obtain a permit from the local prefectural governor (High Pressure Gas Safety Act, Article 5-1(i); Law to Secure the Safety and Optimize Transactions regarding Liquefied Petroleum Gas, Law No.149 of 1967, Article 2-1 and 2-4).

Further, the business in question must also submit a written notice to their local prefectural governor, 20 days before production commences, stating the type of compressed gas to be produced, the location and positioning of the facilities to be used for production, the method of construction, production method and equipment to be used (High Pressure Gas Safety Act, Article 5-2(i))

5.2.2 Relevant pollution laws and policies

The Poisonous and Deleterious Substance Control Act, Law No.303 of 1950 (Poisonous and Deleterious Substance Control Act) would require any person involved in the separation and capture of CO₂ to:

- take all necessary emergency measures; and

⁴ For an English translation of this law go to <http://www.japaneselawtranslation.go.jp/law/>

- notify the police, fire department and health care centre where there was a leak, spill or other incident involving the poisonous substances NaOH or KOH used during the CO₂ separation and capture process, which may harm the health of the public (Article 16-2(i)).

Further, as the substances NaOH and KOH are regulated by the Poisonous and Deleterious Substance Control Act, under this law any CCS facility using these substances to separate and capture CO₂ must:

- take the necessary measures to prevent against the theft or loss of these hazardous substances (Article 11);
- ensure appropriate labelling as a “hazardous substance” on containers (Article 12);
- establish technical standards for the transport, storage and handling of the NaOH and KOH (Article 16); and
- ensure necessary emergency measures have been provided for, to prevent against damage to public health in the case of leaks, spills etc (Article 16-2).

5.3 Liability for failure to capture

Liability for failure to capture CO₂ has not yet been the subject of detailed consideration in Japan, perhaps as consideration of CCS initiatives to date has focussed on the implementation of demonstration and government funded, rather than commercial, projects.

5.4 Taxation of CO₂ capture

There are currently no known tax provisions or rulings in Japan specific to the issue of CO₂ capture. The Japanese National Tax Agency (NTA) only recently issued a tax ruling regarding the corporate income tax and consumption tax treatment of trading in the six types of CO₂ emission credits, recognized under the Kyoto Mechanism, in emission trading schemes in Japan. It is unlikely it will address CO₂ capture until an opinion is sought by METI or the MOE in tax aspects of CCS, or CCS is further commercialized.

5.5 Evaluation

Following its review of the above laws, the ISTPEB's CCS Research Group felt that the capture of CO₂ for storage is adequately covered by the provisions of the High Pressure Gas Safety Act, the Poisonous and Deleterious Substance Control Act and the Industrial Safety and Health Act, Law No.57 of 1972. No additional new laws or regulations are currently being considered, although the Research Group has indicated that this issue should be revisited at the time of wide spread commercialisation of CCS in Japan, taking into account subsequent developments in other overseas jurisdictions.

6. Transport of CO₂

6.1 Introduction

The ISTPEB's CCS Research Group reviewed the existing laws and regulations applicable to the transportation of CO₂ in Japan, for the purposes of creating its Desirable Safety and Environmental Standards for the Implementation of CCS to guide implementation of the government's large-scale CCS project from 2009 onwards. In this context, the Research Group concluded that, at least for the purposes of implementing this demonstration project, the transportation of CO₂ either at room temperature or in its compressed form, whether by road or by sea, would be sufficiently covered by existing laws and regulations in Japan.

It should be noted however that the Research Group has indicated that its conclusions are preliminary only, for the purposes of implementation of the above large-scale government CCS project, and that the issue of regulation of CCS projects should be revisited at the time of commercialisation in Japan.

6.2 General policy and legislation specific to transport of CO₂

6.2.1 Licencing of transportation activities

PIPELINES

NEW PIPELINES

The Gas Business Act, Law No.51 of 1954 (Gas Business Act) imposes the following standards with respect to both onshore and offshore pipelines:

- no licence is required to erect a new pipeline, however;
- a notice must be submitted to the Minister for Economy, Trade and Industry before an entity can supply gas, including CO₂, via the use of pipelines over a certain size, that it maintains and operates itself;
- construction plans must also be submitted to the same Minister before a new pipeline can be erected, and the pipeline must pass the inspection of a registered gas works inspection body before it can be used to transport gas;
- pipelines must be maintained in compliance with the standards set out in the Gas Business Act at all times or the Minister for Economy, Trade and Industry may order repairs or suspension of the pipeline's use; to this end, operators must carry out regular inspections of their pipes; and
- the technical and construction standards for pipelines are outlined in the High Pressure Gas Safety Act.

However, separate technical standards apply to offshore pipelines, which require for example that they be laid at a depth where they will not be impacted by ship passage, waves or tides.

ROAD AND RAIL TRANSPORT

The law does not currently require a special permit or licence for the transport of gas by road, rail or sea. The loading method and load weight must meet the proscribed safety standards however, and depending on the load method or weight, a passage permit may be required, and may impose some restrictions or conditions in passage, for example limiting the roads along which the gas may be transported.

Further, CO₂, whether at room temperature or in its compressed form fits within the definition of a “high pressure gas” under Article 2-1(i) of the High Pressure Gas Safety Act, and as such anyone transporting CO₂ is under a legal obligation under Article 23 of that law, to take all required safety measures. The relevant safety standards are set out in Article 48 of the General High Pressure Gas Safety Rules for transportation of gas by a wheeled vehicle. The transportation of any gas in violation of the safety standards set out in the High Pressure Gas Safety Act may result in fines of up to 300,000 yen.

TRANSPORTATION BY SHIP

The law does not currently require a special permit or licence for the transport of gas by sea. Depending on the loading method or load weight however, a passage permit may be required, which may impose some restrictions or conditions on carriage.

Where CO₂ is transported by ship, it will be covered by the Regulations on Shipping and Storage of Dangerous Substances, under the Ship Safety Law, Law No.11 of 1933 (Ship Safety Law) which sets out the necessary measures and requisite standards to be taken for such transport (METI, 2008a). More specifically, depending on whether the CO₂ is in gaseous, liquid or solid form and how it is transported, it will be defined as a high pressure gas, a harmful substance or a liquid gas substance, with the measures to be taken when transporting each particular substance by ship outlined in the above Regulations.

Further, the transportation of any gas in violation of the safety standards set out in the above Regulations may result in fines of up to 300,000 yen.

6.2.2 Planning

ZONING FOR TRANSPORT FACILITIES

Under Article 6 of the General High Pressure Gas Safety Rules, pipelines can not be built at sites where there is a risk of landslides or land slips, land subsidence or rock avalanches, inside buildings or at sites where such construction is prohibited by designation of the Minister of Economy, Trade and Industry.

Further, the Minister for Environment or the local Prefectural Governor’s permission is required under Article 13 of the Natural Parks Law, before manmade fixtures can be newly erected in Special Areas which form part of a National Park of Quasi-National Park (*kokutei kōen*).

Under the METI Ministerial Ordinance which sets out the technical standards which must be met and maintained to comply with Article 12 of the Mine Safety Act, Law No.70 of 1949 (Mine Safety Act), where specified pipelines, used for petroleum mining, are constructed, they must be erected a prescribed distance from schools, hospitals residential housing, railways and other such facilities.

These requirements do not currently apply to gas pipelines, but the extension of these regulations and technical safety standards to pipelines used for CO₂ transportation is one issue under consideration.

CONSTRUCTION AND BUILDING CODES

Pipelines do not fall under the definition of a “building” set out in the Building Standards Act, Law No. 201 of 1950 (Building Standards Act) and, as a result, are not regulated by this law. Pipelines must however be erected in accordance with the standards set out in the General High Pressure Gas Safety Rules which implement the provisions of the High Pressure Gas Safety Act.

Where transport facilities necessary for the transport of CO₂ fit within the definition of a “building” under the Building Standards Act, their construction will be regulated under this law, resulting in the requirement to meet certain minimum standards regarding the plot, the building construction, the building facilities and its uses and to have building certification issued by local municipal authorities.

Businesses which transport CO₂ will also need to ensure they have the necessary equipment and facilities to meet the proscribed technical safety standards which apply to the method of fixture, and the actual container used, to store and transport CO₂ by road, rail or sea, under Article 50 of the General High Pressure Gas Safety Rules.

PIPELINE LICENCING REGIMES – NEW PIPELINES

ONSHORE PIPELINES

Regulation of gas pipelines under existing Japanese law, including new pipelines, is based upon the submission of notices and documentation to the relevant regulatory authorities, rather than a licencing system. As a result, there is no need to apply for a licence to operate a new gas pipeline. A notice must be submitted to the Minister for Economy, Trade and Industry, before an entity can supply gas, including CO₂, via the use of pipelines over a certain size that it maintains and operates itself.

Construction plans must also be submitted to the same Minister before a new pipeline can be erected, and the pipeline must pass the inspection of a gas works inspection body registered with the Minister for Economy, Trade and Industry before it can be used to transport gas.

Further, where new pipelines are being constructed, and also for their ongoing maintenance and operation, a Chief Gas Engineer must be appointed who possesses a Gas Manager’s Licence, and the requisite level of prior practical experience, under Article 31 and 37(8) of the Gas Business Act.

Gas pipeline operators must maintain pipelines in accordance with the proscribed technical and safety standards, including those mentioned above, or the Minister for Economy, Trade and Industry may order repair or maintenance work, or order that use of the pipelines for gas transportation be suspended.

OFFSHORE PIPELINES

The regulatory rules and regime applicable to offshore pipelines is largely the same as that outlined above for onshore pipelines under the General High Pressure Gas Safety Rules. However under Article 22 of the ministerial ordinance which sets out technical standards applicable to pipelines and other equipment used for operations under the Mining Law, separate, specific technical standards apply to the construction and maintenance of offshore pipelines, including for compressed gases such

as CO₂. These standards require for example that offshore pipelines be laid at a depth where they will not be impacted by ship passage, waves or tides.

PIPELINE LICENCING REGIMES – EXISTING PIPELINES

ONSHORE PIPELINES

Existing laws and regulations impose requirements with respect to the use of existing pipelines to transport gas, including CO₂.

Notification of the name of the entity that will be using and operating the pipeline and requisite supporting documentation is required under the Gas Business Act, but no licence or permit is required to use an existing pipeline to transport gas, including CO₂.

The High Pressure Gas Safety Act covers technical and construction standards for pipelines

The Minister for Economy, Trade and Industry must also be notified where the business entity using or operating an existing pipeline changes. The requirement to submit a construction plan to the Minister and the need for the pipeline to pass the inspection of a registered gas works inspection body before use, which apply to the construction of new pipelines, also apply to the retrofitting of existing pipelines once it is of a certain scale which exceeds minor maintenance or repair work.

The government is currently considering whether or not to apply regulations and technical safety standards which apply to petroleum pipelines, for example under the Mine Safety Act, to pipelines used for CO₂ transportation.

The relevant safety standards applicable to the transportation of high pressure gases (a definition which CO₂ fits, whether at room temperature or compressed) are set out in METI ordinances, as proscribed by Article 51 of the General High Pressure Gas Safety Rules.

OFFSHORE PIPELINES

Regulation of the use of existing offshore pipelines is the same as the regulation of new offshore pipelines, as discussed above.

ENVIRONMENTAL IMPACT ASSESSMENT

The erection or maintenance of gas pipelines is not currently subject to the provisions of the Environmental Impact Assessment Law, Law No.81 of 1997 in Japan, and therefore an environmental impact assessment is not required.

It should be noted however that in some prefectures, the erection of or changes to petroleum pipelines are currently subject to environmental impact assessment, for example under the Tokyo Metropolitan Ordinance on Environmental Impact Assessment. It remains possible therefore that erection of gas pipelines, including for the purposes of CCS projects, may be subject to environmental impact assessment requirements of some form in Japan the future.

Further, the METI's ISTPEB CCS Research Group has specifically discussed environmental impact assessment methodology in the context of implementing CCS projects, in its Desirable Safety and Environmental Standards for the Implementation of CCS. The Research Group's focus however has been on environmental impact assessment in the context of potential leaks of sequestered CO₂ (METI, 2008a).

In the context of transportation of CO₂ following its capture, the Research Group concluded that new environmental and/or safety standards were not required specifically for the purposes of CCS projects in Japan, as the environmental and safety aspects of CO₂ transportation are (at least for current pre-commercialization government funded large-scale project implementation purposes) sufficiently covered by the compliance requirements of the existing Japanese laws and regulations covering the transport of gases mentioned in this Section. The Research Group also noted in this regard that they were not aware of new regulations or restrictions being created or applied specifically to the transport of CO₂ for the purpose of CCS projects in other national jurisdictions.

STAKEHOLDER ENGAGEMENT

As a general rule, the permission of the owner of the land on which a pipeline will be built must be obtained. Also, where it is necessary to construct a pipeline on or under ground which is used for public space such as a road, a river or a bridge, the permission of the public authority responsible for management of the land in question must be obtained.

PUBLIC CONSULTATION

There is no public consultation requirement with respect to the erection or operation of new or existing pipelines for CO₂ or other gas transportation under existing Japanese law. However, should the government decide to require environmental impact assessments for CCS facilities and CCS projects in the future (which the METI's ISTPEB CCS Research Group has specifically discussed), the public consultation procedures in the Environmental Impact Assessment Law, which include obligations to hold public information meetings and to seek the views of local residents, may also apply to pipelines used for the transportation of CO₂.

LEGAL CHALLENGE

While it is possible for affected members of the public to seek a court ordered injunction preventing construction of a new pipeline (unlike the case of airport construction, for example, which has been pro-actively contested), to date, there have not been any such actions regarding the construction of petroleum pipelines brought in Japan. There have, however, been cases in Japan of local residents seeking injunctions to stop the construction of waste disposal sites, and as a result this remains a latent legal risk for pipelines and facilities used to capture, transport and store CO₂ waste.

6.2.3 Access / tenure

NATURE OF PROPERTY INTERESTS CONFERRED

Where permission is granted to erect a pipeline on or under public use land in accordance with Article 42 of the Gas Business Act, this permission includes the right to carry out maintenance work and regular inspections of the pipeline on the land, to the extent that such use does not interfere with the land's normal public use.

Where pipelines are constructed on private land, as a rule, access and entry onto the land in question for maintenance and inspections requires the consent of the land owner. However, where the land owner does not consent to the same, approval for such land use and access must be obtained under Article 48 of the Compulsory Purchase of Land Act, Law No.219 of 1951 (Land Expropriation Law).

Under existing law, rights of ownership over the pipeline itself vest in the entity which constructs it, and there are no provisions allowing government to expropriate ownership rights over pipelines. There are also no restrictions imposed on the use of pipelines under existing Japanese law, provided that they meet the legally proscribed technical standards applicable, including for the transport of high pressure gases, as discussed above.

Existing law also provides for the lease and operation of gas pipelines which are owned by third parties.

ESTABLISHING PRIORITY BETWEEN TRANSPORT AND EXISTING USES AND RIGHTS

PETROLEUM AND RESOURCE EXTRACTION

There are no existing legal provisions in Japan which set out rules with respect to establishing priority between existing uses and rights, including petroleum extraction, and the construction or use of pipelines for the transportation of CO₂ and other gases.

The General High Pressure Gas Safety Rules however empower the Minister for Economy, Trade and Industry to prohibit the construction of pipelines on designated land. As a result, should the government determine that extraction of petroleum or other resources should (presumably for reasons of public policy or public good) take priority over construction of pipelines for the transport of CO₂ or other gases, it is possible for the government to prevent construction of a pipeline on the land in question.

FISHING

There are no existing legal provisions which set out rules regarding establishing priority between fishing rights and construction of offshore pipelines. The fishing industry and its stakeholders in Japan however frequently mobilise opposition to large-scale projects on shorelines, in harbours or offshore which may affect the exercise of their local fishing rights

FAUNA AND FLORA, INCLUDING ENDANGERED SPECIES

There are currently no legal provisions in Japanese law which set out rules for establishing priority between pipeline projects and maintenance of local ecosystems.

However, the implementation methods for CCS environmental impact assessments under consideration by the METI's ISTPEB CCS Research Group, as discussed in Section 6.2.2 above, included specific discussion regarding assessment of impacts on local ecosystems. As a result, it is possible that future legal developments to facilitate CCS projects in Japan may include the establishment of provisions which set out priorities or balancing of competing interests of project development and preservation of local flora and fauna, including endangered species.

NAVIGATION

Under the General High Pressure Gas Rules, offshore pipelines must be laid at a depth where they will not be impacted by tides, waves or ships, and as a result do not impact on or pose an obstruction to navigation routes.

MINING

See Section 6.2.3 above with respect to petroleum and resource extraction.

SUBSEQUENT USES

There are no restrictions on the subsequent uses of pipelines or land where pipelines have been erected, under existing law.

Under the Soil Contamination Countermeasures Law, Law No.53 of 2002, specified facilities which emit certain levels of liquid waste and waste water are required to carry out environmental surveys on their closure, and carry out measures to remediate any contamination found. However, to the extent that CO₂ is used or transported, CO₂ pipelines do not fit within the legal definition of specified facilities (*tokutei shisetsu*) and as a result no environmental survey is required.

RIGHTS OF INDIGENOUS PEOPLES AND OTHER CUSTOMARY RIGHTS

The 1997 *Nibutani Dam decision* (Judgment of the Sapporo District Court 27 March 1997, 1598 *Hanrei Jihō* 33) (Nibutani Dam case) established that the Ainu people, as both a national minority, and an indigenous people have a constitutional right (The Constitution of Japan, Article 13),⁵ and rights under the *International Covenant on Civil and Political Rights* (Article 27)⁶ to enjoy their own minority culture. As a result of these rights, the court found that the Japanese government has a duty to weigh and attempt to minimize the impact of public works (such as the dam construction in the Nibutani Dam case) on the enjoyment of Ainu culture. This finding led to an Ainu cultural and environmental impact assessment committee being established by the central government's Hokkaido Development Bureau to assess and minimize the impact on local Ainu culture of a second dam built on the same Saru river a number of years later (Stevens, 2005).

However, in the Nibutani Dam case the Sapporo District Court explicitly limited the implications of its finding regarding Ainu Indigenoussness "to the extent necessary for the present litigation", "leaving aside the question of whether or not this goes so far as to recognize so-called indigenous rights, meaning indigenous peoples' right to self determination with regard to land, resources, political control etc" (Nibutani Dam case, p.45) and Japanese law still does not officially recognise Ainu land rights or rights over natural resources. Further, the obligation the court found, to carry out an assessment of the impact of public projects on Ainu culture, is unlikely to apply to projects anywhere outside Hokkaido where the Ainu population is concentrated. Even in Hokkaido, the court's findings have not to date resulted in the implementation of a general obligation to assess the impact on Ainu culture of public projects in all areas of Hokkaido, only the Saru River area to which the judgement pertained. As the decision is of a lower court, and has not been followed in a number of subsequent actions brought by Ainu plaintiffs involving group rights, its precedential value is perhaps limited.

However on 6 June 2008 both houses of the Japanese Diet or national parliament adopted a resolution recognizing the Ainu as an indigenous peoples, and calling for the government to further advance Ainu policy, following consideration of the rights set out in the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP). As a result of this resolution, in August 2008 an advisory

⁵ Article 13 of the Japanese Constitution reads "All of the people shall be respected as individuals. Their right to life, liberty, and the pursuit of happiness shall, to the extent that it does not interfere with the public welfare, be the supreme consideration in legislation and in other governmental affairs."

⁶ Article 27 provides: "In those States in which ethnic, religious or linguistic minorities exist, persons belonging to such minorities shall not be denied the right, in community with the other members of their group, to enjoy their own culture, to profess and practice their own religion, or to use their own language."

body, known as the Expert Meeting on Ainu Policy was established to carry out a year of deliberation, following which it will submit its recommendations to the government regarding the new comprehensive Ainu policy which should be adopted by Japan, in light of the UNDRIP, which includes references to indigenous rights over land and natural resources.

In theory, the Expert Meeting could recommend that some Ainu rights over land or resources be recognised, although this is unlikely in light of the context in which the Expert Meeting was created, or deliberations to date. Even if such rights are not recognised, upon the establishment of a comprehensive national policy recognizing Ainu indigenosity and their unique culture (which is already recognized and promoted under the Act for the Promotion of Ainu Culture, the Spread of Knowledge Relevant to Ainu Traditions and Education Campaign, Law No. 52 of 1997, it would be possible for example for the Minister of Economy, Trade and Industry to utilise Article 6 of the General High Pressure Gas Safety Rules to designate sites which are culturally significant to the Ainu people as sites on which the erection of gas pipelines is prohibited. As mentioned however, even if such a policy position was taken (which is by no means guaranteed), it is unlikely to impact upon CCS projects or pipelines anywhere outside the island of Hokkaido.

COMPULSORY ACQUISITION AND COMPENSATION REGIMES

It is possible for land to be compulsorily expropriated for the erection of pipelines, under the provisions of the Land Expropriation Law. This would require the payment of due compensation to the land owners in question, which would be calculated in accordance with the legal procedures set out under that law.

6.2.4 Environmental and other risks

Although existing laws in Japan may have some application to the risk aspects of the transportation of CO₂, the deliberations to date have not examined the existing laws and regulations applicable to these aspects of CO₂ transportation in detail. For the purposes of creating its Desirable Safety and Environmental Standards for the Implementation of CCS to guide implementation of the government's large-scale CCS project from 2009 onwards, the ISTPEB's CCS Research Group examined existing legal regulations in place to ensure the safety of CO₂ transport. These include, for example, the technical standards which must be met and maintained for pipelines which transport CO₂ under the High Pressure Gas Safety Act, the prohibition on pipelines being erected at sites where there is a risk of landslides or land slips under the General High Pressure Gas Safety Rules, requirements for pipelines to be corrosion resistant and able to withstand high pressures under the same law etc., all of which have been discussed above. As a result of this consideration, the Research Group concluded that there was no need to establish new safety or environmental protection standards specific to CO₂ transport for CCS purposes.

However, the Research Group did not specifically consider the environmental, waste/pollution and occupational health and safety aspects of CO₂ leakage or other risks which may occur during CO₂ transportation, where environmental or health and safety incidents occur in spite of the above preventative measures. Rather, the Research Group has focussed its consideration of leakage, occupational health and safety and environmental impact issues in the context of CO₂ injection and storage, post-transportation (discussed below).

6.3 Taxation of CO₂ transport

There are no specific tax provisions regarding CO₂ transport, or the transport of natural gas for Japanese tax purposes. However, if a service provider that is a Japanese consumption taxpayer renders its client with the service of CO₂ transport, and the benefits of this service are enjoyed directly within Japan, the transaction will be subject to Japanese consumption tax at the rate of 5 percent.

7. Exploration of potential CO₂ storage sites

7.1 Introduction

As there are no existing laws and ordinances in Japan which specifically regulate the exploration of potential CO₂ sequestration sites, the following discussion outlines the existing Mining Act, Law No. 289 of 1950 (Mining Act) provisions regarding mining exploration and prospecting rights, which may apply to such exploration. The equipment and facilities used to excavate land during exploration would also have to comply with relevant provisions of the Mine Safety Act and the Petroleum and Combustible Natural Gas Resources Development Act, Law No.162 of 1952.

Where offshore sequestration sites are explored and the sea bed is excavated, depending on the site in question, permission may be required under any of the Harbour Act, Law No.218 of 1950, the Act on Port Regulations, Law No.174 of 1948, the Coast Act, Law No.101 of 1956, the Maritime Traffic Safety Act, Law No.115 of 1972 (Maritime Traffic Safety Act), the Fishing Port and Ground Improvement Act, Law No.137 of 1950 or the Act on the Protection of Fishery Resources, Law No.313 of 1951, or notification may be required under the Marine Resources Development Promotion Act, Law No.60 of 1971.

7.2 General policy and legislation with application to exploration of potential CO₂ sequestration sites

7.2.1 Exploration licencing

APPLICATION CRITERIA

Under Article 17 of the Mining Act, an applicant makes a single application for the grant of mining rights, which include both prospecting rights and excavation rights (Mining Act, Article 11). In order to be eligible, the applicant must be a Japanese national and/or a corporate entity incorporated under Japanese Law, unless bilateral treaties exist which provide otherwise.

In addition to attaching documentation which proves that the applicant meets the Japanese national requirement, in order to obtain registration of mining rights under the Mining Act, the applicant must also submit a map of the area under application, obtain the permission of the Director of their Regional Bureau of Economy, Trade and Industry, along with a written application containing the following information:

- the location of the application area;
- the total area of the territory in question;
- the name of the mineral to be mined; and
- the applicant's name and address.

Matters to be set out in the map of the area under application include:

- the location of the application area;
- the total area of the territory in question;

- the name of the mineral to be mined;
- the map scale;
- a polygon which demonstrates the shape of the application area, with each of its corners numbered in numerical order, beginning at the summit and proceeding clockwise around the shape;
- the coordinates of the summit of the application area when drawn and set out in the rectangular plane;
- the boundaries of the application area; and
- the topography of the application area and surrounds.

However, prior to bringing an application for registration of prospecting and digging rights, a potential applicant may apply for permission from the Director of their Regional Bureau of Economy, Trade and Industry to enter onto the land of others and fell bamboo and trees where necessary, in order to carry out surveys and on-site investigations necessary to ascertain whether the area is amenable to mining (Mining Act, Article 101). The applicant must be intending to apply for permission for mining rights, and must file an application and demonstrate that such testing is necessary. The Regional Bureau Director will also seek the written opinion of the land owner, before deciding whether to grant permission or not (Mining Act, Article 101(2))

Under Article 34 of the Enforcement Regulations of the Mining Act, in order to apply for permission to enter onto land privately owned by a third party to carry out exploratory surveys and on-site investigations, an applicant must submit a written application containing the following information:

- the applicant's name and address;
- the location and land classification;
- the name of landowner and any exclusive occupier and their addresses;
- the duration of the period during which the applicant wishes to enter onto the land and the purpose of such entry; and
- when the applicant intends to fell bamboo and trees, the location of the vegetation, the name and address of the owner, the volume and value of the trees or bamboo, the purpose of clearance and the planned felling date.

RIGHTS CONFERRED BY EXPLORATION LICENCE

An individual who is granted mining rights (which includes prospecting rights) after submitting the application under the Mining Act, is conferred with the right to mine and acquire the registered minerals found on the registered land in question (Mining Act, Article 5).

Alternatively, where a potential applicant for mining rights is given permission to enter onto the land of another for exploratory purposes under Article 101 of the Mining Act, these rights include:

- the right to enter onto the land;
- the right to fell obstructing trees and bamboo; and
- the right to carry out necessary exploratory surveys and on-site investigations.

However the individual or entity in question also has attendant responsibilities to:

- notify the owners and possessors of the land or bamboos and trees therein in advance (Article 101(3));
- carry the permit document at the time of entry onto the land and show it if requested by the owner (Article 102); and
- compensate the land and tree owners for losses caused by their entry and felling (Article 103).

LICENCE TERM

Exploration and other mining rights granted under the Mining Act are valid for a period of two years from the date the rights are registered, and an applicant may apply to have the term renewed a maximum of two times (i.e. a total of 6 years) (Mining Act, Article 18), provided the applicant can meet the conditions of Article 19, that:

- exploration must have been clearly been carried out in good faith;
- further exploration must be necessary in order to confirm the nature of the ore deposits in question; and
- the applicant must not have defaulted on payment of mine-lot tax due on the prospecting rights it is seeking to have extended.

When applying for permission to enter onto the land of a third party for the purposes of carrying out preliminary exploratory surveys and on-site investigations under Article 101, the applicant will usually indicate the duration of time required in order to complete the surveys in question. If the application is approved, permission will be granted to access the land for the period requested (Mining Act, Article 101).

7.2.2 Access / tenure

NATURE OF PROPERTY INTERESTS CONFERRED

Prospecting rights are deemed to be real rights under Japanese law, and legal provisions relating to real property apply to them *mutatis mutandis*, except where the Mining Act provides otherwise (Article 12). An individual or entity granted mining rights (which include exploration rights) under the Mining Act has the right to mine and acquire the registered minerals and other minerals that occur in the same sort of mineral deposit in the registered area of land (Mining Area), for the duration of the registered term.

Where a permit is granted for preliminary exploratory work on another's land prior to applying for mining rights, the interest is in the nature of an easement; a non-possessory interest to use the property of another for the stated purpose of mining related preliminary on-site investigation and surveys of the land.

ESTABLISHING PRIORITY BETWEEN EXPLORATION AND EXISTING USES AND RIGHTS

Under Article 101(2) of the Mining Act, the Director of the Regional Bureau of Economy, Trade and Industry must notify the land owner and any party with possession of the land, and the owners of bamboo and trees on the land that an application for access to the land to carry out on-site pre-mining surveys has been made, and give them the opportunity to submit their written opinion regarding the

application. These views of affected parties are presumably used as part of the matters considered by the Director when deciding whether or not to grant the permission sought.

A corporate entity or individual may also apply for permission to use the land of a third party in or near their mining areas, for the purposes of installing machinery and facilities necessary for prospecting, where this is necessary and appropriate (Mining Act, Article 104). In such cases, before deciding whether to grant permission or not, the Director of the Regional Bureau of Economy, Trade and Industry must:

- consult with the governors of the prefectures concerned;
- convene a public hearing and notify interested parties one week in advance; and
- at the public meeting, explain the facts of the application, and hear the views of:
 - the holders of the mining right or mining lease right;
 - the owners of the land; and
 - those who have any rights in respect of the land;

before deciding whether or not to grant the permission sought (Mining Act, Article 106).

PETROLEUM AND RESOURCE EXPLORATION AND EXTRACTION

Under the Mining Act, where there are competing mining right claims or interests (which include prospecting rights), as a general rule the rights of the first applicant whose mining rights are approved and registered will take priority (Article 27). Article 46 however provides an exception to this rule, but as it applies only where use of adjacent land is necessary for digging and development of “ore deposits” (i.e. extraction rather than injection), it is unlikely to apply to CCS site exploration.

Further, the Director of the local Bureau must not permit prospecting applications in respect of land regarding which mining rights have already been granted (Mining Act, Article 29).

FISHING

For an analysis on the priority of fishing rights see Section 8.2.3 below.

FAUNA AND FLORA, INCLUDING ENDANGERED SPECIES

Under Article 15 of the Mining Act, the Environmental Dispute Coordination Commission may designate an area to be a “mining prohibition area” where it finds that the mining of minerals in the area in question is in conflict with general public interests – which may presumably include the protection of endangered species etc. Once such a designation is made, public interest takes precedence, and mining rights (including prospecting rights) may not be created over the designated land.

NAVIGATION

See Section 8.2.3 below for a discussion on the priority of navigation rights.

SUBSEQUENT USES

No provisions of existing law which may apply by analogy to subsequent uses of land where CCS exploration permission has been granted were found.

Officials at the ISTPEB confirmed that the national government does not impose specific restrictions on land after it has been used for exploration activities, and that such restrictions (if any) would be imposed by the Regional Bureau for Economy, Trade and Industry, with respect to land under their jurisdiction.

RIGHTS OF INDIGENOUS PEOPLES AND OTHER CUSTOMARY RIGHTS

There is currently no recognition under Japanese law of indigenous rights over land and natural resources. Rights of the indigenous Ainu people and their relevance to public works, and legal recognition of Ainu cultural enjoyment rights relevant to competing land uses is discussed in Section 6.2.3.

COMPULSORY ACQUISITION AND COMPENSATION REGIMES

As mentioned in Section 7.2.2 a corporate entity or individual may apply for permission to use the land of a third party in or near their mining areas, for the purposes of installing machinery and facilities necessary for prospecting (Mining Act, Article 104). In such cases, before deciding whether to grant permission or not, the Director of the Regional Bureau of Economy, Trade and Industry must carry out the notification and public hearing procedures proscribed under Article 106 of the Mining Act. Where permission is granted, under Article 106 the Director of the Regional Bureau of Economy, Trade and Industry must immediately notifying the mayors of municipalities where the land to be used or expropriated is located, and send them the drawings of the land, as well as provide public notification of:

- 1) the name and address of those who intend to use or expropriate the land;
- 2) the purpose of use or expropriation;
- 3) the location and area of the land to be used or expropriated; and
- 4) the place where the drawings that show the land to be used or expropriated are available for public inspection.

Further, under Article 107 of the Mining Act, the provisions of the Compulsory Purchase of Land Act, Law No. 219 of 1951 shall apply unless the Mining Act provides otherwise, and compensation will be payable for the expropriation in accordance with the provisions of this Act.

Article 35 of the Mining Act Enforcement Regulations provides that an applicant must submit the following information in its application for use or expropriation of a third party's land under Article 104:

- 1) certification of registered matters regarding the land;
- 2) a survey map of the related area;
- 3) specifications of construction;
- 4) the name and address of the applicant;
- 5) the location of the land and land classification;
- 6) the area of the land;

- 7) the name and address of the landowner;
- 8) the purpose and reason of the use or expropriation; and
- 9) the scheduled date and term of the use or expropriation.

7.2.3 Planning and construction regulation applicable to CO₂ sequestration facilities

ZONING

The High Pressure Gas Safety Act was observed during the implementation of the CCS sequestration and injection pilot project at the Iwanohara Test Site, Nagaoka City, Niigata Prefecture (see above). The application of this Act includes the provisions of Article 6 of the implementing General High Pressure Gas Safety Rules, which set out restrictions on where CO₂ sequestration facilities or equipment may be located. Article 6 of these Rules provides that facilities/equipment should be kept at a certain distance from schools, hospitals, important cultural properties, museums, department stores, hotels and buildings that are used mainly for residential purpose. The specific distance applicable in each instance is determined based upon the storage and processing capacity of the facilities or equipment in question. These provisions also place restrictions on the distance that must be placed between different sets of CO₂ production equipment, and equipment used to produce other inflammable gases.

ENVIRONMENTAL IMPACT ASSESSMENT

There are currently no regulations in Japan which set out environmental impact assessment procedures to be carried out before establishing CO₂ sequestration facilities.

However the ISTEPB's CCS Research Group, in drawing up their Desirable Safety and Environmental Standards for the Implementation of CCS referenced the Intergovernmental Panel on Climate Change's Special Report on CCS as the starting point for all considerations of the possibilities and scope of environmental impact of CCS projects. The Research Group also indicated that in implementing CCS environmental impact assessments (e.g. during the government's large scale pilot project in 2009), CCS project implementers should take the following preparatory steps before implementing an environmental impact assessment:

- 10) clarify leakage scenarios by considering any potential CO₂ leakage routes and the likely power of the CO₂ as it escapes;
- 11) clarify the necessary items or areas to be covered in the environmental impact assessment. The Research Group referred to relevant factors for pre and post storage assessments as air or atmospheric quality, noise, water quality, effect on ecology and ecosystems, effect on the natural and human environment, waste product, soil contamination and effect on topography, geological features, ground conditions;
- 12) clarify the survey implementation method; and
- 13) set out an implementation plan.

The Research Group also confirmed that the main notable aspects of environmental impact assessment of CCS projects are:

- 14) it is not yet clear whether or not there will be environmental impacts as a result of CO₂ leaks from CCS sites;
- 15) it is possible that any environmental impacts from CO₂ leakage may not occur until a time in the distant future; and
- 16) given that there are no current environmental impact assessment applications analogous to the CCS scenario, and that internationally, there is not yet a clear consensus regarding implementation methodology for CCS environmental impact assessments.

The Research Group plans to continue to consider the issue of CCS environmental impact assessment, in light of the latest trends in international consideration of the issue at the time of consideration, and accumulated knowledge gathered through implementation of internal CCS pilot projects in Japan.

PIPELINE LICENCING REGIMES

Pipeline licencing requirements are set out in Section 6.2 above.

CONSTRUCTION AND BUILDING CODES

Article 6 of the General High Pressure Gas Safety Rules sets out detailed provisions covering the construction and building requirements for each of the various categories of facilities which may be used to produce, store or process gases. For example, compressed or high pressure gas facilities or equipment must meet pressure test standards, possess sufficient strength, must have foundations which do not pose a threat due to warping caused by land subsidence, and must have capacity to promptly return environmental conditions to within permissible limits, wherever they exceed permissible amounts by becoming overheated or over pressured.

STAKEHOLDER ENGAGEMENT

There is currently no specific stakeholder engagement process in place.

PUBLIC CONSULTATION

For a discussion on provisions relating to public consultation see Section 6.2.2 above.

LEGAL CHALLENGE

Carbon sequestration facilities are likely to fit within the definition of a waste disposal site, and thus may be subject to injunctions by local residents seeking to prevent their construction. For further discussion see Section 6.2.2 above.

7.3 Taxation of CO₂ sequestration exploration activities

There are no specific tax provisions or rulings regarding CO₂ sequestration exploration activities for Japanese taxation purposes, or taxation provisions specifically applicable to mining exploration activities which may apply by analogy (as due to the lack of natural resources in Japan these activities are in fact rare to non-existent). However, where mining related prospecting rights are granted, mine-lot taxes will be payable on these rights, as indicated by provisions of the Mining Act.

8. Injection and pre-closure of CO₂ storage formations

8.1 Introduction

The Act Pertaining to the Prevention of Marine Pollution and Maritime Disaster, Law No.49 of 1970 (Marine Pollution Act) is the implementing legislation for Japan's international obligations under the London Convention. In May 2007 Japan implemented further amendments to the Marine Pollution Act, in order to reflect the 2006 amendments to the 1996 London Protocol, which allowed storage of CO₂ under the seabed from 10 February 2007. The Marine Pollution Act amendments regulate sequestration of CO₂ streams from CO₂ capture processes in sub-seabed geological formations and provide detailed provisions regulating the sub-seabed sequestration of CO₂.

Japan is also working towards development of an appropriate legal framework to cope with geological CO₂ storage on land, through the METI Research Group's consideration of the applicability and appropriateness of existing laws such as the Mining Act and related ordinances, to the implementation of CCS projects.

8.2 General policy and legislation

8.2.1 Injection licencing

Sub-Seabed

An individual or entity that wishes to inject CO₂ waste into the sub-seabed must apply for and obtain approval for the "disposal" of CO₂ from the Environment Minister (Marine Pollution Act, Article 18-8(1)(ii)).

Land Sequestration

Licensing regimes do not yet apply to the onshore injection of CO₂ into the earth in Japan. The ISTEPB's CCS Research Group, in drawing up their Desirable Safety and Environmental Standards for the Implementation of CCS however, considered such issues in addition to applicable environmental and occupational health and safety standards, criteria for the density of CO₂ which is injected into the ground, the need for creation of CO₂ injection and management plans, considering existing EU regulation regarding this process.

APPLICATION CRITERIA

SUB-SEABED

Applications for sub-sea bed sequestration must include information such as:

- the applicant's name, address and representative's details (for a corporate entity);
- a CO₂ disposal implementation plan including:
 - the length of time the disposal will take (not to exceed 5 years);
 - the amount and the characteristics of the CO₂;
 - the estimated amount of CO₂ already disposed of at the given site;

- where and how the CO₂ will be disposed of; and
- proposed measures to prevent and contain any damage caused to the marine environment by the dumping;
- a detailed plan regarding monitoring of any pollution arising from the dumped CO₂; and
- any other information required by Ministry of Environment Ordinances.

The standards which must be met in order for the above application to receive approval from the Environment Minister to dispose of CO₂ include:

- a finding that the disposal method meets the required standards;
- a finding that there is no other appropriate means to dispose of the CO₂; and
- a finding that the applicant is fit to competently dispose of and monitor the CO₂ after disposal, in accordance with the implementation plans submitted, including having sufficient financial and technical capabilities.

RIGHTS CONFERRED BY INJECTION LICENCE

Under the Marine Pollution Act, an applicant is granted the right to “dispose” of CO₂ in the sub-sea bed.

LICENCE TERM

In accordance with Ministry of Environment Notice No. 83, an applicant who is granted a licence has up to five years to dispose of the CO₂ in question (Marine Pollution Act, Article 10-8-2, as applied correspondingly by Article 18-2). The Ministry of Environment Notice No. 83 includes:

- submission of details regarding the post-injection closure procedure, within the implementation plan;
- regulation of sites which may be used for sub-seabed CO₂ sequestration (sites that have no record of previous seismic activity, are easily monitored and where pollution prevention measures are easy to implement); and
- requirements to submit a “sub-seabed disposal prior assessment” as part of the application to the Environment Minister for approval to sequester CO₂. This assessment must include a list of survey items for a latent marine environment impact assessment, the results of the pre-disposal impact assessment, the predicted extent and nature of environmental damage or changes which may result from CO₂ escaping into the ocean, and related documentation.

CHALLENGING LICENCES

While there is no specific provision of the Marine Pollution Act which allows interested parties to challenge the grant of a CO₂ sea bed sequestration licence, as mentioned under Section 6 above and elsewhere, where an individual's rights and interests may be negatively affected by the grant of a sequestration licence, that individual will have standing to bring an injunctive action to stop the CO₂ “disposal licence” being granted.

8.2.2 Approval processes for sequestration facility closure

APPLICATION CRITERIA

In Japan, a plan for the closure of the site where CO₂ is injected must be submitted as part of the application for permission to dispose of CO₂ under the Marine Pollution Act, in order to obtain permission (Article 18-8-2-2).

The ISTEPB Research Group has also examined the issue from the perspective of onshore sequestration and CO₂ storage. In particular, under existing laws, the provisions of Article 15 of the Mine Safety Act may apply. This article requires that where a mining entity closes its specified facilities, it must submit a notice to the Director of Regional Industrial Safety and Inspection Department.

CLOSURE APPROVAL PROCESS

As mentioned, under the Marine Pollution Act, plans for the closure process must be approved as part of the original application for permission to “dispose” of CO₂ in the sub-sea bed.

8.2.3 Access / tenure

LEGAL ACCESS TO AND USE OF DEEP GEOLOGICAL FORMATIONS FOR SEQUESTRATION

No provisions exist under current Japanese law.

NATURE OF PROPERTY INTERESTS CONFERRED

The interest under the Marine Pollution Act is a right to dispose of the CO₂ under the seabed.

The property interests conveyed where CO₂ is stored under ground onshore, under existing Japanese law would be the digging rights which form part of the mining rights discussed under Section 7.2, above.

EXISTING USES AND RIGHTS (INCLUDING PETROLEUM EXTRACTION)

PETROLEUM AND RESOURCE EXPLORATION AND EXTRACTION

See Section 7.2.2, above regarding the provisions of the Mining Act in respect of which uses will take precedence.

FISHING

There are no provisions under existing law which set out which of CCS and fishing should take precedence. However as mentioned in 7.1, above, where the seabed is excavated for CO₂ storage purposes, depending on the site, permission may be required under the provisions of any one of the Harbour Act, Law No.218 of 1950, the Act on Port Regulations, Law No.174 of 1948, the Coast Act, Law No.101 of 1956, the Maritime Traffic Safety Act, the Fishing Port and Ground Improvement Act, Law No.137 of 1950 or the Act on the Protection of Fishery Resources, Law No.313 of 1951, or notification may be required under the Marine Resources Development Promotion Act, Law No.60 of 1971.

FAUNA AND FLORA, INCLUDING ENDANGERED SPECIES

There are no existing legal provisions which confirm which of CO₂ storage and ecological protection should take precedence, however as described above in relation to fishing rights, permission may be required before CCS projects can be implemented, where environmental protection laws apply to the target area in question.

NAVIGATION

Under Article 30(1) of the Maritime Traffic Safety Act, an individual who intends to carry out construction or work in the waters or vicinity of a sea route, as set out in government ordinances, must obtain the permission of the Commandant of the Japan Coast Guard.

MINING

See Section 7.2.2, above regarding the provisions of the Mining Act in respect of which uses will take precedence.

SUBSEQUENT USES

Under Article 18-15 of the Marine Pollution Act, once the form and nature of the ocean bed has been altered by CO₂ storage (disposal) activities, and this poses a risk of damage to the marine environment due to the CO₂ stored therein, the area in question will be declared a “designated marine area” by the Minister for Environment. Once this designation is made, any person who intends to alter the form or nature of the ocean bed or the sub-sea bed in the designated area must first notify the Minister for Environment (Marine Pollution Act, Article 19-2-1)

RIGHTS OF INDIGENOUS PEOPLES AND OTHER CUSTOMARY RIGHTS

There is currently no recognition under Japanese law of indigenous rights over natural resources. Regarding recognised legal rights of the indigenous Ainu people and their relevance to CCS injection and storage projects. See Section 6.2.

COMPULSORY ACQUISITION AND COMPENSATION REGIMES

See Section 6.2 for discussion of compulsory acquisition and compensation regimes.

8.2.4 Planning and construction regulation applicable to CO₂ sequestration facilities

ZONING

Disposal of CO₂ in the sub-sea bed may only be carried out in ocean areas which meet the following requirements:

- an area without any history of seismic movement or natural phenomena;
- an area where the future risk of large scale seismic movements is predicted to be small;
- an ocean area with geological features which serve to prevent against or minimize the risk of damage to preservation of the marine environment which may result from CO₂ gas;

- an ocean area where it is possible to monitor and manage CO₂ storage conditions and pollution situations;
- an ocean area where it is possible to take the measures necessary to prevent the risk of or actual occurrence or spread of damage to the marine environment which may arise as a result of CO₂ gas;
- an ocean area in respect of which there is already existing knowledge regarding the location of fish or plant life which may require special protective measures, in order to preserve the marine environment.

ENVIRONMENTAL IMPACT ASSESSMENT

There are no provisions under existing laws regarding standards for environmental impact assessments which must be carried out when establishing facilities required to implement CCS projects.

However, under the Marine Pollution Act, where an application is made to the Minister for Environment, for permission to dispose of CO₂ in the sub-sea bed (Article 18-8-2), an ex-ante evaluation of sub-sea bed sequestration (disposal) must be attached to the application, which includes the following matters:

- the nature and characteristics of the CO₂ the applicant wishes to dispose of;
- assuming that the sequestered CO₂ were to escape, the location from which it could be expected to escape, the extent of the CO₂ spread expected and the predicted volume of leaked CO₂, plus the methodology for the above predictions;
- the items covered in the latent environmental risk assessment survey;
- the current condition of the items covered in the latent environmental risk assessment survey, and the method of ascertaining their current status;
- the extent of the change anticipated in the items covered by the latent environmental risk assessment, in the event that the CO₂ leaked into the ocean and the method of calculation of the same;
- analysis of the expected extent of the impact on the marine environment should the sequestered CO₂ leak into the ocean, and the results of the ex-ante assessment based upon this analysis; and
- any other items of reference for the ex-ante assessment based upon the results of the survey on the impact on the marine environment of the sub-sea bed sequestration of CO₂.

PIPELINE LICENCING REGIMES

Pipeline licencing requirements are set out in Section 6.2 above.

STAKEHOLDER ENGAGEMENT

PUBLIC CONSULTATION

See Section 6.2 on public consultation.

LEGAL CHALLENGE

See Section 6.2 regarding legal challenges to establishment of waste disposal facilities.

8.2.5 Leakage liability

Issues of leakage liability are yet to be examined in Japan, and METI officials have confirmed that the government intends to examine this issue following implementation of its large-scale pilot project which is due to begin this year.

LONG-TERM CORPORATE LIABILITY IN THE EVENT OF CORPORATE RESTRUCTURING

Where an applicant who applies for permission under the Marine Pollution Act to dispose of CO₂ under the sub-sea bed undergoes a merger or corporate spin off, the legal entity which succeeds to the management and obligations of the project, the legal entity which survives following the merger or the legal entity established by the merger may take over the rights of the original applicant entity, to dispose of CO₂ at the ocean area in question, provided that the Minister for Environment approves (Marine Pollution Act, Article 18-13).

LIABILITY OF APPROVAL AUTHORITIES

No special provisions provide for the liability of approval authorities for CCS projects or related incidents, under existing law. However state authorities may be liable for their actions or failure to act, under the general doctrine of state responsibility and reparations.

STANDING TO ENFORCE STORAGE OBLIGATIONS

There are no specific existing legal provisions. Individuals whose rights or interests are damaged as a result of the relevant party's failure to enforce storage obligations may claim damages for the loss incurred, but do not have the ability to try and enforce storage obligations.

8.3 Taxation of injection and pre-closure of CO₂ sequestration facilities

There are no specific tax provisions regarding injection and pre-closure of CO₂ sequestration facilities for Japanese tax purposes. While industrial waste taxes are levied by some local cities, villages or municipalities such as Miyagi, Okayama and Hiroshima, it is not clear whether CO₂ "disposal" would be taxable under this levy.

9. Post-closure and long-term storage of CO₂

9.1 Introduction

The Marine Pollution Act provides that applicants who apply for permission to “dispose” of CO₂ via sequestration in the sub-sea bed must submit a closing implementation plan at the time of application, for review by the Minister for Environment. However, the provisions of this Act focus on the act of “disposal” or sequestration, and the licence provided for this is set at a maximum period of 5 years. The Act does not provide detailed provisions regarding post closure and long term storage obligations, although plans for management of the sequestered CO₂ must be submitted with an application to dispose of CO₂ in the sub-sea bed, and implementing parties are obliged to report to the Ministry of Environment on the situation and planned corrective measures, and to take mitigating actions, where leakage occurs in the post-closure phase.

Legal provision for onshore CO₂ sequestration is even less developed than the legal framework for offshore schemes. The law in Japan does not currently specifically provide for sub-surface CO₂ storage onshore. Long term storage and post-closure obligations and liability for leaks are issues which are yet to be specifically provided for in Japanese law, and are slated to be the subject of further consideration following practical experience with the government’s large-scale CCS project, and prior to commercialization of CCS in Japan in five to six years time.

9.2 General policy and legislation

9.2.1 Obligations of approval authorities

Under the Marine Pollution Act, the approval authorities (for example, the Ministry of Environment) have an obligation to assess the appropriateness of the applicant’s implementation plans, and its financial and technical capacity to manage a sub-sea bed sequestration project and attendant risks and potential liabilities, in accordance with the provisions of the Marine Pollution Act and its implementing ordinances and regulations regarding the grant of permission.

9.2.2 Monitoring and reporting obligations

Under the Marine Pollution Act, monitoring of CO₂ sequestration is conducted in accordance with the monitoring plan submitted by the applicant as part of its application documents, described in Section 8 above.

Once permission is granted for sub-sea bed CO₂ disposal, the party in question is required to report on implementation of its monitoring plan, and its periodic monitoring results to the Minister for the Environment.

When leakage is detected, report of the result should be made to the Minister for the Environment based on the prescriptions of each of the following classifications:

- when there are concerns of contamination: after implementation of the monitoring process, the result should be reported to the Minister for the Environment immediately;

- when adverse impact is detected: during the term of the monitoring, for the duration of the monitoring period, the result of monitoring should be reported to the Minister for the Environment periodically, when necessary or when requested to do so; and
- Normal monitoring: after implementation of the monitoring process, the result should be reported to the Minister for the Environment.

Main monitoring items are:

- the injection pressure and formation pressure;
- CO₂ migration in the formation;
- parameters of sea water such as CO₂ concentration and pH; and
- the impact on marine life.

The actual period of the post closure monitoring is yet to be finally determined in Japan, and Japan plans to be guided by international trends such as CDM verification methods, when assessing post-closure monitoring needs (Akai, 2007).

9.2.3 Leakage liability

Leakage liability and other liability issues are yet to be considered in Japan, and is slated to be considered following implementation of the large-scale government backed project due to begin this year.

FRAMEWORK FOR POST-CLOSURE LIABILITY

Under the Marine Pollution Act, a party which has been permitted to carry out sub-sea bed sequestration of CO₂ is required to take corrective actions where CO₂ leakage occurs in the post-closure phase, such as formation pressure release. A party is also obligated to immediately inform the Minister for Environment where the results for CO₂ migration and the marine environment impacts do not settle within the assessment range, and to notify the Minister of the actions it plans to take to correct this situation. The party must also continue high-frequency monitoring until the CO₂ migration and the marine environment impacts settle within original estimate ranges.

LIABILITY CAPS

Liability caps are yet to be considered in Japan.

VICARIOUS LIABILITY

Vicarious liability is yet to be considered in Japan.

CONTRACTUAL ASSIGNMENT OF RESPONSIBILITY

METI and its ISTEPB have confirmed that the enactment of specific legislation to address the legal and practical aspects of implementing CCS projects (including responsibility for post-closure management, monitoring and verification) is due to be considered in the near future. In the meantime however, there are no restrictions under the Japanese Civil Code (the provisions of which set out the rules of contract law) on the assignment of management, monitoring and verification obligations by entities involved in the post-closure and long term storage of CO₂. The party responsible for post-

closure and long-term storage obligations may assign monitoring, management and verification duties to third party sub-contractors, and this contractual arrangement may include assigning full liability for all damages claims and all responsibility for environmental damage caused as a result of leaked CO₂ and other incidents, to the sub-contractor.

Further, Japanese jurisprudence generally recognises the “polluter pays” principle. In Japanese jurisprudence, it is generally understood the polluter should be required to bear the costs of measures to prevent the spread of the pollution they cause, as well as the costs involved in providing a remedy for the contamination or public nuisance the pollution poses. However this principle does not prevent or restrict the polluter from seeking indemnity for these costs from a third party to whom it has assigned full responsibility under contract for any environmental damage caused by the activities in question. Furthermore, the “polluter pays” principle on its own, with nothing more, does not give rise to a specific or tangible legal obligation on an individual to bear responsibility for the environmental pollution they have caused. In each case, specific legislation which underpins the application of the general principle must be enacted, before the “polluter pays” principle can give rise to a legally binding obligation. As a result, this principle is unlikely to apply to parties currently engaged in CCS projects, at least until specific legislation addressing the legal aspects of CCS projects is enacted.

STANDING TO ENFORCE STORAGE OBLIGATIONS

While specific provisions for the enforcement of storage obligations do not exist, individuals who have suffered losses as a result of a failure by the project owner or manager to meet storage obligations would have standing to bring actions for damages.

9.3 Evaluation

Consideration of and provision for issues of liability in particular for post-closure and long term storage obligations (and breaches thereof) are yet to occur in Japan, and are evidence of the fact that Japanese legislative policy on CCS is still in its infant stages, and is currently reactive (to the needs presented by plans to implement a large-scale pilot project) rather than pro-active.

10. Summary

The Japanese government is aware of international developments and trends in most of the main player countries in the area of CCS policy and legal regulation. However, Japan's review of its own domestic legal framework in light of the needs posed by commercialization of CCS in the near future is still in its infancy. With the exception of the Marine Pollution Act, whose amendments were enacted to comply obligations under the London Convention and now provide for sub-sea bed sequestration of CO₂, Japan appears to be taking a "wait and see" approach to CCS policy and legislation. While its METI ISTEPB CCS Research Group has reviewed the applicability of existing gas business, safety, occupational health and safety and mining laws to various aspects of CCS projects, the Research Group has established only non-binding guidelines to guide the government's large scale CCS project. This is to enable it to watch and learn from practical implementation of CCS projects, whilst keeping abreast of international developments, before revisiting all aspects of its legal framework applicable to CCS prior to commercialization in a number of years' time. A number of issues remain unaddressed, including notably the legal implications and liability for CO₂ leaks both during the transportation and pre and post injection stages.

11. References

11.1 Legislation, regulations, case Law and international material

11.1.1 International

International Covenant on Civil and Political Rights, opened for signature 16 December 1966, 999 UNTS 171 (entered into force 23 March 1976).

Kyoto Protocol to the *United Nations Framework Convention on Climate Change*, opened for signature 11 September 1997 2303 UNTS 148 (entered into force 16 February 2005).

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, opened for signature 29 December 1972, 1046 UNTS 138 (entered into force 30 August 1975). [Haikibutsu sonota no mono no tōki ni yoru kaiyō osen no bōshi ni kansuru jyōyaku].

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11.1.3 Case Law

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