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DIRECTORATE-GENERAL

CLIMATE ACTION

Directorate C – Innovation for a Low Carbon, Resilient Economy

CLIMA.C.2 – Low Carbon Solutions (II): Research & Low Carbon Technology Deployment

Brussels
CLIMA.C.2

NOTE TO THE FILE

Subject: Applicability of Directive 2009/31/EC to the CO₂ capture and sequestration project at the Þeistareykir geothermal power plant (Iceland)

1. Background information

Landsvirkjun, the national power company of Iceland, has initiated a project aimed at reducing CO₂ and H₂S emissions from the Þeistareykir geothermal power plant in Iceland.

Landsvirkjun intends to equip the Þeistareykir plant with a gas scrubber facility to capture the CO₂ and H₂S gases stemming from geothermal fluid. These gases will be dissolved in effluent water and re-injected into a nearby well. The water and gases will flow underground, some of the CO₂ will mineralise (90% but based on modelling). There is no plan to inject third party CO₂. (the “**Project**”).

The Planning Agency and the Environmental Agency of Iceland advised Landsvirkjun that the Project might be subject to the Directive 2009/31/EC of 23 April 2009 on the geological storage of carbon dioxide (the “**Directive 2009/31/EC**” or “**the Directive**”).

However, Landsvirkjun takes the view that the Directive is not applicable to the Project.

The Icelandic authorities and Landsvirkjun reached out to the EFTA Surveillance Authority (“**ESA**”) on 8 September, seeking an opinion on whether the Project is subject to the Directive 2009/31.

2. Technical description of the Project

Landsvirkjun owns and operates the Þeistareykir geothermal power plant, a 90 MW power plant in northeast Iceland. The plant is Iceland’s newest geothermal power plant, commissioned in 2017- 2018.

The geothermal fluid comprises boiling water, steam and a mixture of gas (mainly CO₂ and hydrogen sulphide (H₂S)). The steam is routed to the power plant’s steam turbines, the water (separation water) is routed to re-injection wells, and non-condensable gases are released in the atmosphere.

The Project aims to reduce the atmospheric release of CO₂ and H₂S from Þeistareykir by routing the gases to a gas scrubber, where 95% of the CO₂ and 99% of the H₂S will be dissolved in the effluent water.

The effluent water is re-injected to a depth of at least 450 meters where pressure is sufficiently high and the temperature is sufficiently low so that the gas remains dissolved in the water and does not boil out of the solution.

The water then becomes part of a large natural stream of water that flows in the underground and ultimately, after a long time, ends up in the ocean approximately 30 km north of Þeistareykir.

90% of the CO₂ and H₂S gases that are dissolved in the water are expected to react with dissolved cations from the basaltic bedrock and thereby precipitate out of the fluid to form minerals such as calcite and pyrite.

3. Legal assessment of Landsvirkjun's arguments

Landsvirkjun argues that Directive 2009/31/EC is not applicable to the Project, essentially because the gases would not be captured from an industrial installation but rather be returned to where they were extracted from. Landsvirkjun advances a series of legal arguments that are examined one by one below.

a. Geothermal power plants are not covered by the Directive 2009/31/EC

Landsvirkjun contends that that it follows from Recital (19) that the Directive does not apply to geothermal projects. ⁽¹⁾

Recital (19) clarifies the Member States' right to decide whether to allow CO₂ storage and that they may give priority to other uses of their subsoil, *e.g.* for the purpose of geothermal projects. It cannot be inferred from this recital that CO₂ injected into the subsoil in the context of a geothermal project is excluded from the scope of the Directive.

b. Emissions from geothermal power stations are not included in the EU-ETS

Landsvirkjun argues that the Project is not subject to Directive 2009/31/EC because the emissions from geothermal power plants are not covered by the ETS Directive. ⁽²⁾

The scope of the Directive 2009/31/EC is not limited to CO₂ emitted by the ETS sectors and, more generally, the origin of the CO₂ is not relevant for the applicability of the Directive. The only relevant consideration is whether a given project meets the definition of 'geological storage of CO₂' as set out in Articles 2(1), 2 (2) and 3 of the Directive.

c. No CO₂ injection from other parties for a commercial purpose will take place

Landsvirkjun argues that no CO₂ injection from other parties for a commercial purpose will take place.

The commercial or non-commercial nature of the project as well as the motives of the project developer to capture and sequester the CO₂ are irrelevant for determining the applicability of the Directive. The fact that the Directive provides for a third-party access obligation does not mean that the scope of the Directive is limited to projects that will offer storage services.

⁽¹⁾ See Landsvirkjun's memo of 1 November 2022, p. 2.

⁽²⁾ See Landsvirkjun's memo of 8 September 2022, p. 3.

d. The geothermal power plant is not an industrial installation

Landsvirkjun argues that it follows from Recital (4) of the Directive ⁽³⁾ that only CO₂ emitted by industrial installations are covered by the Directive. ⁽⁴⁾

First, Recital (4) provides a non-binding definition of CCS for the sole purpose of underlining the importance of developing CCS projects to abate industrial emissions. This recital does not define the scope of the Directive and therefore cannot restrict it to industrial CO₂.

Second, the notion of “*industrial installations*” can be construed as including power generation installations such as geothermal plants.

e. The Project does not qualify as CO₂ storage

In substance, Landsvirkjun argues that the injection of the effluent water in the geothermal fluid does not qualify as CO₂ storage:

“The planned construction is not intended as a specific CO₂-storage, since CO₂ and H₂S are already bound in the geothermal fluid drawn from underground (and are currently released into the atmosphere in the electricity production process) but aims at closing the circulation loop by returning the gases to the originating sedimentary strata and the natural geothermal system”. ⁽⁵⁾

Article 2 provides that “*Directive [2009/31] shall apply to the geological storage of CO₂*”.

Article 3 (1) defines ‘geological storage of CO₂’ as “*the injection accompanied by storage of CO₂ streams in underground geological formations*”.

Article 3 (13) defines CO₂ stream as a “*flow of substances that results from CO₂ capture processes*”.

We consider that the geothermal system meets the definition of ‘geological formation’ (i.e. “*a lithostratigraphic subdivision within which distinct rock layers can be found and mapped*”).

We also take the view that the CO₂ to be injected in the ground meets the definition of ‘CO₂ stream’ (a “*flow of substances that results from CO₂ capture processes*”), since it would directly come from a CO₂ capture process (gas scrubbing). The fact that the CO₂ is dissolved in the effluent water does not impact this qualification. The effluent water is only the carrier for bringing the CO₂ into the ground, and is not as such the result of the CO₂ capture process.

On the basis of the above interpretation, the Project meets the definition of ‘geological storage of CO₂’ and therefore falls in the scope of the Directive.

4. Consequences of the applicability of the Directive to the Project

Landsvirkjun would need to obtain a storage permit pursuant to Directive 2009/31/EC before the Project can be implemented.

⁽³⁾ “*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 (CO₂) from industrial installations, its transport to a storage site and its injection into a suitable underground geological formation for the purposes of permanent storage*”. Emphasis added.

⁽⁴⁾ See Landsvirkjun’s memo of 1 November 2022, p. 1.

⁽⁵⁾ See Landsvirkjun’s memo of 8 September 2022, p. 4.

Other CO₂ mineral sequestration projects (including Silverstone and Coda Terminal which have been selected for grants under the Innovation Fund) have applied for storage permit in accordance with the Directive.

Electronically signed

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