BANNING THE DUMPING AT SEA OF POLLUTED SEDIMENTS - THE FRENCH CHOICE

Dolbeau Xavier[1], Bataillard Philippe[2], Dréau Alain[3], Vayssié Aurélie[4], Bailly-Maître Marie-Laure[4] and Burtschell Lugdiwine[4].

[1]EGIS, 889 Rue de la Vieille Poste, 34965 Montpellier, France

[2]BRGM – French Geological Survey, 3 avenue Claude Guillemin, Orléans, France

[3]IDRA, La Haye de Pan, 35170 Bruz, France

[4]Ministry of Territorial Planning and Decentralization, Ministry for Ecological Transition and Territorial CohesionParis, France

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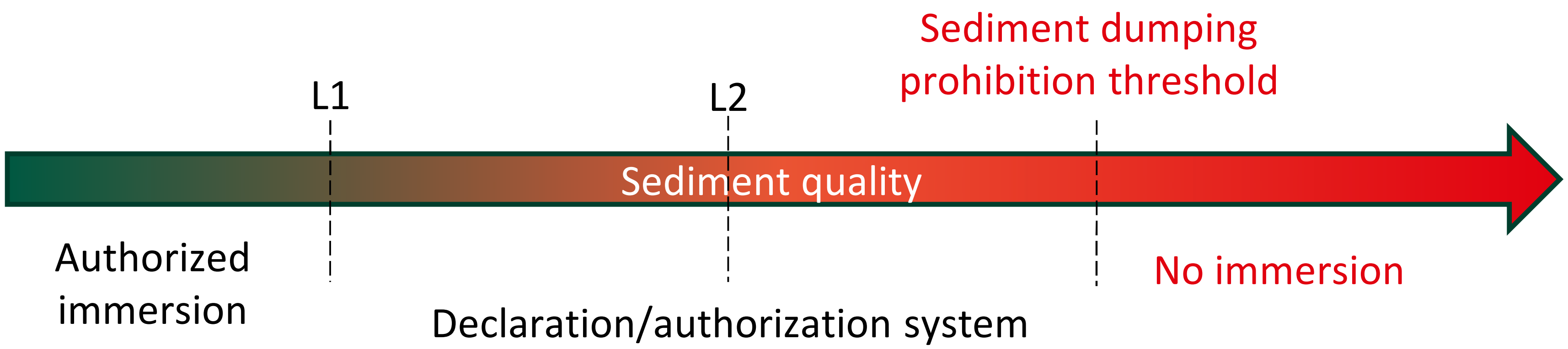
CONTEXTE

Article 85 of the French Blue Economy Act of 2016

« From January 1, 2025, the discharge of polluted sediments and dredging residues into the sea will be prohibited. A system for treating sediments and residues and recovering associated macro-waste will be put in place.

The thresholds above which sediments and residues cannot be dumped will be defined by regulation. »



CONTEXTE AND OBJECTIVE:

The study proposed scenarios for dumping prohibition thresholds, expressing the financial and environmental consequences of each of these choices.

The Ministry in charge of this issue made its decision based on the results obtained.

The work is carried out under the auspices of a technical committee composed of:

- DGITM,
- DGALN,
- DEB,
- DGPR,

Government departments

- IFREMER,
- CEREMA,

Expert organisations

- GPM Nantes-St-Nazaire – GEODE,
- GPM Bordeaux,
- GPM La Rochelle,
- GPM La Réunion.

Grands Ports Maritimes of France

Thresholds scenarios

<u>Two scenarios based solely on chemical thresholds:</u>

- The N2 threshold with regionalization of thresholds for overseas ports based on available studies;
- an ALT1 threshold established on the basis of the upper value of the IMO's Interim Action Levels (IAL).

<u>A N* scenario based on an hypothetical and progressive “triad” approach</u> (chemistry, bioassays, and biological indicators), that would bring ashore a nearly constant percentage of dredged sediments.

	N2	ALT1
Métaux (mg/kg)		
Arsenic	50	100
Cadmium	2,4	10
Chrome	180	370
Cuivre	90	368
Nickel	74	140
Mercure	0,8	1,2
Plomb	200	500
Zinc	552	600
HAP (µg/kg)		
Acénaphtène	260	370
Acénaphtylène	340	480
Anthracène	590	830
Fluorène	280	390
Naphtalène	1 130	1 590
Phénanthrène	870	1230
Benzo(a)anthracène	930	1310
Benzo(a)pyrène	1 015	1 430
Benzo(ghi)pérylène	5 650	7 970
Benzo(b)fluoranthène	900	1270
Benzo(k)fluoranthène	400	560
Chrysène	1 590	2 240
Indéno[1,2,3- cd]pyrène	5 650	7 970
Dibenzo(a,h)anthracène	160	230
Fluoranthène	2 850	4 020
Pyrène	1 500	2 120
PCBi (µg/kg)		
CB 28	10	13
CB 52	10	13
CB 101	20	26
CB 118	20	26
CB 138	40	53
CB 153	40	53
CB 180	20	26
Butylétains (µg/kg)		
TBT (tri-butylétain)	400	400

Scenario N* or “GEODRISK 2.0” scenario

- An approach that allows for **better consideration of the “effect” dimension of pollutants**; total content is not always the most relevant indicator for assessing pollution, as pollutants are not always bioavailable.
- No thresholds as such, but the **implementation of a progressive risk characterization method** similar to GEODRISK in the early 2000s (which will need to be updated if such a scenario is ultimately adopted).
- With regard to the consequences on the **volumes** deposited on land (**V**), **three sub-scenarios** (a, b, and c) are being studied: they consider variable, hypothetical proportions of N1<>N2 and >N2 sediments brought ashore according to the following equation:

$$V_{(N^*i)} = x\% \text{ of } V_{(N1<>N2)} + y\% \text{ of } V_{(>N2)}$$

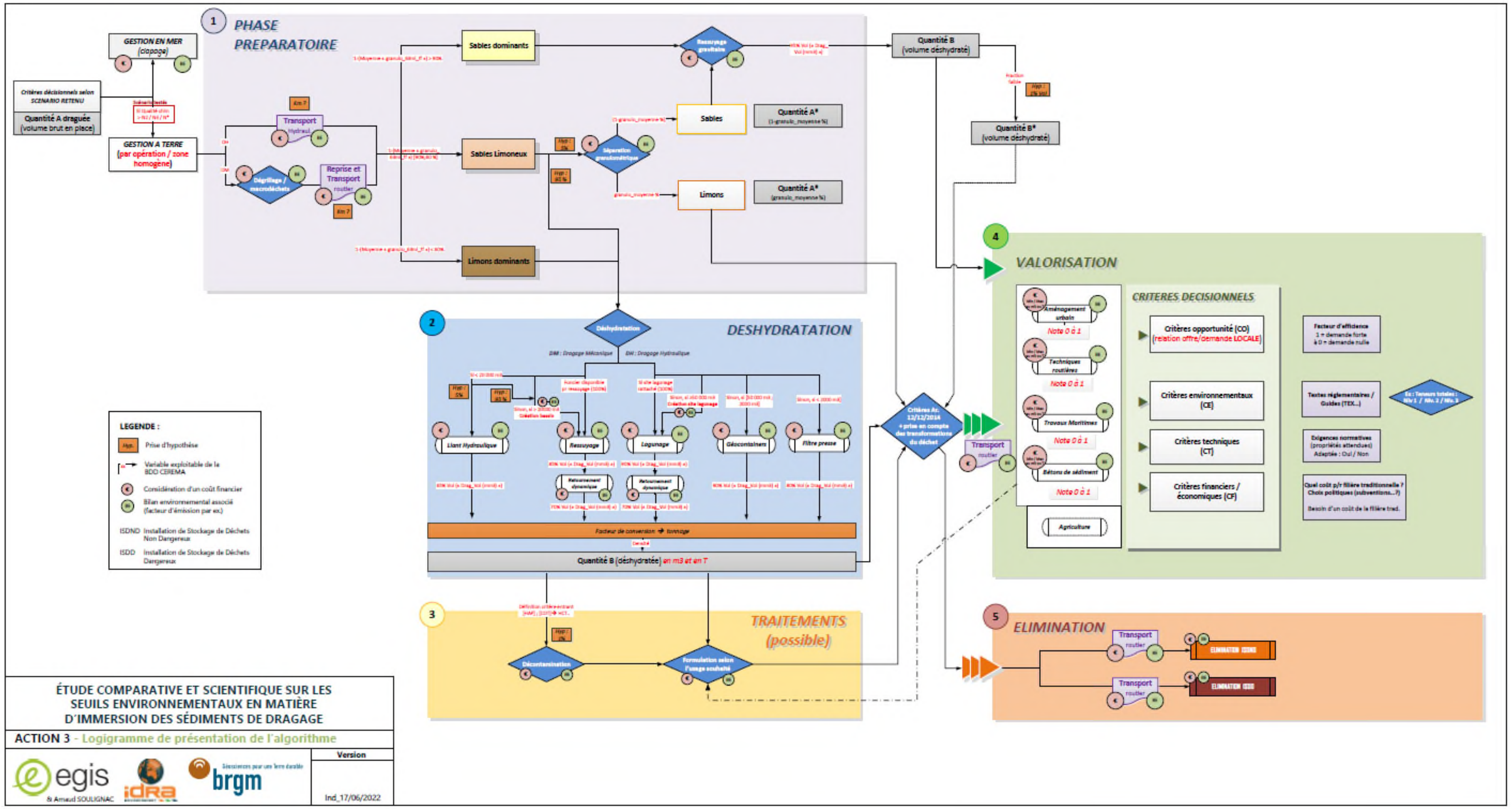
	x	y
N*a	1	10
N*b	5	20
N*c	10	50

KEY STEPS AND ASSUMPTIONS IN INLAND SEDIMENT MANAGEMENT

A model is developed to assess the economic and environmental consequences of the different scenarios.

It consists of five "blocks":

- **Preparation,**
- **Dehydration,**
- **Treatment and formulation,**
- **Recovery,**
- **Disposal.**



D.

FOUR INDICATORS SELECTED TO ASSESS THE CONSEQUENCES OF EACH SCENARIO:

- Management costs (€),
- Greenhouse gas emissions (GHG – kg/CO_2),
- Land use (m^2),
- Pollutant flow into the aquatic environment expressed as a hazard score (see box) that takes into account the properties of the pollutant, sediment concentrations, and volumes involved.

*The **potential danger** is estimated using a set of criteria and their associated **risk scores** (modified from GEODERISK):*

- *The **concentration of the contaminant** in the sediment compared to its level 1 value;*
- *The **Dm value** (level 1 exceedance) is equal to the ratio between concentration and level 1;*
- *The affinity for the dissolved phase expressed by the **partition coefficient** between the solid phase and water (Kd) for inorganic contaminants and, for organic substances, by the Kow, the partition coefficient between octanol and water, which expresses their degree of lipophilicity;*
- *The **bioconcentration**, determined by the bioconcentration factor (BCF); for organic substances, the BCF can be calculated from the Kow;*
- *The **potential toxicity**, assessed on the basis of bibliographic data on*

ADDITIONAL VOLUMES BROUGHT ASHORE DEPENDING ON THE SCENARIO (M3) – ANNUAL AVERAGES*

Scenario	All ports (m^3/an)
Current	-
N2	87 577
ALT1	28 560
N*a	150 155
N*b	688 363
N*c	1 397 530

- Small and medium-sized ports will be most affected by the increase in volumes handled onshore under scenario N2 or ALT1 (data not shown).
- For these scenarios, these will be one-off operations involving a limited number of ports.

** Simulation based on dredging over a six-year period between 2015 and 2020 (source of data: CEREMA).*

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D.

DANGER SCORE RESULT

	All ports	GPM	Excluding GPM
Actuel	1,301	1,417	1,250
N2	1,073	1,250	0,998
ALT1	1,261	1,408	1,197
N*a	1,295	1,413	1,244
N*b	1,287	1,407	1,235
N*c	1,261	1,388	1,207

- The danger score for a submersion operation ranges from 0 (low hazard) to 5 (high hazard).
- The table opposite shows that scenario N2 offers the highest level of protection (lowest hazard score).

NATIONAL RESULTS

	Additional **costs** compared to the current scenario	Additional **GHG emissions** compared to the current scenario	**Reduction in the level of danger** of the marine environment compared to the current scenario	Additional **land** consumed compared to current scenario
Current	-	-	-	-
N2	+ 12 %	+ 23 %	- 17 %	+ 14 %
ALT1	+ 4 %	+ 7 %	- 3 %	+ 0,6 %
N*a	+ 19 %	+ 38 %	- 0,04 %	+ 45 %
N*b	+ 74 %	+ 168 %	- 1,1 %	+ 241 %
N*c	+ 146 %	+ 342 %	- 3 %	+ 502 %

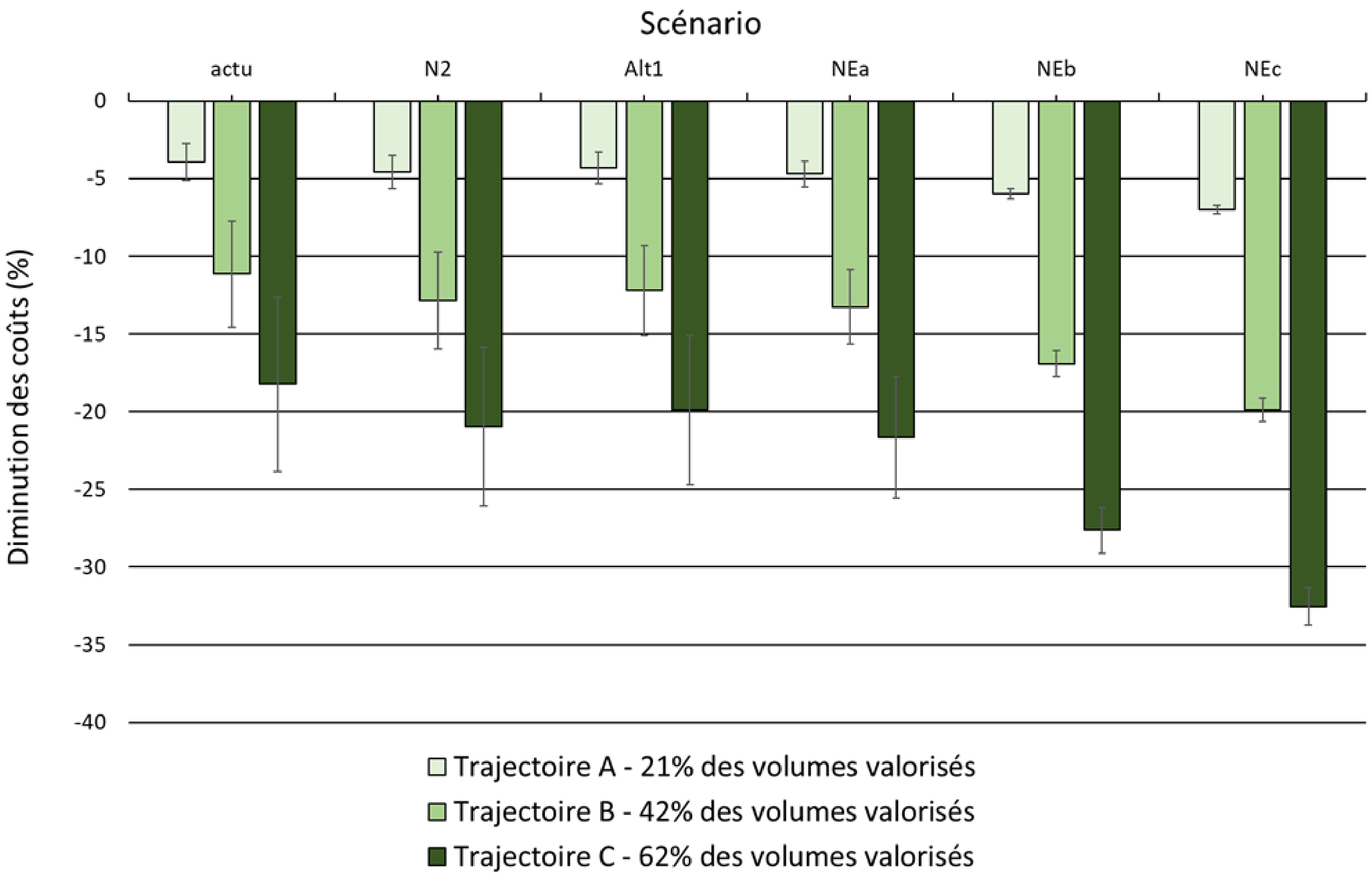
- **Scenarios N*** are the most expensive, emit the most CO2, and consume the most land, yet they are not the ones that reduce the flow of pollutants into the aquatic environment the most.

- **Scenario N2** offers the greatest protection for the marine environment, but it is expected to generate nearly +23% of tons of additional CO2 compared to the current situation. It is also expected to generate additional costs of more than 12% per year on average.

- **Scenario ALT1** generates lower additional costs (+ 4 % per year on average) and emits less GHG and consumes less land than scenario N2, but it provides limited gains in terms of marine environment protection.

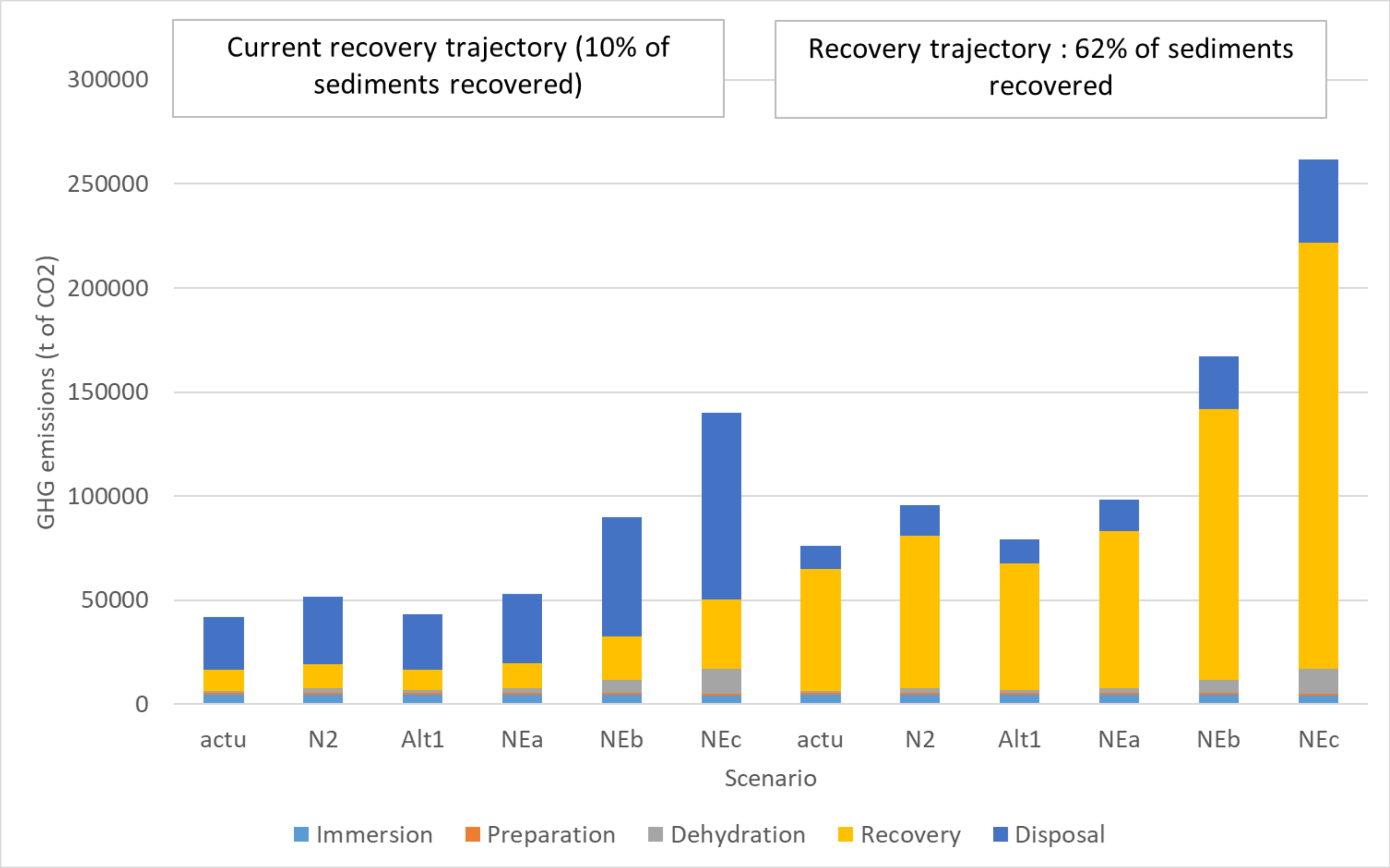
Impact of the valuation trajectory on sediments management costs

- **Between 4% and 7% savings** depending on the scenario if 21% of dredged sediments are recovered (currently 10%) = **recovery generates financial gains compared to disposal**, which is the most expensive aspect of onshore management (representing between 70% and 90% of the total cost).
- However, it is not a decisive factor in choosing a scenario.



Changes in GHG emissions according to the scenario selected – 2015 data

- Recovery and disposal generate the highest emissions.
- Increasing recovery at the expense of disposal is likely to generate more CO_2.
- However, recovery has other benefits, such as saving primary resources and reducing the storage capacity of landfills.



Conclusion

- Scenario ALT1 offers significant protection for the marine environment, albeit less than scenario N2.
- Significant additional costs are to be expected for certain small and medium-sized ports that do not currently have the necessary infrastructure to manage sediments on land.
- Significant financial savings are possible through recovery.
- Transporting sediments on land generates more CO_2 emissions than dumping them at sea.
- **Scenario ALT1 was chosen as the best compromise**. A decree was issued on March 27, 2024, and the ban on the dumping of polluted sediments came into effect on January 1, 2025.