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 Text with EEA relevance

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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

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 175(1) thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Economic and Social Committee [1],

After consulting the Committee of the Regions,

Acting in accordance with the procedure laid down in Article 251 of the Treaty [2],

Whereas:

(1) The ultimate objective of the United Nations Framework Convention on Climate Change, which was approved by Council Decision 94/69/EC of 15 December 1993 [3], is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

(2) The Sixth Community Environment Action Programme established by Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 [4] identifies climate change as a priority for action. That programme recognises that the Community is committed to achieving an 8 % reduction in emissions of greenhouse gases by 2008 to 2012 compared to 1990 levels, and that, in the longer term, global emissions of greenhouse gases will need to be reduced by approximately 70 % compared to 1990 levels.

(3) The Commission Communication of 10 January 2007 entitled "Limiting global climate change to two degrees Celsius – The way ahead for 2020 and beyond" clarifies that in the context of the envisaged global reduction of greenhouse gas emissions of 50 % by 2050, a reduction in greenhouse gas emissions of 30 % in the developed world by 2020 is required, rising to 60 %-80 % by 2050, that this reduction is technically feasible and the benefits far outweigh the costs, but that, to achieve it, all mitigation options must be harnessed.

(4) Carbon dioxide capture and geological storage (CCS) is a bridging technology that will contribute to mitigating climate change. It consists of the capture of carbon dioxide (CO_2) from industrial installations, its transport to a storage site and its injection into a suitable underground geological formation for the purposes of permanent storage. This technology should not serve as an incentive to increase the share of fossil fuel power plants. Its development should not lead to a reduction of efforts to support energy saving policies, renewable energies and other safe and sustainable low carbon technologies, both in research and financial terms.

(5) Preliminary estimates, carried out with a view to assessing the impact of the Directive and referred to in the impact assessment of the Commission, indicate that seven million tonnes of CO_2 could be stored by 2020, and up to 160 million tonnes by 2030, assuming a 20 % reduction in greenhouse gas emissions by 2020 and provided that CCS obtains private, national and Community support and proves to be an environmentally safe technology. The CO_2 emissions avoided in 2030 could account for some 15 % of the reductions required in the Union.

(6) The Second European Climate Change Programme, which was established by the Commission Communication of 9 February 2005 entitled "Winning the Battle Against Global Climate Change" to prepare and examine future climate policy in the Community, set up a Working Group on Carbon Capture and Geological Storage. The Working Group's mandate was to explore CCS as a means of reducing climate change. The Working Group published a detailed report on the topic of regulation, which was adopted in June 2006. It stressed the need for the development of both policy and regulatory frameworks for CCS and urged the Commission to undertake further research into the subject.

(7) The Commission Communication of 10 January 2007 entitled "Sustainable power generation from fossil fuels: aiming for near-zero emissions from coal after 2020" reiterated the need for a regulatory framework based on an integrated risk assessment for CO2 leakage, including site selection requirements designed to minimise the risk of leakage, monitoring and reporting regimes to verify storage and adequate remediation of any damage that may occur. The Communication set out an action plan for the Commission in this area during 2007, which required the development of a sound management framework for CCS, including the work on the regulatory framework, incentive framework, and support programmes, as well as external elements, for example technology cooperation with key countries on CCS.

(8) The European Council of March 2007 also urged the Member States and the Commission to work towards strengthening research and development and developing the necessary technical, economic and regulatory framework in order to remove existing legal barriers and to bring environmentally safe CCS to deployment with new fossil power plants, if possible by 2020.

(9) The European Council of March 2008 recalled that the objective of proposing a regulatory framework on CCS was to ensure that this novel technology would be deployed in an environmentally safe way.

(10) The European Council of June 2008 called on the Commission to bring forward as soon as possible a mechanism to incentivise Member State and private sector investments to ensure the construction and operation by 2015 of up to 12 CCS demonstration plants.

(11) Each of the different components of CCS, namely capture, transport and storage of CO2, has been the object of pilot projects on a smaller scale than that required for their industrial application. These components still need to be integrated into a complete CCS process, technological costs need to be reduced and more and better scientific knowledge has to be gathered. It is therefore important that Community efforts on CCS demonstration within an integrated policy framework start as soon as possible, including, in particular, a legal framework for the environmentally safe application of CO2 storage, incentives, notably for further research and development, efforts by means of demonstration projects, and public awareness measures.

(12) At the international level, legal barriers to the geological storage of CO2 in geological formations under the seabed have been removed through the adoption of related risk management frameworks under the 1996 London Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1996 London Protocol) and under the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention).

(13) In 2006, the Contracting Parties to the 1996 London Protocol adopted amendments to the Protocol. These amendments allow and regulate the storage of CO2 streams from CO2 capture processes in geological formations under the seabed.

(14) The Contracting Parties to the OSPAR Convention in 2007 adopted amendments to the Annexes to the Convention to allow the storage of CO2 in geological formations under the seabed, a Decision to ensure environmentally safe storage of CO2 streams in geological formations, and OSPAR Guidelines for Risk Assessment and Management of that activity. They also adopted a Decision to prohibit placement of CO2 into the water-column of the sea and on the seabed, because of the potential negative effects.

(15) At Community level, a number of legislative instruments are already in place to manage some of the environmental risks of CCS, in particular regarding capture and transport of CO2, and they should be used where possible.

(16) Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control [5] is suitable for regulating, in respect of certain industrial activities, the risks of CO2 capture to the environment and human health and, as a result, should be applied to the capture of CO2 streams for the purposes of geological storage from installations covered by that Directive.

(17) Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment [6] should be applied to the capture and transport of CO2 streams for the purposes of geological storage. It should also apply to storage sites pursuant to this Directive.

(18) This Directive should apply to the geological storage of CO2 within the territory of the Member States, in their exclusive economic zones and on their continental shelves. The Directive should not apply to projects with a total intended storage below 100 kilotonnes, undertaken for research, development or testing of new products and processes. This threshold would also seem appropriate for the purposes of other relevant Community legislation. The storage of CO2 in storage complexes extending beyond the territorial scope of this Directive and the storage of CO2 in the water column should not be permitted.

(19) Member States should retain the right to determine the areas within their territory from which storage sites may be selected. This includes the right of Member States not to allow any storage in parts or on the whole of their territory, or to give priority to any other use of the underground, such as exploration, production and storage of hydrocarbons or geothermal use of aquifers. In this context, Member States should in particular give due consideration to other energy-related options for the use of a potential storage site, including options which are strategic for the security of the Member State's energy supply or for the development of renewable sources of energy. The selection of the appropriate storage site is crucial to ensure that the stored CO2 will be completely and permanently contained. Member States should, in selecting storage sites, take account of their geological characteristics, for example seismicity, in the most objective and effective way possible. A site should therefore only be selected as a storage site, if there is no significant risk of leakage, and if in any case no significant environmental or health impacts are likely to occur. This should be determined through a characterisation and assessment of a potential storage complex pursuant to specific requirements.

(20) Enhanced Hydrocarbon Recovery (EHR) refers to the recovery of hydrocarbons in addition to those extracted by water injection or other means. EHR is not in itself included in the scope of this Directive. However, where EHR is combined with geological storage of CO2, the provisions of this Directive for the environmentally safe storage of CO2 should apply. In that case, the provisions of this Directive concerning leakage are not intended to apply to quantities of CO2 released from surface installations which do not exceed what is necessary in the normal process of extraction of hydrocarbons, and which do not compromise the security of the geological storage or adversely affect the surrounding environment. Such releases are covered by the inclusion of storage sites in 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 [7], which requires surrender of emissions trading allowances for any leaked emissions.

(21) Member States should make available to the public environmental information relating to geological storage of CO2 in accordance with applicable Community legislation.

(22) Member States which intend to allow geological storage of CO2 in their territory should undertake an assessment of the storage capacity available within their territory. The Commission should organise an exchange of information and best practices between those Member States, in the context of the exchange of information provided for in this Directive.

(23) Member States should determine in which cases exploration is required to generate the information necessary for the site selection. Exploration, that is activities intruding into the subsurface, should be made subject to a permit requirement. Member States do not need to set admission criteria for procedures for granting exploration permits, but where they do, they should at least ensure that the procedures for the granting of exploration permits are open to all entities possessing the necessary capacities. Member States should also ensure that the permits are granted on the basis of objective, published and non-discriminatory criteria. In order to protect and encourage exploration investments, exploration permits should be granted

for a limited volume area and for a limited time during which the holder of the permit should have the sole right to explore the potential CO2 storage complex. Member States should ensure that no conflicting uses of the complex are permitted during this time. If no activities are carried out within a reasonable time, Member States should ensure that the exploration permit is withdrawn and can be granted to other entities.

(24) Storage sites should not be operated without a storage permit. The storage permit should be the core instrument to ensure that the substantial requirements of this Directive are met and that geological storage therefore takes place in an environmentally safe way. In the granting of the storage permit, priority should be given to the holder of the exploration permit over competitors, as the former will generally have made substantial investments.

(25) In the early phase of the implementation of this Directive, to ensure consistency in implementation of the requirements of this Directive across the Community, all storage permit applications should be made available to the Commission after receipt. The draft storage permits should be transmitted to the Commission to enable it to issue an opinion on the draft permits within four months of their receipt. The national authorities should take this opinion into consideration when taking a decision on the permit and should justify any departure from the Commission's opinion. The review at Community level should also help to enhance public confidence in CCS.

(26) The competent authority should review and where necessary update or withdraw the storage permit if, inter alia, it has been notified of leakages or significant irregularities, if the reports submitted by the operators or the inspections carried out show non-compliance with permit conditions or if it is made aware of any other failure by the operator to comply with the permit conditions. After the withdrawal of a permit, the competent authority should either issue a new permit or close the storage site. In the meantime, the competent authority should take over the responsibility for the storage site, including specific legal obligations. Costs incurred should be recovered from the former operator.

(27) It is necessary to impose on the composition of the CO2 stream constraints that are consistent with the primary purpose of geological storage, which is to isolate CO2 emissions from the atmosphere, and that are based on the risks that contamination may pose to the safety and security of the transport and storage network and to the environment and human health. To this end, the composition of the CO2 stream should be verified prior to injection and storage. The composition of the CO2 stream is the result of the processes at the capture installations. Following inclusion of capture installations in Directive 85/337/EEC, an environmental impact assessment has to be carried out in the capture permit process. Inclusion of capture installations in Directive 2008/1/EC further ensures that best available techniques to improve the composition of the CO2 stream have to be established and applied. In addition, in accordance with this Directive, the operator of the storage site should only accept and inject CO2 streams if an analysis of the composition, including corrosive substances, of the streams, and a risk assessment have been carried out, and if the risk assessment has shown that the contamination levels of the CO2 stream are in line with the composition criteria referred to in this Directive.

(28) Monitoring is essential to assess whether injected CO2 is behaving as expected, whether any migration or leakage occurs, and whether any identified leakage is damaging the environment or human health. To that end, Member States should ensure that during the operational phase, the operator monitors the storage complex and the injection facilities on the basis of a monitoring plan designed pursuant to specific monitoring requirements. The plan should be submitted to and approved by the competent authority. In the case of geological storage under the seabed, monitoring should further be adapted to the specific conditions for the management of CCS in the marine environment.

(29) The operator should report, inter alia, the results of the monitoring to the competent authority at least once a year. In addition, Member States should establish a system of inspections to ensure that the storage site is operated in compliance with the requirements of this Directive.

(30) Provisions are required concerning liability for damage to the local environment and the climate, resulting from any failure of permanent containment of CO2. Liability for environmental damage (damage to protected species and natural habitats, water and land) is regulated by Directive 2004/35/EC 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 [8], which should be applied to the operation of storage sites pursuant to this Directive. Liability for climate damage as a result of leakages is covered by the inclusion of storage sites in Directive 2003/87/EC, which requires surrender of emissions trading allowances for any leaked emissions. In addition, this Directive should establish the obligation on the operator of the storage site to take corrective measures in case of leakages or significant irregularities on the basis of a corrective measures plan submitted to and approved by the competent national authority. Where the operator fails to take the necessary corrective measures, these measures should be taken by the competent authority, which should recover the costs from the operator.

(31) A storage site should be closed if the relevant conditions stated in the permit have been complied with, upon request from the operator after authorisation of the competent authority, or if the competent authority so decides after the withdrawal of a storage permit.

(32) After a storage site has been closed, the operator should remain responsible for maintenance, monitoring and control, reporting, and corrective measures pursuant to the requirements of this Directive on the basis of a post-closure plan submitted to and approved by the competent authority as well as for all ensuing obligations under other relevant Community legislation until the responsibility for the storage site is transferred to the competent authority.

(33) The responsibility for the storage site, including specific legal obligations, should be transferred to the competent authority, if and when all available evidence indicates that the stored CO2 will be completely and permanently contained. To this end, the operator should submit a report to the competent authority for approval of the transfer. In the early phase of the implementation of this Directive, to ensure consistency in implementation of the requirements of this Directive across the Community, all reports should be made available to the Commission after receipt. The draft approval decisions should be transmitted to the Commission to enable it to issue an opinion on the draft approval decisions within four months of their receipt. The national authorities should take this opinion into consideration when taking a decision on the approval and should justify any departure from the Commission's opinion. The review of draft approval decisions should, in the same way as the review of draft storage permits at Community level, also help to enhance public confidence in CCS.

(34) Liabilities other than those covered by this Directive, Directive 2003/87/EC and Directive 2004/35/EC, in particular concerning the injection phase, the closure of the storage site and the period after transfer of legal obligations to the competent authority, should be dealt with at national level.

(35) After the transfer of responsibility, monitoring should be reduced to a level which still allows for identification of leakages or significant irregularities, but should again be intensified if leakages or significant irregularities are identified. There should be no recovery of costs incurred by the competent authority from the former operator after the transfer of responsibility except in the case of fault on the part of the operator prior to the transfer of responsibility for the storage site.

(36) Financial provision should be made in order to ensure that closure and post-closure obligations, obligations arising from inclusion under Directive 2003/87/EC, and obligations under this Directive to take corrective measures in case of leakages or significant irregularities, can be met. Member States should ensure that financial provision, by way of financial security or any other equivalent, is made by the potential operator so that it is valid and effective before commencement of injection.

(37) National authorities may, after transfer of responsibility, have to bear costs, such as monitoring costs, associated with CO2 storage. A financial contribution should therefore be made available by the operator to the competent authority, before the transfer of responsibility takes place and on the basis of arrangements to be decided by Member States. This financial contribution should at least cover the anticipated cost of monitoring for a period of 30 years. The level of the financial contribution should be determined on the basis of guidelines to be adopted by the Commission to help ensure consistency in implementation of the requirements of this Directive across the Community.

(38) Access to CO2 transport networks and storage sites, irrespective of the geographical location of potential users within the Union, could become a condition for entry into or

competitive operation within the internal electricity and heat market, depending on the relative prices of carbon and CCS. It is therefore appropriate to make arrangements for potential users to obtain such access. This should be done in a manner to be determined by each Member State, applying the objectives of fair, open and non-discriminatory access and taking into account, inter alia, the transport and storage capacity which is available or can reasonably be made available as well as the proportion of its CO2 reduction obligations pursuant to international legal instruments and to Community legislation intended to be met through CCS. Pipelines for CO2 transport should, where possible, be designed so as to facilitate access of CO2 streams meeting reasonable minimum composition thresholds. Member States should also establish dispute settlement mechanisms to enable expeditious settlement of disputes regarding access to transport networks and storage sites.

(39) Provisions are required to ensure that, in cases of transboundary CO2 transport, transboundary storage sites or transboundary storage complexes, the competent authorities of the Member States concerned meet jointly the requirements of this Directive and of all other Community legislation.

(40) The competent authority should establish and maintain a register of the storage permits granted and of all closed storage sites and surrounding storage complexes, including maps of their spatial extent to be taken into consideration by the competent national authorities in relevant planning and permitting procedures. The register should also be reported to the Commission.

(41) Member States should submit reports on the implementation of this Directive on the basis of questionnaires drawn up by the Commission pursuant to Council Directive 91/692/EEC of 23 December 1991 standardising and rationalising reports on the implementation of certain Directives relating to the environment [9].

(42) Member States should lay down rules on penalties applicable to infringements of the national provisions adopted pursuant to this Directive. Those penalties should be effective, proportionate and dissuasive.

(43) The measures necessary for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission [10].

(44) In particular the Commission should be empowered to amend the Annexes. Since those measures are of general scope and are designed to amend non-essential elements of this Directive, they must be adopted in accordance with the regulatory procedure with scrutiny provided for in Article 5a of Decision 1999/468/EC.

(45) Directive 85/337/EEC should be amended to cover capture and transport of CO2 streams for the purposes of geological storage as well as storage sites pursuant to this Directive. Directive 2004/35/EC should be amended to cover the operation of storage sites pursuant to this Directive. Directive 2008/1/EC should be amended to cover capture of CO2 streams for the purposes of geological storage from installations covered by that Directive.

(46) The adoption of this Directive should ensure a high level of protection of the environment and human health from the risks posed by the geological storage of CO2. For this reason, Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste [11] and Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste [12] should be amended so as to exclude CO2 captured and transported for the purposes of geological storage from the scope of application of those instruments. 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 [13] should also be amended to allow for injection of CO2 into saline aquifers for the purposes of geological storage. Any such injection is subject to the provisions of Community legislation on the protection of groundwater, and must be in accordance with Article 4(1)(b) of Directive 2000/60/EC and with Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration [14].

(47) The transition to low-carbon power generation requires that, in the case of fossil fuel power generation, new investments be made in such a way as to facilitate substantial reductions in emissions. To this end, 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 [15] should be amended to require that all combustion plants of a specified capacity, for which the original construction licence or the original operating licence is granted after the entry into force of this Directive, have suitable space on the installation site for the equipment necessary to capture and compress CO2 if suitable storage sites are available, and if CO2 transport and retrofitting for CO2 capture are technically and economically feasible. The economic feasibility of the transport and retrofitting should be assessed taking into account the anticipated costs of avoided CO2 for the particular local conditions in the case of retrofitting and the anticipated costs of CO2 allowances in the Community. The projections should be based on the latest evidence; a review of technical options and an analysis of uncertainties in the assessment processes should also be undertaken. The competent authority should determine whether these conditions are met on the basis of an assessment made by the operator and other available information, particularly concerning the protection of the environment and human health.

(48) The Commission should, by 30 June 2015, conduct a review of this Directive in the light of the experience gained in the early phase of its implementation and make proposals for its revision as appropriate.

(49) Since the objective of this Directive, namely the establishment of a legal framework for the environmentally safe storage of CO2, cannot be sufficiently achieved by the Member States acting individually, and can therefore, by reason of its scale and effects, be better achieved at Community level, the Community may adopt measures in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty. In accordance with the principle of proportionality, as set out in that Article, this Directive does not go beyond what is necessary in order to achieve that objective.

(50) In accordance with point 34 of the Interinstitutional agreement on better law-making [16], Member States are encouraged to draw up, for themselves and in the interest of the Community, their own tables, which will, as far as possible, illustrate the correlation between this Directive and the transposition measures and to make them public.

(51) The application of this Directive is without prejudice to Articles 87 and 88 of the Treaty,

HAVE ADOPTED THIS DIRECTIVE:

CHAPTER 1

SUBJECT MATTER, SCOPE AND DEFINITIONS

Article 1

Subject matter and purpose

1. This Directive establishes a legal framework for the environmentally safe geological storage of carbon dioxide (CO2) to contribute to the fight against climate change.

2. The purpose of environmentally safe geological storage of CO2 is permanent containment of CO2 in such a way as to prevent and, where this is not possible, eliminate as far as possible negative effects and any risk to the environment and human health.

Article 2

Scope and prohibition

1. This Directive shall apply to the geological storage of CO2 in the territory of the Member States, their exclusive economic zones and on their continental shelves within the meaning of the United Nations Convention on the Law of the Sea (Unclos).

2. This Directive shall not apply to geological storage of CO2, with a total intended storage below 100 kilotonnes, undertaken for research, development or testing of new products and processes.

3. The storage of CO2 in a storage site with a storage complex extending beyond the area referred to in paragraph 1 shall not be permitted.

4. The storage of CO2 in the water column shall not be permitted.

Article 3

Definitions

For the purposes of this Directive the following definitions shall apply:

1. "geological storage of CO2" means injection accompanied by storage of CO2 streams in underground geological formations;

2. "water column" means the vertically continuous mass of water from the surface to the bottom sediments of a water body;

3. "storage site" means a defined volume area within a geological formation used for the geological storage of CO2 and associated surface and injection facilities;

4. "geological formation" means a lithostratigraphical subdivision within which distinct rock layers can be found and mapped;

5. "leakage" means any release of CO2 from the storage complex;

6. "storage complex" means the storage site and surrounding geological domain which can have an effect on overall storage integrity and security; that is, secondary containment formations;

7. "hydraulic unit" means a hydraulically connected pore space where pressure communication can be measured by technical means and which is bordered by flow barriers, such as faults, salt domes, lithological boundaries, or by the wedging out or outcropping of the formation;

8. "exploration" means the assessment of potential storage complexes for the purposes of geologically storing CO2 by means of activities intruding into the subsurface such as drilling to obtain geological information about strata in the potential storage complex and, as appropriate, carrying out injection tests in order to characterise the storage site;

9. "exploration permit" means a written and reasoned decision authorising exploration, and specifying the conditions under which it may take place, issued by the competent authority pursuant to the requirements of this Directive;

10. "operator" means any natural or legal, private or public person who operates or controls the storage site or to whom decisive economic power over the technical functioning of the storage site has been delegated according to national legislation;

11. "storage permit" means a written and reasoned decision or decisions authorising the geological storage of CO2 in a storage site by the operator, and specifying the conditions under which it may take place, issued by the competent authority pursuant to the requirements of this Directive;

12. "substantial change" means any change not provided for in the storage permit, which may have significant effects on the environment or human health;

13. "CO2 stream" means a flow of substances that results from CO2 capture processes;

14. "waste" means the substances defined as waste in Article 1(1)(a) of Directive 2006/12/EC;

15. "CO2 plume" means the dispersing volume of CO2 in the geological formation;

16. "migration" means the movement of CO2 within the storage complex;

17. "significant irregularity" means any irregularity in the injection or storage operations or in the condition of the storage complex itself, which implies the risk of a leakage or risk to the environment or human health;

18. "significant risk" means a combination of a probability of occurrence of damage and a magnitude of damage that cannot be disregarded without calling into question the purpose of this Directive for the storage site concerned;

19. "corrective measures" means any measures taken to correct significant irregularities or to close leakages in order to prevent or stop the release of CO2 from the storage complex;

20. "closure" of a storage site means the definitive cessation of CO2 injection into that storage site;

21. "post-closure" means the period after the closure of a storage site, including the period after the transfer of responsibility to the competent authority;

22. "transport network" means the network of pipelines, including associated booster stations, for the transport of CO2 to the storage site.

CHAPTER 2

SELECTION OF STORAGE SITES AND EXPLORATION PERMITS

Article 4

Selection of storage sites

1. Member States shall retain the right to determine the areas from which storage sites may be selected pursuant to the requirements of this Directive. This includes the right of Member States not to allow for any storage in parts or in the whole of their territory.

2. Member States which intend to allow geological storage of CO2 in their territory shall undertake an assessment of the storage capacity available in parts or in the whole of their territory, including by allowing exploration pursuant to Article 5. The Commission may organise an exchange of information and best practices between those Member States, in the context of the exchange of information provided for in Article 27.

3. The suitability of a geological formation for use as a storage site shall be determined through a characterisation and assessment of the potential storage complex and surrounding area pursuant to the criteria specified in Annex I.

4. A geological formation shall only be selected as a storage site, if under the proposed conditions of use there is no significant risk of leakage, and if no significant environmental or health risks exist.

Article 5

Exploration permits

1. Where Member States determine that exploration is required to generate the information necessary for selection of storage sites pursuant to Article 4, they shall ensure that no such exploration takes place without an exploration permit.

Where appropriate, monitoring of injection tests may be included in the exploration permit.

2. Member States shall ensure that the procedures for the granting of exploration permits are open to all entities possessing the necessary capacities and that the permits are granted or refused on the basis of objective, published and non-discriminatory criteria.

3. The duration of a permit shall not exceed the period necessary to carry out the exploration for which it is granted. However, the Member States may extend the validity of the permit where the stipulated duration is insufficient to complete the exploration concerned and where the exploration has been performed in accordance with the permit. Exploration permits shall be granted in respect of a limited volume area.

4. The holder of an exploration permit shall have the sole right to explore the potential CO2 storage complex. Member States shall ensure that no conflicting uses of the complex are permitted during the period of validity of the permit.

CHAPTER 3

STORAGE PERMITS

Article 6

Storage permits

1. Member States shall ensure that no storage site is operated without a storage permit, that there shall be only one operator for each storage site, and that no conflicting uses are permitted on the site.

2. Member States shall ensure that the procedures for the granting of storage permits are open to all entities possessing the necessary capacities and that the permits are granted on the basis of objective, published and transparent criteria.

3. Without prejudice to the requirements of this Directive, priority for the granting of a storage permit for a particular site shall be given to the holder of the exploration permit for that site, provided that the exploration of that site is completed, that any condition set in the exploration permit has been complied with, and that the application for a storage permit is made during the period of validity of the exploration permit. Member States shall ensure that no conflicting uses of the complex are allowed during the permit procedure.

Article 7

Applications for storage permits

Applications to the competent authority for storage permits shall include at least the following information:

1. the name and address of the potential operator;

2. proof of the technical competence of the potential operator;

3. the characterisation of the storage site and storage complex and an assessment of the expected security of the storage pursuant to Article 4(3) and (4);

4. the total quantity of CO2 to be injected and stored, as well as the prospective sources and transport methods, the composition of CO2 streams, the injection rates and pressures, and the location of injection facilities;

5. a description of measures to prevent significant irregularities;

6. a proposed monitoring plan pursuant to Article 13(2);

7. a proposed corrective measures plan pursuant to Article 16(2);

8. a proposed provisional post-closure plan pursuant to Article 17(3);

9. the information provided pursuant to Article 5 of Directive 85/337/EEC;

10. proof that the financial security or other equivalent provision as required under Article 19 will be valid and effective before commencement of the injection.

Article 8

Conditions for storage permits

The competent authority shall issue a storage permit only if the following conditions are met:

1. the competent authority, on the basis of the application submitted pursuant to Article 7 and of any other relevant information, is satisfied that:

(a) all relevant requirements of this Directive and of other relevant Community legislation are met;

(b) the operator is financially sound and technically competent and reliable to operate and control the site and that professional and technical development and training of the operator and all staff are provided;

(c) in the case of more than one storage site in the same hydraulic unit, the potential pressure interactions are such that both sites can simultaneously meet the requirements of this Directive;

2. the competent authority has considered any opinion of the Commission on the draft permit issued pursuant to Article 10.

Article 9

Contents of storage permits

The permit shall contain at least the following:

1. the name and address of the operator;

2. the precise location and delimitation of the storage site and storage complex, and information concerning the hydraulic unit;

3. the requirements for storage operation, the total quantity of CO2 authorised to be geologically stored, the reservoir pressure limits, and the maximum injection rates and pressures;

4. the requirements for the composition of the CO2 stream and the CO2 stream acceptance procedure pursuant to Article 12, and, if necessary, further requirements for injection and storage in particular to prevent significant irregularities;

5. the approved monitoring plan, the obligation to implement the plan and requirements for updating it pursuant to Article 13 as well as the reporting requirements pursuant to Article 14;

6. the requirement to notify the competent authority in the event of leakages or significant irregularities, the approved corrective measures plan and the obligation to implement the corrective measures plan in the event of leakages or significant irregularities pursuant to Article 16;

7. the conditions for closure and the approved provisional post-closure plan referred to in Article 17;

8. any provisions on changes, review, updating and withdrawal of the storage permit pursuant to Article 11;

9. the requirement to establish and maintain the financial security or any other equivalent pursuant to Article 19.

Article 10

Commission review of draft storage permits

1. Member States shall make the permit applications available to the Commission within one month after receipt. They shall also make available other related material that shall be taken

into account by the competent authority when it seeks to make a decision on the award of a storage permit. They shall inform the Commission of all draft storage permits and any other material taken into consideration for the adoption of the draft decision. Within four months after receipt of the draft storage permit, the Commission may issue a non-binding opinion on it. If the Commission decides not to issue an opinion, it shall inform the Member State within one month of submission of the draft permit and state its reasons.

2. The competent authority shall notify the final decision to the Commission, and where it departs from the Commission opinion it shall state its reasons.

Article 11

Changes, review, update and withdrawal of storage permits

1. The operator shall inform the competent authority of any changes planned in the operation of the storage site, including changes concerning the operator. Where appropriate, the competent authority shall update the storage permit or the permit conditions.

2. Member States shall ensure that no substantial change is implemented without a new or updated storage permit issued in accordance with this Directive. Annex II, point 13, first indent of Directive 85/337/EEC shall apply in such cases.

3. The competent authority shall review and where necessary update or, as a last resort, withdraw the storage permit:

(a) if it has been notified or made aware of any leakages or significant irregularities pursuant to Article 16(1);

(b) if the reports submitted pursuant to Article 14 or the environmental inspections carried out pursuant to Article 15 show non-compliance with permit conditions or risks of leakages or significant irregularities;

(c) if it is aware of any other failure by the operator to meet the permit conditions;

(d) if it appears necessary on the basis of the latest scientific findings and technological progress; or

(e) without prejudice to points (a) to (d), five years after issuing the permit and every 10 years thereafter.

4. After a permit has been withdrawn pursuant to paragraph 3, the competent authority shall either issue a new storage permit or close the storage site pursuant to Article 17(1)(c). Until a new storage permit has been issued, the competent authority shall temporarily take over all legal obligations relating to acceptance criteria where the competent authority decides to continue CO2 injections, monitoring and corrective measures pursuant to the requirements laid down in this Directive, the surrender of allowances in cases of leakage pursuant to Directive 2003/87/EC and preventive and remedial action pursuant to Articles 5(1) and 6(1) of Directive 2004/35/EC. The competent authority shall recover any costs incurred from the former operator, including by drawing on the financial security referred to in Article 19. In case of closure of the storage site pursuant to Article 17(1)(c), Article 17(4) shall apply.

CHAPTER 4

OPERATION, CLOSURE AND POST-CLOSURE OBLIGATIONS

Article 12

CO2 stream acceptance criteria and procedure

1. A CO2 stream shall consist overwhelmingly of carbon dioxide. To this end, no waste or other matter may be added for the purpose of disposing of that waste or other matter. However, a CO2 stream may contain incidental associated substances from the source, capture or injection process and trace substances added to assist in monitoring and verifying CO2 migration. Concentrations of all incidental and added substances shall be below levels that would:

(a) adversely affect the integrity of the storage site or the relevant transport infrastructure;

(b) pose a significant risk to the environment or human health; or

(c) breach the requirements of applicable Community legislation.

2. The Commission shall, if appropriate, adopt guidelines to help identify the conditions applicable on a case by case basis for respecting the criteria laid down in paragraph 1.

3. Member States shall ensure that the operator:

(a) accepts and injects CO2 streams only if an analysis of the composition, including corrosive substances, of the streams and a risk assessment have been carried out, and if the risk assessment has shown that the contamination levels are in line with the conditions referred to in paragraph 1;

(b) keeps a register of the quantities and properties of the CO2 streams delivered and injected, including the composition of those streams.

Article 13

Monitoring

1. Member States shall ensure that the operator carries out monitoring of the injection facilities, the storage complex (including where possible the CO2 plume), and where appropriate the surrounding environment for the purpose of:

(a) comparison between the actual and modelled behaviour of CO2 and formation water, in the storage site;

(b) detecting significant irregularities;

(c) detecting migration of CO2;

(d) detecting leakage of CO2;

(e) detecting significant adverse effects for the surrounding environment, including in particular on drinking water, for human populations, or for users of the surrounding biosphere;

(f) assessing the effectiveness of any corrective measures taken pursuant to Article 16;

(g) updating the assessment of the safety and integrity of the storage complex in the short and long term, including the assessment of whether the stored CO2 will be completely and permanently contained.

2. The monitoring shall be based on a monitoring plan designed by the operator pursuant to the requirements laid down in Annex II, including details on the monitoring in accordance with the guidelines established pursuant to Article 14 and Article 23(2) of Directive 2003/87/EC, submitted to and approved by the competent authority pursuant to Article 7(6) and Article 9(5) of this Directive. The plan shall be updated pursuant to the requirements laid down in Annex II and in any case every five years to take account of changes to the assessed risk of leakage, changes to the assessed risks to the environment and human health, new scientific knowledge, and improvements in best available technology. Updated plans shall be re-submitted for approval to the competent authority.

Article 14

Reporting by the operator

At a frequency to be determined by the competent authority, and in any event at least once a year, the operator shall submit to the competent authority:

1. all results of the monitoring pursuant to Article 13 in the reporting period, including information on the monitoring technology employed;

2. the quantities and properties of the CO2 streams delivered and injected, including composition of those streams, in the reporting period, registered pursuant to Article 12(3)(b);

3. proof of the putting in place and maintenance of the financial security pursuant to Article 19 and Article 9(9);

4. any other information the competent authority considers relevant for the purposes of assessing compliance with storage permit conditions and increasing the knowledge of CO2 behaviour in the storage site.

Article 15

Inspections

1. Member States shall ensure that the competent authorities organise a system of routine and non-routine inspections of all storage complexes within the scope of this Directive for the purposes of checking and promoting compliance with the requirements of the Directive and of monitoring the effects on the environment and on human health.

2. Inspections should include activities such as visits of the surface installations, including the injection facilities, assessing the injection and monitoring operations carried out by the operator, and checking all relevant records kept by the operator.

3. Routine inspections shall be carried out at least once a year until three years after closure and every five years until transfer of responsibility to the competent authority has occurred. They shall examine the relevant injection and monitoring facilities as well as the full range of relevant effects from the storage complex on the environment and on human health.

4. Non-routine inspections shall be carried out:

(a) if the competent authority has been notified or made aware of leakages or significant irregularities pursuant to Article 16(1);

(b) if the reports pursuant to Article 14 have shown insufficient compliance with the permit conditions;

(c) to investigate serious complaints related to the environment or human health;

(d) in other situations where the competent authority considers this appropriate.

5. Following each inspection, the competent authority shall prepare a report on the results of the inspection. The report shall evaluate compliance with the requirements of this Directive and indicate whether or not further action is necessary. The report shall be communicated to the operator concerned and shall be publicly available in accordance with relevant Community legislation within two months of the inspection.

Article 16

Measures in case of leakages or significant irregularities

1. Member States shall ensure that in the event of leakages or significant irregularities, the operator immediately notifies the competent authority, and takes the necessary corrective measures, including measures related to the protection of human health. In cases of leakages and significant irregularities which imply the risk of leakage, the operator shall also notify the competent authority pursuant to Directive 2003/87/EC.

2. The corrective measures referred to in paragraph 1 shall be taken as a minimum on the basis of a corrective measures plan submitted to and approved by the competent authority pursuant to Article 7(7) and Article 9(6).

3. The competent authority may at any time require the operator to take the necessary corrective measures, as well as measures related to the protection of human health. These may be additional to or different from those laid out in the corrective measures plan. The competent authority may also at any time take corrective measures itself.

4. If the operator fails to take the necessary corrective measures, the competent authority shall take the necessary corrective measures itself.

5. The competent authority shall recover the costs incurred in relation to the measures referred to in paragraphs 3 and 4 from the operator, including by drawing on the financial security pursuant to Article 19.

Article 17

Closure and post-closure obligations

1. A storage site shall be closed:

(a) if the relevant conditions stated in the permit have been met;

(b) at the substantiated request of the operator, after authorisation of the competent authority; or

(c) if the competent authority so decides after the withdrawal of a storage permit pursuant to Article 11(3).

2. After a storage site has been closed pursuant to points (a) or (b) of paragraph 1, the operator remains responsible for monitoring, reporting and corrective measures, pursuant to the requirements laid down in this Directive, and for all obligations relating to the surrender of allowances in case of leakages pursuant to Directive 2003/87/EC and preventive and remedial actions pursuant to Articles 5 to 8 of Directive 2004/35/EC until the responsibility for the storage site is transferred to the competent authority pursuant to Article 18(1) to (5) of this Directive. The operator shall also be responsible for sealing the storage site and removing the injection facilities.

3. The obligations referred to in paragraph 2 shall be fulfilled on the basis of a post-closure plan designed by the operator based on best practice and in accordance with the requirements laid down in Annex II. A provisional post-closure plan shall be submitted to and approved by the competent authority pursuant to Article 7(8) and Article 9(7). Prior to the closure of a

storage site pursuant to points (a) or (b) of paragraph 1 of this Article, the provisional post-closure plan shall be:

(a) updated as necessary, taking account of risk analysis, best practice and technological improvements;

(b) submitted to the competent authority for its approval; and

(c) approved by the competent authority as the definitive post-closure plan.

4. After a storage site has been closed pursuant to paragraph 1(c), the competent authority shall be responsible for monitoring and corrective measures pursuant to the requirements laid down in this Directive and for all obligations relating to the surrender of allowances in case of leakages pursuant to Directive 2003/87/EC and preventive and remedial action pursuant to Articles 5(1) and 6(1) of Directive 2004/35/EC. The post-closure requirements pursuant to this Directive shall be fulfilled by the competent authority on the basis of the provisional post-closure plan referred to in paragraph 3 of this Article, which shall be updated as necessary.

5. The competent authority shall recover from the operator the costs incurred in relation to the measures referred to in paragraph 4, including by drawing on the financial security pursuant to Article 19.

Article 18

Transfer of responsibility

1. Where a storage site has been closed pursuant to points (a) or (b) of Article 17(1), all legal obligations relating to monitoring and corrective measures pursuant to the requirements laid down in this Directive, the surrender of allowances in the event of leakages pursuant to Directive 2003/87/EC and preventive and remedial action pursuant to Articles 5(1) and 6(1) of Directive 2004/35/EC, shall be transferred to the competent authority on its own initiative or upon request from the operator, if the following conditions are met:

(a) all available evidence indicates that the stored CO2 will be completely and permanently contained;

(b) a minimum period, to be determined by the competent authority has elapsed. This minimum period shall be no shorter than 20 years, unless the competent authority is convinced that the criterion referred to in point (a) is complied with before the end of that period;

(c) the financial obligations referred to in Article 20 have been fulfilled;

(d) the site has been sealed and the injection facilities have been removed.

2. The operator shall prepare a report documenting that the condition referred to in paragraph 1(a) has been met and shall submit it to the competent authority for the latter to approve the transfer of responsibility. This report shall demonstrate, at least:

(a) the conformity of the actual behaviour of the injected CO2 with the modelled behaviour;

(b) the absence of any detectable leakage;

(c) that the storage site is evolving towards a situation of long-term stability.

The Commission may adopt guidelines on the assessment of the matters referred to in points (a), (b) and (c) of the first subparagraph, highlighting therein any implications for the technical criteria relevant to the determination of the minimum periods referred to in paragraph 1(b).

3. Where the competent authority is satisfied that the conditions referred to in points (a) and (b) of paragraph 1 are met, it shall prepare a draft decision of approval of the transfer of responsibility. The draft decision shall specify the method for determining that the conditions referred to in paragraph 1(d) have been met as well as any updated requirements for the sealing of the storage site and for the removal of injection facilities.

If the competent authority considers that the conditions referred to in points (a) and (b) of paragraph 1 are not met, it shall inform the operator of its reasons.

4. Member States shall make the reports referred to in paragraph 2 available to the Commission within one month after receipt. They shall also make available other related material that shall be taken into account by the competent authority when it prepares a draft decision of approval on the transfer of responsibility. They shall inform the Commission of all draft decisions of approval prepared by the competent authority pursuant to paragraph 3, including any other material taken into consideration for arriving at its conclusion. Within four months after receipt of the draft decision of approval, the Commission may issue a non-binding

opinion on it. If the Commission decides not to issue an opinion, it shall inform the Member State within one month of submission of the draft decision of approval and state its reasons.

5. Where the competent authority is satisfied that the conditions referred to in points (a) to (d) of paragraph 1 are complied with, it shall adopt the final decision and notify that decision to the operator. The competent authority shall also notify the final decision to the Commission, and where it departs from the Commission opinion it shall state its reasons.

6. After the transfer of responsibility, routine inspections provided for in Article 15(3) shall cease and monitoring may be reduced to a level which allows for detection of leakages or significant irregularities. If any leakages or significant irregularities are detected, monitoring shall be intensified as required to assess the scale of the problem and the effectiveness of corrective measures.

7. In cases where there has been fault on the part of the operator, including cases of deficient data, concealment of relevant information, negligence, wilful deceit or a failure to exercise due diligence, the competent authority shall recover from the former operator the costs incurred after the transfer of responsibility has taken place. Without prejudice to Article 20, there shall be no further recovery of costs after the transfer of responsibility.

8. Where a storage site has been closed pursuant to Article 17(1)(c), transfer of responsibility shall be deemed to take place if and when all available evidence indicates that the stored CO2 will be completely and permanently contained, and after the site has been sealed and the injection facilities have been removed.

Article 19

Financial security

1. Member States shall ensure that proof that adequate provisions can be established, by way of financial security or any other equivalent, on the basis of arrangements to be decided by the Member States, is presented by the potential operator as part of the application for a storage permit. This is in order to ensure that all obligations arising under the permit issued pursuant to this Directive, including closure and post-closure requirements, as well as any obligations arising from inclusion of the storage site under Directive 2003/87/EC, can be met. This financial security shall be valid and effective before commencement of injection.

2. The financial security shall be periodically adjusted to take account of changes to the assessed risk of leakage and the estimated costs of all obligations arising under the permit issued pursuant to this Directive as well as any obligations arising from inclusion of the storage site under Directive 2003/87/EC.

3. The financial security or any other equivalent referred to in paragraph 1 shall remain valid and effective:

(a) after a storage site has been closed pursuant to points (a) or (b) of Article 17(1), until the responsibility for the storage site is transferred to the competent authority pursuant to Article 18(1) to (5);

(b) after the withdrawal of a storage permit pursuant to Article 11(3):

(i) until a new storage permit has been issued;

(ii) where the site is closed pursuant to Article 17(1)(c), until the transfer of responsibility pursuant to Article 18(8), provided the financial obligations referred to in Article 20 have been fulfilled.

Article 20

Financial mechanism

1. Member States shall ensure that the operator, on the basis of arrangements to be decided by the Member States, makes a financial contribution available to the competent authority before the transfer of responsibility pursuant to Article 18 has taken place. The contribution from the operator shall take into account those criteria referred to in Annex I and elements relating to the history of storing CO2 relevant to determining the post-transfer obligations, and cover at least the anticipated cost of monitoring for a period of 30 years. This financial contribution may be used to cover the costs borne by the competent authority after the transfer of responsibility to ensure that the CO2 is completely and permanently contained in geological storage sites after the transfer of responsibility.

2. The Commission may adopt guidelines for the estimation of the costs referred to in paragraph 1 to be developed in consultation with Member States with a view to ensuring transparency and predictability for operators.

CHAPTER 5

THIRD-PARTY ACCESS

Article 21

Access to transport network and storage sites

1. Member States shall take the necessary measures to ensure that potential users are able to obtain access to transport networks and to storage sites for the purposes of geological storage of the produced and captured CO2, in accordance with paragraphs 2, 3 and 4.

2. The access referred to in paragraph 1 shall be provided in a transparent and non-discriminatory manner determined by the Member State. The Member State shall apply the objectives of fair and open access, taking into account:

(a) the storage capacity which is or can reasonably be made available within the areas determined under Article 4, and the transport capacity which is or can reasonably be made available;

(b) the proportion of its CO2 reduction obligations pursuant to international legal instruments and to Community legislation that it intends to meet through capture and geological storage of CO2;

(c) the need to refuse access where there is an incompatibility of technical specifications which cannot be reasonably overcome;

(d) the need to respect the duly substantiated reasonable needs of the owner or operator of the storage site or of the transport network and the interests of all other users of the storage or the network or relevant processing or handling facilities who may be affected.

3. Transport network operators and operators of storage sites may refuse access on the grounds of lack of capacity. Duly substantiated reasons shall be given for any refusal.

4. Member States shall take the measures necessary to ensure that the operator refusing access on the grounds of lack of capacity or a lack of connection makes any necessary enhancements as far as it is economic to do so or when a potential customer is willing to pay for them, provided this would not negatively impact on the environmental security of transport and geological storage of CO2.

Article 22

Dispute settlement

1. Member States shall ensure that they have in place dispute settlement arrangements, including an authority independent of the parties with access to all relevant information, to enable disputes relating to access to transport networks and to storage sites to be settled expeditiously, taking into account the criteria referred to in Article 21(2) and the number of parties which may be involved in negotiating such access.

2. In the event of cross-border disputes, the dispute settlement arrangements of the Member State having jurisdiction over the transport network or the storage site to which access has been refused shall be applied. Where, in cross-border disputes, more than one Member State covers the transport network or storage site concerned, the Member States concerned shall consult with a view to ensuring that this Directive is applied consistently.

CHAPTER 6

GENERAL PROVISIONS

Article 23

Competent authority

Member States shall establish or designate the competent authority or authorities responsible for fulfilling the duties established under this Directive. Where more than one competent authority is designated, Member States shall establish arrangements for the coordination of the work of those authorities undertaken pursuant to this Directive.

Article 24

Transboundary cooperation

In cases of transboundary transport of CO2, transboundary storage sites or transboundary storage complexes, the competent authorities of the Member States concerned shall jointly meet the requirements of this Directive and of other relevant Community legislation.

Article 25

Registers

1. The competent authority shall establish and maintain:

(a) a register of the storage permits granted; and

(b) a permanent register of all closed storage sites and surrounding storage complexes, including maps and sections of their spatial extent and available information relevant for assessing that the stored CO2 will be completely and permanently contained.

2. The registers referred to in paragraph 1 shall be taken into consideration by the competent national authorities in relevant planning procedures and when permitting any activity that could affect or be affected by the geological storage of CO2 in the registered storage sites.

Article 26

Information to the public

Member States shall make available to the public environmental information relating to the geological storage of CO2 in accordance with the applicable Community legislation.

Article 27

Reporting by Member States

1. Every three years the Member States shall submit to the Commission a report on the implementation of this Directive, including the register referred to in Article 25(1)(b). The first report shall be sent to the Commission by 30 June 2011. The report shall be drawn up on the basis of a questionnaire or outline drafted by the Commission in accordance with the procedure referred to in Article 6 of Directive 91/692/EEC. The questionnaire or outline shall be sent to Member States at least six months before the deadline for the submission of the report.

2. The Commission shall organise an exchange of information between the competent authorities of the Member States concerning the implementation of this Directive.

Article 28

Penalties

The Member States shall lay down the rules on penalties applicable to infringements of the national provisions adopted pursuant to this Directive and shall take all measures necessary to ensure that they are implemented. The penalties provided for must be effective, proportionate and dissuasive. The Member States shall notify those provisions to the Commission by 25 June 2011 and shall notify it without delay of any subsequent amendment affecting them.

Article 29

Amendments of Annexes

Measures may be adopted to amend the Annexes. Those measures, designed to amend non-essential elements of this Directive, shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 30(2).

Article 30

Committee procedure

1. The Commission shall be assisted by the Climate Change Committee.

2. Where reference is made to this paragraph, Article 5a(1) to (4) and Article 7 of Decision 1999/468/EC shall apply, having regard to the provisions of Article 8 thereof.

CHAPTER 7

AMENDMENTS

Article 31

Amendment of Directive 85/337/EEC

Directive 85/337/EEC is hereby amended as follows:

1. Annex I shall be amended as follows:

(a) point 16 shall be replaced by the following:

"16. Pipelines with a diameter of more than 800 mm and a length of more than 40 km:

- for the transport of gas, oil, chemicals, and,

- for the transport of carbon dioxide (CO2) streams for the purposes of geological storage, including associated booster stations.";

(b) the following points shall be added:

"23. Storage sites pursuant to Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide [].

24. Installations for the capture of CO2 streams for the purposes of geological storage pursuant to Directive 2009/31/EC from installations covered by this Annex, or where the total yearly capture of CO2 is 1,5 megatonnes or more.

2. Annex II shall be amended as follows:

(a) the following point shall be added to point 3:

"(j) Installations for the capture of CO2 streams for the purposes of geological storage pursuant to Directive 2009/31/EC from installations not covered by Annex I to this Directive.";

(b) point (i) of point 10 shall be replaced by the following:

"(i) Oil and gas pipeline installations and pipelines for the transport of CO2 streams for the purposes of geological storage (projects not included in Annex I)."

Article 32

Amendment of Directive 2000/60/EC

In Article 11(3)(j) of Directive 2000/60/EC, the following indent shall be inserted after the third indent:

- "— injection of carbon dioxide streams for storage purposes into geological formations which for natural reasons are permanently unsuitable for other purposes, provided that such injection is made in accordance with Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide [] or excluded from the scope of that Directive pursuant to its Article 2(2);

Article 33

Amendment of Directive 2001/80/EC

In Directive 2001/80/EC, the following Article shall be inserted:

"Article 9a

1. Member States shall ensure that operators of all combustion plants with a rated electrical output of 300 megawatts or more for which the original construction licence or, in the absence of such a procedure, the original operating licence is granted after the entry into force of Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide [], have assessed whether the following conditions are met:

- suitable storage sites are available,

- transport facilities are technically and economically feasible,

- it is technically and economically feasible to retrofit for CO2 capture.

2. If the conditions in paragraph 1 are met, the competent authority shall ensure that suitable space on the installation site for the equipment necessary to capture and compress CO2 is set aside. The competent authority shall determine whether the conditions are met on the basis of the assessment referred to in paragraph 1 and other available information, particularly concerning the protection of the environment and human health.

Article 34

Amendment of Directive 2004/35/EC

In Annex III to Directive 2004/35/EC, the following paragraph shall be added:

"14. The operation of storage sites pursuant to Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide [];

Article 35

Amendment of Directive 2006/12/EC

Article 2(1)(a) of Directive 2006/12/EC shall be replaced by the following:

"(a) gaseous effluents emitted into the atmosphere and carbon dioxide captured and transported for the purposes of geological storage and geologically stored in accordance with Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the

geological storage of carbon dioxide [] or excluded from the scope of that Directive pursuant to its Article 2(2);

Article 36

Amendment of Regulation (EC) No 1013/2006

In Article 1(3) of Regulation (EC) No 1013/2006, the following point shall be added:

"(h) shipments of CO2 for the purposes of geological storage in accordance with Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide [];

Article 37

Amendment of Directive 2008/1/EC

In Annex I to Directive 2008/1/EC, the following point shall be added:

"6.9. Capture of CO2 streams from installations covered by this Directive for the purposes of geological storage pursuant to Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide [].

CHAPTER 8

FINAL PROVISIONS

Article 38

Review

1. The Commission shall transmit to the European Parliament and to the Council a report on the implementation of this Directive within nine months of receiving the reports referred to in Article 27.

2. In the report transmitted by 31 March 2015, the Commission shall assess in particular, on the basis of experience with the implementation of this Directive, in light of the experience with CCS and taking into account technical progress and the most recent scientific knowledge:

- whether permanent containment of CO2 in such a way as to prevent and reduce as far as possible negative effects on the environment and any resulting risk to human health and the environmental and human safety of CCS has been sufficiently demonstrated,

- whether the procedures regarding the Commission's reviews of the draft storage permits, referred to in Article 10, and the draft decisions on transfer of responsibility, referred to in Article 18, are still required,

- experience with the provisions on CO2 stream acceptance criteria and procedure referred to in Article 12,

- experience with the provisions on third-party access referred to in Articles 21 and 22 and with the provisions on transboundary cooperation pursuant to Article 24,

- the provisions applicable to combustion plants with a rated electrical output of 300 megawatts or more referred to in Article 9a of Directive 2001/80/EC,

- prospects for geological storage of CO2 in third countries,

- further development and updating of the criteria referred to in Annex I and Annex II,

- experience with incentives for applying CCS on installations combusting biomass,

- the need for further regulation on environmental risks related to CO2 transport,

and shall present a proposal for revision of the Directive if appropriate.

3. Where permanent containment of CO2 in such way as to prevent and, where this is not possible, eliminate as far as possible negative effects and any risk to the environment and human health, and the environmental and human safety of CCS have been sufficiently demonstrated, as well as its economic feasibility, the review shall examine whether it is needed and practicable to establish a mandatory requirement for emission performance standards for new electricity-generating large combustion installations pursuant to Article 9a of Directive 2001/80/EC.

Article 39

Transposition and transitional measures

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 25 June 2011. They shall forthwith communicate to the Commission the text of those measures.

When Member States adopt these measures, they shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. The methods of making such reference shall be laid down by Member States.

2. Member States shall communicate to the Commission the text of the main provisions of national law which they adopt in the field covered by this Directive.

3. Member States shall ensure that the following storage sites falling within the scope of this Directive are operated in accordance with the requirements of this Directive by 25 June 2012:

(a) storage sites used in accordance with existing legislation on 25 June 2009;

(b) storage sites authorised in accordance with such legislation before or on 25 June 2009, provided that the sites are used not later than one year after that date.

Articles 4 and 5, Article 7(3), Article 8(2) and Article 10 shall not apply in these cases.

Article 40

Entry into force

This Directive shall enter into force on the 20th day following its publication in the Official Journal of the European Union.

Article 41

Addressees

This Directive is addressed to the Member States.

Done at Strasbourg, 23 April 2009.

For the European Parliament

The President

H.-G. Pöttering

For the Council

The President

P. Nečas

[1] OJ C 27, 3.2.2009, p. 75.

[2] Opinion of the European Parliament of 17 December 2008 (not yet published in the Official Journal) and Council Decision of 6 April 2009.

[3] OJ L 33, 7.2.1994, p. 11.

[4] OJ L 242, 10.9.2002, p. 1.

[5] OJ L 24, 29.1.2008, p. 8.

[6] OJ L 175, 5.7.1985, p. 40.

[7] OJ L 275, 25.10.2003, p. 32.

[8] OJ L 143, 30.4.2004, p. 56.

[9] OJ L 377, 31.12.1991, p. 48.

[10] OJ L 184, 17.7.1999, p. 23.

[11] OJ L 114, 27.4.2006, p. 9. Directive 2006/12/EC is repealed by Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312, 22.11.2008, p. 3) with effect from 12 December 2010.

[12] OJ L 190, 12.7.2006, p. 1.

[13] OJ L 327, 22.12.2000, p. 1.

[14] OJ L 372, 27.12.2006, p. 19.

[15] OJ L 309, 27.11.2001, p. 1.

[16] OJ C 321, 31.12.2003, p. 1.

[] OJ L 140, 5.6.2009, p. 114.";

ANNEX I

CRITERIA FOR THE CHARACTERISATION AND ASSESSMENT OF THE POTENTIAL STORAGE COMPLEX AND SURROUNDING AREA REFERRED TO IN ARTICLE 4(3)

The characterisation and assessment of the potential storage complex and surrounding area referred to in Article 4(3) shall be carried out in three steps according to best practices at the time of the assessment and to the following criteria. Derogations from one or more of these

criteria may be permitted by the competent authority provided the operator has demonstrated that the capacity of the characterisation and assessment to enable the determinations pursuant to Article 4 is not affected.

Step 1: Data collection

Sufficient data shall be accumulated to construct a volumetric and three-dimensional static (3-D)-earth model for the storage site and storage complex, including the caprock, and the surrounding area, including the hydraulically connected areas. This data shall cover at least the following intrinsic characteristics of the storage complex:

(a) geology and geophysics;

(b) hydrogeology (in particular existence of ground water intended for consumption);

(c) reservoir engineering (including volumetric calculations of pore volume for CO2 injection and ultimate storage capacity);

(d) geochemistry (dissolution rates, mineralisation rates);

(e) geomechanics (permeability, fracture pressure);

(f) seismicity;

(g) presence and condition of natural and man-made pathways, including wells and boreholes which could provide leakage pathways.

The following characteristics of the complex vicinity shall be documented:

(h) domains surrounding the storage complex that may be affected by the storage of CO2 in the storage site;

(i) population distribution in the region overlying the storage site;

(j) proximity to valuable natural resources (including in particular Natura 2000 areas pursuant to Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds [1] and Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora [2], potable groundwater and hydrocarbons);

(k) activities around the storage complex and possible interactions with these activities (for example, exploration, production and storage of hydrocarbons, geothermal use of aquifers and use of underground water reserves);

(l) proximity to the potential CO2 source(s) (including estimates of the total potential mass of CO2 economically available for storage) and adequate transport networks.

Step 2: Building the three-dimensional static geological earth model

Using the data collected in Step 1, a three-dimensional static geological earth model, or a set of such models, of the candidate storage complex, including the caprock and the hydraulically connected areas and fluids shall be built using computer reservoir simulators. The static geological earth model(s) shall characterise the complex in terms of:

(a) geological structure of the physical trap;

(b) geomechanical, geochemical and flow properties of the reservoir overburden (caprock, seals, porous and permeable horizons) and surrounding formations;

(c) fracture system characterisation and presence of any human-made pathways;

(d) areal and vertical extent of the storage complex;

(e) pore space volume (including porosity distribution);

(f) baseline fluid distribution;

(g) any other relevant characteristics.

The uncertainty associated with each of the parameters used to build the model shall be assessed by developing a range of scenarios for each parameter and calculating the appropriate confidence limits. Any uncertainty associated with the model itself shall also be assessed.

Step 3: Characterisation of the storage dynamic behaviour, sensitivity characterisation, risk assessment

The characterisations and assessment shall be based on dynamic modelling, comprising a variety of time-step simulations of CO2 injection into the storage site using the three-dimensional static geological earth model(s) in the computerised storage complex simulator constructed under Step 2.

Step 3.1: Characterisation of the storage dynamic behaviour

At least the following factors shall be considered:

(a) possible injection rates and CO2 stream properties;

(b) the efficacy of coupled process modelling (that is, the way various single effects in the simulator(s) interact);

(c) reactive processes (that is, the way reactions of the injected CO2 with in situ minerals feedback in the model);

(d) the reservoir simulator used (multiple simulations may be required in order to validate certain findings);

(e) short and long-term simulations (to establish CO2 fate and behaviour over decades and millennia, including the rate of dissolution of CO2 in water).

The dynamic modelling shall provide insight into:

(f) pressure and temperature of the storage formation as a function of injection rate and accumulative injection amount over time;

(g) areal and vertical extent of CO2 vs time;

(h) the nature of CO2 flow in the reservoir, including phase behaviour;

(i) CO2 trapping mechanisms and rates (including spill points and lateral and vertical seals);

(j) secondary containment systems in the overall storage complex;

(k) storage capacity and pressure gradients in the storage site;

(l) the risk of fracturing the storage formation(s) and caprock;

(m) the risk of CO2 entry into the caprock;

(n) the risk of leakage from the storage site (for example, through abandoned or inadequately sealed wells);

(o) the rate of migration (in open-ended reservoirs);

(p) fracture sealing rates;

(q) changes in formation(s) fluid chemistry and subsequent reactions (for example, pH change, mineral formation) and inclusion of reactive modelling to assess affects;

(r) displacement of formation fluids;

(s) increased seismicity and elevation at surface level.

Step 3.2: Sensitivity characterisation

Multiple simulations shall be undertaken to identify the sensitivity of the assessment to assumptions made about particular parameters. The simulations shall be based on altering parameters in the static geological earth model(s), and changing rate functions and assumptions in the dynamic modelling exercise. Any significant sensitivity shall be taken into account in the risk assessment.

Step 3.3: Risk assessment

The risk assessment shall comprise, inter alia, the following:

3.3.1. Hazard characterisation

Hazard characterisation shall be undertaken by characterising the potential for leakage from the storage complex, as established through dynamic modelling and security characterisation described above. This shall include consideration of, inter alia:

(a) potential leakage pathways;

(b) potential magnitude of leakage events for identified leakage pathways (flux rates);

(c) critical parameters affecting potential leakage (for example maximum reservoir pressure, maximum injection rate, temperature, sensitivity to various assumptions in the static geological Earth model(s));

(d) secondary effects of storage of CO2, including displaced formation fluids and new substances created by the storing of CO2;

(e) any other factors which could pose a hazard to human health or the environment (for example physical structures associated with the project).

The hazard characterisation shall cover the full range of potential operating conditions to test the security of the storage complex.

3.3.2. Exposure assessment — based on the characteristics of the environment and the distribution and activities of the human population above the storage complex, and the

potential behaviour and fate of leaking CO2 from potential pathways identified under Step 3.3.1.

3.3.3. Effects assessment — based on the sensitivity of particular species, communities or habitats linked to potential leakage events identified under Step 3.3.1. Where relevant it shall include effects of exposure to elevated CO2 concentrations in the biosphere (including soils, marine sediments and benthic waters (asphyxiation; hypercapnia) and reduced pH in those environments as a consequence of leaking CO2). It shall also include an assessment of the effects of other substances that may be present in leaking CO2 streams (either impurities present in the injection stream or new substances formed through storage of CO2). These effects shall be considered at a range of temporal and spatial scales, and linked to a range of different magnitudes of leakage events.

3.3.4. Risk characterisation — this shall comprise an assessment of the safety and integrity of the site in the short and long term, including an assessment of the risk of leakage under the proposed conditions of use, and of the worst-case environment and health impacts. The risk characterisation shall be conducted based on the hazard, exposure and effects assessment. It shall include an assessment of the sources of uncertainty identified during the steps of characterisation and assessment of storage site and when feasible, a description of the possibilities to reduce uncertainty.

[1] OJ L 103, 25.4.1979, p. 1.

[2] OJ L 206, 22.7.1992, p. 7.

ANNEX II

CRITERIA FOR ESTABLISHING AND UPDATING THE MONITORING PLAN REFERRED TO IN ARTICLE 13(2) AND FOR POST-CLOSURE MONITORING

1. Establishing and updating the monitoring plan

The monitoring plan referred to in Article 13(2) shall be established according to the risk assessment analysis carried out in Step 3 of Annex I, and updated with the purpose of meeting the monitoring requirements laid out in Article 13(1) according to the following criteria:

1.1. Establishing the plan

The monitoring plan shall provide details of the monitoring to be deployed at the main stages of the project, including baseline, operational and post-closure monitoring. The following shall be specified for each phase:

(a) parameters monitored;

(b) monitoring technology employed and justification for technology choice;

(c) monitoring locations and spatial sampling rationale;

(d) frequency of application and temporal sampling rationale.

The parameters to be monitored are identified so as to fulfil the purposes of monitoring. However, the plan shall in any case include continuous or intermittent monitoring of the following items:

(e) fugitive emissions of CO2 at the injection facility;

(f) CO2 volumetric flow at injection wellheads;

(g) CO2 pressure and temperature at injection wellheads (to determine mass flow);

(h) chemical analysis of the injected material;

(i) reservoir temperature and pressure (to determine CO2 phase behaviour and state).

The choice of monitoring technology shall be based on best practice available at the time of design. The following options shall be considered and used as appropriate:

(j) technologies that can detect the presence, location and migration paths of CO2 in the subsurface and at surface;

(k) technologies that provide information about pressure-volume behaviour and areal/vertical distribution of CO2-plume to refine numerical 3-D simulation to the 3-D-geological models of the storage formation established pursuant to Article 4 and Annex I;

(l) technologies that can provide a wide areal spread in order to capture information on any previously undetected potential leakage pathways across the areal dimensions of the complete

storage complex and beyond, in the event of significant irregularities or migration of CO2 out of the storage complex.

1.2. Updating the plan

The data collected from the monitoring shall be collated and interpreted. The observed results shall be compared with the behaviour predicted in dynamic simulation of the 3-D-pressure-volume and saturation behaviour undertaken in the context of the security characterisation pursuant to Article 4 and Annex I Step 3.

Where there is a significant deviation between the observed and the predicted behaviour, the 3-D model shall be recalibrated to reflect the observed behaviour. The recalibration shall be based on the data observations from the monitoring plan, and where necessary to provide confidence in the recalibration assumptions, additional data shall be obtained.

Steps 2 and 3 of Annex I shall be repeated using the recalibrated 3-D model(s) so as to generate new hazard scenarios and flux rates and to revise and update the risk assessment.

Where new CO2 sources, pathways and flux rates or observed significant deviations from previous assessments are identified as a result of history matching and model recalibration, the monitoring plan shall be updated accordingly.

2. Post-closure monitoring

Post-closure monitoring shall be based on the information collected and modelled during the implementation of the monitoring plan referred to in Article 13(2) and above in point 1.2 of this Annex. It shall serve in particular to provide information required for the determination of Article 18(1).
