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ANNEX 1

ANNEX

to the

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on Implementation of Directive 2009/31/EC on the Geological Storage of Carbon Dioxide

Determining areas from which storage may be selected (Article 4(1))

Member States retain the right to determine the areas from which storage sites may be selected, including the right not to allow storage in any part of their territories. Whereas most Member States do allow geological storage of CO_2, some Member States do not allow CO_2 storage on their territory or part of it due to unsuitability of their geology for CO_2 storage (Finland, Luxembourg and the Brussels Capital Region of Belgium). A few Member States do not allow geological storage of CO_2 (Austria, Croatia, Estonia, Ireland, Latvia, Slovenia) or restrict it offshore (the Netherlands, UK, Sweden), in time (Czech Republic[1]), in quantity (Germany[2]) or for demonstration purposes only (Poland).

Five German federal states[3] are preparing decisions or have passed laws limiting or banning underground storage of CO_2, including for research purposes. The underpinning reasons span from prioritising uses of the underground such as for geothermal energy, storage of energy or mining to giving special emphasis on the public interest such as environmental and tourism concerns.

Poland has determined one storage area - the Cambrian reservoir within the Polish Exclusive Economic Zone (EEZ) - deep geological formations of exhausted hydrocarbon deposits and the surrounding area.

Assessing of storage capacity (Article 4(2))

The United Kingdom: As part of the Front End Engineering and Design study work under the UK CCS Commercialisation Competition, appraisal work was carried out on the Goldeneye and Endurance stores and published online. The UK also undertook a CO_2 Storage Appraisal Project on five further stores, including outline storage development plans and budget. The project confirms that there are no major technical hurdles to storing industrial scale CO_2 offshore in the UK with sites able to service mainland Europe as well as the UK. This project identified 20 specific CO_2 storage sites (from 579 potential sites) which together represent the tip of a very large national CO_2 storage resource potential, estimated to be around 78,000 $MtCO_2$. The top 15% of this potential storage capacity would last the UK around 100 years.

Sweden: In the period 2011-2015, the Swedish Geological Survey participated in the Nordic CCS Competence Centre NORDICCS. One of the most important results of this is a web-based Nordic CO_2 storage atlas, which provides a comprehensive overview of storage sites in the Nordic countries – Denmark, Norway, Sweden and Iceland. Reservoir simulations indicate a storage capacity of 250 Mt CO_2 for each of two modelled storage units within Sweden's economic zone.

The Netherlands: The CO_2 transport and storage plan will be updated in 2017. The update will examine which storage sites will become available in the future, whether those sites might be technically and geologically suitable, when they will become available and what their storage capacity is. It will also consider what the costs are of keeping the sites available for the storage of CO_2 for a certain period of time where, for example, there is not yet the infrastructure to transport the CO_2 to the storage site.

Greece has conducted a preliminary identification of suitable geological CO_2 storage sites in sedimentary basins of Northern Greece. However, more detailed scientific studies are required for a more accurate assessment of the available storage capacity of these areas.

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1 CO_2 storage in natural rock formations will not be authorised in the Czech Republic before 1 January 2020.

2 Germany has imposed restrictions on the annual quantity of CO_2 that can be stored: 4 Mt CO2 is the national total and 1.3 Mt of CO2 is permitted per storage site.

3 Lower Saxony, Schleswig-Holstein, Mecklenburg-Western Pomerania, Saxony-Anhalt, Bremen.

Hungary has carried out an assessment of geological structures potentially suitable for the geological storage of carbon dioxide and of their capacity in 2013.

Germany is doing a further assessment of CO_2 storage capacity in deep saline aquifers using the methodology of the North American storage atlas for the purposes of an expert comparison of methods.

Italy is completing a Strategic Environmental Assessment that will allow assessing the available storage capacity.

Bulgaria: There is a draft proposal concerning a project for further evaluation of CO_2 storage sites and funding is being sought.

The majority of current assessments done in the Member States are static and do not include aspects such as flow calculations, migration pathways and dissolution effects. Studying these parameters would be necessary for choosing the most appropriate monitoring techniques and for the optimisation of potential CO_2 storage projects. Cost models would also improve the usefulness of CO_2 storage assessments.

JRC is currently developing the first European CO_2 Atlas in close cooperation with the European Geological Surveys based on a harmonised CO_2 storage assessment methodology.

Research projects with relevance to the CCS Directive

Member States participate in EU and regional projects: the ERA-NET cofund projects *ACT* (Accelerating CCS technologies) and *GeoERA*, and the Baltic Sea Region Energy Cooperation project *CGS Baltic* (CO_2 Geological Storage in the Baltic Sea Region). The Netherlands is supporting a large-scale demonstration project – *ROAD*[4]. A number of research projects are of direct relevance to the implementation of the Directive, e.g. those developing better understanding of the underground storage potential, improving the methodology for characterisation and assessment of the potential storage complex and surrounding area, testing of CO_2 injectivity and developing best practices related to the safe management and limitation of the potential impacts of CO_2 storage.

Eleven Member States and one EEA country[5] participate in Action 9 of the SET-Plan - 'Renewing efforts to demonstrate CCS in the EU and developing sustainable solutions for carbon capture and use (CCU)'.

[4] ROAD project, http://road2020.nl/en, one of the six CCS projects funded by the European Energy Programme for Recovery

[5] Belgium, Germany, Spain, Finland, France, Croatia, Italy, the Netherlands, Norway, Poland, Sweden, UK