



potentially on track and running a surplus to meet its contribution under present project timelines. The delivery gap behind the litigation is stark. Operational NZIA-eligible injection capacity currently stands at approximately 0.025 Mtpa (Ravenna CCS Phase 1). Two projects have reached final investment decisions: Greensand at 0.4 Mtpa and Porthos at 2.5 Mtpa. Article 23 Watch (2026) estimates that up to 43 Mtpa could be possible by 2030, with the full 50 Mtpa more likely achieved by 2032. Cavanagh and Lockwood (2025) estimate EU-only operational capacity between 23 Mtpa (expected) and 39 Mtpa (possible), with storage permits as the qualified capacity metric likely to align with 50 Mtpa (EC, 2026)

The penalty architecture compounds the problem. Member States must legislate “effective, proportionate, and dissuasive” penalties by 30 June 2026; few have begun. Germany, the most advanced, proposes €100 per tonne of unmet capacity when adjusted for inflation with 2012 as the baseline year – mirroring the EU ETS approach to compliance. At around €150 per tonne in 2030, penalties for ExxonMobil and Shell, two of the A23 litigants with deficits, would amount to 1–2% of annual profits in a normal year. For OMV Petrom, Romgaz, and Orlen, the same penalties represent somewhere between two-thirds of annual profits and a net loss. Penalties sized to deter majors represent a significant financial impact on mid-tiers; penalties calibrated to mid-tiers are little more than a rounding error for majors. National derogations, where warranted, will likely soften this in practice.

The deeper structural issue, however, is scope. Article 23 applies exclusively to EU oil and gas producers. The EU imports approximately 80% of its fossil fuel supply (Eurostat, 2026). As domestic production declines, the obligated population will shrink. The entities placing the majority of fossil carbon on the European market, importers, face no equivalent obligation. This is the gap that no recalibration of penalties can close. The EU needs a mechanism that generates durable demand for storage from the entities that actually supply the market.

Extending Producer Responsibility

We propose extending the responsibility placed on producers with a deposit scheme. This is applied to all entities placing fossil fuel on the EU market – Figure 2. The EU already applies an extended producer responsibility (EPR) to packaging, batteries, electronics, and end-of-life vehicles; the principle that the entity placing a product on the market bears responsibility for its environmental cost is well established in European law (Jenkins et al., 2023). We extend it to fossil carbon. The entity placing the fuel on the market provides for the storage of a rising fraction of the CO₂ embedded in that fuel. This functions as a deposit, not a tax nor a subsidy. It is a condition of market access that requires the fossil fuel industry to internalise its product’s primary externality. The mechanism operates through a calculated stored fraction, applied at the point of first sale, that rises incrementally over three decades. Table 1 sets out the trajectory and its translation into storage volumes.

Table 1 Deposit-to-storage translation. Scope 3 intensity of 500 kg for oil and 400 kg for gas (boe).
 $\text{Storage (Mtpa)} = \text{Deposit (\%)} \times \text{Volume (bn boe)} \times \text{Carbon intensity (kgCO}_2\text{e/boe)} \times \text{Market Share}$

Year	Deposit	Storage (Mtpa)	Oil Import (bn boe)	Gas Import (bn boe)	Market Share
2030	3%	50	~3.0	~1.5	80%
2035	10%	100	~1.7	~1.0	80%
2040	25%	200	~1.4	~0.8	80%
2050	50%	250	~0.9	~0.5	80%

The cost is transparent and bounded. At early stored fractions (3–5%), the deposit adds 1–5% to the wholesale value of the fuel. The maximum per-tonne cost is capped by offshore CO₂ transport and storage costs, currently €34–209/tCO₂ with a median of €106/tCO₂ (Clean Air Task Force, 2025). Suppliers embed the storage cost in their wholesale price, precisely as they embed extraction, processing, and transport costs today. No taxpayer subsidy is required. The Innovation Fund, Connecting Europe Facility, and national contracts for difference serve as bridge financing; the deposit



is the permanent demand foundation. The proposed legislative vehicle is the Hydrocarbons Licensing Directive (94/22/EC), currently under review by DG ENER. The Directive governs authorisations for hydrocarbon exploration and production, targets a small, identifiable, already-regulated population, and is being reshaped for the managed decline of European fossil fuel production. Embedding the deposit here avoids the ETS review cycle and side-steps CBAM complexities. The Clean Energy Investment Strategy, planned for early 2027, provides the legislative window.

The deposit aligns with the stored-fraction trajectory modelled by Jenkins et al. (2021), who proposed a Carbon Take Back Obligation (CTBO) rising from 0% to 100% by 2050, consistent with 1.5°C scenarios. Our mechanism differs in three respects: it operates as a deposit at EU market entry, defraying storage costs rather than taxing profits; it is housed in a specific legislative instrument rather than an abstract construct; and it increases from 3% to just 50% in 2050. This translates the academic CTBO concept to a deposit scheme as an implementable policy mechanism.

Kuijper et al. (2021) reached similar conclusions in their Netherlands feasibility study, identifying producers and importers as the natural obligated population. The interaction with the NZIA is complementary. Article 23 builds capacity among EU producers; the deposit generates durable demand from the import-dominated supply base. Capacity developed under Article 23 counts toward deposit obligations and no duplication arises. As such, the two mechanisms are concentric; the deposit creates the enduring demand signal that makes CO₂ transport and storage infrastructure bankable.

From argument to arithmetic

The deposit's effectiveness at the corporate level depends on how the obligation enters company accounts. We draw on emerging research into the integration of the embedded cost of carbon, conservatively assessed at \$185/tCO₂ (Rennert et al., 2022), into corporate financial frameworks. If the storage deposit is structured as a financial liability recorded at the point of first sale, it moves from the contested terrain of an ESG narrative into the more rigorous domain of financial compliance, analogous to environmental remediation provisions already recognised under IFRS and GAAP. The distinction matters: while discretionary boardroom arguments about sustainability strategy are routinely contested, regulated line items in the bookkeeping are not. The deposit becomes self-executing: a formulaic provision, audited and reported, that requires no annual advocacy to survive a change of management or a poor earnings quarter. This transforms the compliance pathway from one that depends on corporate goodwill to one that operates through the ordinary machinery of financial reporting.

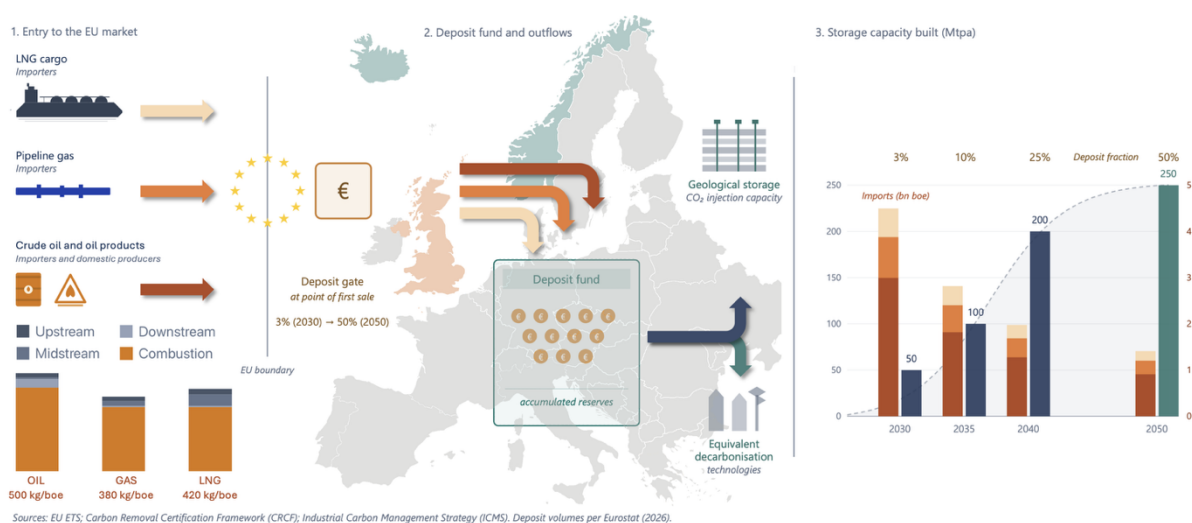


Figure 2 The EPR-like deposit mechanism. Fossil fuel enters the market (left); the deposit is applied at the point of first sale (centre); the resulting demand signal flows to geological carbon storage (right). Domestic producers are covered by Article 23 and the deposit, importers by the deposit only.



Conclusions

The 2030 storage target is a necessary and timely first step towards creating a European market for geological carbon storage. While the NZIA has established the obligation and allocated it pro rata among EU producers, the analysis above suggests that this architecture alone will not generate storage infrastructure at the pace required beyond 2030. The EPR-inspired deposit we propose addresses the structural gap. By attaching a rising storage obligation to all fossil fuel placed on the EU market, not just the declining fraction produced domestically, it generates permanent, self-financing demand for geological carbon storage. The mechanism is grounded in established EU environmental law, housed in a legislative instrument already under review, and calibrated to a trajectory consistent with the EU's own scenario modelling. At early stored fractions the cost impact is modest; at maturity it reflects the true environmental cost of fossil fuel consumption.

As fossil fuel demand declines, the EU holds a valuable, diminishing market. Suppliers want access. The deposit is a condition of that access: a requirement that the industry providing the fuel also provides for the management of its primary externality. The principle is familiar, having been applied to batteries, to packaging, and to vehicles. Fossil carbon, the largest and most consequential emissions stream in the European economy, has so far been exempt. We argue that exemption should end.

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