

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

Guidance Document 4

**Article 19 Financial Security and  
Article 20 Financial Mechanism**



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

## **Guidance Document 4**

### **Article 19 Financial Security and Article 20 Financial Mechanism**

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# 1. Purpose of Guidance Document

This Guidance Document (GD) is part of the following set of Guidance Documents:

- Guidance Document 1: CO<sub>2</sub> Storage Life Cycle Risk Management Framework
- Guidance Document 2: Characterisation of the Storage Complex, CO<sub>2</sub> Stream Composition, Monitoring and Corrective Measures
- Guidance Document 3: Criteria for Transfer of Responsibility to the Competent Authority
- Guidance Document 4: Financial security (Art. 19) and Financial Mechanism (Art. 20)

The purpose of this set of Guidance Documents is to assist stakeholders to implement Directive 2009/31/EC on the geological storage of CO<sub>2</sub> (so-called CCS Directive) in order to promote a coherent implementation of the CCS Directive throughout the European Union (EU). The guidance does not represent an official position of the Commission and is not legally binding. Final judgments concerning the interpretation of the CCS Directive can only be made by the European Court of Justice.

This Guidance Document 4 (GD4) is part of a series of four Guidance Documents each covering different aspects of the geological storage of CO<sub>2</sub>. GD4 is to provide guidance on Article 19 financial security (see section 2) and Article 20 financial mechanism (see section 3).

## 2. Article 19: Financial Security (FS)

### 2.1 Legislative Context

- Article 19 (Financial security) requires that “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.”

The aim of the guidance is to strike the right balance between full coverage of obligations as required under Article 19 while at the same time not overpricing the risks in relation to these obligations for early movers. It should be stressed again that the guidance is not intended to be prescriptive, but rather to outline the options open to the Competent Authority.

Sections 2.2(a) and (b) of this GD discuss options and criteria for identifying various types of FS that MS may decide are adequate to meet the objective of ensuring that all permit obligations can be met. Types of FS instruments can include funds, financial institution guarantees, insurance, and first-party and related party guarantees.

- Article 19(3) states that the FS shall remain valid and effective until the transfer of responsibility to the competent authority (CA) following closure of the storage site pursuant to Article 17(1)(a) or (b) or until a new storage permit has been issued following the withdrawal of a storage permit pursuant to Article 11(3) or until the transfer of responsibility to the CA after a site is closed pursuant to Article 17(1)(c) after withdrawal of a storage permit pursuant to Article 11(3) provided the financial obligation referred to in Art. 20 have been fulfilled.

Section 2.7 of this GD describes approaches that MS may use to ensure that operators establish and maintain valid and effective FS.

- Article 19 requires that the FS should be periodically adjusted to take account of changes to the assessed risk of leakage and the estimated costs of the obligations to be addressed. Article 19(2) clarifies that the amount of the required FS is to be based on the estimated cost of meeting the obligations arising out of the permit issued pursuant to the CCS Directive as well as obligations arising from the ETS Directive (2003/87/EC).

Section 2.4(iv) of this GD discusses different ways in which the estimated costs of the obligations may change, such as changes in the amount or nature of storage under the permit, scope of required monitoring, escalation in the real costs of fulfilling the obligations, inflation, and discount rates (if applicable). This document also discusses options for addressing changes to the assessed risk of leakage, including possible changes to the amount of covered obligations and changes to acceptable instruments.

The CCS Directive raises FS obligation at many specific provisions, as follows:

- Article 7(10) (Applications for storage permits) states that applications for storage permits must include proof that the financial security or other equivalent provision (FS) as required under Article 19 will be valid and effective before commencement of the injection.

Section 2.7(b) of this GD discusses criteria for determining “validity and effectiveness” of FS or other equivalent provision, including criteria for “proof” that the FS or equivalent provision “will be” valid and effective before commencement of the injection.

- Article 9(9) (Contents of storage permits) includes among the contents of permits the requirement to establish and maintain the FS.

Section 2.7(b) of this GD discusses criteria for initial proof of validity and effectiveness at the time a permit is issued, and Section 2.7(d) discusses reporting that validity and effectiveness are being maintained over time.

- Article 11(4) (Changes, review, update, and withdrawal of storage permits) states that after a permit has been withdrawn, the CA may temporarily decide to continue injection (until a new permit is issued) and take over other legal obligations. The CA shall recover any costs incurred from the former operator, including by drawing upon the FS.

Section 2.5(d) of this GD discusses the potential need for provisions that allow the various types of FS to be available for such cost recovery.

- Article 14(3) (Reporting by the operator) requires the operator to submit to the CA at least once a year proof of the putting in place and maintenance of the Article 19 FS.

Section 2.7(d) of this GD discusses criteria for acceptable proof of putting in place and maintaining the FS, which should be included in the operator's report.

- Article 16 (Measures in case of leakage or significant irregularities) describes the obligation to take necessary corrective measures, including measures related to the protection of human health, in the event of leakages or significant irregularities. If the operator fails to take the necessary corrective measures, the CA shall do so and recover its costs from the operator, including by drawing on the Article 19 FS.
- Article 17 (Closure and post-closure obligations) states that if the CA decides to close the storage site after the withdrawal of a storage permit pursuant to Article 11(3), the CA shall be responsible for listed legal obligations and shall recover the costs incurred from the operator, including by drawing on the Article 19 FS.

## 2.2 Definition of a Financial Security or Any Other Equivalent

### (a) Options and Criteria for defining "financial security" (FS)

In defining "financial security," MS and national CAs may use one or both of the following approaches:

- i. List specific types of allowable FS mechanisms that might be derived from existing laws and regulations about FS instruments acceptable for closure and post-closure care of waste landfills, for wastes from extractive industries, decommissioning of offshore structures,<sup>1</sup> transfrontier movements of hazardous wastes,<sup>2</sup> environmental

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<sup>1</sup> The 1998 Convention on the Protection of the Marine Environment of the North East Atlantic ("the OSPAR Convention") established a new regime for the decommissioning of disused offshore installations including a ban on the disposal of offshore installations at sea. Legislation in MS may authorize CAs to require FS for such decommissioning.

liabilities under Directive 2004/35/EC (ELD), and other relevant national programmes. Examples of acceptable types of mechanisms may include trust funds, surety bonds, bank guarantees, insurance, deposits, and the like.

This section provides a general discussion of potential FS instruments which need to be considered in light of individual jurisdiction laws and markets that may affect instrument availability, cost, security, and other relevant features.

Several options involve the setting aside of funds or other assets:

- Operators may offer *funds* (“*deposits*”) as FS directly to the CA, typically as a lump sum but possibly also as instalment payments. This gives funds directly to the custody and control of the CA, which either may create an account on behalf of the operator or may turn the funds over to the government treasury. This approach puts the responsibility on the CA to access funds when needed and to return funds to the operator when the FS is released. Whether the funds earn any interest will vary across MS. This approach is advantageous when the deposited funds are protected from creditor claims in the event of the operator’s insolvency or bankruptcy. Unlike with trust funds and escrows, the CA itself will be responsible for all recordkeeping.
- An *irrevocable trust fund* involves the legal transfer of property to a trustee who acts as a fiduciary on behalf of the CA, which is the beneficiary of the trust. The trust is considered irrevocable because the operator cannot unilaterally terminate the trust and reclaim the property. A trust is advantageous when the property constituting the trust is protected from claims should the operator become insolvent or bankrupt. The trustee provides or arranges for professional management of property in the trust. Certainty of the availability of funds is enhanced by restrictions on investing the trust fund in any stock, bonds, or other securities of the operator and its legal affiliates (including corporate parents and subsidiaries). Following the instructions of the CA, the trustee may release the trust fund assets to the operator when the FS is no longer required or as reimbursement for expenses incurred by the operator. Alternatively, the CA may instruct the trustee to release assets as needed to satisfy obligations when the operator is unable or unwilling to do so. This mechanism may be available to operators that might lack the creditworthiness required for financial guarantees. Trust funds are designed to remain effective over long time periods.
- An *escrow* also involves setting aside property pursuant to a written agreement. Escrows are becoming more familiar in European countries in recent years in connection with commercial software contracts. Legal protection of escrowed property from the claims of creditors may not be available in some MS. Escrows that are revocable by the operator lack desired certainty for FS. The escrow

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<sup>2</sup> Article 27 of EU Council Regulation 259/93 requires that every shipment of hazardous waste within, into, and out of the European Community be covered by a financial guarantee or equivalent insurance to cover the costs of shipment or necessary re-shipment and the cost of alternative disposal or recovery of the waste but not damages to third parties.

agent is not typically a fiduciary of the beneficiary, but instead is responsible to the party putting property into the escrow.<sup>3</sup>

These mechanisms may be tailored for FS of any obligations. They all are available to parties with the required cash or equivalent.

These instruments may be fully-funded or instead may be accumulated over time. Build-up of necessary funds over time (sometimes termed a “sinking fund”) does pose a risk that the operator will default before the required amount of funds has built up. This risk can be mitigated by requiring that the operator complement the gradual build up of funds with another FS instrument that covers the balance. For example, the complementary instrument could be a bank guarantee, letter of credit, or surety bond. As the funds build up toward the required amount, the amount of the complementary FS can be reduced. The implications for the operator will depend on the terms and conditions of the complementary instrument, but may be favourable from a cash flow perspective compared to fully-funding the instrument at the start.

Other mechanisms which may be available from financial institutions do not set aside cash but guarantee that the needed funds will be made available in the event the operator defaults on its obligations. Several different types of functionally similar guarantee instruments may be available to credit-worthy operators:

- *Bank guarantees* can take many forms. For example, a bank guarantee may accompany a check drawn on the operator’s account; such a guarantee assures the CA that the operator’s check will be honoured by the bank. Bank guarantees often are used as a performance bond to allow the beneficiary (e.g., the CA) to make a demand on the bank in the event of non-performance of the obligations covered by the guarantee. Banks may issue a payment guarantee instead of a standby letter of credit. The International Chamber of Commerce developed Uniform Rules for Demand Guarantees (URDG) in 1991 and revised the rules and model forms in 2010. The United Nations Convention on Independent Guarantees and Stand-by Letters of Credit is designed to facilitate the use of independent guarantees and standby letters of credit where only one or the other of those instruments is traditionally in use.
- An *irrevocable standby letter of credit* issued by a bank may serve as an FS instrument. If the operator defaults, the CA can draw funds from the letter of credit to use for the costs of the assured obligations. Although irrevocable by the operator, the issuing bank may set a finite term on the letter so that the issuing bank periodically can review the operator’s creditworthiness. This instrument is widely used in international commerce per the *Uniform Customs and Practice for Documentary Credits* of the International Chamber of Commerce.
- A *bond issued by a surety company (or a bank)* is another form of guarantee. The bond assures the CA that should the operator fail to perform its assured obligations, the surety will make the required amounts available (“payment bond”)

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<sup>3</sup> In many parts of Europe notaries traditionally have functioned as depositories who stored and administered valuables on behalf of their clients. In some MS jurisdictions notaries may be able to provide escrow agent services.

or will arrange for performance of the obligation (“performance bond”). Surety companies make bonds available only to creditworthy parties. Bonds are effective until cancelled or terminated; sureties may set a finite term on the bond because the operator’s creditworthiness may change over time. Bond terms of 5 to 10 years are not uncommon. Some MS may not have legislation authorizing surety bonds.

Financial institutions issuing letters of credit, bonds, and guarantees do not expect to incur significant risk from those mechanisms. The recipient typically agrees to provide collateral and to indemnify the issuers for any payments the issuers may make.

Insurance is another category of financial instruments commonly thought of in connection with FS programs, particularly for obligations to make compensatory payments following some type of accidental occurrence. Insurance companies issue a wide variety of insurance contracts with varying features, some of which resemble guarantees (e.g., annuities) and others of which are quite different (e.g., liability insurance). The latter types of liability insurance are designed to compensate for financial losses due to the occurrence of certain types of accidents such as accidents that might occur at geologic storage sites for CO<sub>2</sub>. There has been much discussion of potential insurance products related to carbon capture and sequestration.

Insurance designed for CCS may be somewhat similar to environmental liability insurance which the European insurance and reinsurance federation CEA describes as a “niche” market with specialist underwriters selectively offering products based on highly detailed risk criteria. The CEA has pointed to important differences in the “liability cultures” and liability regimes of various MS, which affect their markets for liability insurance products. Moreover, lack of sufficient knowledge about the behaviour of sequestered CO<sub>2</sub> also will inhibit insurance offerings. The reason for why this lack of knowledge is an issue for insurance but not for other FS instruments issued by financial institutions is because the insurance contract involves risk sharing among the insurer and its customers. Moreover, although the technology for injecting CO<sub>2</sub> may be insurable, the insurance industry has expressed concerns about the potential risks during the long periods of subsequent maintenance underground.

In comments on the financial security provisions of the CCS Directive, the CEA noted that insurance products could be offered only on a short-term basis due to potential changes in the financial conditions of the insured.

Acceptance of a given insurance policy as FS for one or more obligations should be based on a careful review of the entire policy including definitions, limits, terms, conditions, exclusions and endorsements. The detailed review allows the CA to assess the scope, amount, and certainty of coverage compared to FS requirements.

One insurance provider has described a policy that would be specific to a given geologic reservoir, and may cover pollution event liability, business interruption, control of well, transmission liability, and geomechanical liability. These coverages, which may be attractive to operators, do not correspond to any of the obligations specified in the CCS Directive. On the other hand, a proposed Geologic Sequestration Financial Assurance (GSFA) policy could be designed to cover the costs of performing tasks (e.g., closure, monitoring) specified in the plans that would be part of the permit. This type of coverage typically would require the operator to pay a premium, which the insurer would invest, based on the discounted present value of the expected cost. Specimen policy terms and conditions have not been made available for these products by insurance representatives so precise terms and limits of coverage cannot be determined.

ii. List the necessary characteristics of an acceptable FS mechanism. The characteristics may address the certainty, amount, liquidity, flexibility, and duration of an instrument. Section 2.4(a) provides more details about these characteristics.

(b) Options and Criteria for “any other equivalent”

In defining “any other equivalent” for purposes of Article 19, MS and national CAs may use one or both of the following approaches:

i. List specific types of allowable mechanisms that may not qualify as financial security mechanisms but that can accomplish the required security, such as self-guarantees and related-party guarantees. These types of equivalent mechanisms may be available under MS laws and regulations applicable to financial security for solid waste landfills, wastes from extractive industries, decommissioning of offshore structures,<sup>4</sup> transfrontier movements of hazardous wastes,<sup>5</sup> environmental liabilities under Directive 2004/35/EC (ELD), and other relevant national programmes.

ii. List the necessary characteristics of “other equivalent” mechanisms: The characteristics may address the certainty, amount, liquidity, flexibility, and duration of an instrument. Section 2.4(a) provides more details about these characteristics.

Operators may propose a variety of potential mechanisms as equivalent to FS, such as:

- deed to property (e.g., where the CO<sub>2</sub> is stored)
- pledges or assignments of future revenues (e.g., from injection) or assets
- life insurance policies on the operator’s key employees

<sup>4</sup> The 1998 Convention on the Protection of the Marine Environment of the North East Atlantic (“the OSPAR Convention”) established a new regime for the decommissioning of disused offshore installations including a ban on the disposal of offshore installations at sea. Legislation in MS may authorize CAs to require FS for such decommissioning.

<sup>5</sup> Article 27 of EU Council Regulation 259/93 requires that every shipment of hazardous waste within, into, and out of the European Community be covered by a financial guarantee or equivalent insurance to cover the costs of shipment or necessary re-shipment and the cost of alternative disposal or recovery of the waste but not damages to third parties.

These options should be viewed as lacking adequate certainty, amount, and liquidity to be accepted as equivalent to FS. And these mechanisms impose high administrative burdens.

Operators may offer EU emission allowances (EUAs) as equivalent to FS as this would have the advantage of avoiding risk related to EUA price changes. MS should consider whether these emission allowances, even when placed outside the administrative control of the operator (e.g., in a trust fund, or transferred directly to the CA), provide sufficient certainty, amount, liquidity, and duration to be acceptable as equivalent to FS. MS should in any case ensure that EUAs held as FS to meet obligations arising from inclusion of the storage site under Directive 2003/87/EC are not held as FS for any other purposes at the same time. In this case, the amount of emission allowances tendered as FS should be equal to at least the amount of allowances used to determine the amount of required FS as described in section 2.4(c)(iii) below. The EUAs valid in a certain trading period held as financial security should be replaced in a timely fashion by a substitute, e.g. by banking the allowances pursuant to Article 13(2) second subparagraph of Directive 2003/87/EC. If the operator chooses to use EUAs as FS to meet the obligations arising from inclusion of the storage site under Directive 2003/87/EC, instead of EUAs, also EUA futures or forwards may be used.

## 2.3 Obligations that FS Must Cover

### (a) Obligations that must be covered by FS

As described in section 2.1 above, the Article 19 financial security is intended to ensure that all obligations arising under the permit can be met in the following cases: (i) there is a need to cover CA costs for performing obligations under the permit if the operator fails to do so, or (ii) the CA withdraws the storage permit and temporarily takes over all relevant obligations. Table 1 lists obligations which FS must cover, distinguishing whether those obligations may arise during the operational period or during the closure/post-closure period prior to transfer of responsibility. As shown in Table 1, most obligations may arise in either period but some obligations may arise only in one or the other period.

**Table 1: Obligations under the permit that must be covered by FS under CCS Directive**

| Operations Period  | Closure and Post-Closure Period   |
|--|---|
| 1.A monitoring, updates of monitoring plan, and required reports of monitoring results   | 1.B monitoring, updates of monitoring plan, and required reports of monitoring results  |
| 2.A updates of corrective measures plan, and implementing corrective measures, including measures related to the protection of human health  | 2.B updates of corrective measures plan, and implementing corrective measures, including measures related to the protection of human health |
| 3.A surrender of allowances for any emissions from the site, including leakages, pursuant to ETS Directive   | 3.B surrender of allowances for any emissions from the site, including leakages, pursuant to ETS Directive                                  |
| 4.A update of provisional post closure plan  | 4.B sealing the storage site and removing injection facilities  |
| 5.A maintaining injection operations by the CA until new storage permit is issued, if storage permit is withdrawn, including CO <sub>2</sub> composition analysis, risk assessment and registration, and required reports of CO <sub>2</sub> streams delivered and injected. | 5.B making required financial contribution (FC) available to the CA   |

The obligations which may become the responsibility of the CA include the following:

- (i) Monitoring, as specified by Article 13 and the approved monitoring plan, (see accompanying GD2). Related obligations are to update the monitoring plan pursuant to the requirements laid down in Annex II at least every five years and to prepare reports of monitoring results pursuant to Article 14.
- (ii) Corrective measures in the event of leakages or significant irregularities, including measures to protect human health, as specified by Article 16, the approved corrective measures plan, and accompanying GD2. This includes costs for updating the approved corrective measures plan.
- (iii) Surrender of emission allowances due to inclusion of the storage site under the ETS Directive.
- (iv) Update the provisional post-closure plan (which must be submitted with the permit application and approved by the CA) as necessary, prior to closure of a storage site, taking account of risk analysis, best practices, and technological improvements. Closure of the storage site as specified in Article 17 and the approved and updated post-closure plan, including sealing the storage site and removing the injection facilities.
- (v) Operating the site,<sup>6</sup> including obligations relating to CO<sub>2</sub> acceptance criteria when the CA decides to continue CO<sub>2</sub> injection temporarily until a new storage permit is issued, after the CA withdraws a storage permit under Article 11(3). According to Article 12 (CO<sub>2</sub> stream acceptance criteria and procedures) these acceptance criteria obligations include keeping a register of the quantities and properties of the CO<sub>2</sub> streams delivered and injected, including the composition of those streams. In addition, the CA may need to conduct composition analyses and risk assessments and prepare reports pursuant to Article 14 (see GD2 for more details).

#### (b) Timing of Potential FS Obligations over Storage Site Lifecycle

As shown in Table 1, some of the obligations to be covered by FS may become moot or decrease with the passage of time. Specifically, after the site has been closed, the CA would have no need for FS to cover temporary continuation of injection (i.e., operation of the site), nor would FS for closure be necessary (because the site already would have been closed). Once in the post-closure period, if the remaining time interval prior to site transfer decreases, the potential duration of monitoring obligations to be covered by FS also may decrease. Section 2.4(d) below discusses

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<sup>6</sup> Although the CCS Directive refers only to obligations related to CO<sub>2</sub> acceptance criteria during temporary continuation of injection following permit withdrawal, the European Commission believes that continuation of injection will require the CA to take over operation of the site as a whole.

the CCS Directive requirement that FS should be periodically adjusted to take account of the estimated costs of all obligations arising under the permit.

## 2.4 Amounts of FS

The amount of FS provided by the operator is central to the success of FS programmes.

### (a) Procedural Options for Determining Required Amounts of FS

Procedural options for determining the amounts of FS include either having the operator or having the CA be responsible for developing the amounts. In either case, amounts should be based on the pertinent plans (e.g., the approved Article 13 monitoring plan, the approved Article 16 corrective measures plan, the approved Article 17 provisional and updated post-closure plan), the performance of the storage site, costs for new relevant methods or technologies, and for other obligations, assumptions as discussed further below. If costs are estimated by the operator, the amounts must be subject to review and approval of the CA (Art. 9(9) of the CCS Directive). Alternatively, the CA may itself prepare cost estimates and determine required amounts of coverage; however, input from the operator may be necessary or desirable for the CA to develop appropriate amounts.

#### Phased FS

MS may want to consider allowing operators to provide FS in phases. For example, rather than require an amount of FS based on the ultimate size of the projected storage, MS could accept amounts of FS sufficient to cover the obligations as injection proceeds over time.

This option for determining amounts of required FS is distinct from the use of the sinking fund approach to demonstrate the required FS amounts; the sinking fund and its complementary instruments must together equal the total amount of required FS, which total will increase in phases. Similarly, phased FS, based on the cumulative amounts of CO<sub>2</sub> injected or the increasing subsurface footprint of the CO<sub>2</sub> driving greater areal monitoring, differs from the adjustment of amounts of FS based on risk assessment (discussed in section 2.4(e)(i) of this Guidance).

### (b) Principles for Determining Amounts of FS for Each Obligation or Combination of Obligations

In preparing, reviewing, or approving cost estimates, several principles constitute best practice:

- Amounts should be sufficient for the CA and/or its agent (e.g., contractor) to perform the obligation (often termed “third-party costs”) and should include necessary costs of CA overheads, oversight, and support services;
- Amounts should not be adjusted by multiplying with an estimated probability to calculate an expected value;
- No credit should be allowed for presumed salvage value (e.g., at site closure);
- A bottom-line contingency of at least 25% should be required (except for surrender of allowances in case of leakage, see section 2.4(c)(iii) below);
- Assumptions regarding general inflation and any non-inflation cost escalation should be clarified.

A common question for estimating “third-party costs” is whether the amounts of required coverage can be calculated assuming the availability to the CA of on-site equipment and infrastructure owned by or under the control of the operator of the storage site. For example, with regard to monitoring, the operator already may have developed monitoring wells that the CA can use instead of the CA having to install a new set of monitoring wells. For the CA to install a monitoring system entails much greater costs than being able to use the existing monitoring system, particularly for offshore storage sites. However, during the period of CA responsibility, a monitoring well may cease to perform properly or, new monitoring wells may be needed to track the plume.<sup>7</sup> Similarly, the operator may have acquired and positioned equipment needed for conducting corrective measures; if the CA were assumed to be able to use such equipment, the amount of needed FS would be less than if the amount must cover the cost of acquiring the necessary equipment. However, in a situation where, for example, the operator is bankrupt, creditors may have claims on equipment and infrastructure which may interfere with their use by the CA. The MS must take account of such situations when determining acceptable assumptions about the availability of on-site equipment and infrastructure for calculating required amounts of FS; as FS is periodically reviewed, those assumptions should be re-visited.

The use of “expected value” techniques in determining amounts of FS coverage should be avoided. Such techniques apply probability weightings to costs of obligations that are uncertain to arise, such as costs of corrective measures, surrender of allowances, temporary operation of the site, and the like. A problem with applying such techniques to very low probability events is that the resulting expected values may be much too small to provide sufficient coverage via FS in the event that the obligation does arise.

Best practice in setting required amounts of FS is not to subtract an amount for presumed salvage value of equipment and facilities at site closure. Salvage value

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<sup>7</sup> As a public entity, the CA may or may not have any liability exposure if the new monitoring wells are faulty, depending on the laws of the MS (e.g., “sovereign immunity” laws may protect the CA).

should be viewed as too uncertain, illiquid, and speculative to be a part of FS programmes.

A bottom-line contingency, which can address a variety of uncertainties in the cost estimate, is a best practice in determining required amounts of FS. Because carbon sequestration is a new technology, a minimum 25% contingency is recommended, although MS may choose other levels. However, this may not be appropriate for surrender of allowances in the case of leakages – see section 2.4(c)(iii) below.) For example, in the UK, the Environment Agency adds a contingency of about 40-50% in determining the minimum amount of the FS for transfrontier movements of hazardous waste and adds 50% to the estimated costs of decommissioning offshore installations.

Several options may be considered regarding the effects of inflation when calculating required amounts of coverage (see section 2.4(d)).

(c) Setting Amounts of FS Based on Estimating the Costs that CA would incur to fulfil specific obligations under the CCS Directive if the operator is bankrupt, there is a need to cover costs for necessary corrective measures if the operator fails to do so, or the CA withdraws the storage permit and takes over all relevant obligations.

i. Monitoring. The amount of FS for monitoring depends on (1) the number of years (duration) of monitoring the FS should cover as well as (2) the yearly cost of monitoring, which depends on the scope, scale, and intensity of required monitoring. The approved monitoring plan will include information about monitoring activities, frequencies, and equipment that can provide a basis for estimating costs.

- Duration of Monitoring. Should the operator go bankrupt, the CA needs to perform monitoring for a period of years, update the monitoring plan, and report monitoring results, drawing upon the FS for funding.

Table 2 illustrates two scenarios that can arise if the CA decides to withdraw the storage permit during the injection phase. The amount of monitoring FS needed will depend on whether the CA intends to close the storage site or intends to temporarily continue injection until a new permit is issued:

- If the CA decides to close the storage site, the CA will need sufficient FS for monitoring during the closure (e.g., 1-3 years) and post-closure period (e.g., 20 years).
- If the CA decides to temporarily continue injection until a new permit is issued, the CA will need sufficient FS for monitoring during the period of time required until a new permit is issued (e.g., 3-5 years) to a successor operator that will perform the monitoring. Issuance of a new permit may require several years and may not be successful.

**Table 2: CA obligations in two scenarios after withdrawal of permit**

| <b>CA Withdraws Permit and Closes the Site</b>   | <b>CA Withdraws Permit But Continues Operations Temporarily Until New Permit is Issued</b>   |
|--|--|
| 1.A monitoring, updates of monitoring plan, and required reports of monitoring results through the end of the post-closure period  | 1.B monitoring, updates of monitoring plan, and required reports of monitoring results for applicable period until new permit is issued  |
| 2.A updates of corrective measures plan, and implementing corrective measures, including measures related to the protection of human health through the end of the post-closure period | 2.B updates of corrective measures plan, and conduct of corrective measures, including measures related to the protection of human health until new permit is issued   |
| 3.A surrender of allowances for any emissions, including leakages, through the end of the post-closure period  | 3.B surrender of allowances for any emissions, including leakages, until new permit is issued  |
| 4.A update of provisional post-closure plan  | 4.A N/A  |
| 4.B seal the storage site and remove injection facilities  | 4.B N/A  |
| 5. N/A   | 5.B operation of storage site temporarily including CO <sub>2</sub> composition analysis, risk assessment, registration, and required reports of CO <sub>2</sub> streams delivered and injected until new permit is issued |

Therefore, during the injection phase, the required amount of FS for monitoring may need to cover from as little as a few years of monitoring, to as many as more than a couple of decades of monitoring, as determined by the MS and the CA. At permit issuance and during operations, approaches for addressing this divergence in the required duration of monitoring include the following:

- (1) calculate an amount of FS for monitoring based on the longer duration and ensure that the corresponding FS instrument allows access to the monitoring FS in the event of temporary continuation of injection (in addition to access where temporary continuation of injection is not undertaken by the CA).
- (2) alternatively, bundle the estimate for the cost of monitoring until issuance of a new permit (e.g., 3-5 years of monitoring) into the amount of FS determined for temporary continuation of injection (see section 2.4(c)(v) below). This temporary injection FS would be in addition to monitoring FS sufficient to cover the longer duration of monitoring needed for closure and post-closure.

The first option would require a somewhat smaller aggregate amount of FS that would be sufficient unless monitoring is required both during a period of interim injection and also for closure and post-closure because a new permit was not issued after withdrawal of the initial permit. The second option would require a somewhat larger aggregate amount of FS than the first option.

If the operator becomes bankrupt after the site has been closed, the CA will need sufficient FS for monitoring during the post-closure period until all available evidence indicates that the stored CO<sub>2</sub> will be completely and permanently contained (at which point transfer of responsibility shall be deemed to take place).

Determining an appropriate duration of the monitoring obligation in order to calculate an amount of FS is complicated by uncertainty regarding the length of the post-closure period prior to the Article 18 transfer of responsibility to the CA. Article 18(1)(b) refers to a minimum period of at least 20 years prior to transfer of responsibility to the CA; but the minimum period may be shorter than 20 years if the CA is convinced that the criterion in Article 18(1)(a) has been complied with before the end of that period. Nevertheless, for calculating the amount of FS, this GD recommends using a 20-year post-closure monitoring period as a default because the actual length of the post-closure period cannot be predicted in advance.

- Scale, Scope, and Intensity of Annual Monitoring. Annual costs of monitoring may vary depending on the scale, scope, and intensity of monitoring required. For example, a more expansive scale of monitoring may be required as more CO<sub>2</sub> is injected for storage. As described in GD2, monitoring scopes may include (1) the injection facilities, (2) the storage complex (including where possible the CO<sub>2</sub> plume), and where appropriate (3) the surrounding environment. In addition, more intense monitoring may be required in the event any leakages or significant irregularities are detected. These factors should be considered in setting the initial amount for FS and also in subsequent updates.

The amount developed for the cost of monitoring should include costs of updating the monitoring plan and preparing required reports of monitoring results. Monitoring costs may include not only the direct costs of collecting and analyzing monitoring data but also anticipated costs for maintaining, repairing, and/or replacing (as necessary) the various components of the monitoring system as may be needed over the relevant duration of monitoring.

- Where more than one scenario can be costed for monitoring FS, it is recommended that a realistic and appropriate middle ground scenario taking account of all available evidence of the site specific risk profile is used.

ii. Corrective Measures. Article 16 obligations for corrective measures, including measures related to the protection of human health, are triggered by discovery of leakages or significant irregularities. The approved corrective measures plan should provide information about required activities, labour, and equipment anticipated for different types of corrective measures; the plan can form a technical basis for cost estimation, whether by the operator or by the CA.

Articles 16(4) and (5) state that if the operator fails to take necessary corrective measures, the CA shall do so and shall recover costs incurred, including by drawing on the Article 19 FS. Although the CA may determine to withdraw the storage permit in this situation (see Article 11(3)), permit withdrawal is not required. If the permit is

not withdrawn in this situation, the operator should be required to replenish the corrective measures FS for amounts drawn by the CA.

The following factors will affect the amount of FS required:

- Scale and Scope of Corrective Measures. The approved corrective measures plan may identify different scales and scopes (i.e., scenarios) of corrective measures, such as scenarios calling for corrective measures that include measures related to the protection of human health, as well as scenarios that call for corrective measures that do not include measures related to the protection of human health.
- Duration of Corrective Measures. Duration of corrective measures, as described in the approved corrective measures plan, is likely to be short in comparison to the duration of monitoring obligations.
- Frequency. MS may decide how many instances of corrective measures should be included when calculating the amount for FS. The amount of FS may be based on the assumption that corrective measures will be required only once during the applicable time period, or the amount of FS may be based on the assumption that corrective measures may be required more than once during that period. The applicable time period for corrective measures, should include (1) the operator's anticipated duration of injections (e.g., 20 years, 30 years, 50 years) plus (2) the expected duration of closure activities, and (3) the minimum period of years for post-closure determined by the CA (described in section 2.4(c)(i) above). Periodic updates to the FS may reflect other assumptions about potential frequency of corrective measures as more evidence on the site and storage behaviour is gathered.
  - Where more than one corrective measures scenario can be used for FS, it is recommended that a realistic and appropriate middle ground scenario taking account of all available evidence of the site specific risk profile is used.

iii. Surrender of Allowances. In virtue of the inclusion of geological storage sites under Annex I of the Emissions Trading Directive, installations will be required to surrender allowances for any emissions from the site, including leakages, as calculated pursuant to the Monitoring and Reporting Guidelines for CCS (Commission Decision 2010/345/EU). The amount of the FS for this obligation can be based on the potential total tons of emissions, including due to leakages, multiplied by the market cost of purchasing an equivalent amount of allowances. This calculation will require (1) estimates for the total tons of emissions that may be released, including due to leakages, (2) assumptions about the timing of emissions, and (3) costs of allowances when releases occur.

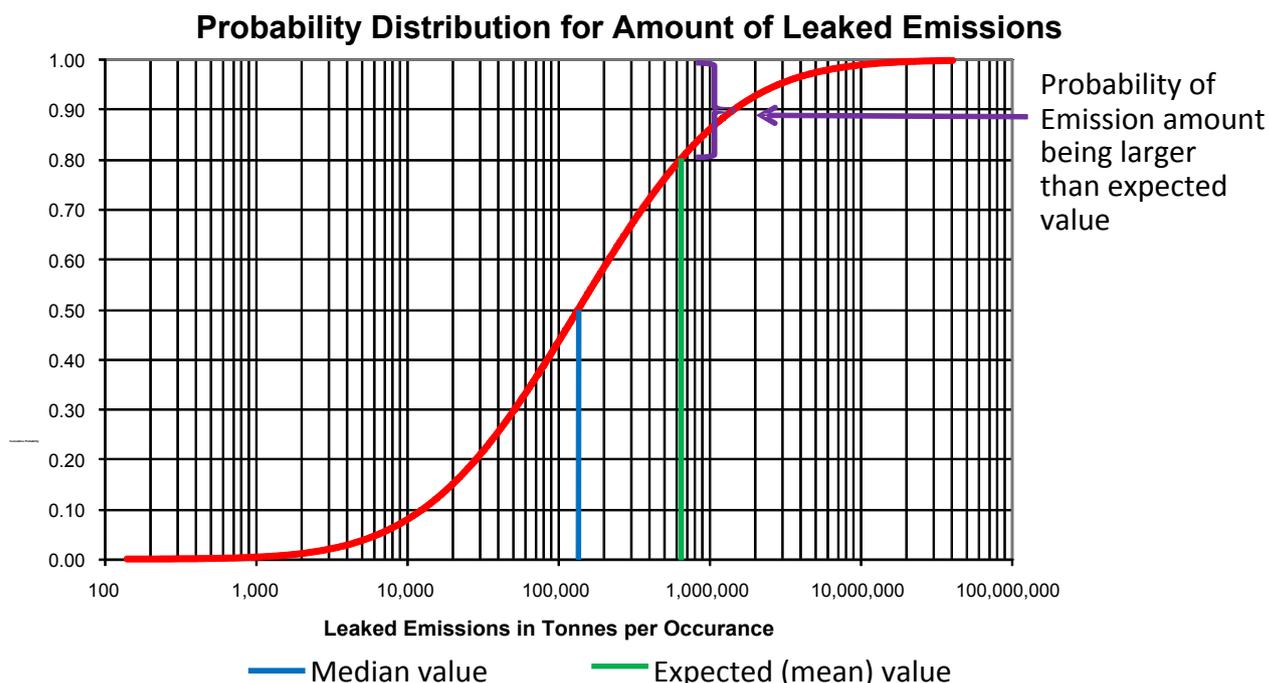
- Estimating Amounts of Potential Leakages. In the absence of experience with geological storage of carbon dioxide, determining an appropriate amount of FS for surrender of allowances can be based on different assumptions concerning the amounts of potential leakages of CO<sub>2</sub>. Options can include calculating the amount based on:

- a conservative estimate of the maximum portion of CO<sub>2</sub> that can be released from storage, which, in most situations, will be much less than 100%; or
- a calculation of the potential leakage amount based on a probability distribution of the amount of leakage from the storage complex. This is elaborated further in the following paragraph.

Geological characteristics of a site, facility design, monitoring program, and statistical modelling could be used to develop a probability distribution for the amount of leakage at any given site for each individual occurrence of leakage (see figure below for an illustrative example) or for the expected sum of all leaks over a period of time. The probability distribution function of amount of tons released per leakage occurrence would be expected to be a log-normal function that would change over time, as the injected amount increases and as more information is obtained about the behaviour of the CO<sub>2</sub>. As the figure shows, there may be a significant probability (20%) that the amount of actual leakage will be above the expected (mean) amount if leakage occurs. This fact should be taken into account in determining the financial security.

Note that the probability distribution does not mean that the leakage will occur, but only that if a leakage occurs, the size of the leakage would be determined by this distribution function. The probability of leakages occurring in any given year would vary over time, and is a function of many site-specific geological and operational factors.

A 25% contingency, as suggested in Section 2.4(b) for FS amounts in general, does not fit particularly well with the approach suggested here for determining a leakage scenario to be covered by the FS. The proposed approach is to use a particular percentile leakage on the probability distribution of leakages, and adding a 25% contingency is equivalent to using a different percentile. Thus it would be simpler for the CA just to select the latter percentile, if it considered it appropriate.

**Figure 1: Hypothetical Probability Distribution of Leaked Emissions**

The initial amount of FS for surrenders of allowances should be based on the potential for leakages during (1) the operator’s anticipated period of injections (e.g., 20 years, 30 years, 50 years) plus (2) the expected duration of closure activities, and (3) the minimum period of years for post-closure determined by the CA (described in section 2.4(c)(i) above). Periodic updates to the FS may reflect other assumptions about potential amounts of leakages as more evidence on the site and storage behaviour is gathered.

- The timing of leakages. Assumptions as regards the timing of potential leakages are important to determining the amount of FS because the EUA price is determined on the carbon market.

**Costs of Allowances.** There is unavoidable uncertainty about the future price of EU Allowances (EUA) at the time of any potential leakage. There is no cap on the EUA price; the penalty for excess emission (100 Euros per tonne) does not relieve the operator of the need to provide allowances to cover the emissions, and is not therefore a cap on EUA prices.

Just as there is no recommendation on making long-term estimates of inflation, making long-term estimates of future EUA prices should be avoided. MS should use current prices (high and low) or estimates for near-term allowance prices (high and low, over the next 3-5 years) for establishing the relevant FS and then update the FS amounts periodically (e.g., every 3 to 5 years) as part of the regular update of the FS. This procedure is similar to the options described in section 2.4(c) for addressing inflation.

iv. Closure and Post-Closure. The amount of FS for closure and post-closure must be sufficient for (1) updating the provisional post-closure plan (which occurs during the closure period) and (2) the costs of sealing the storage site and removing the injection facilities including their recycling or disposal, (which occurs during the post-closure period). The activities, labour, equipment, and disposition plans for site closure should be described in the provisional post-closure plan (and any updates), which can provide a technical basis for estimating the amount required for closure FS. Although the operator may plan for closure to follow many years of successful operations, the amount of FS should be sufficient in the event the facility must be closed at an earlier point in time.

v. Temporary Continuation of Injection. Pursuant to the CCS Directive, the CA may temporarily continue CO<sub>2</sub> injections, following withdrawal of a permit pursuant to Article 11(4). In doing so, the CA becomes responsible for operating the site including legal obligations relating to CO<sub>2</sub> acceptance criteria, monitoring, potential corrective measures, and surrenders of allowance during the applicable period. The CCS Directive authorizes the CA to recover any costs the CA incurs from the former operator, including by drawing upon the Article 19 FS. This language appears to allow MS the following options with respect to determining required amounts of FS:

- (1) develop amounts of FS (a) specifically to cover the cost of operating the site for the time period required to issue a new permit (e.g., 3 to 5 years), except for amounts needed for monitoring, potential corrective measures, potential surrender of allowances, and closure, in addition to (b) separate amounts of FS for monitoring, corrective measures, surrender of allowances, and closure, with provisions allowing the CA to draw upon the FS for the covered obligations in the event the CA temporarily continues injection;
- (2) develop amounts of FS for operating the site for the time period required to issue a new permit (e.g., 3 to 5 years) including the costs of temporary continuation of injection, acceptance criteria obligations, monitoring, potential corrective measures, surrender of allowances, and closure.

Amounts of FS for site operations initially should be based on the operator's pro forma cash flow financial plan, updated later using actual cost information from the operator. There should be no offset to the cost estimate for presumed revenues, which may be unlikely to materialize in this situation.

This obligation would arise only one time for an individual operator because it would occur after withdrawal of the permit and with the intent to award a successor permit to another operator.

(d) Accounting for the Effects of Time on Amount of FS

As discussed above, most obligations subject to Article 19 FS could arise at any time over the lengthy lifecycle of a storage facility that has commenced injection. Some of the obligations also may have long durations. MS may take different approaches to reflect future inflation when determining amounts of FS:

- (i) Method 1: estimate all amounts (including for future years) in current year Euros and sum the yearly amounts to arrive at a total.
- (ii) Method 2: inflate estimated costs in later years to incorporate potential for inflation in those years and sum the yearly inflated amounts to arrive at a total.
- (iii) Method 3: periodically adjust the amount to account for actual inflation since the prior amount was calculated.
- (iv) Method 4: periodically recalculate FS amounts anew, either in current-year (Method 1) or inflated (Method 2) Euros.

Methods 3 or 4 may be used to complement Methods 1 and 2 for purposes of updating FS amounts.

Because future inflation is very difficult to predict, Method 1 simplifies the determination of FS amounts by not including predictions of future inflation. There is some financial risk of underfunding the obligations with this Method, if inflation is greater than zero. Regular updates to the FS amounts, discussed in (d)(i) below will mitigate that risk. Method 2 also may have some financial risk if the projected inflation factor used for determining the amounts of FS turns out to be less than the inflation experienced after drawing on the FS. On the other hand, if Method 2 overestimates future inflation, then the operator will have incurred some unnecessary costs for FS. Regular updates to the FS amounts can mitigate these Method 2 risks.

The technique of discounting can be used to determine a present value (PV) for a stream of monetary values over time. This technique principally addresses the time value of money – a euro next year is treated as less valuable than a euro this year. Sometimes discounting also is used to calculate a PV by adjusting for both inflation and the time value of money. The PV is always less than the sum total from adding yearly values (whether using Method 1 or Method 2). MS may identify instances when discounting future amounts into a present value may be used as the required amount of FS. Discounting should be used only, if at all, in connection with FS instruments where actual funds have been set aside in anticipation that their value will grow over time (e.g., in a trust fund or bank certificate of deposit). The discount rate should be approved or determined by the CA after-tax, should reflect the earnings rate appropriate for the FS instrument, and must be consistent with the

treatment of inflation in determining amounts of coverage<sup>8</sup>. Otherwise, basing the FS amount on the PV of the obligation is not appropriate.

(e) Options and Principles for Periodically Adjusting FS Amounts

Article 19(2) directs that the FS 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 under the CCS Directive as well as any obligations arising from inclusion of the storage site under ETS Directive.

(i) Updating Amounts of FS Due to Changes in Assessed Risks of Leakage

In the event of changes to the assessed risk of leakage, adjustments to amounts of FS may be made when amounts were based on scenarios that reflected the prior assessed risk of leakage. Thus:

- amounts of FS for monitoring may be changed to reflect different scale, scope, and/or intensity of annual monitoring costs;
- amounts of FS for corrective measures may be changed to reflect different scale and/or scope of potential corrective measures costs;
- amounts of FS for surrender of allowances may be changed if the change in the assessed risk of leakages indicates that assumptions about the quantity and timing of potential emissions should be adjusted;
- amounts of FS for closure and post-closure may be increased if the change to the assessed risk of leakage heralds increases in the cost of sealing and removal of injection facilities.

Note that this approach to updating amounts of FS due to changes in assessed risk of leakages does not involve multiplying the estimated amount of funds for a scenario by the probability that the scenario occurs. Such a calculation of expected value is not recommended as a method for determining amounts of required FS unless the calculation of the potential leakage amount is based on a probability distribution.

(ii) Updating Amounts of FS Due to Changes in Estimated Costs of Obligations

Changes in the estimated costs of obligations covered by FS can be due to other factors in addition to changes in the assessed risk of leakage. These factors can include the following:

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<sup>8</sup> If Method 1 is used, the discount rate should not include an inflation component. If Method 2 is used, the discount rate may include an inflation component.

- changes in scale or timing of injections;
- changes in the subsurface area covered by the CO<sub>2</sub> plume;
- changes in science and technology for monitoring, corrective measures, and closure and post-closure;
- changes in prices of emission allowances;
- inflation (which may impact different cost elements to different degrees);
- changes to the monitoring plan that affects scale, scope, intensity, and duration of monitoring;
- changes to the corrective measures plan that affect scale, scope, and duration of corrective measures;
- approved updates to the provisional post-closure plan that affect any of the estimated costs of closure and post-closure period obligations.

In particular, the amount of FS required for surrender of allowances will reflect the amount of CO<sub>2</sub> injected, which will increase during the operating life of the site.

(iii) Frequency of Adjustments to Amount of FS

The CCS Directive does not specify how often adjustments should be made to the amounts of the FS in the absence of a precipitating event such as a change to the assessed risk including leakage or significant irregularities. MS may want to set time frames for such updates taking into account the following benchmarks:

- the monitoring plan shall be updated every five years (and pursuant to Annex II requirements);
- 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 CA has occurred;
- the CA shall review and where necessary update the storage permit five years after issuance and every ten years thereafter (in addition to triggers listed in Article 11(3)(a)-(f)).

To synchronize with these benchmarks, MS may want to consider or adapt the following schedule for updates to the amounts of FS:

- every 3-5 years during operations;
- every 5-10 years after closure until transfer of responsibility;
- in case of leakage or significant irregularities, or where the monitoring plan is updated pursuant to Annex II of the CCS Directive.

Although a period of five years may be sufficient for adjustments to reflect inflation, MS may consider a 10-year period to be too long between inflation adjustments, particularly where amounts of coverage are based on Method 1 (current year cost method) described above. If Method 1 is used, five-year adjustment intervals are recommended. Where the amounts of coverage are based on Method 2 (out-year costs reflect potential inflation), the 10-year intervals may be acceptable. In scheduling periodic adjustments to the amounts of FS, MS may want to consider the following:

- periods of high inflation may call for more frequent updates than periods of low inflation;
- after closure, there will be no further injections, and changes in the subsurface area covered by the CO<sub>2</sub> plume should be minimal, suggesting that less frequent updates of FS after closure may be acceptable.

## 2.5 Acceptable Instruments for FS

### (a) Criteria to Consider in Accepting FS Instruments

The availability and features of FS instruments will vary in different MS and may require individualized negotiation involving the operator, the CA, and issuers (section 2.6 discusses criteria for issuers). Jurisdictions may want to consider the following criteria in determining which instruments to accept as FS:

#### (i) Certainty presented by the instrument. For example:

- Will the instrument be valid and effective in the MS jurisdiction where the storage site is located?
- Is the FS instrument accessible and enforceable by the CA in the MS jurisdiction where the storage site is located?
- Will the instrument protect the FS against claims of creditors and other competing claimants in the event of the operator's insolvency or bankruptcy?
- Will the instrument effectively remove the FS from the ownership or control of the operator?
- Under what conditions, if any, may the FS instrument be cancelled, terminated, non-renewed, voided, or suspended?
- Is the instrument issuer a financial institution that is subject to financial supervisory oversight of solvency?

(ii) Amount of funds assured. For example:

- Will the instrument provide less than full coverage if funds are required prior to a future maturity date? (This may be an issue for deposit certificates which impose a penalty for liquidation prior to maturity)
- Will the instrument cover funding needs from the first euro? (This may be an issue for instruments such as types of insurance that include a deductible or retention which remains the responsibility of the operator)
- Is the value of the security independent of the financial situation of the operator? For example, the operator's stock, bonds, or notes may lose value if the operator becomes insolvent or bankrupt. Other operator assets may be subject to prior or subsequent claims in whole or part by lenders, suppliers or customers, thus impairing their value.

(iii) Liquidity of funds so that they may be accessed whenever needed, with no penalty

- What steps, procedures, or conditions must be satisfied for the CA to gain access to the security? (For example, must proof of the operator's default be adjudicated?)

(iv) Duration or term of the instrument

- How often must the instrument be renewed or replaced, given the expected duration of the permit?

(v) Flexibility with a view to necessary adjustments. For example:

- If the required amount of FS coverage increases (see section 2.7(e)), can the instrument be readily amended accordingly or will an additional FS instrument be required to make up the difference?

Ideal instruments may not be available in every MS, which may mean having to accept some compromises in the desired certainty, amount, liquidity, duration, and flexibility of FS instruments. Independent expert opinions may be useful in evaluating FS instruments. The Guidance recommends using FS options that are simple, established, and low risk. Complex financial arrangements should be avoided as outside the core competencies of CAs; arrangements that appear to flout financial principles (e.g., more certainty and higher return) may contain hidden risks. The intent of FS and FC is to protect the taxpayers and these programmes should not be used for financial speculation.

The Laws of Finance Apply to FS

Note that certainty, liquidity, duration, and flexibility of financial security instruments often are inversely related to the potential rate of return and cost of an instrument.

Table 3 summarizes the generic strengths and weaknesses of types of FS instruments described in this Guidance.

**Table 3: Overview of different financial instruments**

| FS Option   | Certainty   | Amount  | Liquidity  | Duration   | Flexibility   | Cost   | Administrative Burden  |
|---|---|---|--|--|---|--|--|
| 1. Deposits to CA   | Excellent if deposits are not subject to claims of creditors of the operator. Very small risk of sovereign default.                     | Excellent for deposits of full FS amount. No investment risk for deposits of cash or cash equivalents. Sinking fund approach increases risk in proportion to length of build-up period.   | Excellent unless CA must obtain approval (e.g., legislative) to access or use funds. | Excellent. Can last as long as needed.                             | Excellent. Amount can be easily adjusted without need for another instrument.           | <u>Highest cost.</u> Sinking fund approach stretches out payments over time; the longer the pay-in period, the less the effective cost | <u>Low.</u> Must keep track of deposits, especially if payments made over time.                        |
| 2. Irrevocable Trust Fund   | Excellent if property in the trust fund is not subject to claims of creditors.  | Very good for fully-funded trust and where trust is not invested in securities issued by the operator and its corporate affiliates. Subject to risks of investments. Sinking fund approach increases risk in proportion to length of build-up period. | Depends on requiring trust investments to be liquid.                                 | Excellent. Trust can last as long as needed.                       | Excellent. Amount of trust can be easily adjusted without need for another instrument.  |  | <u>Low.</u> Monitor fund balance, including if payments made over time.                                |
| 3. Escrow Account   | Lacking, if escrow deposits are subject to claims of creditors and remain under the ownership and control of the operator.              | Very good for fully-funded escrows and where escrow is not invested in securities issued by the operator or its corporate affiliates. Sinking fund approach increases risk in proportion to length of build-up period.                                | Depends on liquidity of property put in escrow and investment restrictions.          | Good, although escrows typically are not long-term instruments.    | Excellent. Amount of escrow can be easily adjusted without need for another instrument. |  |  |
| 4. Bank Demand (Payment) Guarantee; Irrevocable Standby Letter of Credit; Surety Bond | Excellent unless available to claims of creditors. Certainty also depends on financial strength and supervision of issuing institution. | Excellent.  | Excellent. Designed to pay on demand.  | Good, although guarantees typically are not long-term instruments. | Good. Amount can be adjusted if mutually agreeable without need for another instrument. | <u>Low Cost.</u> Fees for creditworthy parties run 0.5% to 3% of amount assured, exclusive of collateral.                              | <u>Low.</u> Monitor continuity of coverage in the event of proposed cancellation or termination by the |

|  |   |  |   |   |  |   |  |
|--|---|--|---|---|--|---|--|
| (Payment Bond)   |   |  |   |   |  |   | issuer.  |
| 5. Prepaid Insurance Policy for Assurance of Closure and Post-closure Monitoring | Good unless available to claims of creditors and depending on policy terms and conditions. Certainty also depends on financial strength and supervision of issuing institution.   | Good, depending on terms and conditions of payout for early closure. | Good, depending on terms and conditions of payout for early closure and payouts for annual post-closure monitoring. | Excellent. Can last as long as needed.  | Good. Amounts can be adjusted if mutually agreeable without need for another instrument as long as adjustments are made sufficiently before scheduled closure. | <u>High Cost.</u> Typically, total premium must be paid within 1 to 3 years.  | <u>Low.</u> Monitor complete payment of premiums if spread over time.  |
| 6. Liability Insurance Policy for Payments Due to Leakages                       | Lacking, if policy is available to satisfy claims of creditors and depending on policy terms and conditions, which may not cover all causes of leakages. Certainty also depends on financial strength and supervision of issuing institution. | Good, depending on terms and conditions of payouts.                  | Good, subject to insurer claims management and payout practices.  | Good, although liability insurance policies typically are subject to termination, cancellation, and the like. | Excellent. Amount can be adjusted if mutually agreeable without need for another instrument.   | <u>Moderate Cost.</u> Depending on availability and terms of coverage, total premium might be up to 9% of amount of coverage for a 5 year coverage.   | <u>Moderate.</u> Evaluate policy terms and conditions and ensure continuity of coverage in the event of proposed cancellation or termination by insurer. |
| 7. Self-Assurance Based on Annual Financial Test                                 | Considered the most risky option because no protection from claims of creditors. Certainty also depends on stringency of required financial test.   | Excellent if operator can pass the required financial test.          | Depends on the operator's liquidity.  | Excellent. Can last as long as needed, if annual financial test is satisfied.                                 | Excellent. Amount can be easily adjusted without need for another instrument if operator can pass financial test for the adjusted amount.                      | <u>Least Cost.</u> Especially for companies with independently audited financial statements and/or applicable ratings such as for bonds. The only requirement would be a nominal annual fee | <u>Moderate.</u> Annual review required of financial statements and/or applicable credit ratings.  |

|   |  |  |  |   |  |  |  |
|---|--|--|--|---|--|--|--|
| <p>8. Corporate Guarantee from Affiliated Company Based on Annual Financial Test</p>                      | <p>Consider risky due to lack of protection from potential claims of the operator's creditors and potential high degree of financial connection between operator and affiliated guarantor. Certainty also depends on stringency of required annual financial test.</p> | <p>Excellent if guarantor can pass the required annual financial test.</p> | <p>Depends on liquidity of affiliated guarantor.</p> | <p>Excellent. Can last as long as needed, if annual financial test is satisfied.</p>  | <p>Excellent. Amount can be easily adjusted without need for another instrument if guarantor can pass the financial test for adjusted amount.</p>    | <p><u>Low Cost</u>, similar to self-assurance with additional paperwork.</p>                         |  |
| <p>9. Corporate Guarantee or Indemnity from Non-affiliated corporation Based on Annual Financial Test</p> | <p>Good if protected from claims of the operator's creditors. Certainty also depends on stringency of required financial test.</p>   | <p>Excellent if guarantor can pass the required financial test.</p>        | <p>Depends on guarantor's liquidity.</p>             | <p>Excellent. Can last as long as needed, if mutually agreeable, and as long as guarantor can satisfy the financial test.</p> | <p>Excellent. Amount can be easily adjusted if mutually agreeable without need for another instrument as long as guarantor can satisfy the test.</p> | <p><u>Low cost</u>, similar to guarantee from affiliated company, with a potential one-time fee.</p> |  |

## (b) FS Instruments Appropriate for Different Obligations

Obligations of storage site operators can be divided into two types:

- (i) Obligations Certain to Occur Although Timing May Change
  - monitoring and reporting during injection operations;
  - monitoring and reporting during closure and post-closure period.
- (ii) Obligations Not Certain to Occur
  - corrective measures in case of leakages, including measures related to the protection of human health;
  - surrender of allowances in case of leakages pursuant to the ETS Directive;
  - temporary site operations, including continuation of CO<sub>2</sub> injection, register, composition analysis, risk assessment, and reporting.

Instruments that can satisfy the criteria described in section 2.4(a) can be designed to address either or both types of obligations, unless constrained by the laws of an MS or by business decisions of issuers. Obligations dependent on the occurrence of leakages may be more amenable to FS coverage using liability insurance instruments than obligations which are certain to occur. Other types of prepaid insurance may be amenable to FS coverage of monitoring, closure, and reporting. The bank guarantee may be particularly suitable as an FS instrument for temporary operation of the site after withdrawal of a permit if the bank issuing the guarantee also is providing other financial services to the operator. That familiarity with the operator's injection business and cash flows may be useful to the CA if it decides to continue operations after withdrawing the permit.

If available instruments in a jurisdiction provide less than ideal levels of certainty, amount, liquidity, duration and flexibility, a package of different FS instruments may be an acceptable option where the strongest instruments cover obligations listed above in (i) and somewhat weaker instruments cover obligations listed above in (ii). As a first indication, the following could form part of an acceptable package:

- fully-funded trust fund as FS for closure and monitoring;
- corporate guarantee as FS for corrective measures;
- bank guarantee as FS for temporary continuation of injection following withdrawal of permit;

- insurance policy as FS for surrender of allowances.

The obligations that appear least likely to arise (namely, corrective measures due to leakages and surrender of allowances due to leakages) are also those which would impose the largest cost burden. This is so particularly for the surrender of allowances. For a well-developed technology, with a large number of relatively homogeneous sites and a long empirical history, some kind of risk-sharing approach would be appropriate in these circumstances – for instance, commercial insurance. However, the lack of experience with CCS and other factors create a high degree of uncertainty in estimating probabilities and magnitudes of leakages.

In the absence of commercial insurance a Member State may decide to provide insurance, by accepting some transfer of risk in relation to, e.g. the surrender of allowances in exchange for a non-refundable premium. In case Member States provide insurance in conditions that are more favourable than the market conditions, this may involve State aid within the meaning of Article 107(1) of the TFEU. In accordance with Article 108 of the TFEU, State aid must be notified and authorised by the Commission before it is granted.

In the case of a small number of sites, the cumulative non-discounted costs for the operator of such an approach are likely to be higher than the costs of an option implying no risk transfer (such as a bank guarantee), but the operator gains the benefit of the risk transfer. In the early phase of CCS, there will be very few sites in each Member State, and the premiums needed to ensure that the risk of a Member State exposure is low, would be high. Member States must ensure that adequate funds will be in place in the event that the FS has to be drawn on.

It is also open to Member States to decide to pool FS arrangements for the first mover sites to increase the number of projects participating in an insurance scheme and so reduce the premiums required to provide a given level of security to the Competent Authorities. The Member States would need to establish the arrangements for financing any liability in excess of the pool, and for sharing any profits and losses from the pool.

Other approaches may also be possible, and this discussion is not intended to be exhaustive or to recommend any particular option. Member States may also for instance decide to offer other risk-sharing arrangements with CCS operators on a case by case basis – subject to State aid approval (see above and Section 2.8 below)

#### (c) Options for Relating Changes in Assessed Risk to Acceptable Mechanisms

Although all acceptable types of instruments must be valid and effective for providing FS, there may be some differences in levels of certainty and liquidity associated with different types of acceptable instruments. Therefore, upon a change in the assessed risk of leakage, the CA may want to consider whether the operator should draw only from a subset of the allowable FS instruments.

#### (d) Key Terms and Conditions of FS Instruments

For FS instruments issued by a third-party (neither the operator and corporate affiliates nor the CA) or a related party (e.g., corporate affiliates), the instrument should incorporate provisions respecting potential cancellation, termination, renewal, voiding, or suspension by the issuer or the operator. At a minimum, provisions should include:

- sufficient advance notification to the CA and the counterparty;
- option for the operator to provide an approved substitute mechanism within a limited time period without penalty;
- option for the CA to draw funds from the mechanism prior to the effective date of cancellation, termination, nonrenewal, voiding, or suspension.

MS should include in the rules for FS, and in specific instruments as applicable, a provision to the effect that changes to the terms and conditions of the instrument may not be made without the prior written approval of the CA.

For government-provided FS instruments, the government issuer should commit to advance notification to the CA of any action or event that might affect the certainty, liquidity, or amount of funds available.

Each instrument should identify the obligations for which it may be used. In other words, an FS instrument to be used to assure the costs of closure should state that the CA may draw upon the instrument as needed for the costs of closure. An FS instrument to be used to assure costs of monitoring should state that the CA may draw upon the instrument as needed for the costs of monitoring.

#### (e) Coverage of Obligations in One or More FS Instruments

MS can consider the following options: (1) allow an operator to use a single FS instrument to cover multiple obligations, (2) allow the operator to combine multiple instruments for a single obligation, and (3) allow or require an operator to use different instruments as FS for different obligations.

If an operator is allowed to use multiple instruments as FS for a particular obligation, a best practice is to provide clear provisions regarding the order in which the instruments should be accessed by the CA if needed to fund performance of the obligation.

MS may request that FS for potential operating period obligations be separate from FS for potential closure/post-closure period obligations; or an FS instrument may cover potential obligations in both periods. Similarly, MS may require or allow separate FS for monitoring. Another option is to use a different instrument for

closure and post-closure monitoring than is used to ensure performance of obligations that are not certain to arise, such as obligations related to corrective measures, obligations to surrender allowances, and the temporary continuation of injection. After the MS has identified which obligations are to be covered by FS, as long as all of the applicable potential obligations are covered by FS, they can be carved up in different ways among FS instruments.

If a single instrument may cover some or all of the required obligations, MS have the following options:

- (1) require the single instrument to identify specific amounts for each obligation, or
- (2) allow the aggregate total to be available to the CA to cover any or all obligations under the permit.

The first option would establish limits on how much of the FS may be used for each type of obligation. The second option has the advantage of pooling the individual FS amounts so that if more funding is required for closure, for example, the CA may draw upon funding assured for other obligations.

FS instruments should include provisions that spell out the requirements which the CA must follow in order to access the assured funding. Irrevocable standby letters of credit that conform to the standards of the International Chamber of Commerce include standardized provisions for drawing upon the letter of credit. Other instruments may require that access provisions be negotiated.

## 2.6 Eligibility Criteria for Issuers of Acceptable FS Instruments

The security provided by an FS instrument depends not only on the terms and conditions of the instrument but also on the financial strength of the entity issuing the instrument. Therefore, MS may want to define criteria for determining acceptable issuers.

MS may want to draw upon issuer eligibility criteria used for national FS programs for waste facilities (e.g., landfills), extractive operations, decommissioning of offshore installations,<sup>9</sup> transfrontier movements of hazardous wastes,<sup>10</sup> environmental liabilities under Directive 2004/35/EC (ELD), and similar programs, taking into account lessons learned from those programs.

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<sup>9</sup> The 1998 Convention on the Protection of the Marine Environment of the North East Atlantic (“the OSPAR Convention”) established a new regime for the decommissioning of disused offshore installations including a ban on the disposal of offshore installations at sea. Legislation in MS may authorize CAs to require FS for such decommissioning.

<sup>10</sup> Article 27 of EU Council Regulation 259/93 requires that every shipment of hazardous waste within, into, and out of the European Community be covered by a financial guarantee or equivalent insurance to cover the costs of shipment or necessary re-shipment and the cost of alternative disposal or recovery of the waste but not damages to third parties.

(a) Criteria for Determining Eligibility of Issuers That are Financial Institutions

MS and national CA may want to specify criteria for identifying types of institutions eligible to issue acceptable FS instruments for purposes of Article 19. Criteria may address the types, sizes, or other characteristics of such institutions. For example, if a MS decides that bank guarantees are to be acceptable instruments, the MS also should determine whether to accept such guarantees from any bank or only from certain types of banks, banks of certain sizes, or banks satisfying other criteria (e.g., credit ratings from recognized or accredited rating organizations).

Eligibility criteria should be chosen in order to support the certainty and liquidity of an instrument and in consideration of the enforceability of the instrument by the CA. For example, issuing institutions that are subject to a higher level of financial supervision and approval may provide greater certainty and liquidity than institutions subject to less oversight.

MS should keep in mind that as eligibility criteria become more stringent, fewer issuers may qualify, which can affect the availability and cost of FS instruments to operators.

(b) Eligibility Criteria for Instruments Issued by Governments or Government Agencies

MS may decide that eligibility criteria are not needed when the FS instrument is issued by a national government. Such entities typically have ample liquidity and can secure funds through their powers to tax.

Governments at sub-national levels (city, town, state, or region) and government agencies lacking legal authority to tax or otherwise raise funds may provide less certainty and liquidity. MS may want to specify eligibility criteria for such entities. Criteria may relate eligibility to type, size, financial characteristics, and other features of such government bodies (e.g., credit ratings from recognized or accredited rating organizations).

(c) Eligibility Criteria for Self-Insurance, Captive Insurance, and Related-Party Guarantors

Eligibility criteria are important when the issuer of the allowable FS instrument is the operator itself or a related corporate parent or subsidiary. FS provided by such instruments do not entail a potential independent third-party source of funds; without that independence, there is a greater risk that whatever may cause the need for FS also may cause the self- and related-party instruments to fail. Some MS may decide not to accept such instruments because of the lack of independence. Other MS made decide to accept such instruments because

- the probabilities of issuer default for self- or related-party guarantees are absolutely low, even if somewhat greater than for the default of an issuing financial institution;
- the costs of alternative instruments are much higher<sup>11</sup>;
- alternative instruments are not readily available;
- some entities issuing self- and related-party guarantees may have greater resources than banks and other financial institutions.

Eligibility criteria for issuers of acceptable self-guarantees and related-party guarantees may be based on the issuers' size, type of organization (e.g., a public utility), indicators of financial strength, and other characteristics that may affect the certainty and liquidity of their commitments (e.g., credit ratings from recognized or accredited rating organizations).

As is true for the other categories of issuing institutions, eligibility criteria will reduce the potential pool of parties that may provide acceptable FS instruments, with possible implications for cost and competition.

## 2.7 Establishing and Maintaining FS

### (a) Responsible Parties

The operator is responsible for establishing and maintaining FS.

### (b) Proof of Validity and Effectiveness of FS for Storage Permit Application

Article 19 of the CCS Directive requires that the potential operator applying for a storage permit must present proof that adequate FS will be valid and effective before commencement of the injection. The arrangements to be decided by MS should include criteria for the "proof" required in connection with the permit application. Proof would comprise the necessary documents to be submitted with the application.

The CCS Directive does not require that the FS be valid and effective at the time the permit application is submitted. But the FS must be valid and effective before commencement of injection.

MS need not define "valid and effective" as part of their arrangements, and the CCS Directive does not define those terms. However, MS may want to consider or adapt the following definitions:

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<sup>11</sup> The costs of alternate instruments always will be greater than the nominal costs of self- and related-party instruments. Alternate instruments provided by financial institutions are often issued for customers that are considered creditworthy. The costs of such instruments should not be interpreted as evidence of the customer's potential for default. Instruments acceptable for FS purposes are intentionally not well-suited for speculative activities.

- An FS instrument is “valid and effective” when it satisfies the legal criteria for that type of instrument, it is issued by an eligible party, it is enforceable by the CA, and otherwise conforms to the laws of the MS jurisdiction where storage will occur.
- An FS instrument is “valid and effective” when it has been properly executed by all required signatory, authorizing, witnessing, and/or attesting parties as being effective as of a stated date prior to the date when injection commences.

MS may want the presentation of proof in the permit application to include one or more of the following:

- Copies of the FS instrument and necessary accompanying documents (e.g., resolutions, powers of attorney);
- Explanation how the FS instrument satisfies the criteria for that type of instrument;
- Demonstration that the issuing institution satisfies the eligibility criteria for issuers of that type of instrument;
- Explanation of any deviation from the criteria and statement regarding the impact of such deviations on the certainty and liquidity of the FS;
- Independent legal opinion regarding validity and effectiveness;
- Basis for proposed initial amounts of FS, including description of all calculations, data, and data sources, and documentation of assumptions used.

(c) Review and Approval/Disapproval of FS in Storage Permit Applications

(i) Both FS instruments and FS amounts should be reviewed and approved by the CA.

The CA may choose to review instruments and amounts in parallel or may prefer to review instruments before amounts, or vice versa. MS may draw upon procedures used for similar FS programs and lessons learned from those programs in deciding upon procedures to be used in connection with review of FS for storage permits under the CCS Directive.

(d) Reporting

Article 14 states that at least once per year the operator shall submit to the CA proof of putting in place and maintaining the FS. More frequent reporting, although authorized under the CCS Directive, should rarely be required.

MS may want to describe specific information to be provided by the operator with respect to annual reports on maintenance of FS. For example, required information could include the following:

- any changes made to the wording of FS instruments without the written approval of the CA;
- demonstrating that the issuing entity continues to meet eligibility criteria;
- information about costs (e.g., of site operations, of monitoring and of complying with CO<sub>2</sub> acceptance criteria);
- demonstrating that the FS is still adequate with respect to the most recent risk assessment of the storage site.

Specific FS instruments may require additional information. For example, where an instrument (such as an insurance policy) requires regular payments of premium, the operator's annual reports may provide evidence to the CA that the required payment was made. The operator should report when an instrument has been renewed or extended after a termination date.

### Changes in Wording of FS Instruments

MS are encouraged to consider making explicit provisions that no changes may be made to the wording of FS instruments without the prior written approval of the CA. In addition, when reviewing instruments submitted in connection with the permit application or subsequently, the CA should be alert for and object to any language that would allow changes to the wording of the instrument with the prior written approval of the CA.

Most acceptable FS instruments should require little maintenance from year-to-year.

#### (e) Periodic Adjustments to FS Amounts

, Article 19(2) of the CCS Directive requires that the FS be periodically adjusted to take account of changes to the assessed risk of leakage and the estimated costs of obligations, to account for inflation and/or for real increases (i.e., increases not due to inflation) in the costs of fulfilling obligations under the permit. Options and principles for adjusting the amounts of FS are described in section 2.4(d). Changes to the required amount of FS must be reflected in FS documentation such as by:

- (i) increasing the amounts of the FS instruments, which may require execution and submission of new documents;
- (ii) adding a properly executed and valid instrument that can cover the needed increase in amount of coverage.

If the second option is used, the instrument should clearly state how it is to be used with regard to other instruments providing FS for the storage permit.

#### (f) Substitution/Replacement of FS Instruments

An FS instrument presented by the operator as a substitute or replacement should be reviewed against instrument and issuer eligibility criteria and should provide an equivalent amount of FS. Until the CA has approved the substitute/replacement FS, the existing FS should remain valid and effective. After the substitute/replacement FS has been approved and becomes effective the prior FS instruments may be allowed to terminate or be cancelled.

#### (g) Change in Operator or Ownership of Storage Site

MS should review whether a proposed change in the entity serving as the operator of the storage site or a change in ownership of the site would impair the validity or effectiveness of the site's FS. For some instruments, such change may require substitute or replacement FS. Such changes also may affect issuer eligibility where self- or related-party guarantees were being used.

(h) Cancellation/Termination/Nonrenewal/Voiding/Suspension of FS Instruments by Issuer

MS arrangements for FS should include provisions relating to cancellation, termination, non-renewal, voiding, or suspension of FS instruments by issuers. The preferred option should be that only FS instruments are accepted that may not be cancelled, terminated, non-renewed, voided, or suspended by their issuers. If this approach would unacceptably narrow the market and so increase costs, MS should require the following:

- requiring sufficient prior notice to operators and the CA of the issuer's intent to cancel, terminate, non-renew, void, or suspend the instrument so that a substitute or replacement instrument can be provided, and
- allowing the CA to draw funds from an instrument prior to its cancellation, termination, non-renewal, voiding, or suspension if the operator does not timely produce an approved substitute instrument.

(i) Incapacity of FS Instrument Issuer

As opposed to an issuer's voluntary decision to cancel, terminate, non-renew, void, or suspend an FS instrument, "incapacity" refers to situations where the issuer:

- ceases to satisfy the eligibility criteria;
- loses its legal authority to issue the FS instrument.

Although desirable, prior advance notice of incapacity by the issuer to the operator and the CA may not be possible or may not occur. MS should require that the operator provide a substitute or replacement FS instrument within a specified time period after learning of the issuer's incapacity in order to maintain FS as required by Article 19.

(j) Drawing upon FS Instruments when Needed

MS should ensure that procedures and criteria for drawing upon each allowable type of FS instrument are clear and workable. The instruments should be drafted so that funds can be drawn for any of the potential obligations being covered by the FS at any time.

(k) Release from FS Requirements

Article 19 describes three situations when an operator need no longer maintain FS:

- (i) when a new storage permit has been issued after withdrawal of the storage permit pursuant to Article 11(3);

- (ii) when a storage site has been closed pursuant to Article 17(1)(a) or (b) and the responsibility for the storage site is transferred to the CA pursuant to Article 18(1) to (5), and
- (iii) where the site is closed pursuant to Article 17(1)(c) until the transfer of responsibility pursuant to Article 18(8), provided the Article 20 financial obligations have been fulfilled.

The CCS Directive does not require that the CA formally release the operator or the FS instrument(s) when the requirement to maintain the FS ends. However, the FS should be released if not used by the CA or after a valid substitute FS has become effective. For example, after the operator completes closure, the following FS should be released:

- FS for closure, and
- FS for temporary continuation of injection.

The key elements of a procedure for release of FS include:

- defining the roles and responsibilities of the operator and the CA;
- criteria for release;
- notification of issuers of FS instruments.

The procedures, which may be uniform for all acceptable forms of FS or may differ for specific types of FS, should state whether

- the operator is responsible for asking the CA for permission to release FS;
- the operator may unilaterally release FS;
- the CA may decline to release FS and reasons for doing so;
- the CA alone may release FS.

Procedures should indicate any required findings or rationales.

Issuers should be formally notified about release of FS, including when the FS need no longer be maintained.

Where the FS took the form of funds or other assets given to the custody of the CA, release will entail the return of those funds or other assets to the operator. The CA should require a written receipt or acknowledgement from the operator as evidence that the FS was received by the operator.

## 2.8 State Aid Implications

Where State aid within the meaning of Article 107(1) of the TFEU is involved in the establishment of the FS, in accordance with Article 108 of the TFEU, that State aid must be notified and authorised by the Commission before it is granted.

### 3. Article 20: Financial Mechanism

This GD follows the structure of the CCS Directive in addressing Article 19 Financial Security (FS) in a separate part from the discussion of Article 20 Financial Contribution (FC). Nevertheless, these two articles are linked by similar intent, and by similar options available to MS for their implementation:

- (1) An intent of Article 19 FS is to ensure that the costs of performing any necessary monitoring, safety, or related obligations, should the operator be unable or unwilling to do so, or if the permit is withdrawn under Article 11(3), are fully covered. Article 19 FS also intends to limit any delays in performance of these obligations by assuring the ready availability of funds. Article 20 shares the intent that the post-transfer costs of at least the monitoring obligation for a period of 30 years need to be fully covered by the operator and that necessary funds be readily made available to the CA.
- (2) To a certain extent similar options are available to MS in making arrangements for Article 19 FS and Article 20 FC. For example, the same instrument could be used for both sets of obligations, or the obligations could be assured using different instruments or groups of instruments, as described in section 2.4 of this GD.

Although the FC under Art. 20 need not be made available to the CA until the end of the post-closure period, the operator's injection-related revenues will have ceased with site closure and there is financial risk to the taxpayer unless the FC has been secured at an early stage of the storage project. Art. 19(3)(b)(ii) requires that the FS can only be released if the FC under Art. 20 has been provided. This condition might however not be able to be met if, for example, the operator has gone insolvent and if the FS under Art. 19 has at this stage already been exhausted to meet other obligations under the storage permit. Therefore, the FS should in substance also cover the FC required under Art. 20.

Section 3 of the GD also identifies options for FC that may differ from the guidance for FS and discusses provisions that are unique to Article 20.

#### 3.1 Legislative Context

Because the CA may have to bear costs, such as monitoring costs, after the transfer of responsibility, Article 20 of the CCS Directive states that a "financial contribution" (FC) be made available by the operator to the CA before the transfer of responsibility takes place and on the basis of arrangements to be decided by MS. Notably, Article 20 states that MS "shall ensure" that the operator makes the FC available. Article 20 requires that the operator's contribution cover at least the anticipated cost of monitoring for a period of 30 years. This guidance elaborates on how these costs can be estimated with a view to ensure transparency and predictability for operators.

## 3.2 Definitions of Financial Contribution (FC)

Just as the CCS Directive does not define “financial security or any other equivalent,” it also does not define “financial contribution.” For the reasons described above, MS may decide that the same types of instruments acceptable for assuring obligations arising under the permit may be acceptable for assuring the post-closure obligation for the FC. Using the same set of criteria and procedures also has the benefit of simplifying administration of the programmes.

All of the discussion in Part 2 of this Guidance about FS instruments is applicable to assuring the FC except for material specific to closure and to temporary continuation of operations after permit withdrawal. However, MS may want to consider two additional points:

- (1) If MS are willing to consider an expected value (see section 3.4) approach to determining and updating the amount of the required FC, if any, for corrective measures and surrender of allowances due to leakages, those MS also may want to consider accepting somewhat more risk with regard to the use of build-up periods (“sinking funds”) for monitoring obligations to be covered by the FC.
- (2) It should not be assumed that the idea of a prepaid insurance policy for financial assurance of geological sequestration site closure and post-closure monitoring would necessarily also extend to an additional 30 years of monitoring after the transfer of responsibility. Insurers willing to issue a policy for such obligations arising under the permit may be unwilling to assume the additional risk from covering the FC. (Although “prepaid,” the insurer does assume risk under this product.)

## 3.3 Post-Transfer Obligations that FC May Cover

Article 18(1) of the CCS Directive states that the post-transfer obligations of the CA include the following:

- monitoring – reduced level which allows for detection of leakages or significant irregularities (Article 18(6));
- corrective measures in the event of leakages or significant irregularities;
- surrender of allowances in the event of leakages, pursuant to the ETS Directive.
- obligations for preventive and remedial action under Articles 5(1) and 6(1) of Directive 2004/35/EC (ELD)

MS arrangements may limit the required FC to the anticipated cost of monitoring for a period of 30 years, or may require the contribution also to cover one or more of the following:

- additional years of monitoring;
- potential costs of corrective measures for a defined time period;
- potential costs of surrender of allowances due to leakage for a defined time period;
- potential costs of preventive and remedial action pursuant to Articles 5(1) and 6(1) of Directive 2004/35/EC (ELD).

To provide predictability to site operators, it is expected that the CA will define in connection with permit issuance the length of the monitoring period and any other obligations the FC is to cover, as determined at that time. Section 3.4(b) discusses updates.

### 3.4 Estimation of Amounts

The CCS Directive does not require that the FC covers the full estimated amount of the costs which the CA will incur for the post-transfer obligations. Nor is there any restriction on setting the amount of the FC at a value that might represent the full costs of those obligations.

MS that decide to have the FC address more than 30 years of low intensity monitoring are encouraged to clarify requirements as early as possible.

#### (a) Setting the Initial Amount of Contribution

The approaches described in section 2.4(c) to determine amounts of obligations potentially covered by Article 19 FS also may be used for estimating amounts of the required Article 20 FCs. The Article 19 guidance describes methods for assuring the reasonable full costs of potential obligations. However, MS may want to consider two additional considerations in calculating amounts under Article 20:

- (i) use of expected value techniques;
- (ii) number of occurrences for contingent obligations.

i. Expected Value. With respect to determining the amount of the Article 20 FC, unless MS want CA to recover full cost from the FC, MS may allow use of expected value techniques for estimating FC amounts for contingent obligations in addition to using more deterministic approaches to estimating the FC for monitoring. In other words, when calculating an amount for FC, the probability of occurrence of each type of contingent event may be factored into the cost estimates. This method is acceptable for Article 20 but not for Article 19 FS because full coverage of CA costs after transfer of responsibility is not necessarily required by Article 20. In addition, MS with multiple storage sites can pool the risks of contingent obligations to some

degree. Where the MS intends for the operator's FC to cover the CA's full costs, then the expected value approach should not be used.

ii. Frequency of Occurrence of Contingent Events. After the transfer of responsibility, the CA becomes responsible for post-transfer obligations. Therefore, contingent liabilities such as for corrective measures, surrender of allowances, and preventive and remedial actions may arise multiple times after transfer, subject to the limiting factor that leakages will cease if the entirety of releasable stored emissions is released (taking into account that in most storage settings, release of 100% of stored CO<sub>2</sub> would be physically impossible). Thus, the amount of the FC may be based in multiple occurrences of these obligations.

#### (b) Updating or Adjusting Contribution Amounts

Article 20 of the CCS Directive requires that the contribution from the operator take into account criteria and elements relevant to determining the post-transfer obligations of the CA:

- Criteria. Annex I to the CCS Directive includes criteria for the characterization and assessment of the storage complex and surrounding area. Section 2.4(e) discusses how changes to the assessed risk of leakage may be accounted for in estimating the amounts of obligations.
- Elements. Elements related to the history of storing CO<sub>2</sub> also may be relevant to determining post-transfer obligations of the CA. In particular, the occurrence of leakages or significant irregularities, detection of significant adverse effects, and assessment of the effectiveness of corrective measures taken may affect estimates of the probability, duration, scale and scope, intensity, and timing of post-transfer obligations.

The criteria referred to in Annex I to the CCS Directive and relevant elements relating to the history of storing CO<sub>2</sub> may be used to adjust the target amount of the FC based on the site's history:

- recalculate monitoring costs using different assumptions about the intensity, scale, and scope of post-transfer monitoring;
- recalculate monitoring costs based on costs for more than 30 years of monitoring;
- determine whether the FC should include costs for corrective measures, and/or recalculate corrective measures costs based on different assumptions about the scale, scope, and duration of corrective measures and their frequency over a defined time period;
- determine whether the FC should include potential costs to surrender allowances, and/or recalculate the costs for surrender of allowances based on different assumptions about the likelihood that surrender of allowances may be required,

the potential quantity of emissions that may be released, and timeframes when such releases and surrenders may occur.

The “history of storing CO<sub>2</sub> relevant to determining the post-transfer obligations” should refer to the history only at each permitted site and not to the collective history at all sites of the operator.

MS should consider whether the procedures for Article 20 should differ from the Article 19 FS procedures under which the amounts of FS continue to be regularly reviewed and updated through the post-closure period.

### **3.5 Availability of Contribution to the CA**

MS may decide to spell out specific procedures and timetables for fulfilment of the financial obligations referred to in Article 20.

Availability criteria should emphasize such indicators as the following:

The FC is available to the CA when

- the CA can exercise exclusive rights of ownership, control, possession, and disbursement of the FC;
- the operator transfers to the CA or relinquishes all rights and claims with respect to the FC.

It is anticipated that the FC will involve a one-time transaction between the operator and the CA. MS may make other arrangements.

### **3.6 Use of the Contribution by the CA**

Article 20 does not require the FC to be used in any specific manner. Clause 1 states only that the FC may be used to cover the costs borne by the CA after the transfer of responsibility to ensure that the CO<sub>2</sub> is completely and permanently contained in geological storage sites after the transfer of responsibility.

### **3.7 State Aid Implications**

Where State aid within the meaning of Article 107(1) of the TFEU is involved in the establishment of the FC, in accordance with Article 108 of the TFEU, that State aid must be notified and authorised by the Commission before it is granted.

## 4. Summary

This GD addresses Article 19 (Financial Security) and Article 20 (Financial Contribution) of the CCS Directive. The guidance provides information and options that MS may choose to use in establishing an effective system for FS, including options for defining FS instruments or acceptable equivalents, determining amounts of FS for site operators' obligations under the CCS Directive, criteria for issuers of FS instruments, and procedures for establishing, maintaining, and releasing FS. The guidance also describes options for determining the amount of the financial contribution to be made available by operators prior to transfer of their storage sites to their CAs, including similarities and differences with methods described for determining amounts of FS. The guidance encourages MS to secure the payment of the FC through the instruments and procedures described for FS. For both Article 19 and Article 20, the guidance describes the legislative context and the relevant obligations from the CCS Directive. The Guidance recommends options that are simple, established, and low risk. Complex financial arrangements should be avoided as outside the core competencies of CAs; arrangements that appear to flout financial principles (e.g., more certainty and higher return) may contain hidden risks. The intent of FS and FC is to protect the taxpayers and these programmes should not be used for financial speculation.

## 5. Acronyms

|                 |  |
|-----------------|--|
| CA or           |  |
| CAs             | Competent Authority or Competent Authorities                                   |
| CCS             | Carbon Dioxide Capture and Storage   |
| CEA             | Comité Européen des Assurances (European insurance and reinsurance federation) |
| CO <sub>2</sub> | Carbon dioxide   |
| e.g.            | For example  |
| ETS             | Emission Trading Scheme  |
| etc.            | Et Cetera (Latin: And So Forth)  |
| EU              | European Union   |
| EUA             | European Union Allowance   |
| FS              | Financial security   |
| GD              | Guidance document  |
| GSFA            | Geologic Sequestration Financial Assurance                                     |
| i.e.            | Id est (Latin: that is)  |
| MS              | Member State(s)  |
| PV              | Present value  |
| UK              | United Kingdom   |
| URDG            | Uniform Rules for Demand Guarantees  |
| USA             | United States of America   |
| TFEU            | Treaty on Functioning of the European Union                                    |

## 6. References

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.

Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC.

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.

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

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