The Impact of Classifying CO_2

Introduction

Technically, CO_2 is a greenhouse gas, known for its ability to trap heat from the sunlight, which is both a necessity and a threat to the planet. Traditionally, we know CO_2 stems from the burning of fuels, wildfires, or volcanic eruptions. However, CO_2 may also be emitted from decomposing vegetation or found in pockets in deep waters or subsurface reservoirs. Regardless of origin, the characteristics of the CO_2 molecule are the same.

How we approach CO_2 from a legal and policy perspective differs, however, depending on where it stems from, how it is used, and how it is managed. CO_2 stemming from fossil sources is treated differently in policies than CO_2 stemming from biogenic (natural) sources. Anthropogenic (industrial) CO_2 is treated differently from CO_2 produced from underground. Also, whether said CO_2 is injected for geological storage, used as feedstock in products, or emitted in the air triggers different policy and regulatory options and criteria. However, the fundamental approach to the classification of CO_2 may differ from policies, and how CO_2 is classified, including its legal definition, is of great importance to the legal and policy framework for Carbon Capture, Utilization, and Storage (CCUS), both for national and cross-border value chains.

Under some instruments of international law, the classification of CO_2 is of less importance, such that the CO_2 is treated under general principles applicable to a number of other substances. Yet, under certain instruments of international law, the classification of CO_2 may have significant impacts.

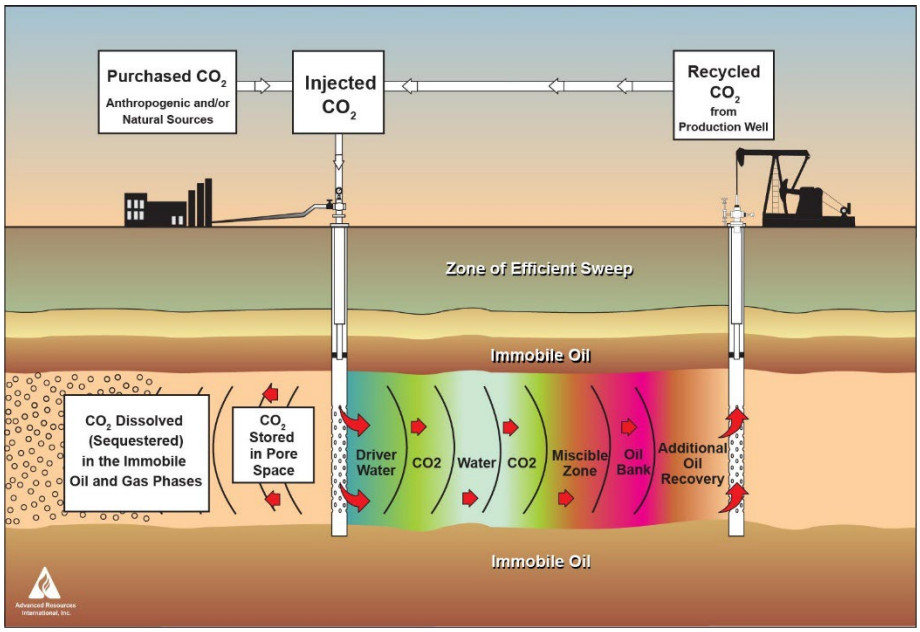
In national legal frameworks, one often observes one of two approaches with regard to classifying CO_2. It is typically classified as waste or a commodity. Historically, this may stem from whether or not CO_2 has been utilized for enhanced oil and gas recovery, and potentially even produced for those purposes. This has been the case in North America and Croatia. However, generally, the European Union and a number of jurisdictions around the world consider CO_2 as waste.

Method and/or Theory

This presentation will address international legal frameworks under instruments such as the London Protocol, OSPAR Convention, the Helsinki Convention, and the Basel Convention, to illustrate different approaches to classifying and defining CO_2. Further, the presentation will provide an overview of different national implementations of these definitions and approaches in selected jurisdictions. Finally, how this implementation has impacted the framework for CCUS will be considered, compared, and contrasted with a case study presenting a country with no clear classification for CO_2, to assess the consequences of different approaches to classify and define this molecule.

Technical and commercial

The commercial aspects of CO_2 use (or utilization) are varied. It has a long history of use in the beverage market for carbonating drinks as well as in poultry packaging. Yet these markets are completely saturated with the small volumes of captured and cleansed CO_2 already collected in the market space. Other burgeoning technologies could see growth in CO_2 utilization. They include markets for carbon black, carbon nanofibers, cement, and carbon fuels, among others. However, none may have as large a growth pathway as that for CO_2-enhanced oil and gas recovery. These closed-loop recovery processes use collected CO_2 to scour hard-to-produce oil and gas from within the pore space of deeply buried rocks and increase hydrocarbon production. This process leaves CO_2 stored in the pore space, thereby producing a lower carbon footprint hydrocarbon (**Figure 1**).



Public international law

Historically, there has been legal uncertainty under public international law whether CO_2 is considered waste or not, resulting in different approaches nationally depending on which international agreements the various countries have ratified, and uncertainty for industry. A classic example is the London Protocol, which prohibits the dumping of "wastes and other matter", which comprise "material and substances of any kind, form or description." Interestingly, the London Protocol does not distinguish between waste or other matter, but treats both similarly, prohibiting their dumping or release into the marine environment unless expressly accepted in Annex 1. In that context, CO_2 was never classified one way or the other, and the implication of not classifying it was an approach treating it as waste. Until an amendment in 2006, in which expressly included CO_2 streams for subsea-bed storage in Annex 1, offshore CO_2 storage was thus prohibited. The amendment did not, however, classify CO_2 in either category.

One of the international instruments creating uncertainty in this space, is the Basel Convention. The Basel Convention does not directly define CO_2 as waste, but the definition of waste is wide and comprises "substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law", leaving the ultimate decision to the countries signing up to the Convention. Further, the Convention grants the countries freedom to define waste as hazardous, which may result in prohibitions to import or export said waste for disposal. This could impact CCS, in particular cross-border value chains, which is emphasized by a statement by the UNFCCC; "There is a debate as to whether CO_2 falls within the definition of a hazardous waste for the purposes of transboundary movement, with some noting that CO_2 in some forms may have characteristics that could bring it within the definition of a hazardous waste."

In the European Union, there is a common framework on waste under the Waste Framework Directive. In this framework, CO_2 is not directly classified. However, 'waste' is defined as "any substance or object which the holder discards or intends or is required to discard," indicating that CO_2 may be classified depending on the situation. This interpretation is supplemented by the exclusion from the Waste Directive's scope of "gaseous effluents", which would include CO_2, "emitted into the atmosphere" or CO_2 captured and transported for geologic storage pursuant to the CCS Directive. The implication is that the CO_2 would be considered waste if separated and captured only to be discarded,

but not if emitted directly from the smokestack, thus contributing to clearing up confusion and hurdles in a number of countries' legal frameworks to support large-scale deployment of both CCS and CCU technologies.

National law

In 2012, the World Bank published a study analyzing some of the barriers to deployment of CCUS in developing countries. In their report, they noted that Botswana, Mozambique, and South Africa could potentially classify CO_2 in the existing laws at the time as "a noxious or offensive gas, certain types of "waste," or a dangerous good for the purposes of transport". The situation still seems unclear within South Africa, where waste is defined as "any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered." The full wording of the definition includes a reference to a schedule 3, which lists wastes included in addition to what the Minister defines as waste. However, the schedule was repealed in 2022, leaving the definition dependent on the Minister. This would potentially thus comprise CO_2, even for storage. Waste ceases to be waste, inter alia, once recycled or reused, implying that CO_2 used as feedstock could be exempt from the definition.

Another example worth mentioning is Kazakhstan, which, similarly to South Africa, doesn't have a dedicated legal framework for CCUS. Also, the definition of waste includes "any substance, material or item generated in the course of production, work, service or consumption (including goods that have lost their consumer properties) which its owner explicitly recognises as waste or is required by law to submit to disposal or recovery operations or intends to submit to or is subject to disposal or recovery operations." There is made an exemption of "substances discharged into the atmosphere as part of waste gases," implying that the CO_2 is considered waste first after it has been separated and captured, similar to in the EU. However, unlike the EU, Kazakhstan has not implemented an exemption of CO_2 captured and transported for geological storage.

Consequences

From a regulatory perspective, classifying CO_2 as waste will have consequences, such as having to deal with CO_2 injection under a strict waste regime. Technically, this is operational, and many countries have underground injection control programs related to waste management from either oil and gas or other industries. However, tying a waste regime to financial incentives for CCS may require a number of amendments to the waste framework that, unless a separate injection class is developed such as in the United States' UIC Class VI program for geological storage, may be a challenging legal exercise. Also, waste streams from petroleum and other industrial operations will often be dealt with separately, such that classifying CO_2 as waste and regulating storage through the waste framework may prompt a parallel legal framework for storing CO_2 volumes stemming from petroleum versus other industries. Although separate regulatory tracks for permitting of CO_2 injection and storage may still be the result, the driver should not be the CO_2 classification.

Perhaps the largest consequence of labeling CO_2 as waste reveals itself during public engagement activities. As waste, it immediately creates a stigma over any geologic storage operation, despite the fact we breathe it and consume it on a daily basis. In most cases, even deeply buried CO_2, whether emplaced there for geologic storage or as a naturally occurring gas, could still remain a commodity for future projects.

Conclusions

The World Bank noted that the legal framework should define CO_2 in terms of CCS activities, and further recommended to exclude CO_2 from the scope of waste legislation. We would support the recommendation to exclude the CO_2 from the waste definition. There may, however, not be a need to classify or define CO_2 for CCS purposes directly. By keeping the definition open, one may treat CO_2

streams as waste if not used or injected for storage but still allow for the CO_2 to be treated as commodity when used for EOR or other industrial purposes.

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