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Summary report on regulatory status of CCS



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1 Introduction & overview

CCS legislation is constantly evolving within the EU, driven by the directive 2009/31/EC (called hereafter the CCS Directive). International marine conventions are other drivers of regulatory changes concerning transport and storage of CO₂.

This report is summarising the work carried out so far in the Carbon Capture and Storage Programme (CCSP) work package 1.1, on the status assessment of CCS affecting Finnish and EU legislation. The CCSP will run for 5 years (2011-2015), and is one of the four programmes managed under the Cleen Ltd, a strategic research centre for the Energy and Environment Cluster. The regulatory review was begun by assessing the Finnish legislation concerning the capture and transportation of CO₂. The initial legal assessment during the first year of the project concentrated less on the storage phase of CCS, and more on the legal requirements concerning capture and transportation of CO₂. During the second funding period of the process, the existing and emerging regulatory framework was tested through comparison to a published model framework (IEA, 2010) to obtain a general qualitative view on the effectiveness and maturity of the legislation concerning CCS implementation. Additionally, possible EU's legal frameworks in preparatory stage were scanned. The results were given as an input to other tasks of CCSP WP1. During the third funding period, regulatory status assessment was continued.

In addition to an annual legislative status summary report, the scope of the work includes a regularly updated database on national acts, Community directives and other regulation or conventions having relevance on the implementation of CCS in Finland. The database, presented in Annexes I and II. Annex II consists of abstracts and key points of each regulation, including links to original documents and sites with relevant information. This report essentially serves as a summary on the key points found in the legal database presented in the Annexes.

2 The regulatory data collected and assessed to date

The full list of regulatory documents reviewed for the purposes of data collection on regulatory status concerning CCS is given in Annex I. The list consists of 19 national acts under the Ministry of the Environment, Ministry of Employment and the Economy, Ministry of Interior, Ministry of

Justice and Ministry of Social Affairs and Health. Other 28 documents are essentially various decisions, regulations and directives enacted in to the national legislation, directives waiting for implementation, marine conventions and proposals for regulation. Summaries of each reviewed proposed or enacted piece of regulation are given in the Annex II or in the CCSP WP1 report D102, if so referenced in the Annex II.

3 Legal framework of CCS

3.1 The implementation of CCS Directive in Europe

The European commission released a communication on February 2014 (COM(2014)99 final), summarizing the member state reports on the implementation of the CCS Directive. Commission noted that the implementation of the directive across the union has been slow. By November 2013 Austria, Cyprus, Hungary, Ireland, Sweden and Slovenia had not notified the Commission complete transposing measures of the directive. Finland, Luxembourg and the Brussels Capital Region of Belgium chose to prohibit geological storage of CO₂, other than for research purposes, due to unsuitable geology. In the Baltic Sea region, Estonia, Latvia, Sweden and Germany have also prohibited or imposed restrictions to the geological storage. In addition, Austria, Ireland and Slovenia have prohibited the geological storage of CO₂ and Czech Republic has restricted it.

Norway has yet to finish its work on the regulations on transport and storage of CO₂ in the off-shore reservoirs on the Norwegian continental shelf (IEA 2014).

The next Commission report on the implementation of CCS directive is due to be published in March 2015.

3.2 The Finnish national legislation

3.2.1 Acts and amendments resulting from the CCS Directive

During the year 2012 a new law was passed in Finland to implement the remaining provisions of the CCS Directive. The new Act on the capture, transport and geological storage of CO₂ (416/2012) includes a prohibition of geological storage of CO₂ within Finland. The prohibition, limiting the need to implement further legislation on the geological storage of CO₂, is proposed based on the unfavourable geological characteristics of the

whole of the economic area. Otherwise, the national Act is enacting the requirements of the CCS Directive in a quite straightforward manner, without any extra features. The major provisions include the prohibition to export any CO₂ to be geological stored outside the European Economic Community, and the rules and requirements concerning the rights of use of a CO₂ pipeline network, cross-border co-operation. Also general purity requirements for the captured CO₂ are included in the Act as they are in the CCS Directive. The ship transportation of CO₂ and other storage alternatives, such as mineral carbonation, would be opted into the national act if needed only once opted into the monitoring and reporting regulation (601/2012) of the EU-ETS and/or the CCS Directive. For further information, see the summaries on the CCS Directive and the national act (416/2012) in Annex II.

In addition to the Act on the capture, transport and geological storage of CO₂ (416/2012), the provisions of the CCS Directive have been enacted as separate amendments to existing national acts.

The CCS Directive has been implemented in the Finnish national legislation on environmental permitting and environmental impact assessments, as discussed briefly below. The amendments done in the national legislation on the emission trading are explained in the following chapter 'European Union Emission Trading Scheme (EU-ETS)'.

The amended Environmental Protection Decree (169/2000) includes provisions for environmental permitting phase of large combustion power plants. Therefore, an assessment of the economy of CCS applicability must be attached to every application of environmental permit of power plants over 300 MW_{el}.

The Decree concerning Environmental Impact Assessment (713/2006) has been amended to include the CO₂ capture facilities, capturing over 1.5 Mt annually for purposes of CCS, within the list of activities that require an environmental impact assessment (EIA). Pipelines for CO₂ transportation and facilities where CO₂ is stored permanently, both with certain provisions as given in the CCS Directive, are listed within the same activities. The EIA procedures are described in the Act on Environmental Impact Assessment (468/1994).

The Act on Protection of the Marine Environment (1415/1994) was amended in 2012 to allow the disposal of CO₂ into sub-seabed formation from ship loaded in Finland.

3.2.2 Other relevant national legislation

The capture and transport of CO₂ are governed under the national legislation on environmental permitting and protection, land use and building planning and liability issues in case of damages as all other similar types of industries. Therefore, the legislation affecting the planning and build-up phase of CCS have been in place in Finland before the CCS Directive.

Environmental Protection Act imposes strict ground water pollution prohibition. Also the Water Act requires all activities which might cause damage to water environment to have an environmental permit. CO₂ pipelines would possibly fall to such category.

The land use and Building Act (132/1999) obliges public authorities to supervise the permitting procedure, due to the associated technically demanding nature, of CO₂ capture plants and intermediate storages. The act further requires for the above ground facilities transportation pipeline networks to be included in the general structure and city plan.

The legislation concerning possible financial compensation and remediation of damages in case of accidents caused by industrial activities is in its current form able to deal with the foreseeable requirements of CCS activities (See Annex II: Act on the Remediation of Certain Environmental Damages, 383/2009). The safety of the operation of pressure equipment, such as pipelines for transportation of CO₂, intermediate storages and capture facilities is currently ensured by the Pressure Equipment Act (869/1999).

3.3 European Union Emission Trading Scheme (EU-ETS)

The emissions trading scheme of the European Union is implemented in the Act on Emission trading (311/2011) in Finland. The provisions of the CCS Directive and the Directive 2009/29/EC improving and extending the ETS have been implemented in the act. Most notably, emission allowances do not need to be returned for CO₂ captured and transported for geological storage as described in the CCS Directive. Secondly, the emission permit of a facility needs to be revised in case a retrofit capture facility is installed (see Annex II).

Ship transportation of CO₂ is not included in the current monitoring and reporting (M&R) regulation issued by the EU Commission, and is not covered in the national or EU legislation on EU-ETS. Therefore, ship

transportation is not a viable transportation method from an intermediate storage to a sequestration site.

The commission regulation from 2013 onwards, repealing the old M&R - guidelines, on the emission monitoring and reporting under the EU-ETS does not recognize in its current form any other transport mode for captured CO₂ except pipeline transportation. The article 49 of the regulation also stipulates that emissions allowances do not need to be returned from “any amount of CO₂ originating from fossil carbon” that is geologically stored. Furthermore, no subtraction is allowed “for any other transfer of CO₂ out of the installation”. Moreover, the capture, transport and storage of CO₂ must conform to Directive 2009/31/EC. Until any amendments, these provisions of the M&R -regulation, in force as such throughout the Member States, rule out the possibility of ship transportation of CO₂ from capture facilities to the storage sites and Bio-CCS altogether.

3.4 International Marine conventions

Finland is one of the signed parties of the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, also known as the London Convention. The Convention itself, governed under the International Maritime Organization, has been amended to enable the geological storage of CO₂ from any vessels or man-made structures to sub-seabed formation. However, the amendment allowing the export of CO₂ for the purposes of geological storage off-shore needs to be ratified by 2/3 of the signed parties as a prerequisite for entry into force. The amount of ratifications is far from reaching this limit, and therefore the ship transport of CO₂ from Finland to an off-shore geological storage site would currently be prohibited under the London Convention.

The situation concerning the cross-border shipment of CO₂ under the London Convention is discussed in detail by IEA (2011).

4 Near-term view on upcoming changes in CCS regulation

As much of the available data as possible was collected from public sources such as the European Commission´s Climate Action website¹,

¹ http://ec.europa.eu/clima/news/index_en.htm

including also any news from the IEA Regulatory Network² to create a general overview of the upcoming CCS related regulation on the EU level. Searches were run on the European PreLex database, to see if any regulations with direct relevance on CCS were already in the pipeline. The IEA's newest editions of the Carbon Capture and Storage Legal and Regulatory Review (2012 & 2014) were also studied as a valuable material for the ends of our work on the CCSP Work Package 1.

As a summary of the efforts, little news of any clear relevance was found. CCS in Europe is in a stage where the last EU countries are transposing the Directive 2009/31/EC on the geological storage of CO₂, and a form of CCS has been included in the EU Emission Trading Scheme from 2013 onwards. The CCS Directive was transposed into the Finnish national legislation as a new law in July 15th 2012. Although important progress in the related regulation is yet needed, such as the opt-in of the ship transport of CO₂ for purposes of geological storage to the regulation on the monitoring and reporting of greenhouse gasses under the EU-EU ETSETS, the main components enabling the implementation of CCS in Europe seem to be or are in the process of settling into place.

Based on the Carbon Capture and Storage Legal and Regulatory Reviews by the International Energy Agency (2012, 2014), major developments on CCS regulation are not to be expected on behalf on European Union officials. The major advancements will be made in the final transpositions of the CCS Directive (2009/31/EC) into national legislations and in the monetization of the second award decision under the NER 300 funding programme. The first decision round ended with the awarded CCS applications withdrawn, postponing any realised funding decisions until the second call round. The awarded projects under the current second award round include one CCS project in the United Kingdom. The investment decisions concerning the awards in the second round should be made by July 2016.

4.1 Maritime CO₂ emissions and CCS

The European Commission launched a public consultation in January 2012, in order to collect opinions and views from specialist on shipping and climate change for a possible Commission proposal on including maritime transport emissions in the EU's greenhouse gas reduction commitment³. Although having no direct relevance to CCS as such, the

² <http://www.iea.org/topics/ccs/ccslegalandregulatoryissues/ieainternationalccsregulatorynetwork/>

³ http://ec.europa.eu/clima/consultations/0014/index_en.htm

issue of monitoring and reporting of the GHG gas emissions from shipping is worth taking an interest to, as it is a feature still lacking from the current EU-ETS regulation. The Commissioner for Climate Action issued in 2012 a joint statement, where an intention was expressed to pursue a monitoring, reporting and verification system based on ship fuel consumption in the early 2013⁴. The draft proposal⁵ for a regulation on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport and amending Regulation (EU) No 525/2013 was published in June 2013.

In order to transport CO₂ in ships for purposes of CCS, monitoring and verification rules for the on-route ship emissions are mandatory. Moreover, the emissions should be monitored on a voyage basis rather than on time basis to enable other complementary uses of the tankers during the seasons. If maritime transport would eventually be included in the emission trading scheme, a double counting of the ship emissions would have to be avoided. The current proposal for a monitoring and reporting regulation on maritime CO₂ emissions give an option to rely on the on-board bunker delivery notes (BDNs) to monitor the emissions from fuel use. Such monitoring method would imply a time based approach, unfavourable to the purposes of CCS.

4.2 The Industrial Safety Regulations

Called Seveso III, after the Seveso disaster in 1976, the newest directive (2012/18/EU) on the control of major-accident hazards involving dangerous substances was published in the Official Journal of the European Union on 24th July 2012⁶. The Seveso III Directive sets out various requirements on hazard prevention, planning and reporting for industrial facilities incorporating hazardous substances listed under the Directive. Transport, storage and handling of CO₂ are not included in the scope of the directive. The Seveso III will repeal the older Seveso II from the beginning of 2015, when the new directive must be transposed into national legislations.

4.3 EU's decision making process

None of the search runs through the European Commission's PreLex database⁷ on the field of CCS, maritime and pipeline transportation,

⁴ http://ec.europa.eu/clima/news/articles/news_2012100101_en.htm

⁵ COM(2013)0480, <http://www.ipex.eu/IPEXL-WEB/dossier/document/COM20130480.do>

⁶ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:197:0001:0037:EN:PDF>

⁷ <http://ec.europa.eu/prelex/apcnet.cfm?CL=en>

monitoring and reporting of emissions and environmental, health and safety concerns generated hits on relevant open decision making processes.

5 Finnish legislation compared to a model legal framework on CCS

The IEA (2010) study *Carbon Capture and Storage Model Regulatory Framework*: recognizes 29 important key points under broad, existing and CCS-specific regulatory issues. The study also includes a model of a legal text on CO₂ storage. This chapter discusses how the current Finnish legislation complies with or compares to the results of the IEA (2010) study, key point at a time. Below is a list of the key points on CCS legal framework, as presented by IEA (2010), each freely summarized in short bullet points:

Broad regulatory issues:

1. Classifying CO₂
 - CO₂ should be clearly classified. The classification can vary depending on the situation and use of the CO₂. Is CO₂ classified, and in which circumstances, as hazardous compound, waste, pollutant or commodity?
2. Property rights
 - Property rights associated with CCS include ownership of transported or stored CO₂, property rights of storage infrastructure and space and intellectual property rights. Legislation should recognize these issues and cover their allocation and management along the CCS chain.
 - The ownership of the captured CO₂ should reside on the responsible operator along the CCS chain, establishing a chain of custody from capture to storage of CO₂.
3. Competition with other users and preferential rights issue
 - Is the co-existence of authorizations to use a geological storage space for other industrial purposes taken into account? How will possible conflicts be settled?
4. Transboundary movement of CO₂
 - When captured CO₂ is transported within at least two jurisdictions, the national legal frameworks must have

compatibility and transboundary regulatory co-operation becomes necessary.

- Are liabilities in case of transboundary secondary effects caused by or sub-surface migration of stored CO₂ addressed?
5. International laws for the protection of the marine environment
 - Parties to either London Convention or OSPAR Convention have to make sure the legal framework for CO₂ storage complies with the requirements set by the Conventions. Non-signatories should comply for the sake of harmonization.
 6. Providing incentives for CCS as part of climate change mitigation strategies
 - Incentive frameworks are better kept separated from CCS regulatory frameworks.
 - When incentive is applied in the capture point of CCS chain, a complete chain of custody until the storage operations is required to avoid economic benefit in case the CO₂ is emitted downwards the chain.

Existing regulatory issues applied to CCS:

7. Protecting human health
 - Are occupational health and safety regulations ensuring the safety of a worker in a facility dealing with large amounts of CO₂?
 - Are the laws on civil protection and industrial accidents covering the risks posed by CCS operations?
8. Composition of the CO₂ stream
 - The legal framework should acknowledge that the risks posed by impurities vary depending on the concentrations, the mass flow and other case-by-case variables.
 - Addition of other material for purposes of waste disposal should be prohibited and possibly monitored.
9. The role of environmental impact assessment
 - The sub-surface elements of CO₂ storage can prove to be challenging to existing EIA procedures, which should therefore be assessed.
10. Third-party access to storage site and transportation infrastructure

- Laws should be in place to ensure effective use of a pipeline network with spare capacity, enabling third party access to the infrastructure.
 - The legal framework should account for the high entry cost for new market participant and especially for first movers.
11. Engaging the public in decision making
- Regulation should promote public participation in the decision making process.

CCS-specific regulatory issues (capture and transport)

12. CO₂ capture
- The permitting procedures should recognize the various technical options for CO₂ capture and also the option to retro-fit existing industrial facilities.
 - Are regulations on direct pollution control and chemical safety covering the operations?
13. CO₂ transportation
- CO₂ transportation in pipelines sets specific requirements on risk management and accident prevention measures, as the gas with the presence of water is corrosive and upon leakage accumulates on the ground level.
 - Do health, safety, civil and environmental protection regulation cover the CO₂ transportation?
 - Are liabilities clear in the case of damages caused by CO₂ leakage from the pipelines?

CCS-specific regulatory issues (storage):

Most new regulatory requirements are caused by the need to govern liabilities, monitoring, site selection, permitting and civil, environmental and economic safety of CO₂ storage sites. The bulk of the regulatory framework published by IEA (2010) is related to CO₂ storage. A model legal text by IEA (2010), left un-summarized here, consist of the following points/articles:

14. Scope of framework and prohibitions
15. Definitions and terminology applicable to CO₂ storage regulations
16. Authorisation of storage site exploration activities
17. Regulating site selection and characterisation activities

18. Authorisation of storage activities
19. Project inspections
20. Monitoring, reporting and verification requirements
21. Corrective measures and remediation measures
22. Liability during the project period
23. Authorisation for storage site closure
24. Liability during the post-closure period
25. Financial contributions to post-closure stewardship

Emerging CCS regulatory issues:

IEA (2010) listed four issues that were not during the date of publication well-understood in a legal context, but none the less significant to the regulatory framework of CCS:

26. Sharing knowledge and experience through the demonstration phase
 - A national strategy for CCS demonstrations, including research on the technical aspects, regulatory needs, CCS financing and public engagement can facilitate the rolling out of the technology.
 - Various international organizations are available for public dissemination of good practices and findings from technical demonstrations and CCS research.
27. CCS ready
 - Is the risk of “carbon lock-in” controlled by sufficient regulation to ensure new installation are able to retro-fit CCS once favourable economic or other enabling or imperative conditions are met?
28. Using CCS for biomass-based sources
 - Development of the regulatory framework of CCS is needed to create a driver for capture and storage of biogenic CO₂ emissions.
29. Understanding enhanced hydrocarbon recovery (EHR) with CCS
 - Objectives of a CCS project and an EHR project differ from each other. For EHR operations to be accounted as CCS operations, storage site permitting, monitoring and post-closure measures must be required.

5.1 Broad regulatory issues

5.1.1 Classifying CO₂

CO₂ is not listed as hazardous on the regulation EC 1272/2008 (CLP-regulation) on classification, labelling and packaging of substances and mixtures. Neither does the Chemicals Act (744/1989) classify CO₂ as dangerous substance.

Upon the publication of the CCS Directive, the waste directives (2006/12/EC & 2008/98/EC) and regulation on shipments of waste (1013/2006) were amended to exclude captured CO₂ from their scope. Implemented into national legislation, the CO₂ captured for the purposes of CCS has been taken outside the scope of the new Waste Act (646/2011). CCS itself is defined under the national Act on the capture, transport and geological storage of CO₂ (416/2012).

Captured CO₂ for purposes of CCS is therefore not considered as waste. All in all, classification of CO₂ in the national legislations does not pose any clear difficulties for CCS operations.

5.1.2 Property rights

The supervising authority named in the national CCS act has the right to carry out its responsibilities regardless of the property rights of the transport network operator and secrecy regulations.

The Energy Market Authority can grant access for a third party to the transport network upon request. Otherwise, the CCS act (416/2012) does not further interfere with property rights along the CCS chain.

The chain of custody is required under the regulation (601/2012) on the monitoring a reporting of CO₂ emissions under EU-ETS. Each operator along the CCS chain (source, capture plant, pipeline, and geological storage site) has an identification number which is reported in the annual emission reports of each operator. In this sense, the CO₂ itself is the property of the actual operator.

5.1.3 Competition with other users (of storage space) and preferential rights issue

The national CCS legislation of Finland does not apply to disputes on storage space use. The Act on the capture, transport and geological storage of CO₂ (416/2012) prohibits the geological storage, or storage into water column, in the economic zone of Finland. Therefore, the

provisions on storage site selection, permitting and post-closure period are dismissed all together.

5.1.4 Transboundary movement of CO₂

The national legislation of Finland does not address storage operators, and therefore does not give provisions on liabilities in case of transboundary movement of CO₂ in geological storage formations. The issue neither is within the field of the existing monitoring and reporting regulation (601/2012) under the EU-ETS, as the regulation recognizes only leaks from the reservoir to water column or to surface.

The CCS Directive requires that a single storage site has only one operator. Storage site is a defined volume area within a formation. The directive does not address the liabilities in case of CO₂ migration from one storage site to another, but sets requirements for monitoring of the stored CO₂ plume.

5.1.5 International laws for the protection of the marine environment

The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) has fully implemented counterparts in Finnish legislation. Finland is also a signatory state to London Protocol (not a contracting state). The national legal framework relating to CO₂ transport and storage is compatible with the international laws for the protection of marine environment.

5.1.6 Providing incentives for CCS as part of climate change mitigation strategies

National legal framework on CCS does not contain provisions for economic incentives for the operators. The chain of custody for CO₂ along the value chain will be reported under the Commission regulation (601/2012) on monitoring and reporting. Therefore, incentives for capture operators for instance, could be granted without a risk of intentional later release of the CO₂.

5.2 Existing regulatory issues applied to CCS

5.2.1 Protecting human health

The EHS issues arising from CCS implementation are discussed in detail in the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland. The report has a

lifecycle approach to EHS requirements on CCS value chain. All stages of CCS sub-processes, from preliminary planning to operation and maintenance, fall under the existing regulatory framework.

5.2.2 Composition of the CO₂ stream

The Act on the capture, transport and geological storage of CO₂ (416/2012) sets requirements to the purity of transported and stored CO₂, as required by the CCS Directive. The Environmental protection act (527/2014) requires that the environmental permits of CO₂ capture facilities include guidelines how to achieve the required purity of the transported and stored CO₂ stream.

5.2.3 The role of environmental impact assessment (in sub-surface elements of CCS)

The national environmental impact assessment legislation has not been tested against the challenges of geological storage of CO₂, as these operations (excluding small-scale injection for research purposes) are prohibited in Finland.

5.2.4 Third-party access to storage site and transportation infrastructure

Third-party access to transportation network is ensured with certain pre-conditions in the Act on the capture, transport and geological storage of CO₂ (416/2012). If technically and economically viable and environmentally sound, the Energy Market Authority can order the operator of the transport network to make the required changes. Again, the geological storage is outside the scope of the national legislation.

5.2.5 Engaging the public in decision making

The environmental permitting procedures require the hearing of the public before permitting industrial operations such as CCS processes. Therefore, the public is engaged in the decision making. The public engagement processes have not been modified for CCS in any way, however.

5.3 CCS-specific regulatory issues (capture and transport)

5.3.1 CO₂ capture

A capture facility, whether greenfield or retro-fitted, must always apply for an emission permit, as required by the Act on emission trading (311/2011).

The permitting process for a CO₂ capture facility is assessed in the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland. The key legislations involved are the Act on environmental impact assessment (468/1994) and Decree (713/2006), Land use and building act (132/1999) and Decree (895/1999) and Act on safe handling of chemicals and explosives (390/2005). Occupational and safety legislations apply during the construction phase.

The EHS challenges for post-combustion capture facilities, as described in the report D102, include slippage of solvent to the released flue gasses. Pre-combustion capture is associated with a risk of oxygen, carbon monoxide and hydrogen leakage resulting in intense fire and explosion. Oxygen leakage in the case of oxy-combustion can result in intense fires, in the presence of combustibles, as well. Looking at the less mature chemical looping combustion and CO₂ capture, metals like nickel and cobalt can present risks to health and the environment. How well these risks are recognized and avoided in the permitting process, will ultimately depend on the judgement and expertise of the permitting authority.

The operation and maintenance phase of a CO₂ capture facility is within the scope of the existing EHS regulatory framework, as pointed out in chapter "Protecting human health". Report D102 concluded that CCS is not likely to introduce any new or significant changes in occupational safety and health requirements compared to relating processes. Pre-combustion capture process designs should however be given special attention regarding explosion prevention when following the Government decree on the prevention of hazard to workers caused by explosive air mixtures (576/2003). This is due to high concentrations of carbon monoxide and hydrogen in the capture plant.

5.3.2 CO₂ transportation

Again, the permitting process for a CO₂ transport facilities, including pipelines and harbour facilities, is assessed in the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland. The environmental, health and safety risks from CO₂ transportation were summarized in the report as well. Concerning pipeline routing, the construction and maintenance will have

impacts on the environment and the landscape. The risk of undermining the effectiveness of CO₂ emissions mitigation by the action results from the risk of pipeline or intermediate storage leaks or ruptures. The CO₂ leaks also present a serious EHS risk to surrounding population, flora and fauna, resulting from asphyxiation or acidifying effect to the soil and groundwater.

Pipelines for CO₂ transport of nominal diameter of at least 800 mm and length of over 40 km need an environmental impact assessment according to the EIA decree 713/2006. The environmental permitting procedure is not modified in any way for CO₂ transport pipelines. Depending on the pipeline route, case specific permitting procedures may be needed when the pipeline crosses protected areas or certain surface water locations. These permitting procedures fall under the Nature protection act (1096/1996) and Decree (160/1997) and Water act (587/2011).

Concerning shipping routes, harbours, loading dock or discharge quays, an EIA is mandatory in the CCS scale. CO₂ storage does not need an additional permit, if the harbour facility has previous actions for chemical storage, according to the report D102. Permitting procedure due to land use legislation may apply.

As with the permitting of CO₂ capture facilities, the effectiveness of CO₂ transport permitting depends on the available information and know-how in the decision making process of the permitting authority. What comes to the liabilities in case of industrial accidents relating to CO₂ transportation, Act on the Remediation of Certain Environmental Damages (383/2009) applies to all CO₂ transport processes.

5.4 CCS-specific regulatory issues (storage):

Specific legislation for geological storage of CO₂ does not exist in the national legislation, as the operations are prohibited in the economic zone of Finland. Therefore the model legal text by IEA (2010) cannot be used for benchmarking purposes.

5.5 Emerging CCS regulatory issues

5.5.1 Sharing knowledge and experience through the demonstration phase

The national legal framework for CCS does not mention or refer to any strategy for CCS demonstration. The National Climate and Energy Strategy from 2008 mentioned the potential of the technology. The

updated strategy in March 2013 does not base the emission reductions on CCS either, at least on the short term (Ministry of Employment and the Economy of Finland, 2013).

5.5.2 CCS ready

The risk of “carbon lock-in” is mitigated by the Environmental Protection Decree (169/2000), which requires that power plants of over 300 MW_{el} attach an assessment of potential permanent geological storage sites and techno-economic feasibility of retrofitted CO₂ capture facility and of needed transport infrastructure to the application of an environmental permit. Apart from not addressing smaller power plants or other industrial facilities, the effectiveness of the “CCS ready” requirements depend on the judgement of the permitting authority.

5.5.3 Using CCS for biomass-based sources

For CCS to be implemented in biogenic CO₂ emission, the mechanism would have to be included in the EU-ETS. This would certainly open a significant additional potential for CO₂ capture. Current directive and regulations on EU’s emission trading scheme do not have such an option, and neither are any amendments towards enabling Bio-CCS in the pipeline.

5.5.4 Understanding enhanced hydrocarbon recovery with CCS

Ensuring EHR operations fulfil the requirements of CCS depends on national laws and permitting procedures of the countries where geological storage sites are operated. Finland does not such legislative frameworks as the geological storage of CO₂ is prohibited, due to lack of known domestic sequestration capacity.

6 Conclusions

The legal framework enabling the capture, pipeline transport and geological storage of CO₂ is nearly settled into place across the EU and EEA. Finland adopted the required amendments and a new act during 2012. New amendments to existing legislation or new legal frameworks have not been identified in the EU’s preparation process.

The national legal framework on CCS seems to address most of the key issues identified in the IEA model regulatory framework (IEA 2010) on capture and storage of CO₂. Concerning storage of CO₂, the comparison

is not meaningful, due to prohibition on geological storage in Finland. The comparison between the enacted legal framework to the key issues or requirements identified and reposted by IEA (2010) pointed out open question mainly on the field of transport of CO₂ and inclusion of the capture of CO₂ from biogenic sources.

Concerning the pipeline network access, how well a third or n:th party access can be ensured in practice, is a question of the designed flexibility of the future transport network and the dispute settling ability of the Energy Market Authority. Inclusion of ship transport of CO₂ in the valid CCS mechanism under the EU-ETS would likely require addressing and amending the transport network access article of the CCS directive and the resulting national legislations. Aside from the CCS Directive and the resulting national legislations, an amendment to the monitoring and reporting regulation under the EU-ETS will have to be made to enable ship transportation of CO₂ in the possible CCS value chains. The Work Package 1 of the CCSP could be able to work on such required regulatory framework.

Ship transport of CO₂ is at the moment hindered also due to the London Convention. As the amendments allowing the export of CO₂ under the London Convention remain waiting for ratifications, off-shore storage of CO₂ captured from Finland would still be prohibited. Finland can take an active role with neighbouring regulators to come up with a tailored solution to the issue. IEA (2011) has published a study on available options to deal with the current restrictions by the London Convention.

In addition to ship transport of CO₂, capture of CO₂ from biogenic sources is a relevant issue when considering a large scale implementation of CCS in Finland. Inclusion of Bio-CCS into the emission trading mechanism will hardly happen in the short-term, as this would require more political pressure or interest from the industries. After all, implementation of CCS value chains in Europe has yet to get going. The first call of NER300 funding resulted in withdrawals of all CCS project applications, but on the second round one CCS project in the United Kingdom was awarded.

The new EU legislation on CCS and ETS, and also the international treaties on the protection of marine environment have a high level of importance regarding the future of CCS in Finland. The most obvious question marks on the evolving legislation are the monitoring and reporting regulation concerning the inclusion of CCS relying on ship

transportation to the EU-ETS and ratifications of the cross-border transport of CO₂ for the purposes of off-shore storage enabling article of the London Convention. The new emission monitoring and reporting regulation under EU-ETS is unfavourable for Finland as the CCS based on ship transportation of CO₂, BioCCS, or activities such as PCC-manufacturing will not be accounted towards avoiding emissions. Commission guidelines⁸ for the interpretation of the M&R -regulation do not give reason for any other conclusion either (European Commission, 2012). Evolution of EU legislation on CCS and ETS will have to be actively observed and interacted with in order to build regulatory grounds for economically viable Finnish CCS operations in the future.

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- European Commission, 2012. Guidance Document. The Monitoring and Reporting Regulation – General guidance for installations. MRR Guidance document No. 1, Version of 16 July 2012.
- Ministry of Employment and the Economy of Finland, 2013. National Energy and Climate Strategy. Government Report to Parliament on 20 March 2013.

⁸ http://ec.europa.eu/clima/policies/ets/monitoring/docs/gd1_guidance_installations_en.pdf

Annex I: List of reviewed legislation

1996 protocol to the convention on the prevention of marine pollution by dumping of wastes and other matter, 1972 (as amended in 2006)

Act amending the act on protection of the marine environment (418/2012)

Act on amending the decree on implementing the provisions of Convention for the Protection of the Marine Environment of the North-East Atlantic (419/2012)

Act amending the Environmental Protection Act (417/2012)

Act on emission trading (311/2011)

Act on Environmental Impact Assessment Procedure (468/1994)

Act on protection of the marine environment (1415/1994)

Act on safe handling of chemicals and explosives (390/2005)

Act on the capture, transport and geological storage of CO₂ (416/2012)

Act on the Remediation of Certain Environmental Damages (383/2009)

Administrative judicial procedure act (586/1996)

Chemicals Act (1989/744)

Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council

Convention for the protection of the marine environment of the North-East Atlantic (1992 OSPAR Convention)

Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment

Decision by the Ministry of Trade and Industry on the safety of pressure equipment (953/1999)

Decision by the Ministry of Trade and Industry on pressure equipment (938/1999)

Decree on environmental impact assessment (713/2006)

Decree on industrial handling and storage of hazardous chemicals (59/1999)

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327, 22.12.2000, p. 1–73)

Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants (OJ L 309, 27.11.2001, p. 1–21)

Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC

Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage (Official Journal L 143 , 30/04/2004 P. 0056 – 0075)

Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives

Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community

Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006

Environmental Protection Act (527/2014)

Environmental Protection Decree (169/2000)

Government Decree on the safe use and inspection of work equipment (403/2008)

Government Decree on the prevention of hazard to workers caused by explosive air mixtures (576/2003)

Government Decree on rescue services (407/2011)

Government Decree on the safety of construction work (205/2009)

Land Use and Building Act (132/1999)

Land use and building Decree (895/1999)

Nature Protection Act (1096/1996)

Nature protection Decree (160/1997)

Occupational safety and health act (738/2002)

Pressure Equipment Act (869/1999)

Directive 2012/27/EU of the European Parliament and of the Council on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC

Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009

Directive 2013/30/EU of the European Parliament and of the Council of 12 June 2013 on safety of offshore oil and gas operations and amending Directive 2004/35/EC

Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste

COM (2013) 480: Proposal for a Regulation of The European Parliament and of The Council on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport and amending Regulation (EU) No 525/2013

Rescue Act (379/2011)

Water Act (264/1961, 587/2011)

Waste Act (1072/1993, 646/2011)

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7 Finnish national legislation in force

7.1 Ministry of the Environment

7.1.1 Act on the capture, transport and geological storage of CO₂ (416/2012)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/2012/20120416>

Ministry of the Environment

Further info: n/a

Upon entry into force in 2012, this new act fully implements the EU CCS Directive 2009/31/EC on the national level of Finland.

In the Act on the Capture, Transport and Geological Storage of CO₂, all geological storage of CO₂ is prohibited within the economic zone of Finland. The prohibition applies also to the disposing of CO₂ into the water column. Experimental operations, where under 100 000 t of CO₂ will be sequestered, are allowed.

As set in the CCS Directive, export of CO₂ outside the European Economic Community is forbidden.

Concerning the permanent storage of CO₂, the sequestered CO₂ can not contain any additional waste compounds, except small traces of other substances involved in the capture process. The traces are not allowed to reach levels able to impose a threat to human health or the environment. The risks related to additional components in the CO₂ stream have to be assessed at the capture side of the CCS chain. The material flows have to be documented and recorded at the capture plant as well.

As the ship transport of CO₂ currently is not included among the CCS operations as intended in the CCS Directive, ETS Directive and M&R - regulation, ship transport of CO₂ is not included as an option in the introduced act. For purposes of geological storage, the captured CO₂ will have to be transported in pipelines. However, ship transport of CO₂ can be opted in to the relevant CCS legislation across Europe, once the need to do so and the mandatory monitoring and reporting regulations under the EU-ETS are in place. Regarding other issues than monitoring, reporting and verification of transport emissions, the regulations concerning ship or other transport of CO₂ are given in the transport legislation.

The act implements the rules and requirements set out in the CCS Directive concerning the rights of use of a pipeline network, cross-border co-operation and settling of disputes in the above. The operator of a CO₂ pipeline has to give rights of use for the pipeline at request, provided that the capacity of the pipeline is adequate and the CO₂ meets the quality criteria for the pipeline. The operator of CO₂ pipeline has to expand the pipeline at request for the benefit of having additional users, if economically viable (at the expense of the requesting stakeholder). Moreover, the law sets conditions for the initial planning of the pipeline logistics, to ensure accessibility to the pipeline from CO₂ sources.

Part of the CCS Directive 2009/31/EC has been implemented in other national legislation:

- The inclusion of CO₂ capture facilities in the list of activities obligated to have an environmental permit was put into force by the amendment 1792/2009 to the Environmental Protection Decree.
- The requirements for new large combustion plants to have a techno-economic assessment of retrofitted CO₂ capture of and transport system, and an assessment of the availability of a suitable geological storage site were implemented in the amendment 446/2010 of Environmental Protection Decree and amendment 447/2010 of Decree on large combustion plants.
- The environmental impact assessment of CO₂ capture facilities, transport pipelines and storage sites were made mandatory by the amendment 359/2011 to the Decree on Environmental Impact Assessment.
- The Waste Act has been amended in order to exclude CCS from its scope.

7.1.2 Act amending the Environmental Protection Act (417/2012)

(In Finnish) <http://www.finlex.fi/fi/laki/alkup/2012/20120417>

Ministry of the Environment

Further info: n/a

An amendment to the Environmental Protection Act requires guidelines in the environmental permits of CO₂ capture facilities ensuring the conformity of the transported and stored CO₂ stream to the requirements of the proposal. The captured CO₂ has to consist almost solely of CO₂,

with only minor traces of chemicals and other substances present in the capture process. The other components mixed in the CO₂ may not pose any risk to the environment or human health.

7.1.3 Act amending the act on protection of the marine environment (418/2012)

(In Finnish) <http://www.finlex.fi/fi/laki/alkup/2012/20120418>

Ministry of the Environment

Further info: n/a

Act on protection of the marine environment (1415/1994) was amended in 2012 in order to allow Finnish ships, or ships loaded in Finland to unload the CO₂ they carry to be permanently stored, as intended in the proposed legislation on CO₂ capture, transport and storage, in sub-sea geological formations.

7.1.4 Act on amending the decree on implementing the provisions of Convention for the Protection of the Marine Environment of the North-East Atlantic (419/2012)

(In Finnish) <http://www.finlex.fi/fi/laki/alkup/2012/20120419>

Ministry of the Environment

Further info: n/a

The requirements in the revised annexes II and III of Convention for the Protection of the Marine Environment of the North-East Atlantic were implemented in 2012 in the treaty's counterpart in Finnish legislation.

7.1.5 Act on Environmental Impact Assessment Procedure (468/1994)

<http://www.finlex.fi/en/laki/kaannokset/1994/en19940468?search%5Bkieli%5D%5B0%5D=en&search%5Bteksti%5D=468%2F1994&search%5Btype%5D=meta>

Ministry of the Environment

Further info: n/a

As required in the decree concerning environmental impact assessment 713/2006, an environmental impact assessment needs to be carried out for projects that include CO₂ capture facilities for purposes of CCS, and for other facilities where annually captured CO₂ amount reaches over 1.5 Mt.

The impacts to the environment by pipelines for CO₂ transport, spanning over 40 km and having a diameter of over 800 mm, needs to be assessed as well. The requirements are imposed on the pressure booster station as well.

Geological storage sites are also subjected to environmental impact assessment, apart from research, development and testing activities involving less than 100 000 t of CO₂.

7.1.6 Merensuojelulaki (Act on protection of the marine environment, 1415/1994)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/1994/19941415>

Ministry of the Environment

Further info: n/a

The current act on protection of the marine environment prohibits all kind of discharging or dumping of waste from ships, vessels or air-crafts to the marine environment or in the geological formation below seabed. The prohibition applies also outside the economic zone of Finland.

The act was amended in 2012 according to the annexes II and III of the Convention for the Protection of the Marine Environment of the North-East Atlantic, in order to enable ship transport of CO₂ for the purposes of CCS.

7.1.7 Act on the Remediation of Certain Environmental Damages (383/2009)

<http://www.finlex.fi/en/laki/kaannokset/2009/en20090383?search%5Bkieli%5D%5B0%5D=en&search%5Bteksti%5D=383%2F2009&search%5Btipe%5D=meta>

Ministry of the Environment

Further info: n/a

Act on the Remediation of Certain Environmental Damages lays down financial liabilities and responsibilities in the events of serious environmental damage.

The act implements, for the part of prevention and remedy of damages to the environment, the EU directive 2004/35/EC. The act would cover in its current form the procedures in the case of environmental damage

caused by the capture or transport of CO₂, together with Environmental Protection Act, nature conservation act and Water Act.

According to the Act 383/2009, the operator is usually financially liable on remedying the damage to the environment or property. The Act includes, however, conditions in which concessions can be made concerning the financial responsibility.

7.1.8 Chemicals Act (744/1989)

<http://www.finlex.fi/en/laki/kaannokset/1989/en19890744?search%5Bteksti%5D=744%2F1989&search%5Btype%5D=meta>

Ministry of the Environment

Further info: n/a

The Chemicals Act does not classify CO₂ as a dangerous substance, concerning harmfulness to the nature, flammability or risk of explosion. Therefore, the capture, transport or storage of CO₂ is not subjected to the Act on Safe Handling of Chemicals and Explosives 2007/390. The same applies to the amines used in post-combustion capture processes.

The safety issues of chemical handling are assessed during the environmental impact assessment (see Act on Environmental Impact Assessment Procedure (468/1994)).

7.1.9 Decree on environmental impact assessment (713/2006)

(In Finnish) <http://www.finlex.fi/fi/laki/alkup/2006/20060713>

Ministry of the Environment

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapter of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Preliminary planning, research phase and basic planning: Environmental impact assessment.

7.1.10 Environmental Protection Act (527/2014)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/2014/20140527>

Ministry of the Environment

Further info: n/a

The Environmental Protection Act lays down rules and principles concerning all activities that may have a negative effect on the environment, unless governed in a separate legislation.

Activities associated with a risk of detrimental effect on the environment need an environmental permit. The municipal environmental protection committee is the primary environmental permit authority. The Environmental protection Decree describes in detail the activities for which the permit procedures are mandatory.

The act includes a strict groundwater pollution prohibition. Currently it is not possible by the Finnish law to give any special permission for activities which affect the quality of groundwater. In EU legislation, such an option has been given for member states own consideration.

7.1.11 Environmental Protection Decree (169/2000)

<http://www.finlex.fi/en/laki/kaannokset/2000/en20000169?search%5Bkieli%5D%5B0%5D=en&search%5Bteksti%5D=169%2F2000&search%5Btype%5D=meta>

Ministry of the Environment

Further info: n/a

The Environmental Protection Decree provides the list of activities subject to permission. In the revised form of the decree, a CO₂ capture facility must have an environmental permit.

Over 300 MW_{el} power plants have to attach an assessment of potential permanent geological storage sites and techno-economic feasibility of retrofitted CO₂ capture facility and of needed transport infrastructure to the application of an environmental permit.

7.1.12 Land Use and Building Act (132/1999)

<http://www.finlex.fi/en/laki/kaannokset/1999/en19990132?search%5Bkieli%5D%5B0%5D=en&search%5Bteksti%5D=132%2F1999&search%5Btyyppi%5D=meta>

Ministry of the Environment

Further info: n/a

According to the provisions given in the Land Use and Building Act, the CO₂ capture facility, storages above ground and transport pipelines must be included in the general structure plan and city plan.

The supervision by public authorities would be carried out in the building permitting procedure, due to the technically demanding nature of CO₂ capture plants and intermediate storage facilities.

Further effects of the act 132/1999 are that a building process of a CO₂ pipeline may need a separate landscape work permit.

7.1.13 Land use and building Decree (895/1999)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/1999/19990895>

Ministry of the Environment

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapter of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Building permit.

7.1.14 Nature Protection Act (1096/1996)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/1996/19961096>

Ministry of the Environment

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapter of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Case specific requirements for pipelines.

7.1.15 Nature protection Decree (160/1997)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/1997/19970160>

Ministry of the Environment

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapter of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Case specific requirements for pipelines.

7.1.16 Water Act (587/2011)

<http://www.finlex.fi/en/laki/kaannokset/1961/en19610264?search%5Bkieli%5D%5B0%5D=en&search%5Bteksti%5D=264%2F1961&search%5Btype%5D=meta>

Ministry of the Environment

New act (In Finnish):

<http://www.finlex.fi/fi/laki/smur/2011/20110587?search%5Btype%5D=pika&search%5Bpika%5D=587%2F2011>

Ministry of Justice

Further info: n/a

The new Water Act (587/2011) repealed the old Water Act (264/1961) in full from the beginning of the year 2012.

Any activities, which can have effects on water environment causing damage to private or public interest, require a permit from the Regional State Administrative Agency. This can have consequences on the design of CO₂ pipelines.

7.1.17 Waste Act (646/2011)

<http://www.finlex.fi/en/laki/kaannokset/1993/en19931072?search%5Bkieli%5D%5B0%5D=en&search%5Bteksti%5D=1072%2F1993&search%5Btype%5D=meta>

Ministry of the Environment

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

After May 2012, the new Waste Act (646/2011) has implemented the Article 35 of the CCS Directive. The old Waste Act (1072/1993) was repealed accordingly.

The CO₂ captured for the purposes of CCS has been taken outside the scope of the Waste Act.

The Decree is discussed in detail in the following chapter of the CCSP WP1 report D102 - Data package about environmental, health and safety

requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Operation and maintenance phase: Environment.

7.2 Ministry of Employment and the Economy

7.2.1 Act on safe handling of chemicals and explosives (390/2005)

(In Finnish) <http://www.finlex.fi/fi/laki/smur/2005/20050390>

Ministry of Employment and the Economy

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapters of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Preliminary planning, research phase and basic planning: Chemical safety.
- Detailed planning and construction phase: Permit for chemical handling and storage.
- Operation and maintenance phase: Chemical safety.

7.2.2 Päästökauppalaki (Act on Emission Trading, 311/2011)

(In Finnish) <http://www.finlex.fi/fi/laki/smur/2011/20110311>

Ministry of Employment and the Economy

Further info: <http://www.tem.fi/index.phtml?l=en&s=3994>

The act on emission trading 311/2011 implements the revised EU-ETS Directive in the national legislation of Finland. The act therefore includes provisions concerning CCS.

First of all, a facility in the scope of emission trading scheme does not have to return emission allowances for CO₂ captured, transported by pipelines and permanently stored.

Secondly, the emission permit of a facility needs to be revised if it is retrofitted with CO₂ capture facility, from where the CO₂ is transported and permanently stored. The facility must also have an environmental

permit which conforms to the requirements in the EU CCS Directive (2009/31/EC) (concerning guidelines on safe managements of the CO₂ stream and its components).

CO₂ transported by ship from the capture plant to the storage site is not currently accepted as verified avoided emission. Ship transport of CO₂ is currently in need of Community guidelines or regulation for monitoring, verification and reporting procedures. The ship transport of CO₂ is neither accounted for in the new monitoring and reporting regulation from 2013 onwards (see chapter 4.1 'Maritime CO₂ emissions and CCS'). If and when a set of common practices concerning shipping of CO₂ are published however, these modes of transport can be opted into the ETS legislation.

7.2.3 Decision by the Ministry of Trade and Industry on pressure equipment (938/1999)

(In Finnish) <http://www.finlex.fi/fi/laki/alkup/1999/19990938>

Ministry of Employment and the Economy

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapter of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Operation and maintenance phase: Pressure equipment.

7.2.4 Decision by the Ministry of Trade and Industry on the safety of pressure equipment (953/1999)

(In Finnish) <http://www.finlex.fi/fi/laki/alkup/1999/19990953>

Ministry of Employment and the Economy

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapters of the CCSP WP1 report D102 - Data package about environmental, health and safety

requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Pressure equipment.
- Operation and maintenance phase: Pressure equipment.

7.2.5 Decree on industrial handling and storage of hazardous chemicals (59/1999)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/1999/19990059>

Ministry of Employment and the Economy

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapters of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Permit for chemical handling and storage.
- Operation and maintenance phase: Chemical safety.

7.2.6 Pressure Equipment Act (869/1999)

<http://www.finlex.fi/en/laki/kaannokset/1999/en19990869?search%5Bkieli%5D%5B0%5D=en&search%5Bteksti%5D=869%2F1999&search%5Btype%5D=meta>

Ministry of Employment and the Economy

Further info: n/a

The Pressure Equipment Act is intended to ensure the safety in the positioning, use and inspection of pressure equipment, regarding the environment, human health and property. The Pressure Equipment Act can be applied as such to capture facilities of CO₂, intermediate storages and pipelines which are operated in overpressure.

Gas carriers are not in the scope of Pressure Equipment Act as they are governed by the marine act (674/1994) and the act on containers for chemical and gasses (244/1982). These laws have been adopted to implement the orders of the International Maritime Organization (IMO).

7.3 Ministry of the Interior

7.3.1 Government Decree on rescue services (407/2011)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/2011/20110407>

Ministry of the Interior

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapters of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Rescue.
- Operation and maintenance phase: Rescue.

7.3.2 Rescue Act (379/2011)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/2011/20110379>

Ministry of the Interior

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapters of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Rescue.
- Operation and maintenance phase: Rescue.

7.4 Ministry of Justice

7.4.1 Administrative judicial procedure act (586/1996)

(In Finnish) <http://www.finlex.fi/fi/laki/alkup/1996/19960586>

Ministry of Justice

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Administrative Judicial Procedure Act is of relevance in appealing procedures.

The Decree is discussed in detail in the following chapters of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Occupational safety and health.
- Detailed planning and construction phase: Pressure equipment.
- Detailed planning and construction phase: Permit for chemical handling and storage.
- Detailed planning and construction phase: Explosion prevention.
- Detailed planning and construction phase: Rescue.
- Operation and maintenance phase: Occupational safety and health.
- Operation and maintenance phase: Chemical safety.
- Operation and maintenance phase: Environment.
- Operation and maintenance phase: Pressure equipment.
- Operation and maintenance phase: Rescue.
- Operation and maintenance phase: Case specific requirements for harbour facilities.

7.5 Ministry of Social Affairs and Health

7.5.1 Government Decree on the prevention of hazard to workers caused by explosive air mixtures (576/2003)

(In Finnish) <http://www.finlex.fi/fi/laki/alkup/2003/20030576>

Ministry of Social Affairs and Health

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapters of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Explosion prevention.
- Operation and maintenance phase: Occupational safety and health.

7.5.2 Government Decree on the safe use and inspection of work equipment (403/2008)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/2008/20080403>

Ministry of Social Affairs and Health

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapter of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Occupational safety and health.

7.5.3 Government Decree on the safety of construction work (205/2009)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/2009/20090205>

Ministry of Social Affairs and Health

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapter of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Occupational safety and health.

7.5.4 Occupational safety and health act (738/2002)

(In Finnish) <http://www.finlex.fi/fi/laki/ajantasa/2002/20020738>

Ministry of Social Affairs and Health

Further info: CCSP Research Report nr D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland.

The Decree is discussed in detail in the following chapters of the CCSP WP1 report D102 - Data package about environmental, health and safety requirements related to the capture, transfer and intermediate storage of carbon dioxide in Finland:

- Detailed planning and construction phase: Occupational safety and health.
- Operation and maintenance phase: Occupational safety and health.

8 EU Regulations

8.1 Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32012R0601:EN:NOT>

European Commission

Further info:

http://ec.europa.eu/clima/policies/ets/monitoring/documentation_en.htm

The Commission's Regulation on the monitoring and reporting of greenhouse gas emissions was approved by the European Parliament and Council in 2012.

The new regulation replaced the old monitoring and reporting guidelines from 2013 onwards. An operator of a facility within the scope of the EU-ETS shall subtract from the emissions of the installation the amount of fossil CO₂ transferred to a capture installation, a transport network or a storage site for the purpose of CCS.

Activity-specific monitoring methodologies related to CCS installations are given in the following chapters of Annex IV:

“determination of greenhouse gas emissions from CO₂ capture activities for the purposes of transport and geological storage in a storage site permitted by the directive 2009/31/EC”

CO₂ capture is carried out either in a separate installation processing CO₂ streams from one or several sources or in the same installation producing the CO₂ under the same GHG emission permit. The installations related to CO₂ capture, intermediate storage transfer to a transportation network or direct transfer to geological storage site will be included in the emission permit and accounted for in the associated monitoring plan. The operator of the capture related activities must include at least the CO₂ transferred to the capture installation and activities related to fuel combustion for the capture process as the potential sources of CO₂ emissions. Roughly put, the capture installation emissions are calculated as the sum of escaped CO₂ due to capture

efficiency and the emissions caused by the capture installation other activities than CO₂ capture. The formula depends on whether the capture installation is within the CO₂ emitting installation or not.

“determination of greenhouse gas emissions from the transport of CO₂ by pipelines for geological storage of in a storage site permitted under directive 2009/31/EC”

Concerning the greenhouse gas emission permit for the CO₂ pipeline transportation network, the operators of such processes must include at least the combustion and other processes functionally connected to the pipeline, vented CO₂ and leaked CO₂ during incidents as potential CO₂ emissions of the pipeline network. The proposed regulation will give alternative methods for quantification of CO₂ in the pipeline transportation processes. The operator must choose the most appropriate one according to the provisions.

“geological storage of CO₂ in a storage site permitted under Directive 2009/31/EC”

The CCS Directive specifies a permitting procedure for permanent storage sites, in which a competent authority shall base the boundaries of monitoring and reporting the CO₂ emissions from the storage site. In addition to the requirement to monitor and report the emissions from the storage site, the monitoring and reporting regulation sets further notification obligation for the storage site operator in the case of a leakage. The methods for quantification of CO₂ emissions are given in the proposal.

Annex IX sets minimum data and information to be retained in accordance with article 66(1) on record keeping.

Ship transportation of CO₂ is not included within the scope of the monitoring and reporting regulation.

8.2 Regulation on shipments of waste (Regulation (EC) No 1013/2006)

Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1013:EN:NOT>

Further info: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1013:EN:NOT>

The Community legislation on waste shipments applies to the majority of wastes, notably excluding radioactive wastes. Lists of wastes within the scope of the regulation are given in the annexes. The regulation ensures that the wastes are shipped between member states, are exported from or imported into the Community or are in transit through the Community in an environmentally sound manner. Depending how the waste is classified in the annexes, the authorities must be notified for consent or the shipments must be recorded.

The recovery or disposal of waste is coupled with its shipment. If the shipment and waste recovery or disposal cannot be fulfilled, the notifier is obliged to take the waste back.

The CCS Directive sets out rules and guidelines of CO₂ transportation, including rules for settlement of disputes and liabilities. It was therefore necessary to rule out CO₂ for purposes of geological storage from the scope of waste shipment regulation.

The regulation on shipments of waste was amended by the CCS Directive:

- The transport of CO₂ for the purposes of CCS was excluded from the scope of the regulation on waste shipments (Regulation (EC) No 1013/2006).

8.2.1 Regulation 347/2013 on Guidelines for trans-European energy infrastructure

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:115:0039:0075:EN:PDF>

European Commission

Further info:

http://ec.europa.eu/energy/infrastructure/strategy/2020_en.htm

The guidelines for trans-European energy infrastructure lay down rules to identify projects of common interest that are needed to be prioritised within the EU. The Commission establishes a list of such projects, updated by every two years.

The regulation identifies cross-border CO₂ transport infrastructure as one of the thematic areas of trans-European energy infrastructure for which EU action is most needed. The regulation therefore aims to streamline permit granting procedures while increasing public participation. Besides streamlined permit procedures, the regulation ensures necessary market-based or direct financial support from EU to the projects which are of common interest. The direct financial support is to be provided under the Regulation on a Connecting Europe Facility. Regarding the transaction volumes, In June 2011 the Commission reported a total estimate of EUR 2.5 billion for investment needs in CO₂ transport infrastructure by 2020.

CO₂ transport infrastructure projects must fulfil the criteria concerning low cost avoidance of CO₂ emission while maintaining security of supply, increase of the resilience and security of CO₂ transport and ability to connect multiple CO₂ sources and storage sites via common infrastructure with low risk and high efficiency. The transport processes listed as the categories to be developed are pipelines from more than one source, facilities for liquefaction and buffer storage of CO₂ and any essential component of the transport system needed for the safe, proper and efficient functioning of the infrastructure, including monitoring and control systems. Infrastructure within the sequestration site is not included among the listed categories to be developed in the regulation.

9 Upcoming legislation

9.1 Proposals

9.1.1 Proposal for a Regulation of The European Parliament and of the Council on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport and amending Regulation (EU) No 525/2013

<http://eur-lex.europa.eu/procedure/EN/1041028>

European Commission

Further info:

http://ec.europa.eu/clima/policies/transport/shipping/index_en.htm

The Commissioner for Climate Action issued in 2012 a joint statement, where an intention was expressed to pursue a monitoring, reporting and verification system based on ship fuel consumption in the early 2013. The draft proposal for a regulation on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport and amending Regulation (EU) No 525/2013 was published in June 2013.

The current proposal for a monitoring and reporting regulation on maritime CO₂ emissions give an option to rely on the on-board bunker delivery notes (BDNs) to monitor the emissions from fuel use.

9.2 Laws, regulations and administrative provisions to be implemented

9.2.1 1996 protocol to the convention on the prevention of marine pollution by dumping of wastes and other matter, 1972 (as amended in 2006)

<http://www.ucl.ac.uk/cclp/pdf/PROTOCOLAmended2006.pdf>

International Maritime Organization

Further info:

<http://www.imo.org/About/Conventions/ListOfConventions/Pages/Convention-on-the-Prevention-of-Marine-Pollution-by-Dumping-of-Wastes-and-Other-Matter.aspx>

Known as the London Convention, the 1996 protocol to the convention on the prevention of marine pollution by dumping of waste and other materials was a revision to the original 1972 convention.

As an internationally binding contract, with currently signed parties, it aims to prevent marine pollution globally. Sources of marine pollution covered by the Convention are the deliberate disposals to the sea from vessels, air-crafts, platforms and other man-made structures.

After adoption of the 1996 protocol, a precautionary approach and a polluter pays –principles were adopted to the convention. The precautionary principle allows preventative measures to be carried out even with a lack of clear evidence causality between negative effects and disposed substances. The 1996 protocol provides a list of which substances may be dumped at sea and prohibits the rest in Article 4. After the amendment to the protocol in 2006, CO₂ streams from CO₂ capture processes was added to the list. Moreover, the disposal of CO₂ can only be into the sub-seabed geological formation, and the material must consist overwhelmingly of CO₂, such as in the CCS Directive.

In Article 6, the Convention prohibits all export of waste by contracting parties for the purposes of disposal at sea. This article was amended in 2009 in order to not to concern CO₂ for the purposes of CCS, but the changes have not yet entered into force. According to the Convention, amendments to the articles will enter into force on the 60th day after two thirds of the contracting parties have deposited an instrument of acceptance to the IMO. This is yet to occur.

IEA has published a working paper on the options for enabling transboundary CO₂ transfer⁹. In two years since the 2009 amendment, only Norway had ratified it. As there were 40 contracting parties to the London Protocol in 2011, 26 more ratifications are needed before the transboundary transport of CO₂ for offshore geological sequestration will be allowed.

⁹ http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=2446

10 Background for the current enacted legislation

10.1 CCS Directive (2009/31/EC)

Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0031:en:NOT>

Further info:

http://ec.europa.eu/clima/policies/lowcarbon/ccs_directive_en.htm

On EU level, the CCS directive brings a completely new legislation on permanent geological storage of CO₂. The regulation concerning the capture and transportation of CO₂ are within the scope of existing legislation, although some amendments to these were needed and are now introduced.

The CCS directive aims to ensure safe and reliable storage of CO₂, by setting requirements for site selection and risk management. The sequestration activities are needed to have a storage permit in order to start the operations. The directive sets post-closure obligations of monitoring to the site operators, backed up by requirements for sufficient financial reserves for carrying out the work. The timeframes are given within which the post-closure liabilities can be transferred to the state. The liabilities in the event of possible leakages are covered in the existing regulation, namely on the EU level the Directive on Environmental Liability. The liabilities in case of damages to public health or property are decided in the national legislations of the member states.

The risks to the environment and human health induced by the transported and stored CO₂ are addressed by setting requirements to the assessment, monitoring and risk management of the component substances in the CO₂ stream. Furthermore, the transported and stored flow must consist of almost solely CO₂.

The CCS directive amends the ETS directive so as to repeal the need for the producers to return emission allowances for the captured and stored

amounts of CO₂. Another amendment concerns the Waste Directive, in order to remove the CO₂ to be geologically stored from its scope. A third important amendment introduced by the CCS directive concerns the Large Combustion Plants Directive. The directive in its new form requires capture-readiness for new plants of over 300 MW.

To support the implementation of the CCS Directive, the Commission has published four guidance documents on CO₂ storage life cycle risk management, on characterisation of the storage complex, CO₂ stream composition, monitoring and corrective measures, on criteria for transfer of responsibility to the competent authority and on financial security and financial mechanism.

Important facts about the CCS directive:

- The directive is applied to CCS demonstrations, where at least 100 000 t of CO₂ is planned to be stored. The sequestration of CO₂ is allowed only within the territories, economic zones and continental shelves (as stated in the United Nations Convention on the Law of the Sea UNCLOS) of EU member states and in the European Economic Community (EEC). Storage of CO₂ in the water column is prohibited. The member states have the right to prohibit the geological storage of CO₂ within their territories. If a member state chooses to allow a domestic geological storage of CO₂, an obligation of capacity estimation and administering of storage permits are imposed on the state. The EU Commission inspect the state granted storage permits, which is the most important mechanism of supervision of the Commission.
- A part of the Barents Sea does not belong to the EEC, which rules out some of the potential sequestration sites in the light of current knowledge. This has relevance at least in the Nordic area.
- Ship transport of CO₂ is currently not covered by the CCS directive.
- The liability of post-closure monitoring and operations at the storage site remains on the operator of the site at least for 20 years after the closure. The responsibilities can then be transferred to the state officials nominated for the task in national legislation. The operator of the storage site has to, however, set aside sufficient funds for all possibly required post-closure activities for at least 50 years.

10.2 Directive 2009/29/EC improving and extending the greenhouse gas emission allowance trading scheme of the Community

Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0029:EN:NOT>

Further info: n/a

Directive 2009/29/EC was adopted to amend the ETS Directive. It introduces substantial changes to the original ETS Directive, in order to provide a system for the EU-ETS phase III (2013-2020) that is more harmonized and fair.

The amendments in Directive 2009/29/EC are published as consolidated ETS Directive 2003/87/EC.

Concerning the inclusion of CCS in the emission trading scheme, the Directive 2009/29/EC is of utmost relevance:

- CCS is included in the ETS, starting from the year 2013.
- CCS can receive funding from the state revenues of auctioned emission allowances.
- Emission allowances do not need to be returned from permanently stored CO₂.
- See Emission Trading Scheme Directive (2003/87/EC)

10.3 Convention for the protection of the marine environment of the North-East Atlantic (1992 OSPAR Convention)

http://www.ospar.org/html_documents/ospar/html/OSPAR_Convention_e_updated_text_2007.pdf

OSPAR Commission

Further info:

http://www.ospar.org/content/content.asp?menu=01481200000000_000000_000000

The OSPAR Convention, on the protection of North-East Atlantic environment, entered into force in 1998, and is basically ratified by European countries. Aside from the general obligations concerning the prevention of pollution and the application of the precautionary and polluter pays principles, the Convention gives provisions on the prevention of pollutions from land based sources, by dumping or incineration, from offshore sources and from certain other sources. Additionally, the Convention obliges the contracting parties to undertake regular assessments of the quality of the marine environment, and to form programmes of scientific or technical research, reporting to the OSPAR Commission.

The Annex II on the prevention and elimination of pollution by dumping or incineration has been amended In order to enable off-shore sequestration of CO₂ for the purposes of CCS. Carbon dioxide streams from capture processes have been added to the list of waster or other matter allowed for dumping, provided it is disposed of into sub-seabed geological formations. As in the CCS Directive, the sequestered material must consist overwhelmingly of CO₂, with no added substances for disposal. Moreover, the CO₂ must be intended to be retained permanently in the formation, without any negative effect on the marine environment, human health or any legitimate use of the maritime area.

Similarly, the Annex III on the prevention and elimination of pollution from offshore sources has been amended, so as not to prohibit the geological sequestration of CO₂ from offshore installations. The provisions concerning the sequestered CO₂ are the same as in Annex II.

The OSPAR Convention is enacted into Finnish legislation. The amendments to Annexes II and III were implemented in 2012.

10.4 EU Water Framework Directive (2000/60/EC)

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT>

Further info: http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm

Water protection is one of the priorities of the EU Commission. The water framework directive was published in 2000 in order to unify the fragmented Community water policy. The directive was drafted so as to expand the scope of water protection to both surface waters and ground water, and to involve the public more. The directive gave emission limit values and quality standards, combined with targets for the state of all waters by a set deadline. Furthermore, the directive promoted water managements by river basins instead of administrative boundaries.

Concerning the ground waters, the directive aims for a complete lack of contamination, unlike the targets of good ecological and chemical states for surface waters. The direct discharges to ground water were prohibited completely in the directive.

The CCS directive amends the water framework directive, to enable the injection of CO₂ to saline aquifers:

- Permanently deteriorated (unsuitable for other purposes for natural reasons) saline groundwater reservoirs can be used for CO₂ sequestration after an amendment, introduced by the CCS directive, to the water framework directive.

10.5 The Large Combustion Plant (LCP) Directive (2001/80/EC)

Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32001L0080:EN:NOT>

Further info: http://www.airclim.org/policy/sub6_8b.php

The LCP directive concerns heat and power plants of over 50 MW of thermal input, where energy is generated by combustion. The directive sets limit values for certain harmful components in the flue gas stream.

Current aspirations in policies concerning the sectoral pollution control directives such as the LCP Directive are concentrating on merging the LCP Directive, along with the IPPC Directive and four other directives, in to one streamlined piece of legislation.

The CCS Directive introduced amendment to the LCP Directive concerning requirements for capture-readiness:

- Member states must ensure, that concerning new (licenced after the CCS-Directive) 300+ MW_{el} installations, the technical and economic feasibility of retrofitted CO₂ capture is assessed. The assessment must include the transport facilities and the availability of suitable storage sites.
- A competent authority will then, based on the provided assessment, decide whether suitable space must be reserved at the site of installation to ensure capture-readiness.

10.6 Environmental Liability Directive (2004/35/EC)

Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0035:EN:NOT>

Further info:

http://europa.eu/legislation_summaries/enterprise/interaction_with_other_policies/l28120_en.htm

The directive 2004/35/EC was introduced to unify the “polluter pays” principle across the Union, in the occurrences of environmental damage. The directive defines two levels of liability, of which the first one concerns dangerous or potentially dangerous occupational activities. These are industrial and agricultural activities under the IPPC Directive, waste management activities or activities involving genetically modified organisms, heavy metal discharging in to the environment, and production of dangerous chemicals, for example. The dangerous occupational activities are fully listed in the Annex III of the directive. Operators in this liability level may be held liable even if they are not at fault, in the case of damage to animals, environment or human health.

Operators of other activities as those classified as dangerous under the Annex II of the directive may only be held responsible in the case of damage only if they are at fault or negligent.

The Environmental Liability Directive also requires each member state to designate a responsible authority, which ensures the operator take the necessary measures to prevent any damage. Otherwise the responsible authority must take the measures itself, and incur the cost later on the operator. In case of damage, the authority will ensure the operator take the required measures of remediation and restoration. Again, the responsible authority may take action on its own, and recover the costs later from the operator. The directive does not force the operators to take out a financial security, but encourages it.

The CCS Directive introduced the following amendment to the Environmental Liability Directive:

- The directive 2004/35/EC is amended in order to count the geological storage of CO₂ among the operations (listed in Annex III) which impose a heavy responsibility on the operator in the event of environmental damage.

10.7 Old EU waste directive (2006/12/EC)

Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006L0012:EN:NOT>

Further info: http://europa.eu/legislation_summaries/other/l21197_en.htm

The EU framework for coordinating the waste management was governed by the Waste Directive until the end of 2010. Currently, the EU waste policy is governed in the directive 2008/98/EC.

The old waste directive imposed strict abandonment and dumping restrictions on waste, which were completely incompatible with the notion of CO₂ capture and sequestration. Upon the introduction of the CCS Directive, the handling of captured CO₂ was necessarily removed from the scope of EU waste legislation.

The waste directive has been amended according to the CCS Directive:

- Gaseous effluents emitted into the atmosphere and CO₂ captured for the purposes of geological storage are excluded from the waste substances covered by the waste directive.

10.8 Directive on waste (2008/98/EC)

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0098:EN:NOT>

Further info:

http://europa.eu/legislation_summaries/environment/waste_management/ev0010_en.htm

The new EU legal framework on waste management aims to decouple economic growth and waste generation and protect the environment and human health through promotion of waste hierarchy, waste management and permitting procedures. According to the directive, the EU must be able to independently treat its own waste.

According to waste hierarchy, the primary option for waste management is prevention, then reuse, recycling, energy recovery. Disposal of waste is seen as the last solution. The member states can, however, choose whether or not to follow this kind of waste hierarchy.

The Directive on waste is CCS-compatible in the sense that gaseous effluents emitted to the atmosphere are excluded from its scope.

- The new waste directive does not require any new legal obligations concerning CCS.

10.9 EU IPPC directive (2008/1/EC)

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0001:EN:NOT>

Further info:

<http://ec.europa.eu/environment/air/pollutants/stationary/ippc/summary.htm>

The Integrated Pollution Prevention and Control (IPPC) Directive was published in order to minimise pollution from industrial sources. The

directive was fully implemented to all new and existing installations 30th October 2007.

The IPPC Directive controls a wide array of environmental harms caused by industry, including emission to air, water, land, noise and waste generation. The Directive also set requirements for energy efficiency, raw material use, prevention of accidents and site restoration after closure. The directive also defines the concept of Best Available Techniques (BAT), used in the permit conditions with emission limit values (ELVs). The permit conditions are determined by local authorities, which can take into account the technical characteristics of the installation, location and local environmental conditions.

Another important effect of the IPPC Directive is the securement of the rights of the public to participate in the permit process, and to receive information on its consequences. The public must have the access the permit applications, permits and results of monitoring reports. The European Pollutant Release and Transfer Register must also be available to the public.

The CCS directive imposed a need for an amendment to the EU IPPC directive:

- The amended directive 2008/98/EC covers the CO₂ capture facilities, which are required then to have environmental permits.

10.10 Environmental Impact Assessment Directive (85/337/EEC)

Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31985L0337:en:NOT>

Further info:

http://europa.eu/legislation_summaries/environment/general_provisions/28163_en.htm

The Environmental Impact Assessment (EIA) Directive harmonizes the requirements for assessing what effects a certain project may have on man, the fauna, the flora, the soil, air, water, the landscape, cultural heritage, the material assets and the climate. The EIA Directive indicates

for which types of projects the assessments are obligatory, and for which types of projects the decision is left for the member states.

The developer of the project must provide the responsible authority with the project description, the data required to assess the foreseeable effects on the environment, possible measures to reduce the adverse effects, the reasoning why the project has been chosen among its alternatives and finally a non-technical summary of the information provided. The information must be made available also to other relevant (and possibly consulted) authority and the public, along with information on the procedure of project approval, details on the approving authority and possibility of public participation in the decision making. Other member states will also need to be informed at this state, if the project is likely to have transboundary effects.

The results on the approval or rejection of the project are published to all the above stakeholders. The results include the reasoning behind the decision, the results of the public consultations and any measures to reduce the adverse effects of the project.

Capturing, transporting and storing of CO₂ are now included in the EIA Directive, as a result of an amendment introduced by the CCS Directive:

- Facilities, where at least 1,5 Mt of CO₂ is captured annually, pipelines of a length of more than 40 km and a diameter of more than 800 mm, including associated booster stations, and storage sites, all for the purposes of geological storage of CO₂ require an environmental impact assessment.
- CCS operations, which do not fulfil the above definitions, require EIA if seen necessary by the member state.
- In the Finnish legislation, the EIA Directive is implemented in the decree on environmental impact assessment (713/2006).

10.11 Emission Trading Scheme Directive (2003/87/EC)

Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0087:en:NOT>

Further info:

http://europa.eu/legislation_summaries/energy/european_energy_policy/l28012_en.htm

The energy sector, iron and steel production and processing, mineral industry and pulp, paper and boards industry have been obligated since the beginning of the year 2005 to have a CO₂ emission permit under the Emission Trading Scheme (ETS) Directive for each installation. These permits are reviewed by the state authorities in at least every five years. The installations given each year an amount of CO₂ emission allowances, based on their emission permit. The overall amount of emission allowances have been released according to the yearly emission reduction targets in the cap-and-trade principle. The industrial facilities must be in possession of emission allowances in the amount representing their realized emissions; otherwise they need to buy the missing allowances from operators of other facilities. The ETS Directive therefore has been one of the main instruments to reduce greenhouse gas emissions in pursuit of climate change mitigation.

The ETS Directive sets out rules for the distribution and trading of allowances, including the allocation of revenues from state auctioning of the allowances.

By the end of year 2011, a regulation for the monitoring and reporting of emissions will be adopted by the Commission. Concerning the verification and accreditation of the emission reports, the Commission will propose a regulation on the accreditation and supervision of the verifiers.

The ETS Directive was amended by the Directive 2009/29/EC in order to include CCS as a legitimate means of emission reduction:

- An obligation to surrender allowances shall not arise in respect of emissions verified as captured and transported for permanent storage.
- Environmentally safe capture and geological storage was added in the list of activities fit for receiving public funding from the revenues from emission allowance auctioning (a minimum of 50% of revenues from the auctions must be used in emission reducing projects).
- Up to 300 million emission allowances in the new entrants' reserve shall be available until the end of the year 2015 to stimulate the construction and operation of up to 12 commercial CCS demonstration projects.

10.12 The Energy Efficiency Directive (2012/27/EU)

<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1399375464230&uri=CELEX:32012L0027>

European Commission

Further info: http://ec.europa.eu/energy/efficiency/eed/eed_en.htm

A 20% energy efficiency target (primary energy saving) is included in the Europe 2020 Strategy for smart, sustainable and inclusive growth. The Energy Efficiency Directive 2012/27/EU repeal both the Cogeneration (CHP) Directive 2004/8/EC and the Energy Services Directive (ESD) 2006/32/EC as they have failed to adequately promote energy saving in the EU. Article 4(1)-(4) and Annex I, III and IV of the ESD remains in force, however.

Each Member State has set a national energy efficiency target expressed as an absolute level of primary or final energy consumption, savings or as energy intensity in 2020. The states must also establish an energy efficiency obligation scheme where the obligated parties, all energy distributors or all retail energy sales companies, shall reach an energy savings of 1.5% per year among the end users, excluding the transport sector. The energy saving targets can be expressed either in primary or final energy consumption. Concerning the efficiency in energy use, the Energy Efficiency Directive (EED) has a direct effect on the energy renovation and acquisition of the public sector's property, and to

the availability of energy auditing services, certification schemes and real-time consumption information of heat and electricity for the private sector. On the energy supply side, the EED requires cost-benefit analysis on new installations of over 20 MW thermal input to have an ability of cogeneration with high efficiency. Examining the waste heat demand at location is also a prerequisite for a permit. Old heat or power plants that are being significantly refurbished or are seeking to renew their permits have the same requirements. Retrofit carbon dioxide capture plants for the purposes of CCS would not, however, be burdened with these requirements.

Moreover, the EED sets further requirements on reporting, establishing inventories of combustion installations and further elaborates on the energy efficiency targets, efficiency in energy use and supply and promotion of certification schemes and market access for small and medium energy services. The EED defines the conditions, where member states can make concessions to parties concerned with for instance the above mentioned cogeneration requirements.

CCS applications would be contrasting the primary energy saving efforts, but the EED itself is fully CCS compatible. The Member States have to take the losses of primary energy efficiency into account in the obligatory plans to achieve the energy savings targets.

10.13 Directive 2013/30/EU of the European Parliament and of the Council on Safety of Offshore Oil and Gas Operations

<http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32013L0030>

European Commission

Further info: n/a.

After several severe accidents on offshore oil and gas production facilities, especially the catastrophe on the Bay of Mexico in 2010, the Commission ordered a gap analysis on offshore practices and the legislative framework in the Union. Disparities between the Member States' legislations, absence of international law instruments and gaps in Union law called for action on safety regulation on Community level. Therefore, the proposal for a regulation, later adopted as a directive, on safety of offshore oil and gas prospection, exploration and production action was published in 2011.

The general objectives of the directive is to ensure use of best practices in hazard control and best regulatory practices in European jurisdictions with offshore oil and gas activities, strengthen Union's preparedness of emergencies and finally to improve existing Union liability provisions. However, offshore CO₂ transportation and sequestration for the purposes of CCS is not mentioned in the scope of the proposal.