



Comité Stratégique
de la Filière Eau

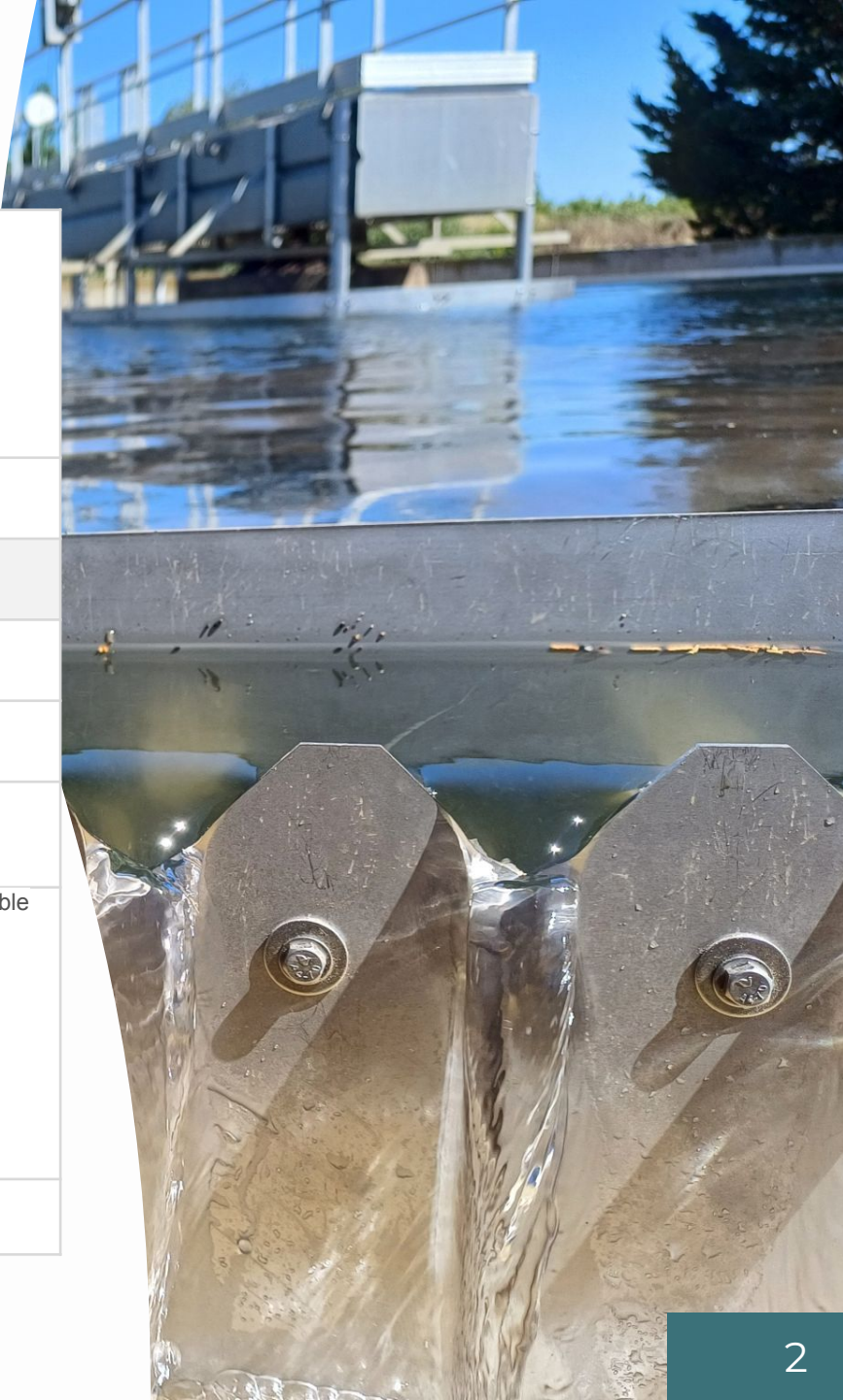
DERU 2 Directive Impact: Cost-Benefit Analysis for France



Final Report - September 2026

VERSION HISTORY

Groupement ALTEREO-SCE-BRLi-EGIS Eau					Report authors	Benoît MARDUEL (Altereo) Emmanuel ROCHAIS (SCE) Béatrice DE ABREU (BRLi) Michel ALLARI (EGIS EAU) Coordinated by Frédéric Maurel (setec hydratec)
File: Etude CSF DERU 2-Livvable final_v3_diffusion au COPIL						
V.	Date	Prepared by	Checked by	Approved by	No. of pages	Comments / Sign-off
V0	15.12.2025	Study team			96	Internal review by study team + 1 st distribution to pilots
V1	18.01.2026	Study team	Team+ pilots	FM	111	2nd distribution to pilots
V2	26.01.2026	Study team	Team+ pilots	FM	144	Distribution to the COPIL of v2, in the form of the phase 2 deliverable
v3	05.05.2026	Study team	Team+ pilots	FM	181	Incorporation of COPIL comments on the phase 2 deliverable Addition of a SIAAP Focus Additional content on energy neutrality Additional content on the OPEX section Full revision of the Cost/Benefits section Multiple additions for the summary work. Finalization of the document with appendix
v3	03.09.2026	Study team	Team+ pilots	FM	207	Incorporation of COPIL comments



STUDY TEAM

Groupement Altereo/SCE/BRLi/Egis

Collection systems: Benoît MARDUEL (Altereo)

Treatment plants: Emmanuel ROCHAIS (SCE)

Benefits analysis / financial impact: Béatrice de ABREU (BRLi)

Expertise: Michel ALLARI (Egis)

Coordination: Frédéric MAUREL

Steering (CSF)

Laurent VIVIANI, Member of the CSF Board - Groupe Carso

Jean-Pierre HANGOUET, Study co-lead - Groupe Suez

Patrick FAISQUES, Permanent Delegate - Groupe Veolia



PRELIMINARY NOTE – HOW TO READ THE REPORT

Getting started with this document

The report authors chose to present this report in the form of written slides/panels.

Certain detailed methodological elements (notably a) for the « Collection » component, for which database-building work was carried out, and b) for the Cost-Benefit analysis) are provided in the report's appendices.

Recommendations and points of attention for the transposition are provided a first time in chapters II. Collection (end of chapter) and III. Treatment (tags to the right of the slides), and summarized at the end of the document (chapter V).



TABLE OF CONTENTS

I. Study context — p. 6

II. Impact on collection — p. 9

II.1. Integrated management plans (PGI) — p. 12

II.2. Lowering to 1,000 PE — p. 18

II.3. Wet weather discharges — p. 27

II.4. Collection recommendations — p. 43

III. Impact on treatment — p. 51

III.1. Secondary treatment — p. 61

III.2. Tertiary N/P treatment — p. 69

III.3. Quaternary treatment — p. 89

III.4. Energy neutrality — p. 99

III.5. Treatment CAPEX summary — p. 118

III.6. Operational impact — p. 123

III.7. SIAAP Focus — p. 133

III.8. Treatment recommendations — p. 136

Summary of CAPEX costs, collection + treatment — p. 143

IV. Benefits of DERU 2 — p. 145

IV.1. CAPEX and OPEX costs — p. 148

IV.2. Benefits — 7 categories — p. 151

IV.3. CBA results — 3 scenarios — p. 157

IV.4. Methodological limitations and recommendations — p. 164

IV.5. Key messages for the transposition — p. 167

V. Conclusions and recommendations — p. 169

Appendices — p. 179



I. GENERAL CONTEXT OF THE STUDY

I. STUDY CONTEXT

Origin of the request

- The request was initiated by the Comité Stratégique de Filière (CSF) Eau as part of the revision of the European Directive concerning the treatment of urban wastewater (DERU 2).
- The objective is to support the transposition of the directive into French law, which must take place from 2025 to 2027, by assessing its impacts on existing infrastructure and on industry stakeholders.

The strategic objectives of the study are:

- **Identify and quantify the technical and financial impacts** related to the new obligations of DERU 2 for collection and treatment systems.
- **Envision the types of possible solutions** to meet the requirements of the directive, associating them with an assessment of the necessary investments and efforts.
- **Assess the overall benefits** expected in terms of environmental protection, public health, and resilience to climate change.
- **Formulate recommendations/points of attention** regarding the transposition of the directive into French law

The institutional framework

- This study is part of the industry contract signed in 2024 between the CSF Eau and the State, and aims to provide decision-support material to public authorities and stakeholders.



I. STUDY PHASING

Phase 1: Preparation and scoping

Methodology scoping with the COPIL: 29 January 2025

Data collection: SANDRE / IGEDD database / exchanges with other partners (Synteau, FNCCR).

The data was obtained during June and July 2025.

The phase 1 COPIL was held on 21 October 2025.

Phase 2: Technical and financial analysis

- Analysis of the data collected; production of an interim report on the possible uses of this data
- Assessment of collection and treatment systems.
- Analysis of the costs and benefits associated with DERU 2.

The phase 2 COPIL was held on 9 February 2026.

Phase 3: Summary and deliverables

Compilation of results, drafting of the final report, and preparation of presentations

The phase 3 COPIL was held on 2 June 2026.



II. STUDY OF THE IMPACT OF DERU 2 ON COLLECTION SYSTEMS

II. COLLECTION: INTRODUCTION

Main regulatory impacts introduced by DERU 2

1. **Integrated Management Plans** (PGI) for urban wastewater made mandatory – *Article 5 and Annex V*

- Agglomerations $\geq 10,000$ PE and $< 100,000$ PE (subject to conditions in Art 5.2 and 5.3) - 31.12.2039 *Slide no. 13 specifies the scope of application.*
- Agglomerations $\geq 100,000$ PE - 31.12.2033

Obligation to develop integrated wastewater management plans to limit overflows of untreated wastewater during heavy rainfall. These plans must prioritize approaches to prevent stormwater from entering the networks (source control, de-sealing of surfaces).

1. **Collection** (and treatment) of wastewater made mandatory – *Article 3*

- Agglomerations $\geq 1,000$ PE (Art 3.2) - 31.12.2035

Obligation to equip all these agglomerations with collection systems. This is a significant extension of the scope of application (the former DERU had an obligation threshold of 2,000 PE and above).

2. **Reduction of discharges** of wastewater during wet weather

1. Agglomerations $\geq 10,000$ PE - *Article 5 (details in Annex V of the text)*
 1. 31.12.2039 $\geq 100,000$ PE
 2. 31.12.2045 $\geq 10,000$ PE

a non-binding indicative target aiming for storm-related discharges to represent a low percentage, not exceeding 2% of the urban wastewater load collected annually, calculated under dry weather conditions



II. COLLECTION: INTRODUCTION

Preamble - status of European litigation / 2022 reporting

- **78** Sanitation agglomerations PE are subject to European litigation for non-compliance with the 1991 DERU – *map opposite*

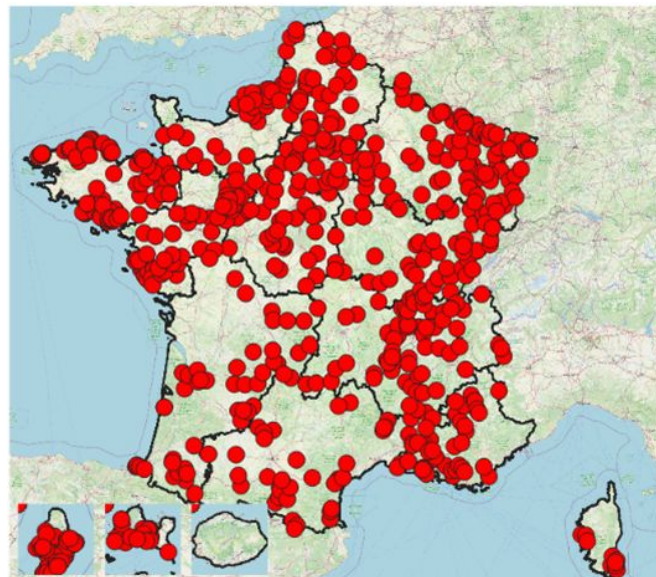
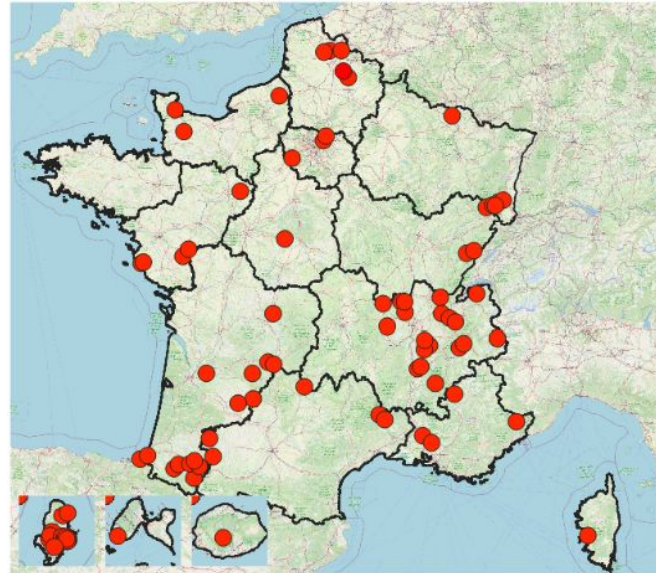
That is, less than 0.5% of all sanitation agglomerations

- **610** Sanitation agglomerations are in breach of Art 4 and/or 5 of the DERU - *map opposite*

That is, less than 3% of all sanitation agglomerations

Source: Government Instruction of 4 July 2025 relating to the collection and treatment of urban wastewater, NOR: TECL2518006J

All sizes of sanitation agglomerations combined



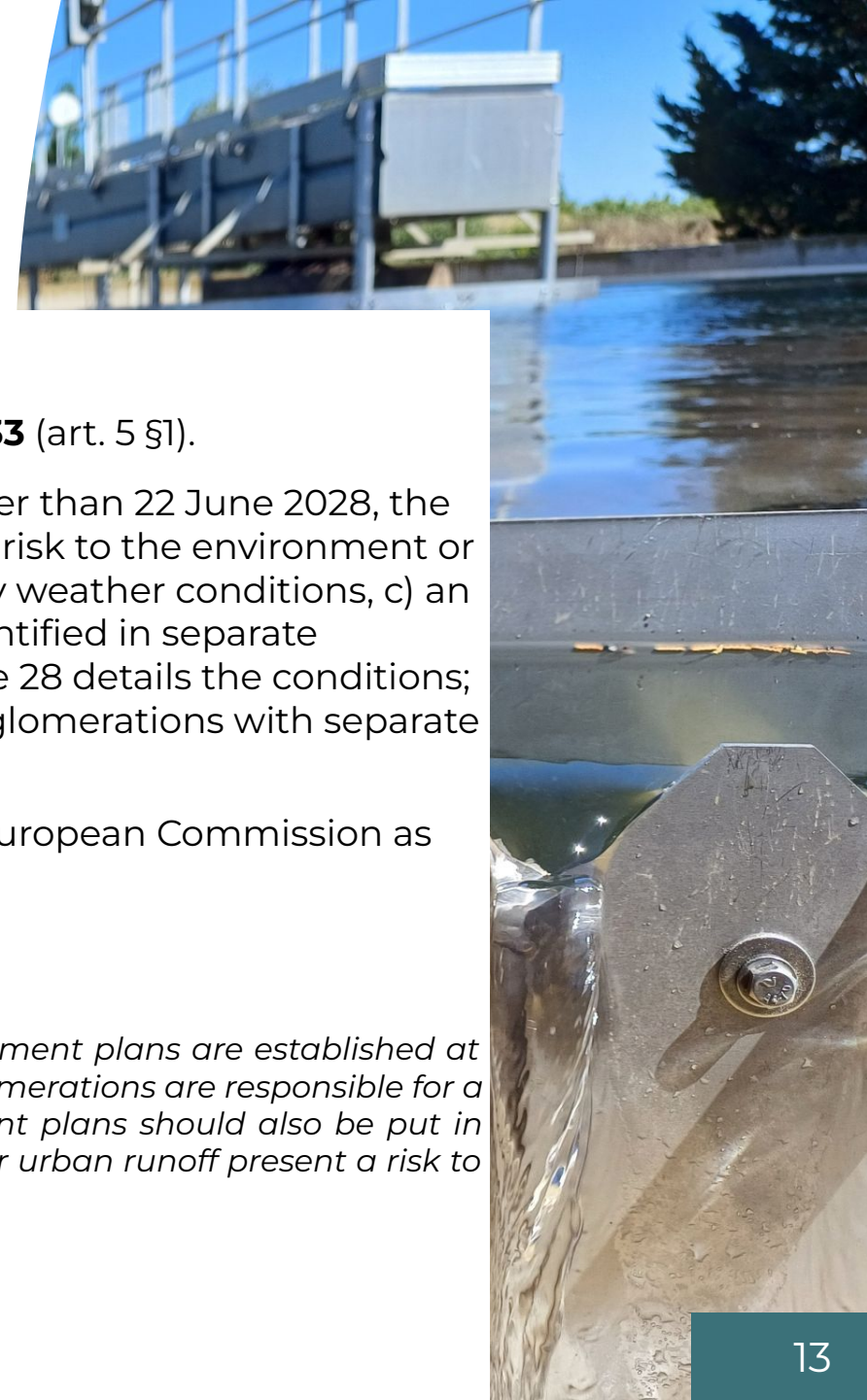
II. 1. INTEGRATED MANAGEMENT PLANS (PGI)

II.1. COLLECTION: PGI

Integrated Management Plans (PGI): key elements of the text

PGIs are made mandatory under Article 5, interpreted below:

- **Agglomerations $\geq 100,000$ PE: PGI established no later than 31 December 2033** (art. 5 §1).
 - Agglomerations from 10,000 to 100,000 PE: Member States shall establish, no later than 22 June 2028, the list of those meeting at least one of the four conditions of Article 5 §2, namely a) risk to the environment or human health, b) discharge exceeding 2% of the annual load collected under dry weather conditions, c) an obstacle to compliance with six directives cited in the text, d) relevant points identified in separate networks where urban runoff is polluted. This list is reviewed every six years. Slide 28 details the conditions; **all these agglomerations must adopt a PGI before 2039** (this may concern agglomerations with separate collection systems).
 - PGIs will need to be tracked at the national level and may be requested by the European Commission as part of reporting.
 - Revision of PGIs every 6 years
- *Text of the directive: Member States should ensure that integrated urban wastewater management plans are established at the local level for all agglomerations equal to or greater than 100,000 PE, given that these agglomerations are responsible for a significant share of emitted pollution. Furthermore, integrated urban wastewater management plans should also be put in place for agglomerations between 10,000 PE and 100,000 PE, where storm-related discharges or urban runoff present a risk to the environment or public health (Text of the European Directive 12.12.2024)*



II.1. COLLECTION: PGI

Integrated Management Plans (PGI): assumptions and tools used

Assumptions used to assess the financial impact of implementing PGIs

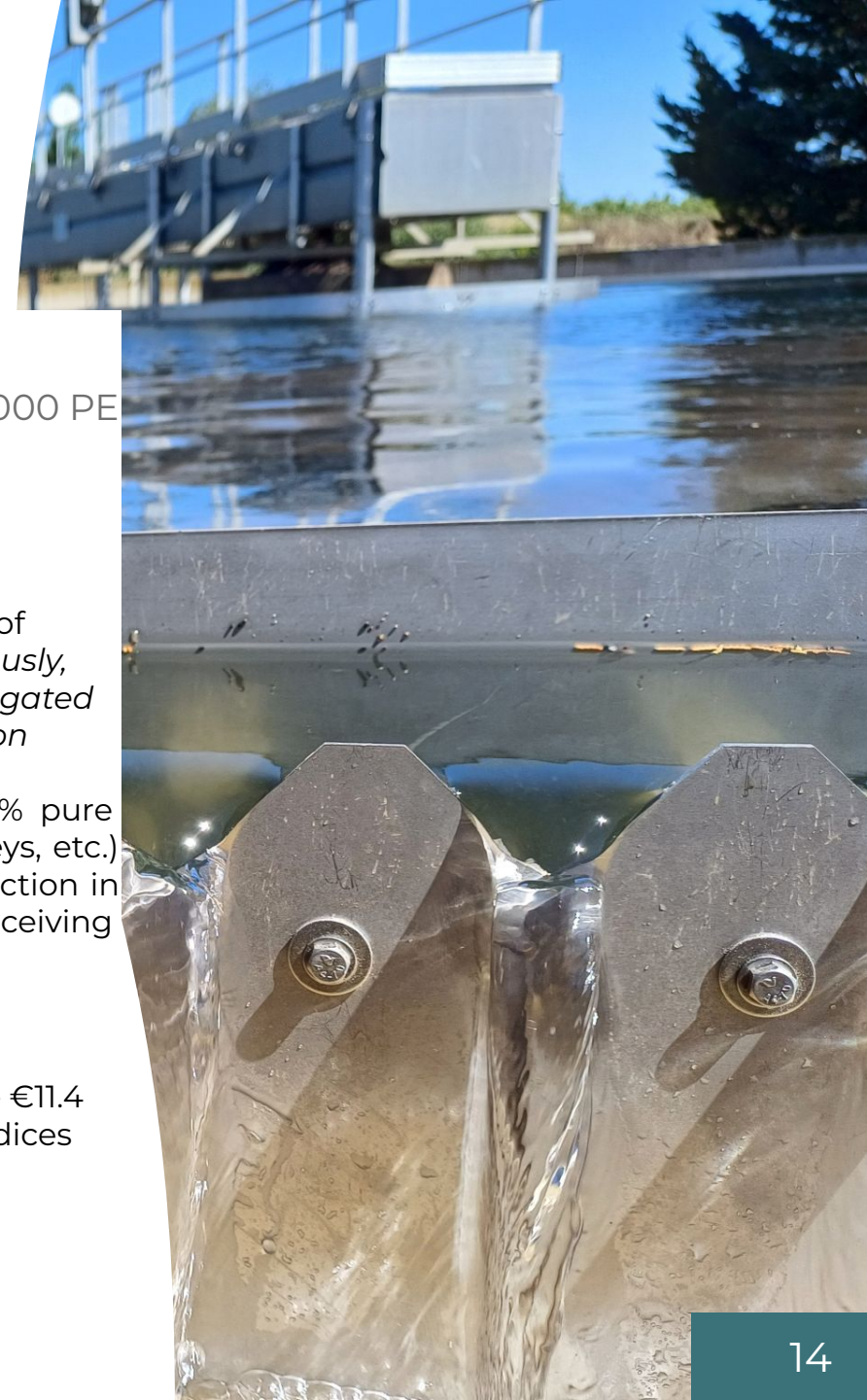
- New sanitation agglomerations entering the scope of the collection obligation $\geq 1,000$ PE are not affected by PGIs (as they fall within the $< 10,000$ PE bracket).
- Average cost per PE of €5.5 excl. tax, all agglomeration sizes combined

This cost of €5.5/PE comes from the analysis of a sample compiled by the study team with the help of Syntec-Ingénierie member organizations (see appendix VI.A.). *This sample was compiled anonymously, based on past data (collection carried out between July and October 2025), and used only in aggregated form. The cost of €5.5/PE is an average across all agglomeration sizes, which conceals wide variation depending on the size of the system (see appendix, slide 186)*

This cost currently breaks down into 20% asset inventory / georeferencing, 23% metrology, 35% pure engineering (models, studies, reports, etc.), 20% investigations (CCTV inspection, connection surveys, etc.) and 2% receiving environment studies. An iso-cost per PE assumption is used, considering a reduction in the share of inventory/georeferencing in the future cost per PE studied, and an increase in the receiving environment study and metrology items.

Databases used

- Internal « Syntec » sample compiled in 2025 (cost per PE of producing a master plan found to be €11.4 excl. tax for the 10,000-100,000 PE class and €3.6 excl. tax for the $> 100,000$ PE class) – see appendices
- Roseau 2023 (database of sanitation agglomerations by network type)
- INSEE 2023 (municipal populations)
- Sandre 2025 (zoning of Nitrogen and/or Phosphorus sensitive areas)



II.1. COLLECTION: PGI

Integrated Management Plans (PGI): cost estimate

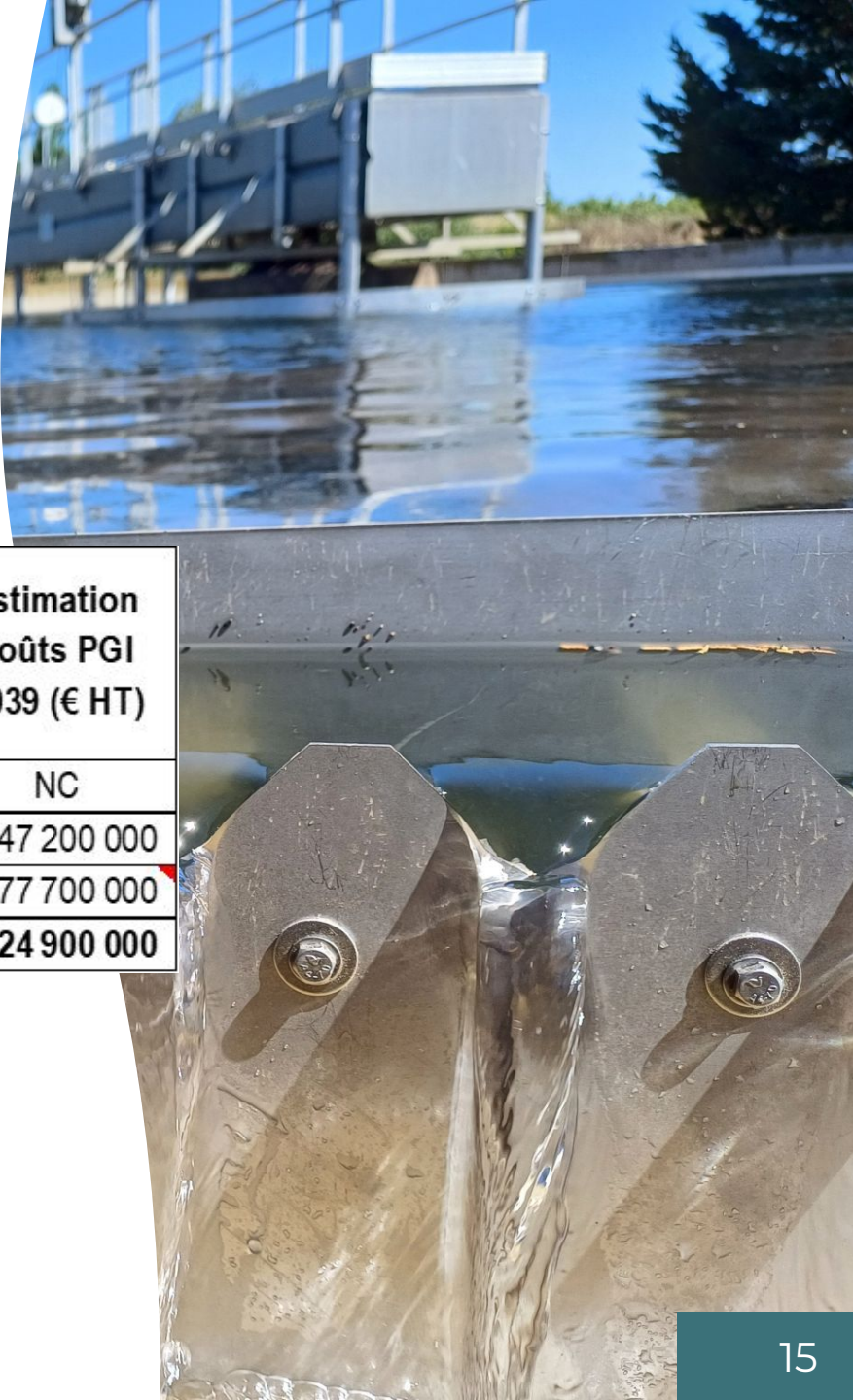
Case no. 1 : Without considering sensitive areas as representing a risk to health and/or the environment.

Least likely case, where only sanitation agglomerations with combined or mixed systems ≥ 10,000 PE and all ≥ 100,000 PE must carry out their PGI.

Agglomérations d'assainissement		Population Agglomération assainissement	Si agglomération avec réseau majoritaire Unitaire ou Mixte*		Estimation coûts PGI 2033 (€ HT)	Estimation coûts PGI 2039 (€ HT)
Taille	Nombre		Nombre	Population correspondante		
[0 ; 10 000 [EH	20 740	21 902 112	11 514	10 608 359	NC	NC
[10 000 ; 100 000 [EH	1 124	18 651 832	456	12 906 770	NC	147 200 000
[100 000 ; ... [EH	144	23 950 989	45	21 562 071	77 700 000	77 700 000
	22 008	64 504 932	12 015	45 077 200	77 700 000	224 900 000

**including networks of unknown type in the Roseau database*

- > 45 agglomerations concerned by 2033 | 2027-2033 estimate of **€78 M excl. tax**
- > 501 agglomerations concerned by 2039 | 2033-2039 estimate of **€225 M excl. tax**
- > That is **~€303 M excl. tax** of PGI by 2039 ((78)+225) | ~€5/inhabitant
- > ~598 person-years of engineering by 2033 (i.e. ~75 FTEs, based on a daily engineering cost of between €550 and €750 excl. tax and 200 working days per year)
- > ~1,730 person-years of engineering for the 2033-2039 period (i.e. ~288 FTEs)



II.1. COLLECTION: PGI

Integrated Management Plans (PGI): estimation of development costs

Case no. 2 : considering N and/or P sensitive areas as representing a risk to health and/or the environment.

Most likely case application of DERU 2, whereby all sanitation agglomerations ≥ 10,000 EH meet one or more conditions listed in DERU 2 Art. 5 (combined or mixed system, N/P sensitive area) and all those ≥ 100,000 EH must carry out their PGI.

Agglomérations d'assainissement		Population Agglomération assainissement	Si agglomération en réseau Unitaire ou Mixte et/ou zone sensible N, P (ou les 2)		Estimation coûts PGI 2033 (€ HT)	Estimation coûts PGI 2039 (€ HT)
Taille	Nombre		Nombre	Population correspondante		
[0 ; 10 000 [EH	20 740	21 902 112	19 950	20 338 179	NC	NC
[10 000 ; 100 000 [EH	1 124	18 651 832	651	17 743 971	NC	202 300 000
[100 000 ; ... [EH	144	23 950 989	56	23 759 256	85 600 000	85 600 000
	22 008	64 504 932	20 657	61 841 405	85 600 000	287 900 000

*including networks of unknown type in the Roseau database

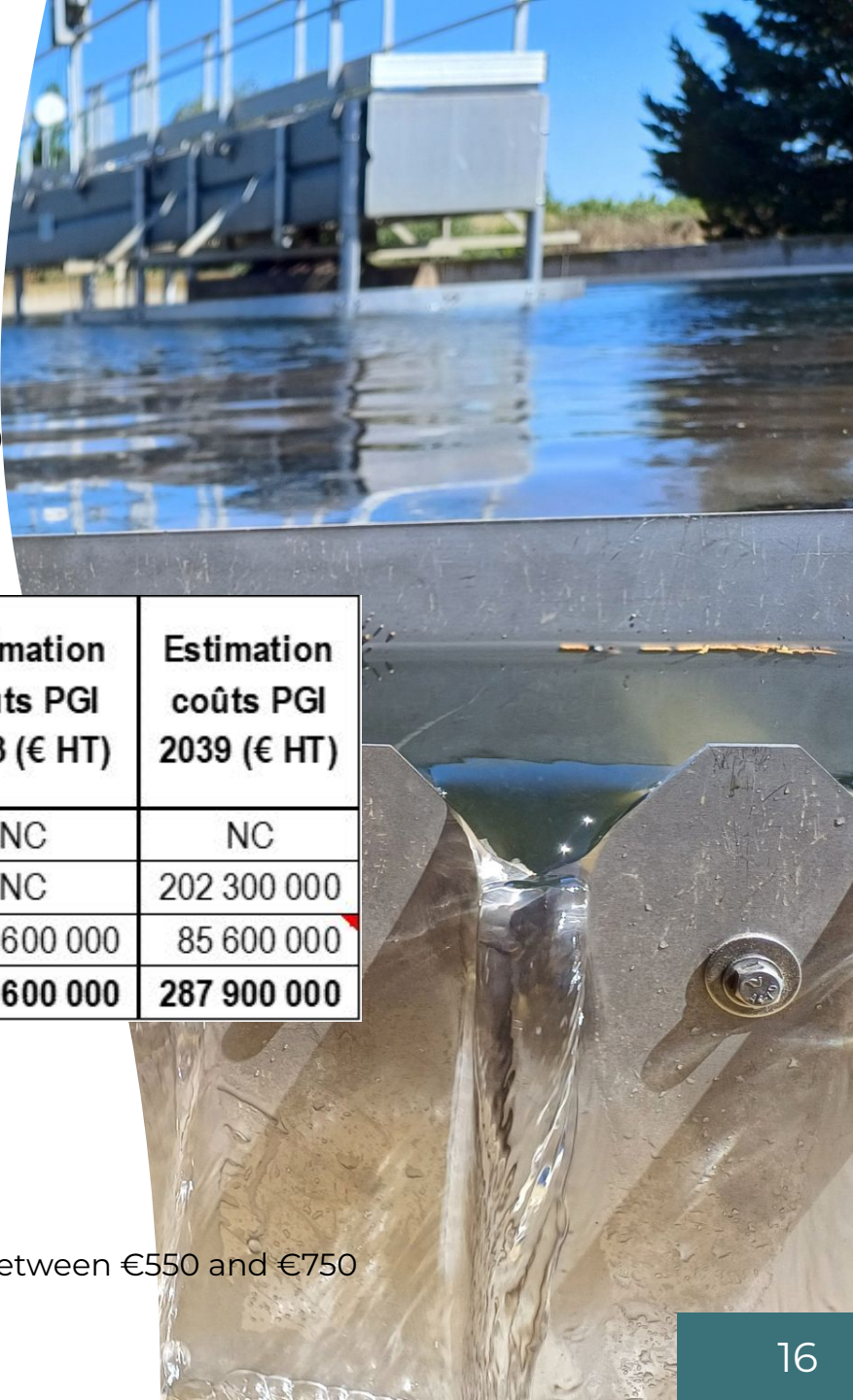
--> 56 concerned by 2033 | 2026-2033 estimate of **86 M €HT**

--> 707 concerned by 2039 | 2027–2039 estimate of **288 M €HT**

--> **i.e. 374 M €HT** of PGI by 2039 (86+288 M€HT) | 4.7€/inhabitant

--> ~658 person-years of engineering by 2033 (~83 FTE, based on a daily engineering cost of between €550 and €750 excl. tax and 200 working days per year)

--> ~2,215 person-years of engineering for the 2033-2039 period (~369 FTE)

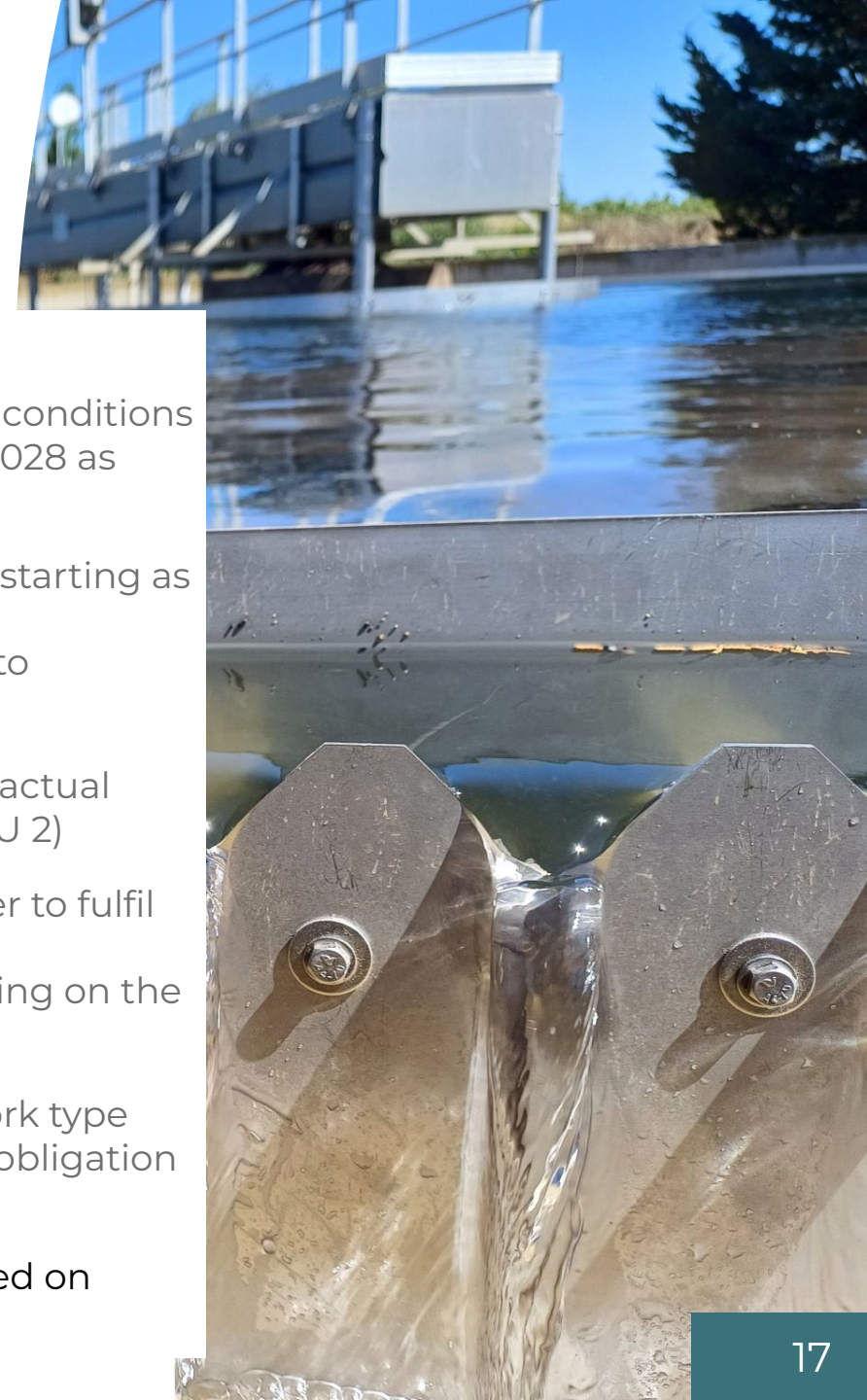


II.1. COLLECTION: PGI

Integrated Management Plans (PGI): recommendations

Points of attention / recommendations

- The list of agglomerations of 10,000 to 100,000 EH meeting at least one of the four conditions of the text should be established as soon as possible, and at the latest by 22 June 2028 as provided for in Article 5 §2, in order to:
 - Smooth out implementation for agglomerations of more than 10,000 EH (worth starting as early as possible)
 - Allow all agglomerations of more than 10,000 EH launching a stormwater study to integrate DERU 2 into their objectives
- Monitor at the national level (tracking, for example by the Agences de l'Eau, of the actual amounts of funded PGI studies and funded compliance works with regard to DERU 2)
 - Track the completion of PGIs for all concerned sanitation agglomerations in order to fulfil European reporting requirements
 - The costs of carrying out these PGIs (in order to have a cost base per EH depending on the size of the agglomerations concerned, network type, etc.)
- Improve the reliability of the national Roseau database for the predominant network type (combined, mixed, separate) for each sanitation agglomeration in the $\geq 10,000$ EH obligation bracket
- Recommend, at the scale of the area of jurisdiction, an initial overall approach based on cross-referencing environmental / usage / stormwater issues in order to define a policy adapted to each sanitation system



II. 2. LOWERING THE COLLECTION OBLIGATION TO 1,000 EH

II.2. COLLECTION: LOWERING TO 1,000 EH

Lowering to 1,000 EH: Regulation

The collection and treatment of wastewater is made mandatory for agglomerations $\geq 1,000$ EH under Article 3

Article 3.1: *Member States shall ensure that all agglomerations equal to or greater than 2,000 EH meet the following requirements: a) they are equipped with a collection system; b) all their sources of domestic wastewater are connected to the collection system.*

Article 3.2. *Member States shall ensure that agglomerations equal to or greater than 1,000 EH but less than 2,000 EH meet the obligations of paragraph 1 **at the latest by 31 December 2035.***

*In order for urban wastewater to be effectively treated before being discharged into the environment, all the urban wastewater of the agglomerations **equal to or greater than 1,000 EH should be collected** by means of collection systems, unless Member States provide justification of the need to use, by way of derogation, individual systems under this directive. When delimiting their agglomerations, Member States **should take into account the indicative reference threshold of 10 to 25 EH per hectare**, above which the population, possibly combined with economic activities, located in a given area is considered to be sufficiently concentrated*



II.2. COLLECTION: LOWERING TO 1,000 EH

Lowering to 1,000 EH: Assumptions and tools used

Databases used

- Roseau 2023 (Sanitation agglomerations)
 - INSEE 2023 (municipal population, population density)
 - IGN 2025 (BdTopo)
 - Sispea (banatic)
- construction of the map opposite of the « unsewered areas on a collective basis »

State of play

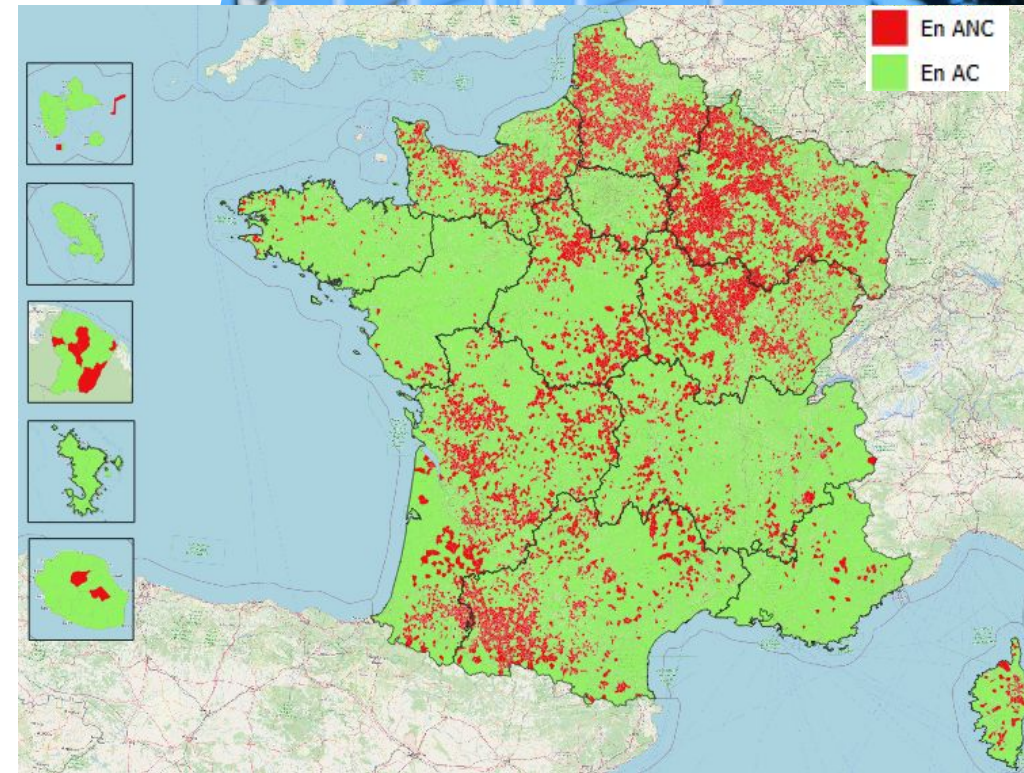
~ 35,000 municipalities / ~11,600 services (SISPEA)

of which 23,330 in collective sanitation (AC) - reminder: 22,008 sanitation agglomerations)

11,617 municipalities are not served by collective sanitation (ANC)

--> 264 municipalities with population > 1,000 inhabitants are on non-collective sanitation

--> None of these 264 municipalities has a density > 1,000 inhabitants per km²
(threshold indicative reference of 10 EH per hectare)



II.2. COLLECTION: LOWERING TO 1,000 EH

Lowering to 1,000 EH: Cost estimation

2 parallel approaches were adopted to assess the municipalities* concerned

1. Municipal-scale approach: identify all municipalities with more than 1,000 inhabitants currently on non-collective sanitation (ANC),
2. Geographic analysis and clustering approach: use GIS analysis to geographically identify all municipalities which, through close geographic clustering, allow the 1,000-inhabitant threshold to be "passed"

Assumptions common to both approaches

- The entire INSEE population of the municipalities concerned is considered connectable to collective sanitation (maximalist approach)
- The approach does not include any potential industrial activity establishments
- The network length adopted (*derived from the analysis of the SISPEA sample; see Appendix I*) is
 - 11.9 ml / inhabitant if density < 150 inhab/km²
 - 8.3 ml / inhabitant if density > 150 inhab/km²
- The investment cost per ml of network is €330 excl. tax/ml (derived from the works database).
- The cost of new STEU (treatment plants) is addressed later in Chapter III.

**minimum working scale adopted based on INSEE data, for which population is defined. The current difficulty is moreover that sanitation agglomerations are defined at the municipal boundary level in the Sandre database.*



II.2. COLLECTION: LOWERING TO 1,000 EH

Lowering to 1,000 EH: Cost estimation

Case no. 1 : All municipalities ≥ 1,000 inhabitants

	Ensemble des communes actuellement en ANC		Communes >= 1000 habitants actuellement en ANC		Création d'infrastructures		Coûts investissements (€ HT 2025) yc MOE	ETP ingénierie en année homme (étude, conception, suivi de travaux)
		Population		Population	Nombre	Linéaire de	Réseau de collecte	
Densité de population	Nombre	correspondante	Nombre	correspondante	STEU	réseau estimé (km) (1)	uniquement yc Bchts	Réseau uniquement
0-15[hab/km2	8 039	1 377 113	11	22 299	Densité hab/km2 trop faible (2)			sans objet
[15-40[hab/km2	2 986	1 198 387	109	138 023	109	1 650	544 500 000	319
[40-150[hab/km2	557	450 851	131	231 789	131	2 760	910 800 000	535
[150 -.... hab/km2	21	29 942	13	25 811	13	220	72 600 000	60
	11 603	3 056 293	264	417 922	253	4 630	1 527 900 000	964
							1 527 900 000	964

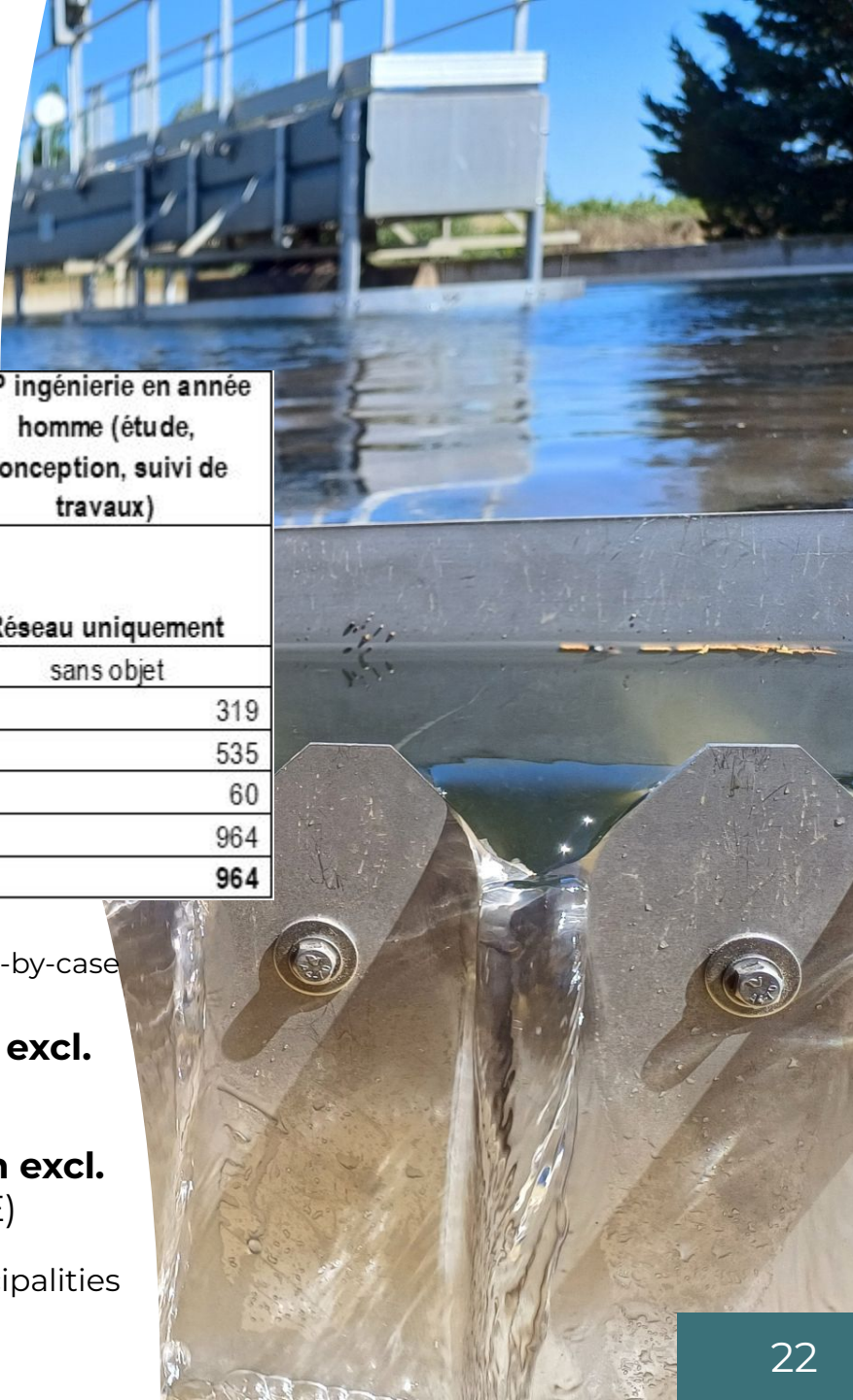
(1) considering all connected inhabitants

(2) density < 15 inhab/km2 does not seem relevant for switching to collective sanitation (to be assessed on a case-by-case basis)

--> 253 municipalities with density > 15 inhab/km2 concerned by 2035 | **€1.5 Billion excl. tax of works** | 3,860€/inhab | ~964 person-years of engineering by 2035 (~ 96 FTE)

--> 264 municipalities if all densities are included, concerned by 2035 | **€1.62 Billion excl. tax of works** | ~3,880 €/inhab | ~1016 person-years of engineering by 2035 (~ 102 FTE)

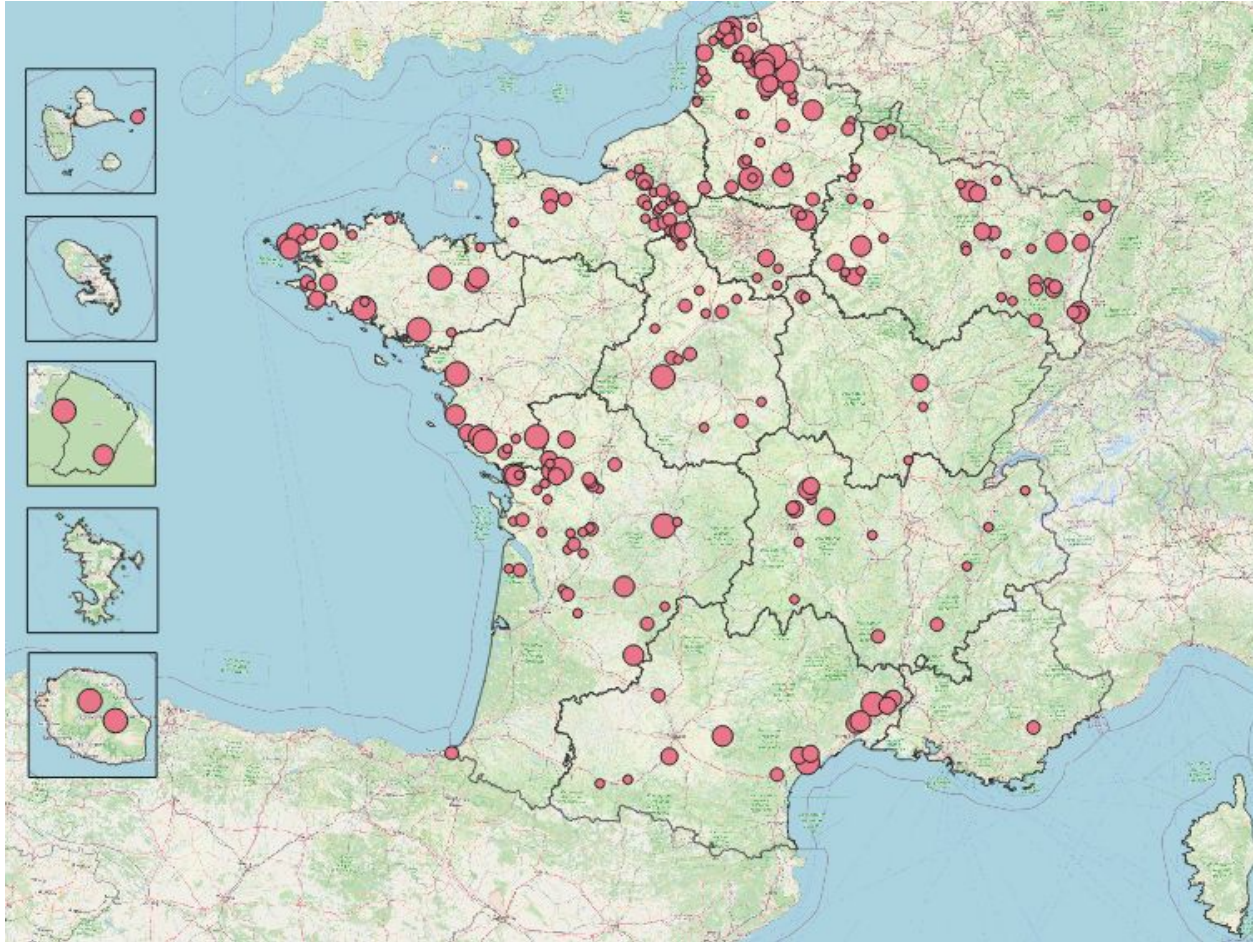
Note: If we assumed a minimum threshold of 10 EH/ha (i.e. 1000 EH/km2), none of the 264 municipalities ≥ 1000 EH currently on non-collective sanitation would be affected by the collection obligation



II.2. COLLECTION: LOWERING TO 1,000 EH

Cost estimation

Case No. 1 : All municipalities $\geq 1,000$ inhabitants on ANC (264 municipalities) – map below



II.2. COLLECTION: LOWERING TO 1,000 EH

Lowering to 1,000 EH: Cost estimation

Case No. 2 : geographic search to optimize reaching the 1,000-inhabitant threshold (1 or more municipalities via clustering)

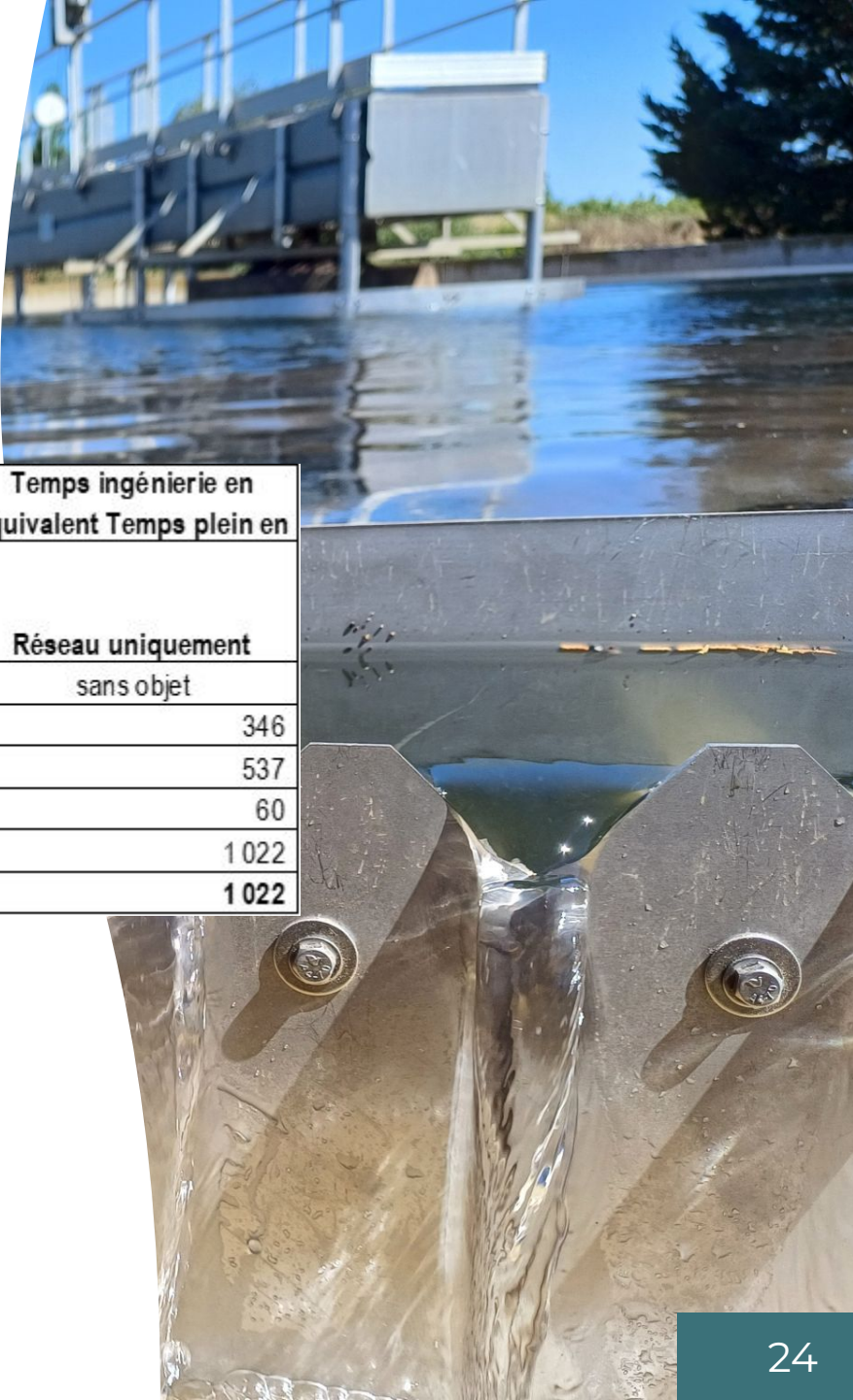
Densité de population	Ensemble des clusters actuellement en ANC		Clusters >= 1000 habitants actuellement		Création d'infrastructures		Coûts investissements (€)	Temps ingénierie en équivalent Temps plein en
	Nombre de cluster	Population correspondante	Nombre	Population correspondante	Nombre STEU	Linéaire de réseau estimé (km)	Réseau de collecte uniquement yc Bchts	Réseau uniquement
0-15[hab/km2	2 838	1 472 013	23	34 299	Densité hab/km2 trop faible			sans objet
[15-40[hab/km2	1 628	1 172 450	121	150 023	121	1 790	590 700 000	346
[40-150[hab/km2	343	383 008	132	232 789	132	2 780	917 400 000	537
[150 -..... hab/km2	18	28 822	13	25 811	13	220	72 600 000	60
	4 827	3 056 293	289	442922	266	4 790	1 580 700 000	1 022
							1 580 700 000	1 022

(1) considering all connected inhabitants

(2) density < 15 inhab/km2 does not seem relevant for switching to collective sanitation (to be assessed on a case-by-case basis)

--> 266 clusters with density > 15 inhab/km2 concerned by 2035 | **€1.6 Billion excl. tax of works** | 3,870€/inhab | ~1,022 person-years of engineering by 2035 (~102 FTE)

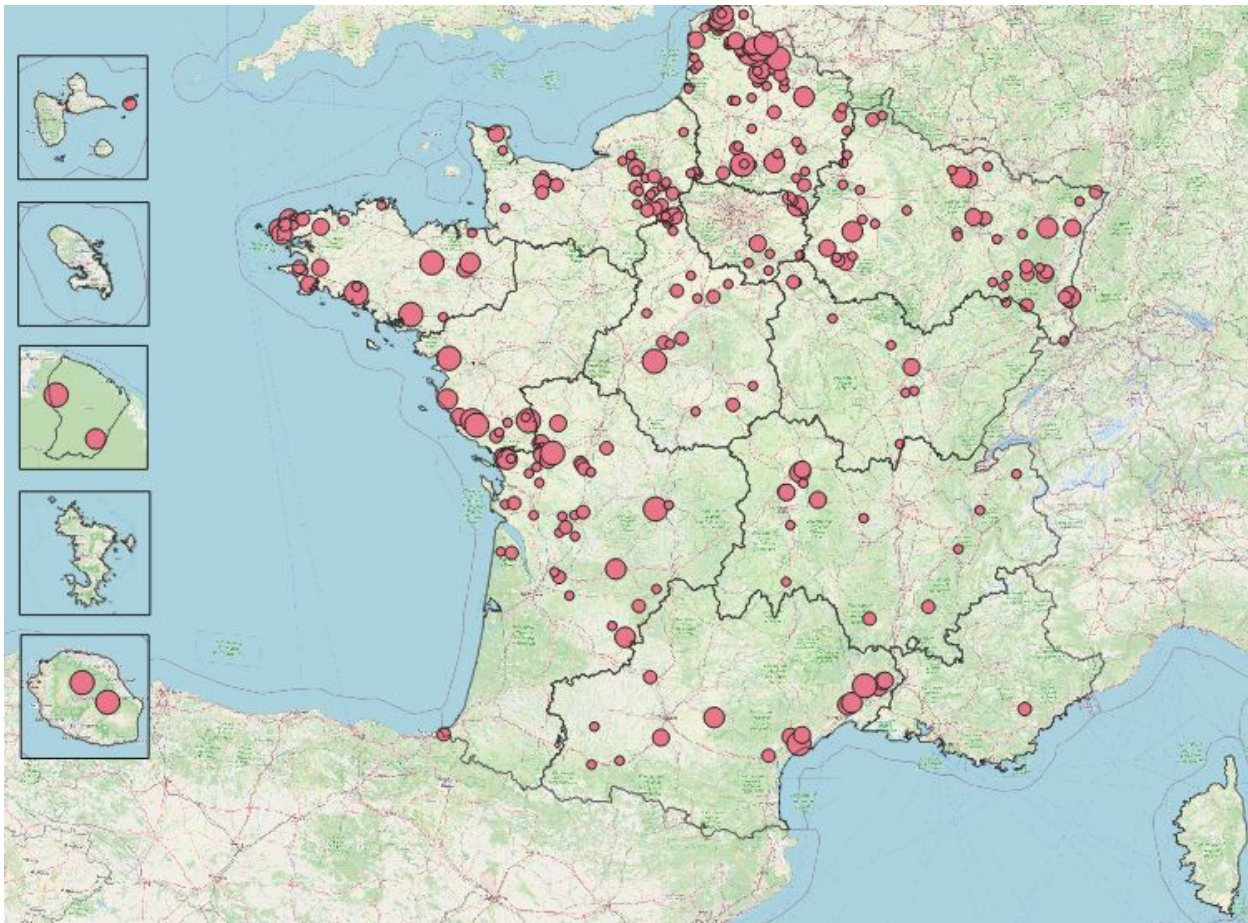
--> 289 municipalities if all densities are included, concerned by 2035 | **€1.72 Billion excl. tax of works** | 3,885€/inhab | ~1100 person-years of engineering by 2035 (~110 FTE)



II.2. COLLECTION: LOWERING TO 1,000 EH

Lowering to 1,000 EH: Cost estimation

Case No. 2 : geographic search to optimize reaching the 1,000-inhabitant threshold (1 or more municipalities via clustering): 289 units – map below



II.2. COLLECTION: LOWERING TO 1,000 EH

Lowering to 1,000 EH: Recommendations

Points of attention / recommendations

- **There is no urgency/priority in national action regarding the collection and treatment of $\geq 1,000$ EH not served by collective sanitation** (the densities in inhab/km² of the municipalities concerned are below the European text's recommended threshold, but this does not preclude higher local densities within the organizing authorities themselves)

It is therefore advisable to

- **Encourage AC/ANC zoning studies** which have the advantage of combining population density criteria with other technical-economic criteria (network length/EH collected, receiving environment impact, economic activities, housing layout, ANC difficult to implement, etc.) for the use of collective sanitation systems.
- To monitor at the national level (via the DDT(M)?)
 - The creation of any new sanitation agglomerations in order to fulfil European reporting requirements
 - The project costs and actual costs of these new collection systems
 - Feeding the Roseau database with the new agglomerations concerned.
 - If possible, the boundary of the sanitation agglomeration based on the technical geographic limit rather than the municipal one (Sandre)
 - AC zoning maps (similar for example to the Géoportail de l'Urbanisme)



II. 3. REDUCTION OF WASTEWATER DISCHARGES DURING RAINFALL

II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Regulation

Timelines

- Agglomerations $\geq 10,000$ EH (Article 5 & Annex V)
 - 31.12.2039 $\geq 100,000$ PE
 - 31.12.2045 $\geq 10,000$ EH (Health-sensitive or sensitive areas)

Art. 5: « (...) storm rainfall discharge represents more than 2% of the load in the urban wastewater collected annually for the parameters referred to in table 1 (COD, BOD5, SS) and, where applicable, table 2 (total P, total N) of Annex I, calculated in relation to dry weather flow; (...) »

Link with PGIs « Measures should be provided for in these plans in order to limit pollution resulting from storm rainfall discharges to a maximum of 2% of the annual urban wastewater load collected, calculated for dry weather and based on the pollutants listed in tables 1 and 2 of Annex I.»

Health-sensitive/sensitive areas for agglomerations $\geq 10,000$ EH are those where (see Art.5):

- Storm rainfall discharge poses a risk to the environment or human health
- Storm rainfall discharge prevents compliance with the requirements of the 6 directives cited in the text (Directive (EU) 2020/2184 - 2006/7/EC (Art.5) - 2008/105/EC (Art.3) - 2000/60/EC (Art.4) - 2008/56/EC (Art.1) - 2006/118/EC (Art.3))
- Storm rainfall discharge represents more than 2% of the load in the urban wastewater collected annually
- Relevant points have been identified in separate networks where urban runoff is polluted to the point of constituting a risk to the environment or human health, or of hindering compliance with the above requirements.



II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Regulation

Difficulties encountered

- **Very few local authorities have historically chosen the possible flow criterion** derived from the order of 21.07.2015 >>> we therefore have little knowledge at the national level regarding the mass flows discharged by mixed / combined systems.
- Current difficulty: lack of knowledge of loads discharged during rainfall compared with the dry-weather load collected.
- **The Flow criterion as set out in the 21.07.2015 order is not comparable to the 2%** "non-binding" DERU 2 criterion. The first is based on a ratio comparing the total flows discharged during rainfall against the total flows entering the plant (dry weather + rainfall). The second is the ratio comparing the total flows discharged during rainfall against the dry-weather flows collected entering the plant.
- **> Absence of a clear national rule for defining dry weather:** without a shared definition of dry weather (rainfall threshold, prior rainfall history, reference duration), the denominator of the ratio varies from one operator to another and results are not comparable between systems. This point alone determines the robustness of the compliance assessment.
- **A particular difficulty ahead, as R1 overflow structures are not recorded at the national level and are very rarely monitored** let alone for mass load (Note: knowledge of AIs is already very poor in the Roseau database) >>> care must be taken in transposing the 2% objective into French law, as it will necessarily include overflow structures $\geq 1,000$ EH and therefore probably R1s (see previous slide on potential calculation methods).

Reminders:

R1: Storm overflow / TP of the collection system < 120 kg BOD5/day (i.e. 2000 EH/day)

A1 = Storm overflow / TP of the collection system > 120 kg BOD5/day

A2 = Overflow at the head of the STEU; A3 = all wastewater inflows from the collection system reaching the STEU to be treated there.



II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Regulation

Several possible interpretations of the non-binding 2% objective

21.07.2015 (for the flow criterion among the 3 possible criteria: 5% of flows | 5% of volumes | 5% of time)

Current formulation

(Only used
in France)

$$\frac{\sum \text{Volume ou flux déversés en A1 par temps de pluie}}{\sum \text{Volume ou flux en A3, A2, A1 par temps sec et temps de pluie}}$$

DERU 2

Several possible interpretations of the criterion in the transposition

$$\frac{\sum \text{Volume ou flux déversés en A1, R1, A2 par temps de pluie}}{\sum \text{Volume ou flux en A3 par temps sec}}$$

$$\frac{\sum \text{Volume ou flux déversés en A1, R1 par temps de pluie}}{\sum \text{Volume ou flux en A3 par temps sec}}$$

$$\frac{\sum \text{Volume ou flux déversés en A1, R1 par temps de pluie}}{\sum \text{Volume ou flux en A3, A2, A1, R1 par temps sec}}$$

With

R1: TP/DO < 120 kgBOD5/day

A1: TP/DO > 120 kg BOD5/day

A2: Overflow at STEU inlet

A3: Plant inlet

Art. 5: « (...) storm rainfall discharge represents more than 2% of the load in the urban wastewater collected annually for the parameters referred to in table 1 (COD, BOD5, SS) and, where applicable, table 2 (total P, total N) of Annex I, calculated in relation to dry weather flow; (...) »

Link with PGI "Measures should be provided for in these plans in order to limit pollution resulting from storm rainfall discharges to a maximum of 2% of the annual urban wastewater load collected, calculated for dry weather and based on the pollutants listed in tables 1 and 2 of Annex I."

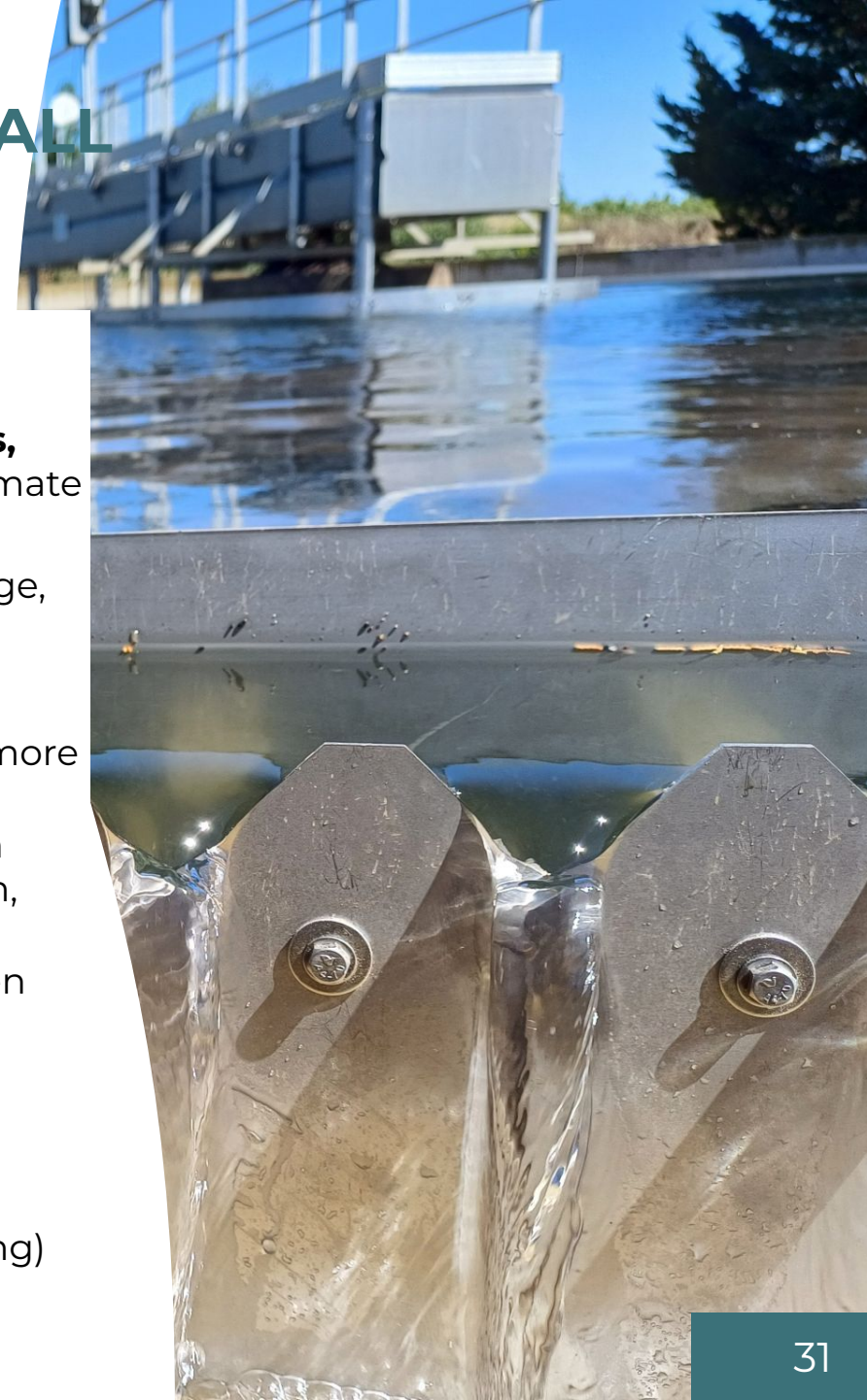


II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Cost estimation

Assumptions adopted

- It was considered that **if the current mass flow of an agglomeration is 2% or less, then the agglomeration complies with the objectives DERU 2** (note: an approximate approach given the points raised on the previous slide).
- The following were not taken into account (for the sake of simplification at this stage, and not for lack of interest):
 - changes in rainfall patterns. The context of climate change could alter the typology/frequency of discharges and their impact on receiving environments (more severe low-water periods) - PGIs will make it possible to address this locally
 - the assumption of massive de-sealing / disconnection or source-based action on stormwater (even though the European text encourages moving in this direction, Annex V / PGI)
 - the technical or economic impact on STEUs of implementing the 2% target, given that it will be necessary to discharge less into collection systems and therefore "bring" more hydraulic flow to the plant (a possible need for additional rainfall treatment lines)
 - the technical or economic impact linked to optimizing management of the collection network (control, in-line storage, storage valves, etc.) or linked to the possible increase in the frequency of crises (prolonged low-water periods, flooding) requiring adaptation of infrastructure and management methods.



II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Cost estimation

Assumptions adopted (continued)

- Cost assessment elements for moving toward the 2% target based on a sample of local authorities : this "collection compliance" cost was estimated at ~€1,000 excl. tax/inhab +/- 30%, made up of:
 - **5% compliance ~€450/EH** for collection alone (based on a sample of 95 Schémas Directeurs d'Assainissement (SDA) programs)
 - Additional cost per EH to go from 5% and **move toward the 2% target, estimated at €520/EH** (using a sample of 5 agglomerations with between 19,000 and 260,000 inhabitants that were the subject of a study targeting a maximum discharge of 2% (in BOD5).

see VI.A. Study appendices for the detailed methodology

- Agglomerations with a collection system of "Unknown" status are automatically considered to be subject to an objective aiming to move toward the 2% target (whether or not their current level is > or = to 5% -or unknown- or an undeclared separate network)



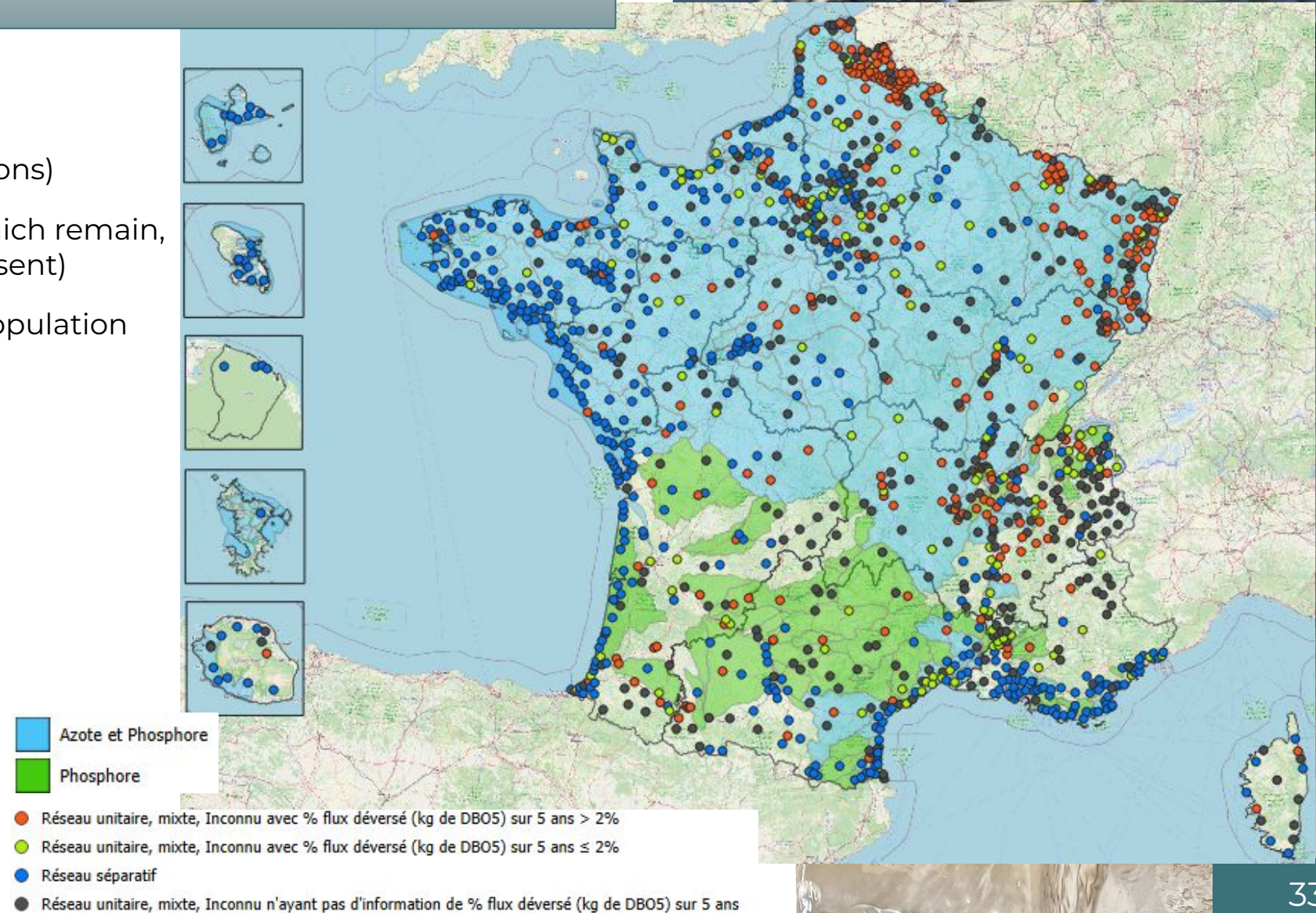
II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Cost estimation

Databases used

- Roseau 2023 (Sanitation agglomerations)
- N and/or P sensitive areas Sandre (which remain, in the projections, the same as at present)
- INSEE 2023 (municipal population, population density)

>>> Construction of the map of agglomerations $\geq 10,000$ EH

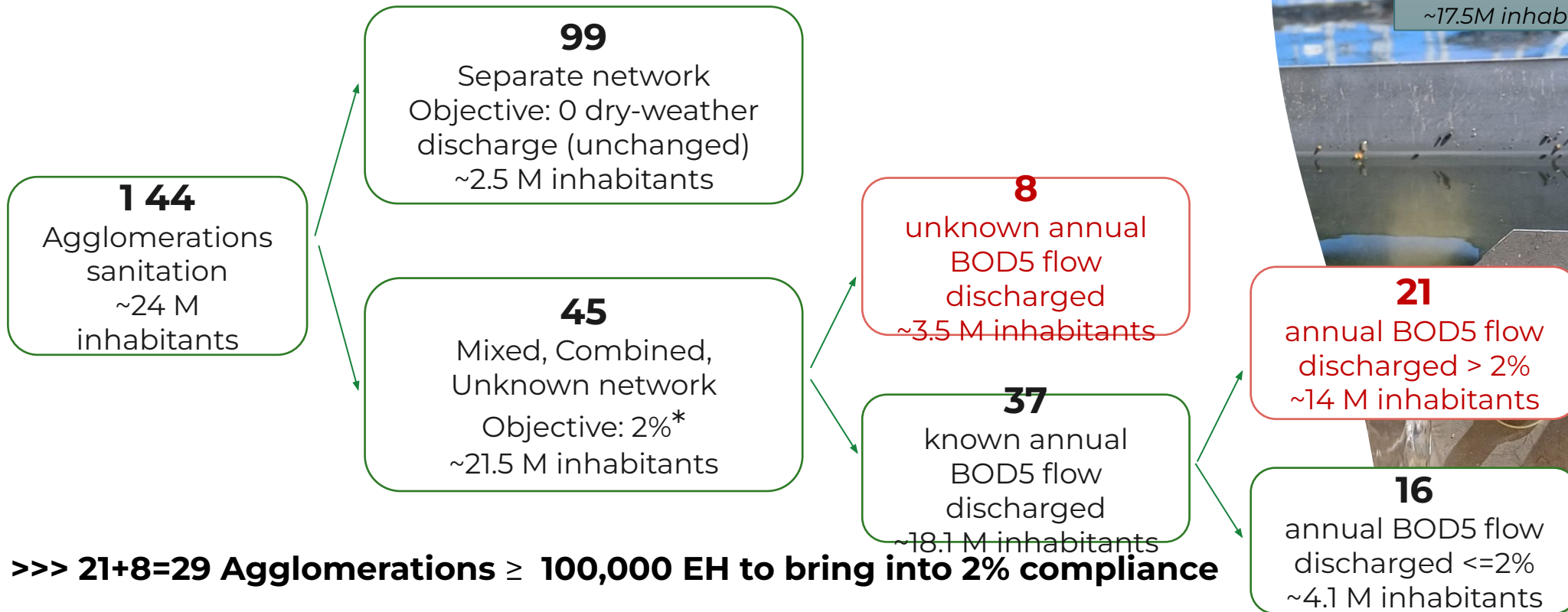


II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Cost estimation

1. Case of sanitation agglomerations $\geq 100,000$ EH

Current state of knowledge of flows



>>> **21+8=29 Agglomerations $\geq 100,000$ EH to bring into 2% compliance**

Comments: among the 45 « non-separate » systems, $37/45 = 57\%$ have a known % of annual discharged flow; the 8 unknowns are assumed to be $> 2\%$ discharge.

Of these 37, 16 are $< 2\%$ and therefore « compliant » ($< 2\%$) and 21 (i.e. 57%) are « non-compliant » ($> 2\%$). i.e. a total of $= 21 + 8 / 45 = 64.5\%$ non-compliant, i.e. $14 + 3.5 = \sim 17.5\text{M}$ inhabitants concerned

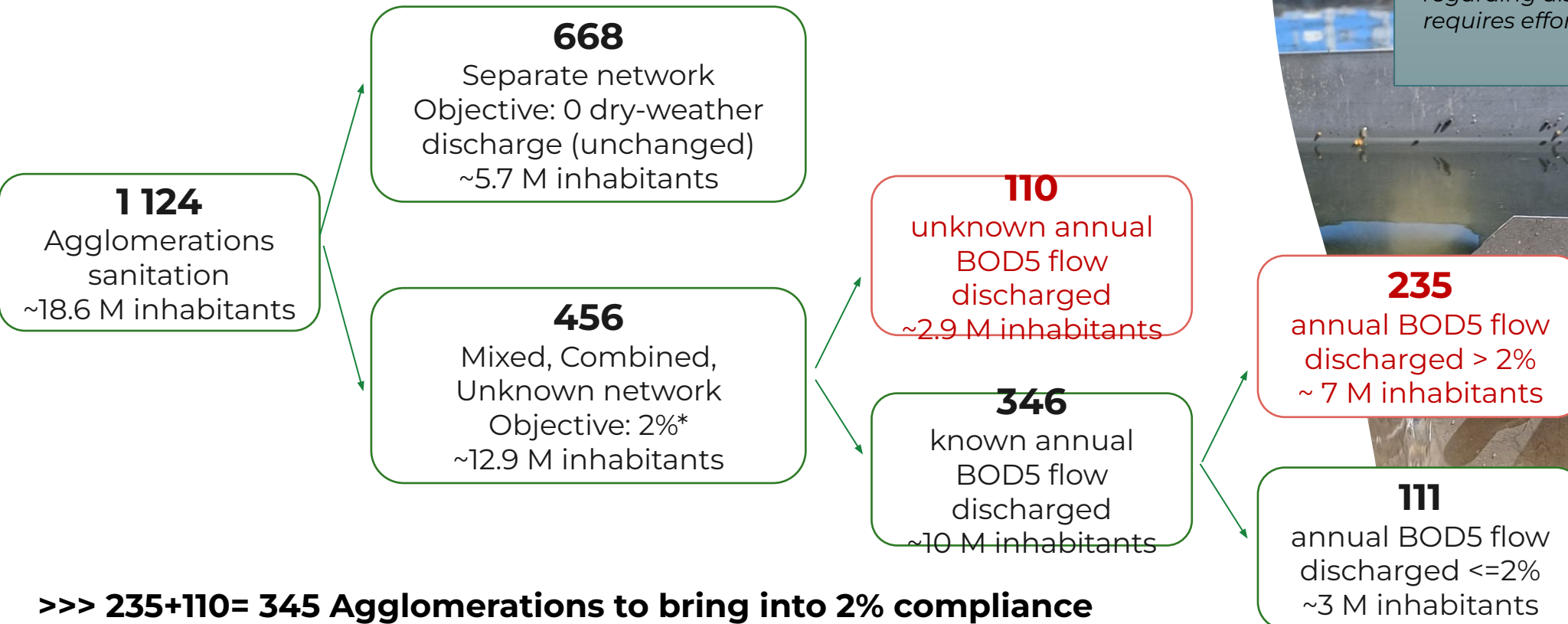
*Direct discharges of untreated wastewater during rainfall (storm overflows) must not exceed 2% of the pollution produced during dry weather.

II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Cost estimation

2. Case of sanitation agglomerations $\geq 10,000$ and $< 100,000$ EH

Current state of knowledge of flows



>>> **235+110= 345 Agglomerations to bring into 2% compliance**

*Direct discharges of untreated wastewater during rainfall (storm overflows) must not exceed 2% of the pollution produced during dry weather.

Comments: among the 456 « non-separate » systems, $346/456 = 68\%$ have a known % of annual discharged flow; the 110 unknowns are assumed to be > 2% discharge.

Of these 346, 111 are < 2% and therefore » compliant » and 235 (i.e. 57%) are « non-compliant » (>2%). i.e. a total of $=235+110 / 456 = 76\%$ non-compliant, i.e. 9.9M inhabitants concerned

There is also considerable uncertainty regarding discharged BOD5 flows, which requires efforts in terms of monitoring

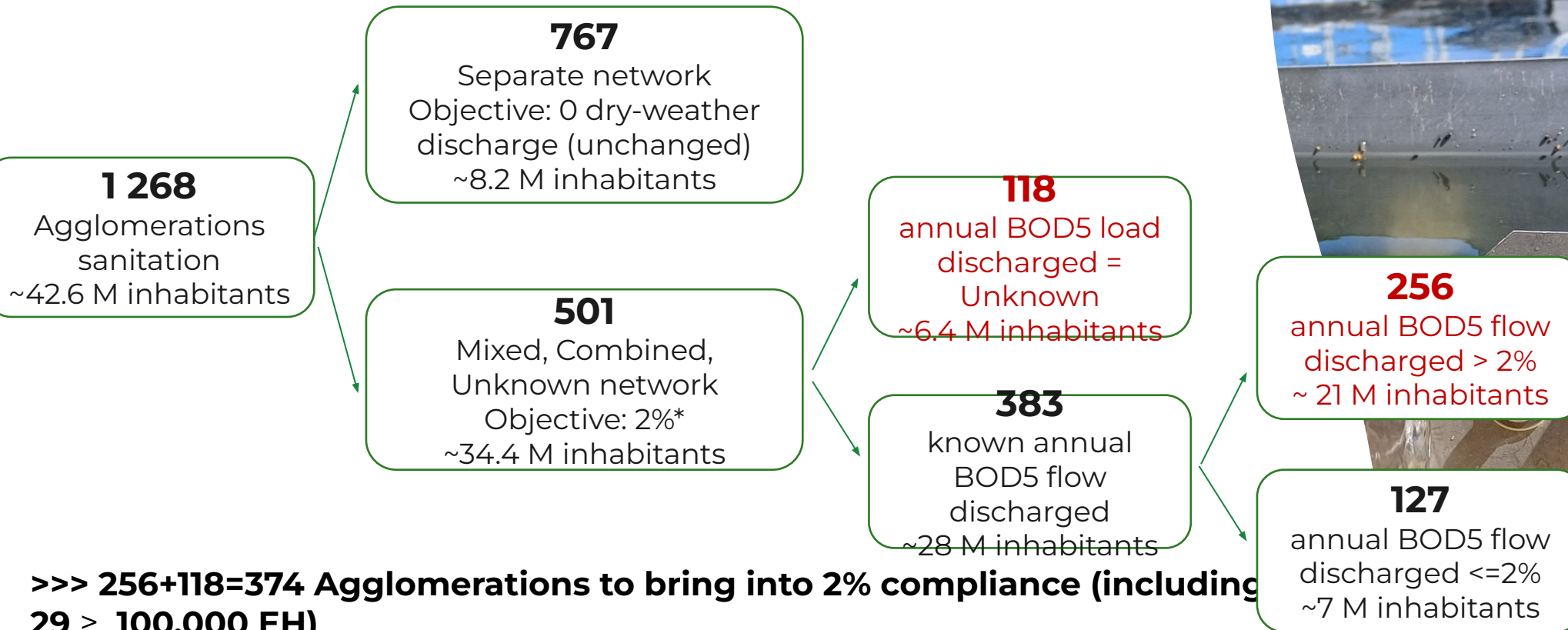
II.3. COLLECTION: DISCHARGES DURING RAINFALL

Cost estimation

Summary of the 2 previous panels = case of sanitation agglomerations $\geq 10,000$ EH

Current state of knowledge of flows

Comments: in total, for systems $\geq 10,000$ PE, there are $118+256 = 374$ agglomerations non-compliant with the 2% criterion, representing 27.4 M inhabitants, i.e. approximately 2/3 of the total inhabitants of this agglomeration class



>>> **256+118=374 Agglomerations to bring into 2% compliance (including 29 $\geq 100,000$ EH)**

*Direct discharges of untreated wastewater during rainfall (storm overflows) must not exceed 2% of the pollution produced during dry weather.

II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Cost estimation

Case 1 : All agglomerations $\geq 10,000$ PE (combined, mixed, unknown

Agglomérations d'assainissement		Population correspondante Agglomération assainissement	Agglomérations avec réseau majoritaire Unitaire, Mixte ou		Agglos avec % flux annuel déversé 5 ans (kgDBO5) inconnu		Nombre d'agglos avec % flux déversé connu (kg de DBO5) sur 5			Agglomérations avec réseau majoritaire Unitaire, Mixte, Inconnu				Estimation coûts pour tendre vers 2% réalisation (€ HT)	
Taille	Nombre		Nombre	Population correspondante concernée	Nombre	Population correspondante	Nombre total	> 2%	$\leq 2\%$	Nombre total	Population concernée correspondante à Flux $\leq 2\%$	Nombre Flux > 2% ou Flux inconnu	Population concernée correspondante à Flux > 2% ou Flux inconnu	avant 2039	avant 2045
[0 ; 10 000 [EH	20 740	21 902 112	11 514	10 608 359	Non concerné		NON CONCERNE								
10 000 ; 100 000 [EH	1 124	18 651 832	456	12 906 770	110	2 909 863	346	235	111	456	2 963 581	345	9 943 189	Non concerné	9 940 000 000
[100 000 ; ... [EH	144	23 950 989	45	21 562 071	8	3 435 774	37	21	16	45	4 140 809	29	17 421 261	17 420 000 000	Non concerné
	22 008	64 504 932	12 015	45 077 200			383	256	127		7 104 391	374	27 364 451	17 420 000 000	9 940 000 000
														27 360 000 000	

--> 29 Agglomerations by the horizon **2035** | **€17.5 billion excl. tax of works** ([12 to 22] billion)

--> 345 Agglomerations by the horizon **2045** | **€10 billion excl. tax of works** ([7 to 12] billion)

Total 374 Agglomerations / ~ €27.5 billion (+/- €8 billion) for

II.3. COLLECTION: DISCHARGES DURING RAINFALL

Rainfall: Cost estimation

Case 2 : Agglomerations $\geq 10,000$ PE in an N, P sensitive area or both

Agglomérations d'assainissement		Population correspondante Agglomération assainissement	Agglomérations avec réseau majoritaire Unitaire, Mixte ou		Agglos avec % flux annuel déversé 5 ans (kgDBO5) inconnu		Nombre d'agglos avec % flux déversé connu (kg de DBO5) sur 5			Agglomérations en réseau Unitaire, mixte, inconnu et uniquement en zone sensible N, P (ou N + P) pour les > 10 000 et < 100 000				Estimation coûts pour tendre vers 2% réalisation (€ HT)	
Taille	Nombre		Nombre	Population correspondante concernée	Nombre	Population correspondante	Nombre total	> 2%	$\leq 2\%$	Nombre Total	Population concernée correspondante à Flux $\leq 2\%$	Nombre Flux > 2% ou Flux inconnu	Population concernée correspondante à Flux > 2% ou Flux inconnu	avant 2039	avant 2045
[0 ; 10 000 [EH	20 740	21 902 112	11 514	10 608 359	Non concerné		NON CONCERNE								
10 000 ; 100 000 [EH	1 124	18 651 832	456	12 906 770	110	2 909 863	346	235	111	403	2 637 098	308	9 005 022	Non concerné	9 010 000 000
[100 000 ; ... [EH	144	23 950 989	45	21 562 071	8	3 435 774	37	21	16	45	4 140 809	29	17 421 261	17 420 000 000	Non concerné
	22 008	64 504 932	12 015	45 077 200			383	256	127		6 777 908	337	26 426 284	17 420 000 000	9 010 000 000
														26 430 000 000	

--> 29 Agglomerations by the horizon **2035** | **€17.5 billion excl. tax of works**

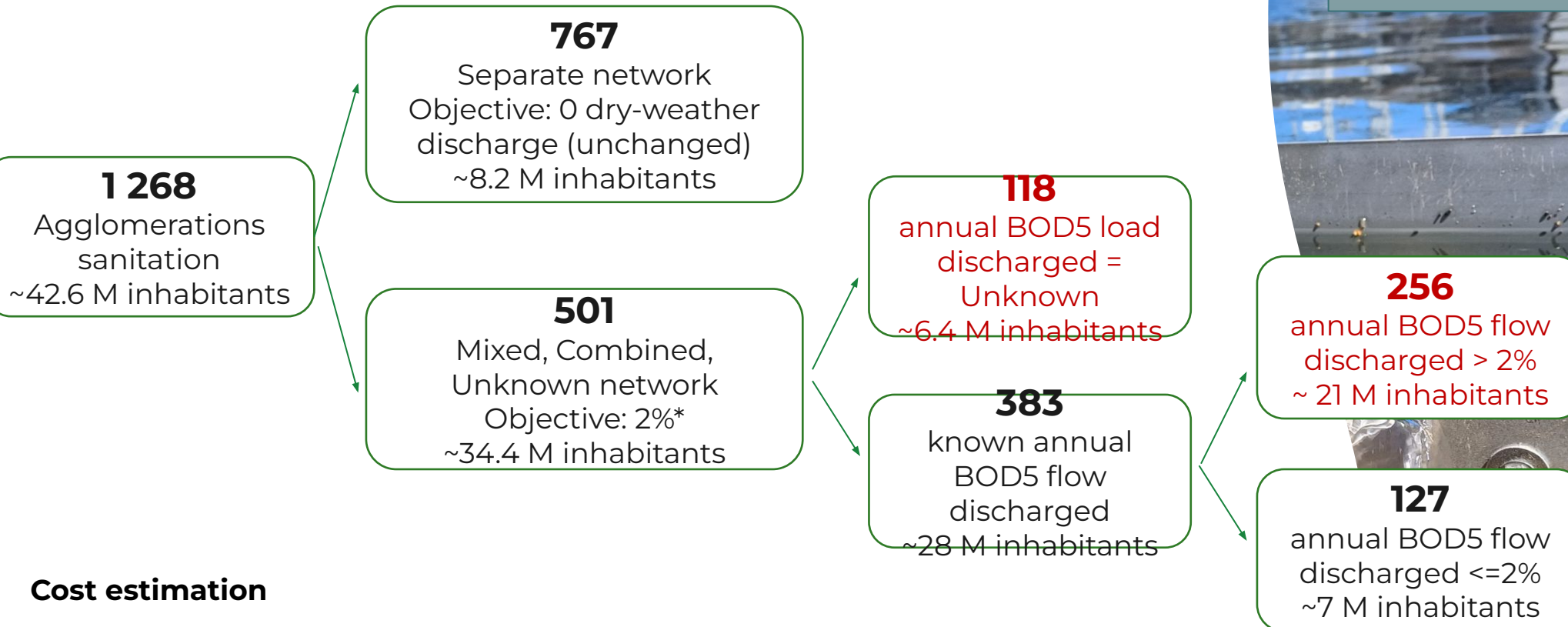
--> + 308 Agglomerations by the horizon **2045** | **€9 billion excl. tax of works**

Total 337 Agglomerations / ~ €26.5 billion (+/- €8 billion) for compliance, including €12 billion to target 5% and €14.5 billion to move toward 2% (~€1000/inhabitant)

II.3. COLLECTION: DISCHARGES DURING RAINFALL

Cost estimation

Comments: in total, for systems $\geq 10,000$ PE, there are $118+256 = 374$ agglomerations non-compliant with the 2% criterion, representing 27.4 M inhabitants, i.e. approximately 2/3 of the total inhabitants of this agglomeration class
29 concern agglomerations $\geq 100,000$ PE



Cost estimation

~ €14 to 29 billion / first tier reaching 5% (~€12.5 billion), second tier 2% (~€15 billion)

*Direct discharges of untreated wastewater during rainfall (storm overflows) must not exceed 2% of the pollution produced during dry weather.

II.3. COLLECTION: DISCHARGES DURING RAINFALL

Wet weather: Recommendations (1/2)

Points of attention / recommendations

- It is advisable to determine as soon as possible:
 - The transposition into French law of the **notion of "discharge due to storm rainfall represents more than 2% of the load in urban wastewater collected annually, calculated against dry weather flow"**, its calculation method and thus the assessment of collection compliance
 - To decide as soon as possible on the monitoring arrangements for RIs, should they need to incorporate the 2% compliance calculation method. Given their large number, the technical and human costs and resources could be very difficult for sanitation agglomerations to bear. In that case, it is recommended to decide on the possibility of using a hydraulic model to estimate the loads discharged at RI points.
 - **the national zoning of areas presenting a risk to the environment or public health** (art.5.2.c) in order to
 - Identify the agglomerations that will need to move toward 2% as a priority and allow an intermediate 5% step for those that are very far from it (the compliance study must be aligned with an eventual 2% target)
 - Refine the number of agglomerations concerned (10,000 - 100,000 bracket) to be monitored by State services
 - Direct funding as a priority toward these sanitation agglomerations (strategy at the scale of each River Basin)
 - Aim to reach 5% for agglomerations outside the zoning for which the target is not currently met



II.3. COLLECTION: DISCHARGES DURING RAINFALL

Wet weather: Recommendations (2/2)

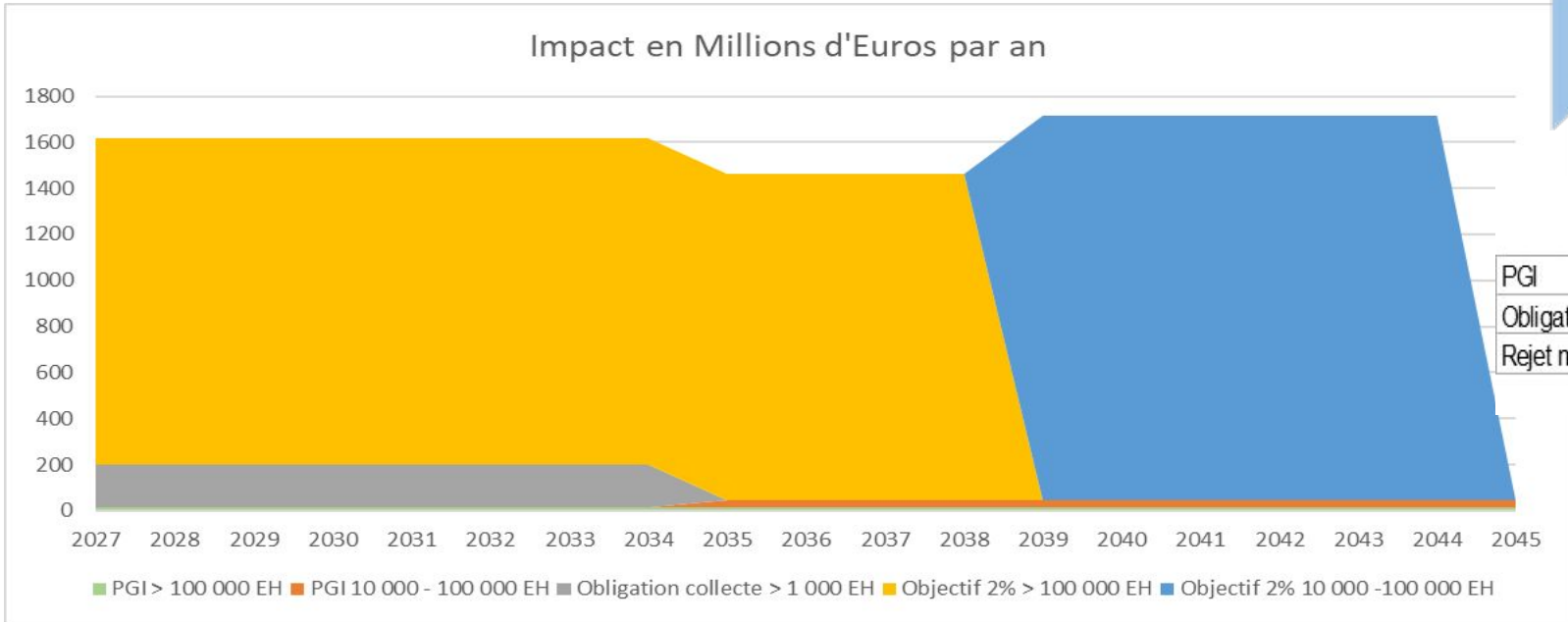
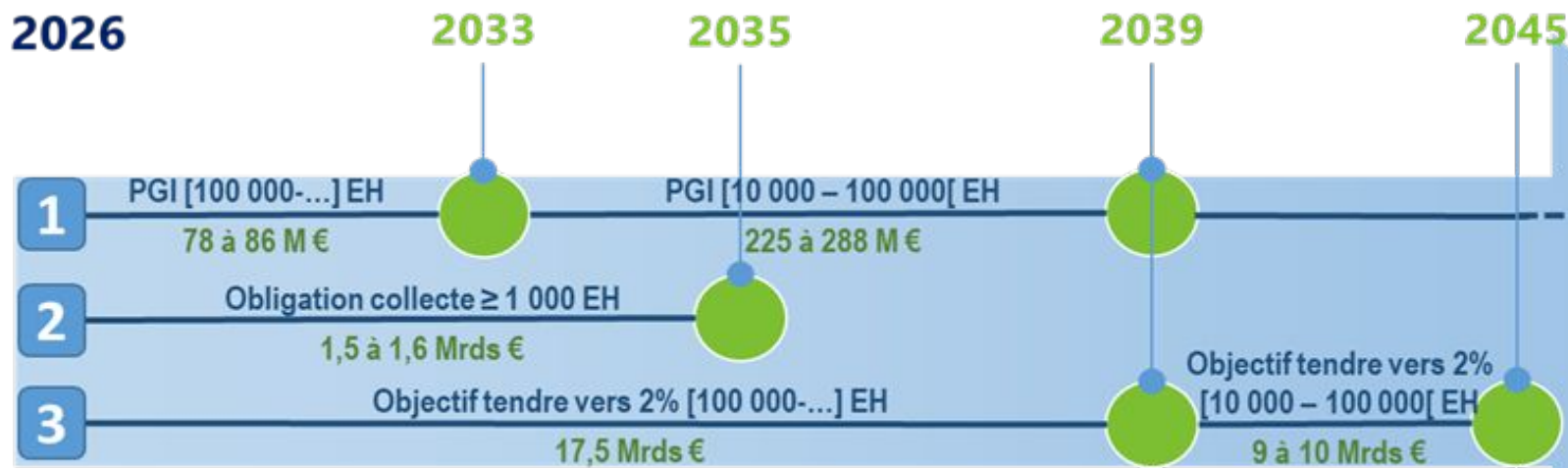
Points of attention / recommendations

- **Improve national-level knowledge and metrology of relief structures** A1 and R1 (make the Roseau database more reliable): number, monitoring arrangements and discharged flows, for a stock of assets that is currently very poorly instrumented
- **"Take advantage" of the regulatory transposition of DERU 2 into French law to push forward the collection of information on the installation date of buried assets and improve knowledge of them** (Length unknown at national level, including in the SISPEA database, installation dates unknown). This is not a regulatory obligation but an issue with respect to the risk of a "tsunami" of network renewal to be carried out, overlapping with other technical obligations (such as strengthening treatment, energy neutrality, etc.) but also operational ones (age not being the sole criterion for renewal/rehabilitation, the ability to ensure the service and the expected performance of each collector also being key decision factors)
- **Rely on the PGIs, self-monitoring and permanent diagnosis** to strengthen the upgrading/compliance of connections. This is an economic item underestimated in the approach presented above, as it falls more under private financing (compliance of residential buildings, houses, activities), the general budget for the administrative public stormwater service, and the related budget of local authorities for roads and buildings they own. Draw inspiration from the lessons learned in the Paris region / 2024 Olympics.



II.3. COLLECTION: DISCHARGES DURING RAINFALL

Summary elements: timelines and economic envelopes



	Montant totaux en Millions d'Euros par période			
	2027-2033	2033-2035	2035-2039	2039-2045
PGI	85	28	190	285
Obligation collecte > 1000 EH	1 125	375	-	-
Rejet max 2% par temps de pluie	8 500	2 833	5 667	10 000
	9 710	3 237	5 857	10 285

II. 4. RECOMMENDATIONS FOR TRANSPOSITION INTO FRENCH LAW

II.4. COLLECTION: RECOMMENDATIONS

Define as a priority the calculation and control method for collection compliance

The transposition into French law of the notion of "discharge due to storm rainfall representing more than 2% of the load in urban wastewater collected annually, calculated against dry weather flow" can take several forms

Objectives targeted:

- Define the control arrangements
- Define as soon as possible the control criteria consistent with the requirements of Art.5 and Annex 5 of DERU 2 (BOD5, COD, SS, others?)
- Identify additional monitoring resources for discharge structures, in particular RIs, whose economic and resource impact can be substantial
- Decide on the exemption allowing recourse to hydraulic modeling to estimate the loads discharged at RI points (supported by CSO sampling, for example)

$$\frac{\sum \text{Volume ou flux déversés en A1 par temps de pluie}}{\sum \text{Volume ou flux en A3, A2, A1 par temps sec et temps de pluie}}$$



$$\frac{\sum \text{Volume ou flux déversés en A1, R1, A2 par temps de pluie}}{\sum \text{Volume ou flux en A3 par temps sec}}$$



$$\frac{\sum \text{Volume ou flux déversés en A1, R1 par temps de pluie}}{\sum \text{Volume ou flux en A3 par temps sec}}$$



$$\frac{\sum \text{Volume ou flux déversés en A1, R1 par temps de pluie}}{\sum \text{Volume ou flux en A3, A2, A1, R1 par temps sec}}$$



II.4. COLLECTION: RECOMMENDATIONS

Define as a priority the national zoning of areas presenting a risk to public health and/or the environment (art 5.2.c)

- To make it possible to identify sanitation agglomerations $\geq 10,000$ PE and $< 100,000$ PE (~1,125 units) with non-combined networks subject to the obligation to conduct a PGI before 2039;
- To make it possible to identify sanitation agglomerations $\geq 10,000$ PE and $< 100,000$ PE subject to the obligation to move toward 2%;
- To identify the agglomerations that will need to move toward 2% as a priority and allow an intermediate 5% step for those that are very far from it, see next slide (the compliance study must be aligned with an eventual 2% target)

Recommendation: Rely on the chemical and biological status of water bodies established at the end of 2025 + bathing areas + drinking water catchment perimeters + local economic issues (shellfish farming, etc.) in application of the conditions listed in Art.5 and Annex V of DERU 2 (compliance with the 6 directives on drinking water/bathing water/marine waters/WFD/surface water quality/groundwater quality)

Objectives targeted:

- Smoothing of PGI implementation for agglomerations of more than 10,000 PE (benefit of starting as early as possible)
- Allow all agglomerations of more than 10,000 PE that launch a stormwater study to integrate DERU 2 into the objectives (as well as into sanitation studies and zoning)
- Direct funding as a priority toward these sanitation agglomerations (in a strategic approach at the scale of each River Basin)
- Aim to reach 5% for agglomerations outside the zoning for which the target is not currently met



II.4. COLLECTION: RECOMMENDATIONS

Move toward 2% with an intermediate 5% step

- Rely on national zoning to "push" for achieving 2% in priority high-stakes areas (prioritized PGIs, earmarked funding) and justify maintaining the course set by the order of 21.07.2015 for collection systems outside the zoning
- Launch PGIs with a compliance scope of 2% by 2039 ($\geq 100,000$ PE) and 2045 ($\geq 10,000$ PE), with an intermediate 5% step

Objectives targeted:

- Smoothing of works and associated costs
- Allow time for implementing solutions incorporating Nature-Based Solutions, de-sealing, etc.
- Allow time to incorporate the complexity and timing, and to bear the costs of works on combined networks (storm basins, etc.) in urban areas/city centers



II.4. COLLECTION: RECOMMENDATIONS

Introduce national specifics into the PGIs (1/2)

- **Legislate on the funding of stormwater (EP) management**
 - As a lever for achieving the 2% target in mixed or combined networks (the topic being linked to wet weather and hence to stormwater)
 - As a means of financing disconnection, de-sealing, and source-based stormwater management actions (current situation: no tariff differentiation possible on the bill between stormwater discharged into a combined network, a stormwater network, or managed at plot level)
 - Considerations for activating alternatives to the stormwater tax or malus/penalty (which have not worked in cases of non-disconnection of stormwater or misconnection on private property)
 - To address
 - The financing needs of the collective sanitation service for structuring equipment: storm basins, wet-weather treatment train (what about the possibility of different wastewater (AC) tariffs depending on whether the subscriber discharges their stormwater into a combined network or a separate network?)
 - The possibility of introducing a tariff "malus" for wastewater (AC) if the subscriber does not carry out stormwater disconnection works aimed at reducing wet-weather overflows?
 - **More broadly, rethink the funding of the stormwater (EP) competency** which is an administrative service in "interaction" with a SPIC (industrial and commercial public service).



II.4. COLLECTION: RECOMMENDATIONS

Introduce national specifics into the PGIs (2/2)

- **Integrate the obligation of a strategic and financial vision** into the PGIs (long-term scope) in order to have a realistic and financeable PPI, and to break down this 20-year strategic vision (2045) into tactical stages that will be the PGIs every 6 years (2033, 2039)
- **Require a wet-weather approach** incorporating a 50-year climate projection of the synthetic rainfall year for any hydraulic modeling used when drawing up the action plan aimed at reducing wet-weather discharges
- **Require a Cost/Benefit Analysis** (CBA) systematically at the scale of the sanitation agglomeration within the PGI framework, in order to prioritize and measure the benefits of each action in the action plan and help with prioritization
- **Require the completion of a strategic de-sealing study** at the scale of the territory to identify and prioritize the areas of the territory with the greatest impact in terms of reducing wet-weather discharges and preserving receiving environments (multi-criteria approach)
- **Integrate an asset-management approach** for collection structures in order to incorporate renewal/rehabilitation needs.



II.4. COLLECTION: RECOMMENDATIONS

Retain the minimum reference threshold of 10 to 25 PE per hectare for the collection and treatment obligation, or promote IAC/ANC zoning studies which have the advantage of combining population density criteria with other techno-economic criteria (network length/PE collected, impact on the receiving environment, housing layout, ANC (on-site sanitation) difficult to implement, etc.) for the use of collective sanitation systems.

This is justified

- Because the municipalities not currently served by collective sanitation all have a density $\leq 1,000$ inhabitants* /km²
- In order not to impose systematic collection and treatment on municipalities ≥ 1000 PE not currently served by collective sanitation;
- To smooth the associated collection and treatment costs
- Due to local specifics that are difficult to assess at the national level

**this requires first identifying the municipalities not served by collective sanitation in the ≥ 1000 PE bracket that have economic activities*

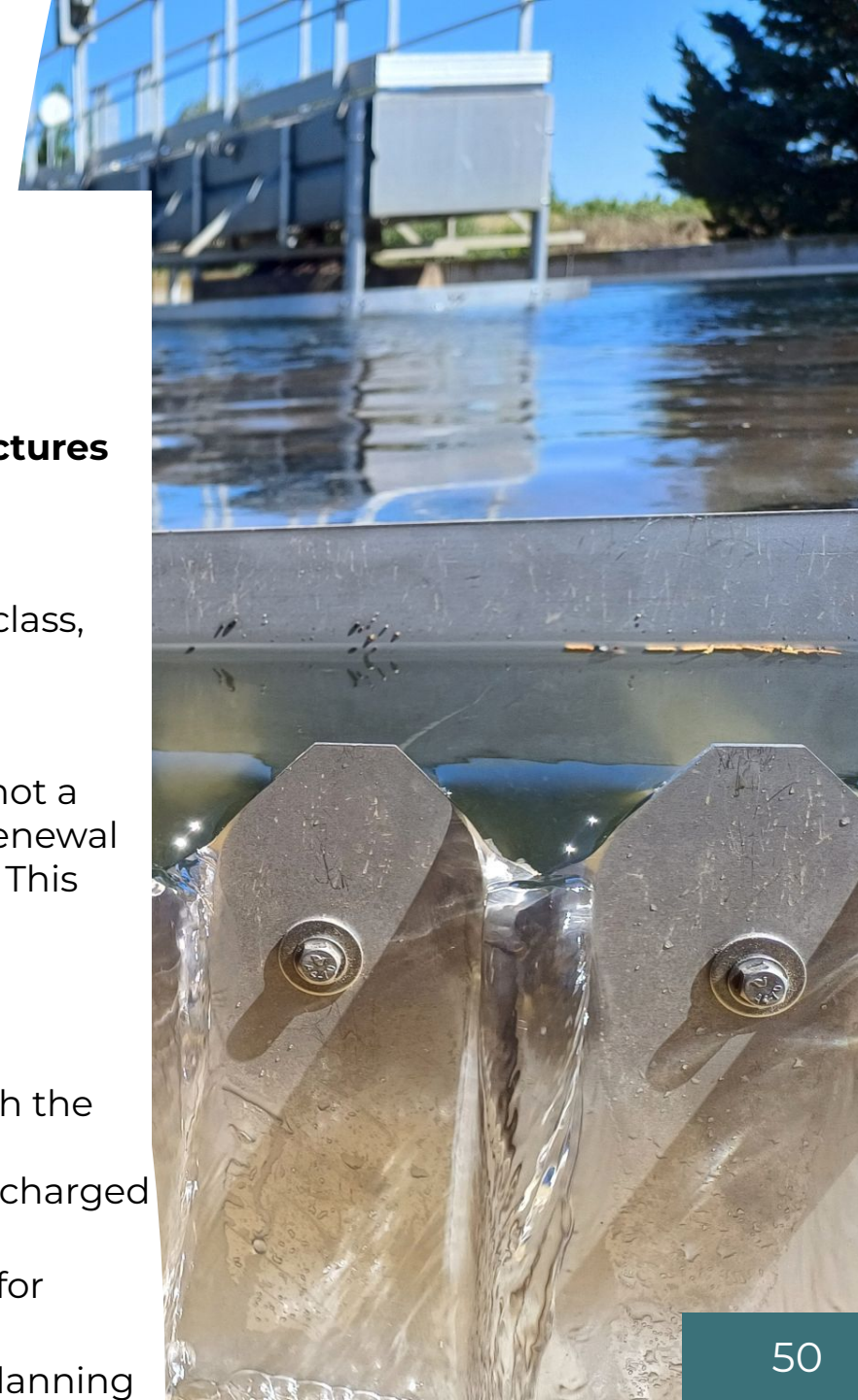


II.4. COLLECTION: RECOMMENDATIONS

Strengthen and improve the reliability of national-level knowledge of collection systems through regulation

Take advantage of the regulatory transposition of DERU 2 into French law to

- **Capitalize on and monitor at national level the knowledge of A1 and R1 relief structures** for collection systems: number, monitoring arrangements for discharged flows.
- **Improve the reliability of the Roseau database** whose information is incomplete or erroneous (e.g. network type M/S/U/I), as a priority for the $\geq 10,000$ PE agglomeration class, with the dual aim of knowledge/control/planning and European reporting
- **Push forward the collection of information on the age of network assets** (Length unknown at national level, including in the SISPEA database, ages unknown). This is not a regulatory obligation but an issue with respect to the risk of a "tsunami" of network renewal to be carried out, overlapping with other technical obligations (STEU treatment, etc.). This knowledge will help promote asset management through network rehabilitation/replacement actions (reduction of direct discharges, exfiltrations, etc.)
- **Monitor at national level**
 - o **the actual amounts of the PGIs** (presumably financed by the Water Agencies) with the aim of having a national database of costs per PE according to the size of the agglomerations concerned, network type, the gap to be closed on the % of flow discharged during wet weather, etc.
 - o **The amounts of works carried out** (presumably financed by the Water Agencies) for compliance with DERU 2 - collection and treatment
 - o through a centralized system for wastewater zoning perimeters (similar to urban planning



III. STUDY OF THE IMPACT OF DERU 2 ON TREATMENT SYSTEMS

III. TREATMENT: MAJOR ISSUES (1/3)

Reduction of the impact of treatment systems on natural environments and on the uses of aquatic environments via:

- a strengthening of discharge standards for treatment systems
- an update of the treatment requirements and monitoring of treated water quality (taking into account micropollutants, emerging pollutants, microplastics, etc.)



III. TREATMENT: MAJOR ISSUES (2/3)

Scope of treatment systems concerned:

- Obligation of (collection and) secondary treatment from 1,000 PE
- Obligation of N/P treatment even outside eutrophication-sensitive areas for WWTPs > 150,000 PE

Treatment quality:

- Strengthening of the N/P discharge levels to be achieved for WWTPs > 150,000 PE and for sanitation agglomerations > 10,000 PE in eutrophication-sensitive areas
- Implementation of micropollutant treatment (all WWTPs > 150,000 PE + sanitation agglomerations > 10,000 PE in micropollutant-sensitive areas)

Treatment optimization:

Energy aspect:

- Energy audits for WWTPs > 10,000 PE
- Energy neutrality target for WWTPs > 10,000 PE at the France level, with a possible exemption of up to 35% of renewable energy produced off-site
- Use of new technologies to aim for an optimum between discharge quality and energy consumption

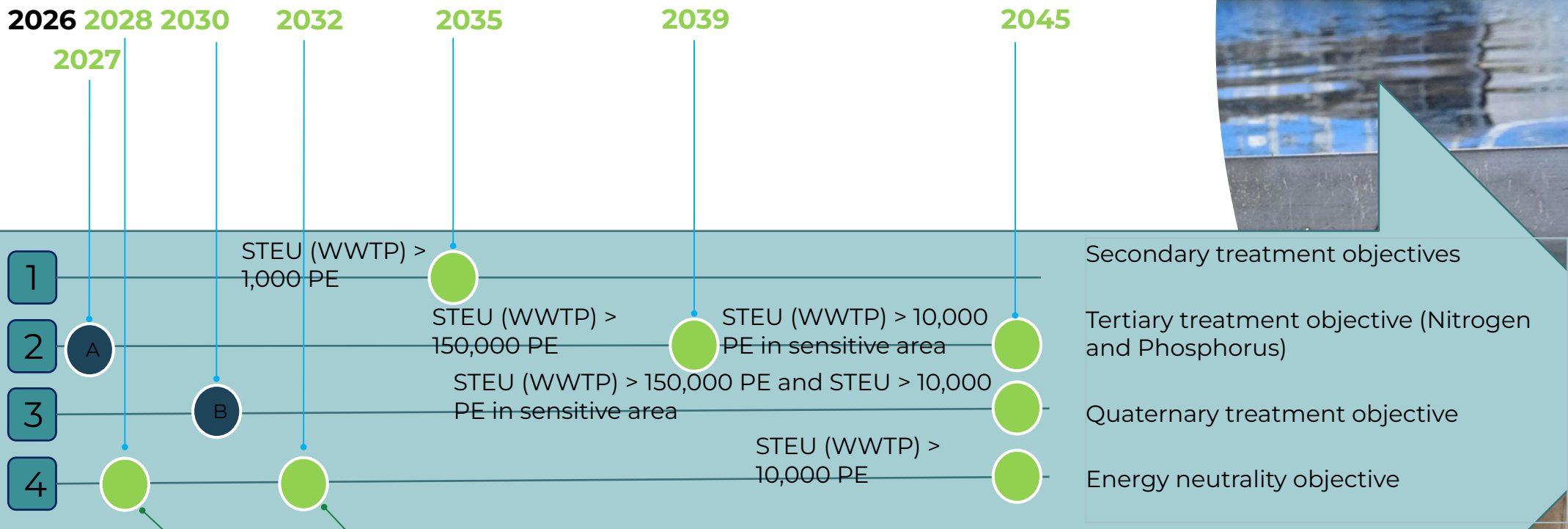
Monitoring of wastewater / treated effluent / sludge:

- Microplastics / PFAS
- Bacteriological and virological contamination



III. TREATMENT: MAJOR ISSUES (3/3)

Regulatory deadlines:



Audit of STEU (WWTP) > 10,000 PE, then every 4 years
Audit of STEU (WWTP) > 100,000 PE, then every 4 years / Implementation of the Micropollutants EPR (extended producer responsibility) scheme

- A Mapping of N/P sensitive areas to be carried out by the Ministry
- B Mapping of micropollutant priority areas to be carried out by the Ministry



III. TREATMENT: GENERAL METHODOLOGY

III. TREATMENT: METHODOLOGY

Data made available

Work based on the extract of the Roseau database provided by State services and that of the Portail Assainissement

Database cleaned of certain anomalies:

- WWTP outside France
- Incorrect obligation bracket

Recommendation: This database must be consolidated and cleaned; some data is missing or incorrectly entered - Additions needed for monitoring the new parameters

Additional information on certain agglomerations was provided by FNCCR and FP2E



III. TREATMENT: METHODOLOGY

Data made available

Important methodological point: we used the CBPO 2021-2023 to define the obligation brackets, in accordance with articles 6, 7 and 8 of DERU 2.

As a reminder, the CBPO is determined by calculating the daily load of the busiest week of the year, excluding unusual situations.

This deserves to be highlighted, as it does not correspond to the plant's nominal load (usually corresponding to a plant design horizon of 15-25 years taking into account changes in the sanitation agglomeration's collection area), nor to the load generated by the agglomeration, but rather the load actually received by the WWTP, which is used for classification.

This means that a plant designed for 200,000 PE but which only receives 80,000 PE (measured CBPO) might not be subject to the obligations of the 150,000 PE treatment threshold — at least until its actual load reaches that threshold.

- annual maximum value for many plants ==> relevance of sizing based on maximum load? What about plants with high load variations (coastal/mountain)? Only plants > 50,000 PE carry out more than one analysis per week
- Value lower than the nominal treatment capacity: estimation of additional treatment needs (secondary, tertiary, quaternary) based on the plant's current maximum load received rather than its theoretical nominal treatment capacity.



III. TREATMENT: METHODOLOGY

Recap of elements concerning treatment systems:

- New sanitation systems (collection obligation for sanitation agglomerations of more than 1,000 PE)
- Secondary treatment
- Tertiary treatment (Nitrogen/Phosphorus)
- Quaternary treatment
- Energy neutrality



III. TREATMENT: METHODOLOGY

Taking future demographic changes into account:

Use of INSEE regional demographic data to estimate changes / shifts in the compliance levels to be met (example: the case of a WWTP that would cross the 10,000 PE threshold by 2045).

- The data show a bracket change for only 0.7% of French WWTPs (102) by 2045
- **As a result, not considered for the present study**



III. TREATMENT: METHODOLOGY

Taking into account the impacts of DERU 2 - Collection on treatment systems:

Improvement of collection: assumption made of network works (storage, retention, etc.) allowing a smoothing of the organic and hydraulic loads arriving at the WWTP

Climate change: Integrated Stormwater Management strategy to be rolled out across all systems / network renewal works

- Stormwater removed from sanitation networks --> little impact on treatment systems
- Wet-weather treatment trains/configurations at the treatment system level to be studied in certain cases

□ **As a result, impact not considered for the present study**



III.1. SECONDARY TREATMENT

III.1. SECONDARY TREATMENT

Secondary treatment - WWTPs > 1,000 PE:

Recap of requirements (same as DERU I):

Parameters	Concentration	Minimum percentage reduction
Biochemical oxygen demand (BOD ₅ at 20°C) without nitrification	25 mg/l O ₂	70-90 %
Chemical oxygen demand (COD)	125 mg/l O ₂	75 %
Total solid matter in suspension	35 mg/l	90 %



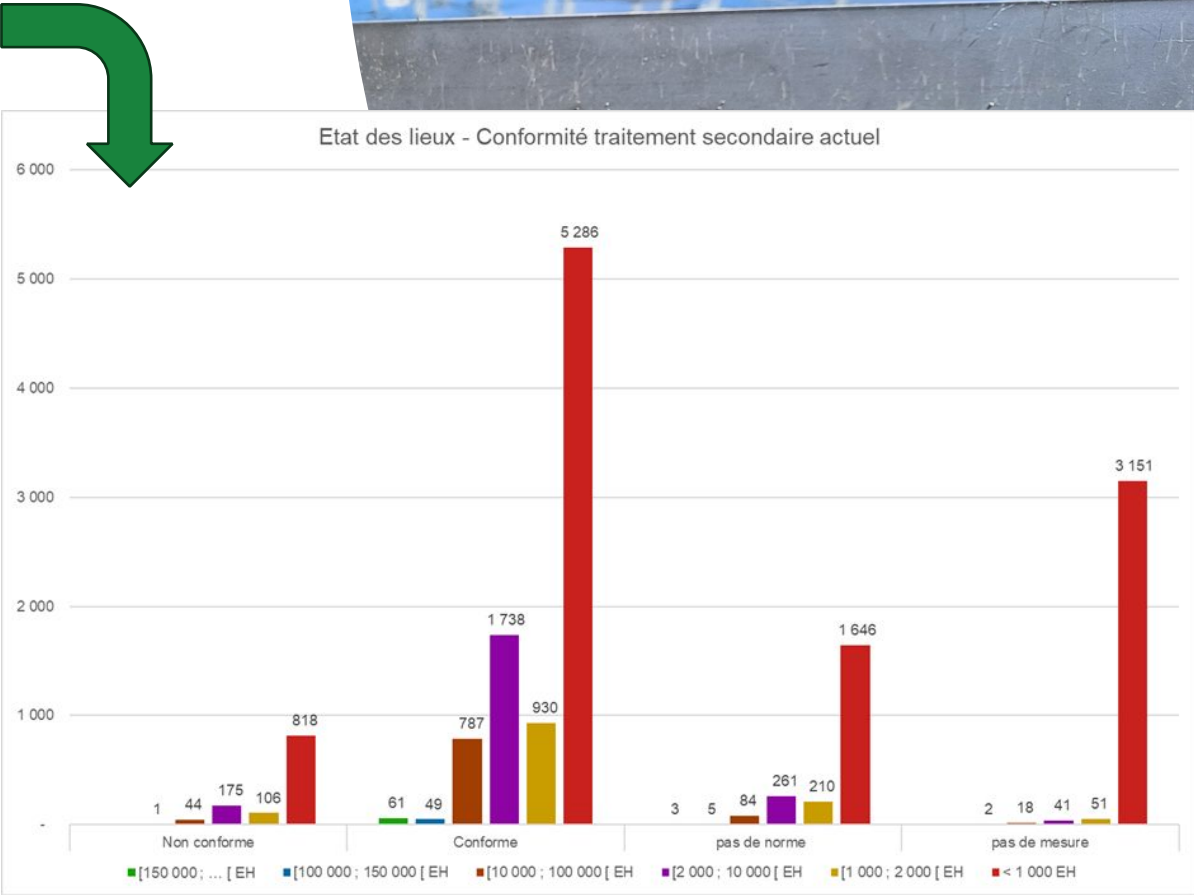
III.1. SECONDARY TREATMENT

Secondary treatment – WWTPs > 1,000 PE: current situation

Current state in terms of compliance:

SECONDAIRE ACTUEL				
Respect normes secondaire	Non conforme	Conforme	pas de norme	pas de mesure
[150 000 ; ... [EH		61	3	
[100 000 ; 150 000 [EH	1	49	5	2
[10 000 ; 100 000 [EH	44	787	84	18
[2 000 ; 10 000 [EH	175	1 738	261	41
[1 000 ; 2 000 [EH	106	930	210	51
< 1 000 EH	818	5 286	1 646	3 151
Total général	1 144	8 851	2 209	3 263
Total général > 1000 EH	326	3 565	563	112
	7%	78%	12%	2%

Overview of compliant, non-compliant plants, plants with no standard, or plants with no data reported in the Roseau database, for secondary treatment



III.1. SECONDARY TREATMENT

Secondary treatment – Overview of the 4,566 WWTPs > 1,000 PE:

Good level of compliance (86% of plants)

However, note that:

- 9% of plants non-compliant
- 5% of plants with no data in Roseau

535 WWTPs affected
of which 87% < 10,000
PE

Focus on systems > 1,000 PE and < 2,000 PE (1,297 WWTPs) --> 2035 deadline :

- 77% already compliant
- 14% of plants non-compliant
- 9% of plants with no data in Roseau

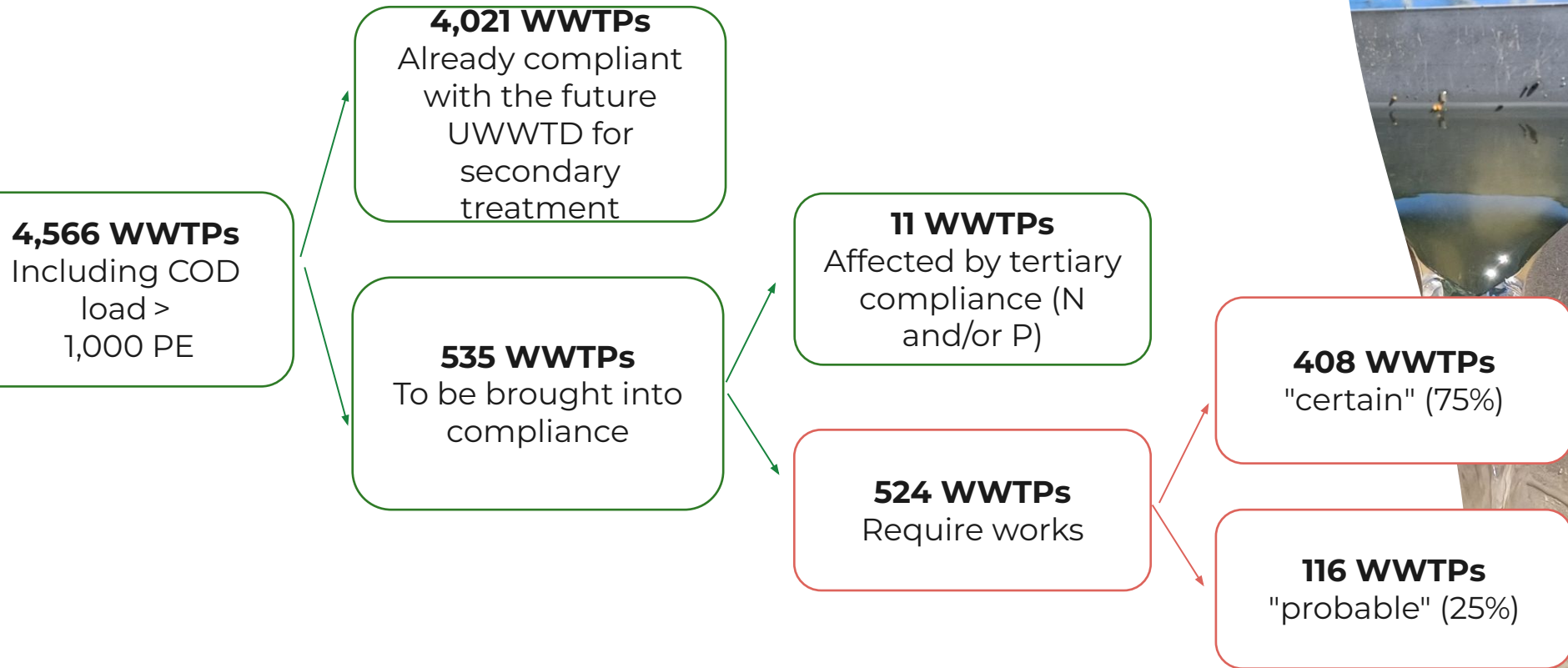
243 WWTPs
affected

Recommendation:

Ensure the completeness of the Roseau database --> goal: no plant left without data

III.1. SECONDARY TREATMENT

Secondary treatment – Overview of the 4,566 WWTPs > 1,000 PE:



III.1. SECONDARY TREATMENT

Cost estimation

Secondary treatment - WWTPs > 1,000 PE:

Works recommended if:

- **Non-compliance with BOD5, COD, or SS standards, whether in concentration or removal efficiency**

Cost assumption for works:

- Assumption: the cost of upgrading a small WWTP for secondary treatment is equivalent to 50% of the cost of building a new plant of the same capacity
- Costed using a correlation chart between WWTP cost and capacity in PE

Special cases:

- WWTPs requiring a tertiary treatment upgrade -> secondary treatment cost included in the tertiary treatment cost



III.1. SECONDARY TREATMENT

Secondary treatment – WWTPs > 1,000 PE: Cost estimate

Secondary treatment - WWTPs > 1,000 PE:

€660 M excl. tax

For about 550 plants to be optimized for better treatment of carbon pollution and suspended solids

/!\ Of the €660 M, 1/4 relates to works planned on plants due to the lack of available data in the Roseau database

□ amount probably overestimated since some of these "no data" plants are likely already compliant

Recommendation:

Ensure the completeness of the Roseau database

III.1. SECONDARY TREATMENT

Secondary treatment – case of **new sanitation systems for agglomerations of more than 1,000 PE**

Cost calculation:

Cost-per-PE formula derived from SCE's feedback for plants from 1,000 PE to 10,000 PE

Increasing or decreasing factor depending on location (overseas departments/regions, in eutrophication-sensitive areas)

Secondary treatment – new WWTPs > 1,000 PE:

€355 M excl. tax

For 253 plants to be built for sanitation agglomerations of more than 1,000 PE (scenario 1, see Slide 21)

See associated collection network cost elsewhere

/!\ As a reminder, there is no urgency/priority in national action regarding the collection and treatment of agglomerations $\geq 1,000$ PE not served by collective sanitation, since the population densities (inhabitants/km²) of the municipalities concerned are below the recommendation threshold of the European text)



III. 2. TERTIARY TREATMENT (NITROGEN AND PHOSPHORUS)

III.2. TERTIARY TREATMENT

Tertiary treatment – Sanitation agglomerations > 10,000 PE and < 150,000 PE – Reminder of obligations

Reminder of discharge levels:

0.7 mg/L total Phosphorus or 87.5% removal efficiency

10 mg/L total Nitrogen or 80% removal efficiency

Reminder of the expected deadlines for compliance:

(sensitive areas update before end of 2027):

2033: 20% of agglomerations in sensitive areas

2036: 40% of agglomerations in sensitive areas

2039: 60% of agglomerations in sensitive areas

2045: 100% of agglomerations in sensitive areas



III.2. TERTIARY TREATMENT

Tertiary treatment – Sanitation agglomerations > 10,000 PE and < 150,000 PE

933 agglomeration WWTPs in this obligation bracket, of which 610 in Nitrogen-sensitive areas and 706 in Phosphorus-sensitive areas

Deadline calculation on the total of 706 WWTPs

More than 70% of WWTPs in Sensitive Areas already comply with the future N and/or P standards

--> 2039 deadline already met

--> 2045 deadline: 197 plants to be optimized for Phosphorus, 55 plants to be optimized for Nitrogen treatment



III.2. TERTIARY TREATMENT

Tertiary treatment – WWTPs > 150,000 PE

Reminder of discharge levels:

0.5 mg/L total Phosphorus or 90% removal efficiency

8 mg/L total Nitrogen or 80% removal efficiency

Reminder of the expected deadlines for compliance:

2033: 30% of WWTPs "not applying tertiary treatment"

2036: 70% of WWTPs "not applying tertiary treatment"

2039: 100% of WWTPs



III.2. TERTIARY TREATMENT

Tertiary treatment – WWTPs > 150,000 PE

Point of attention:

What definition of an existing tertiary treatment?

- N/P standard in the permit?
- Indication from the Sanitation portal or the Roseau database?
- Current location in an N or P sensitive area?

Recommendation:

What definition of existing tertiary treatment?



III.2. TERTIARY TREATMENT

Tertiary treatment – **WWTPs > 150,000 PE**

For this study: the definition adopted for an existing tertiary treatment = an N/P discharge standard exists in the operating permit

--> 64 WWTPs > 150,000 PE, of which 46 with tertiary treatment and 18 without N and P tertiary treatment (including 8 with no data)

(Reminder: 69 plants according to the Ministry's working group data, of which 9 without tertiary treatment – 10/12/2025)

Deadline calculation on 30% and 70% of the 18 WWTPs without tertiary treatment

--> 2033 deadline: 5 plants to be optimized

--> 2036 deadline: 13 plants to be optimized (10 more between 2033 and 2036)

--> 2039 deadline: 55 plants to be optimized in total (18 without tertiary treatment and 37 with tertiary treatment)



III.2. TERTIARY TREATMENT

Tertiary treatment – **WWTPs > 150,000 PE**

--> 2039 deadline: **55 plants to be optimized in total** (18 without tertiary treatment and 37 with tertiary treatment)

Among the 37 plants with tertiary treatment to be optimized, 29 already comply with the future Nitrogen standard (probably the most difficult to guarantee)

--> Significant work to be carried out on Phosphorus treatment (17 plants with tertiary treatment already complying with the future standard)

--> After additional input from FNCCR/FP2E, 8 plants with no data

Significant number of large plants to be optimized

--> Land available? To be studied on a case-by-case basis for the identified plants starting now. At this stage, any land acquisitions have not been taken into account

--> Studies to be launched as soon as possible on systems without tertiary treatment (greatest additional treatment needs + closest deadlines)

Recommendation:

National oversight and progress monitoring

National-level decision on the compliance upgrade schedule

Recommendation:

Studies to be launched on large WWTPs as soon as possible: very long study and works durations

III.2. TERTIARY TREATMENT

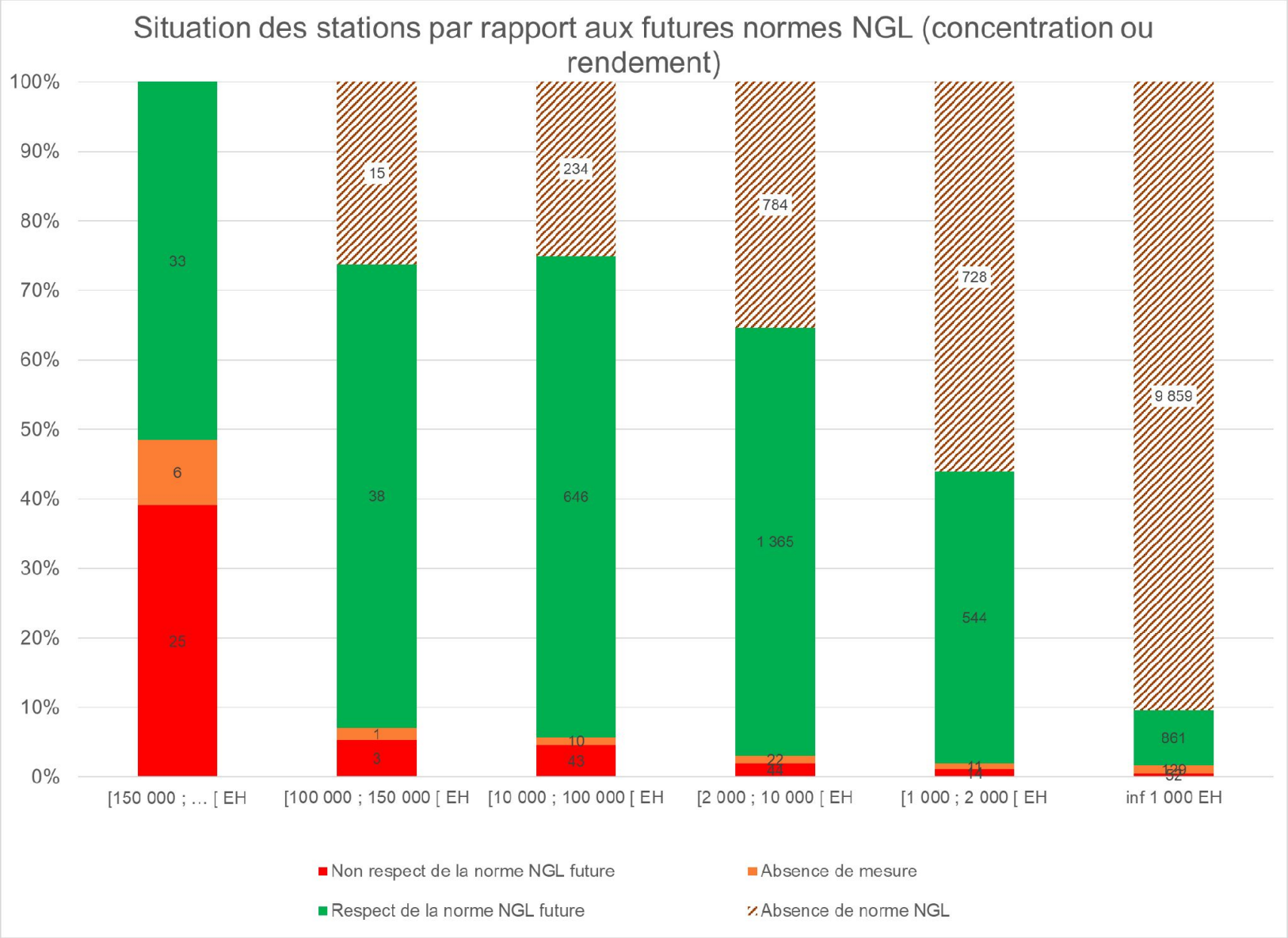
Nitrogen treatment – Future situation
Nitrogen treatment – future situation:
50% of plants > 150,000 PE already comply with the future UWWTD

Less than 10% of plants in sensitive areas > 10,000 PE do not comply with the future UWWTD

Assumptions:

No change to the sensitive areas mapping

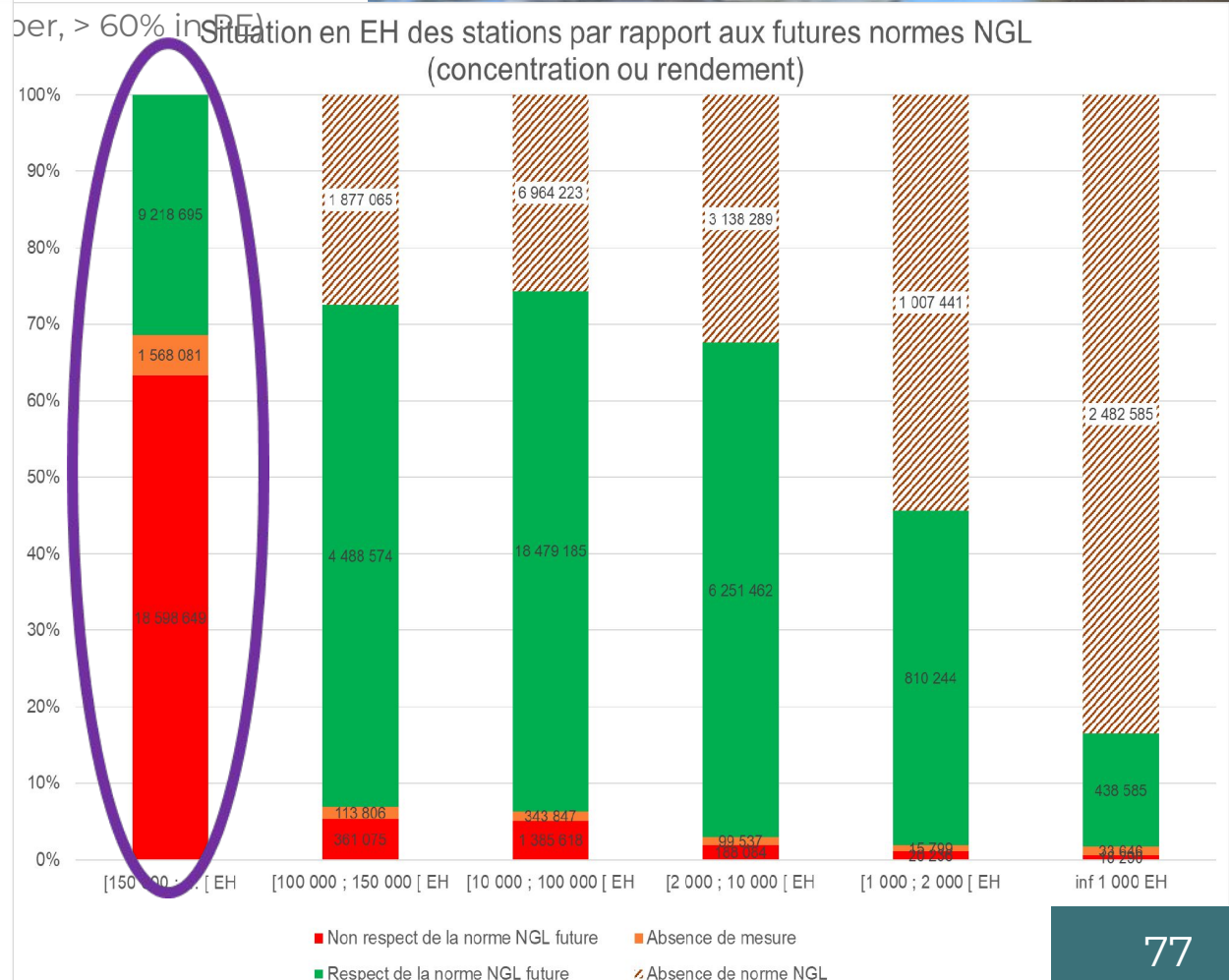
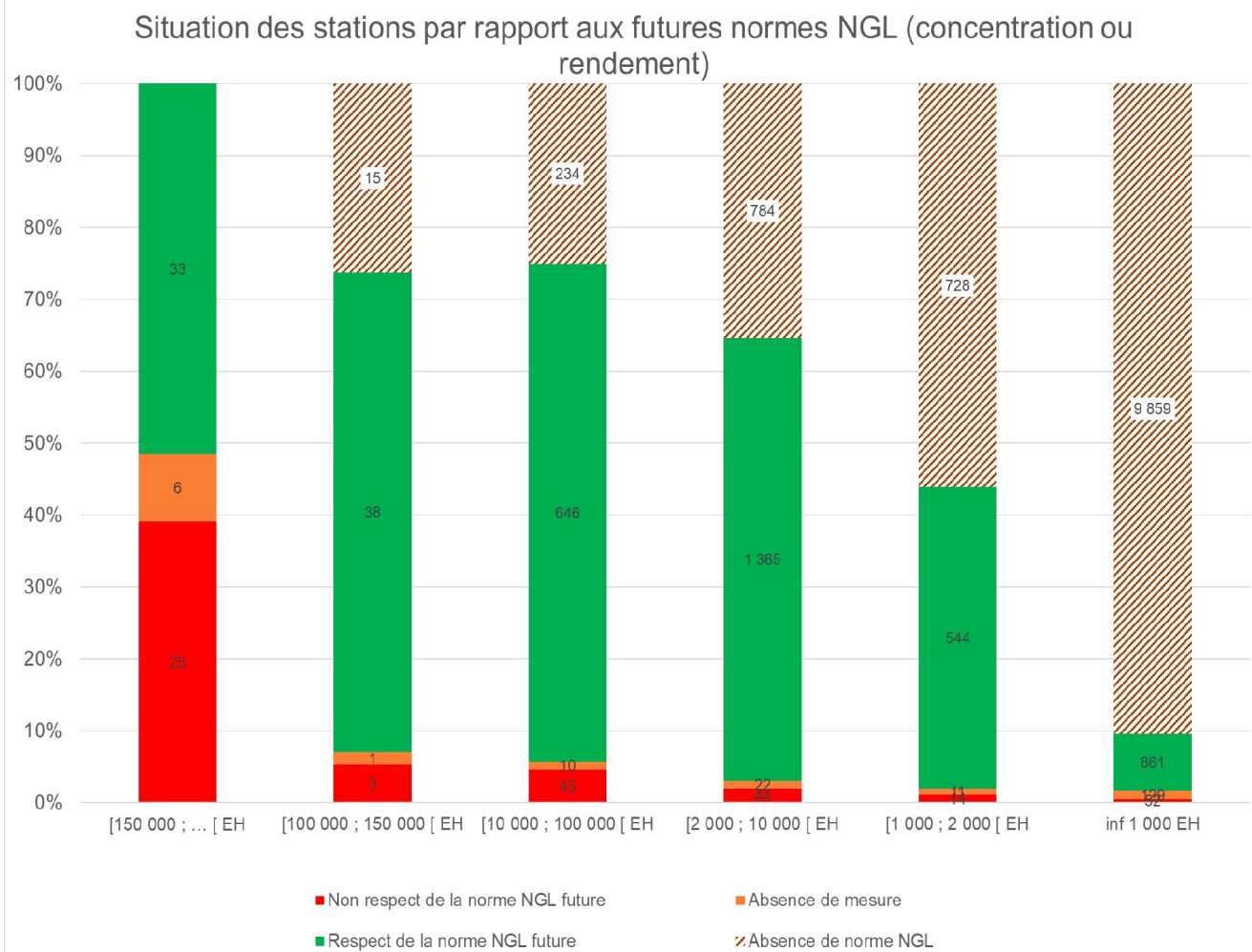
If current standards are stricter than future standards, current standards are retained



III.2. TERTIARY TREATMENT

Nitrogen treatment – Future situation

--> Same data but presented in PE



III.2. TERTIARY TREATMENT

Treatment Phosphorus – Future situation

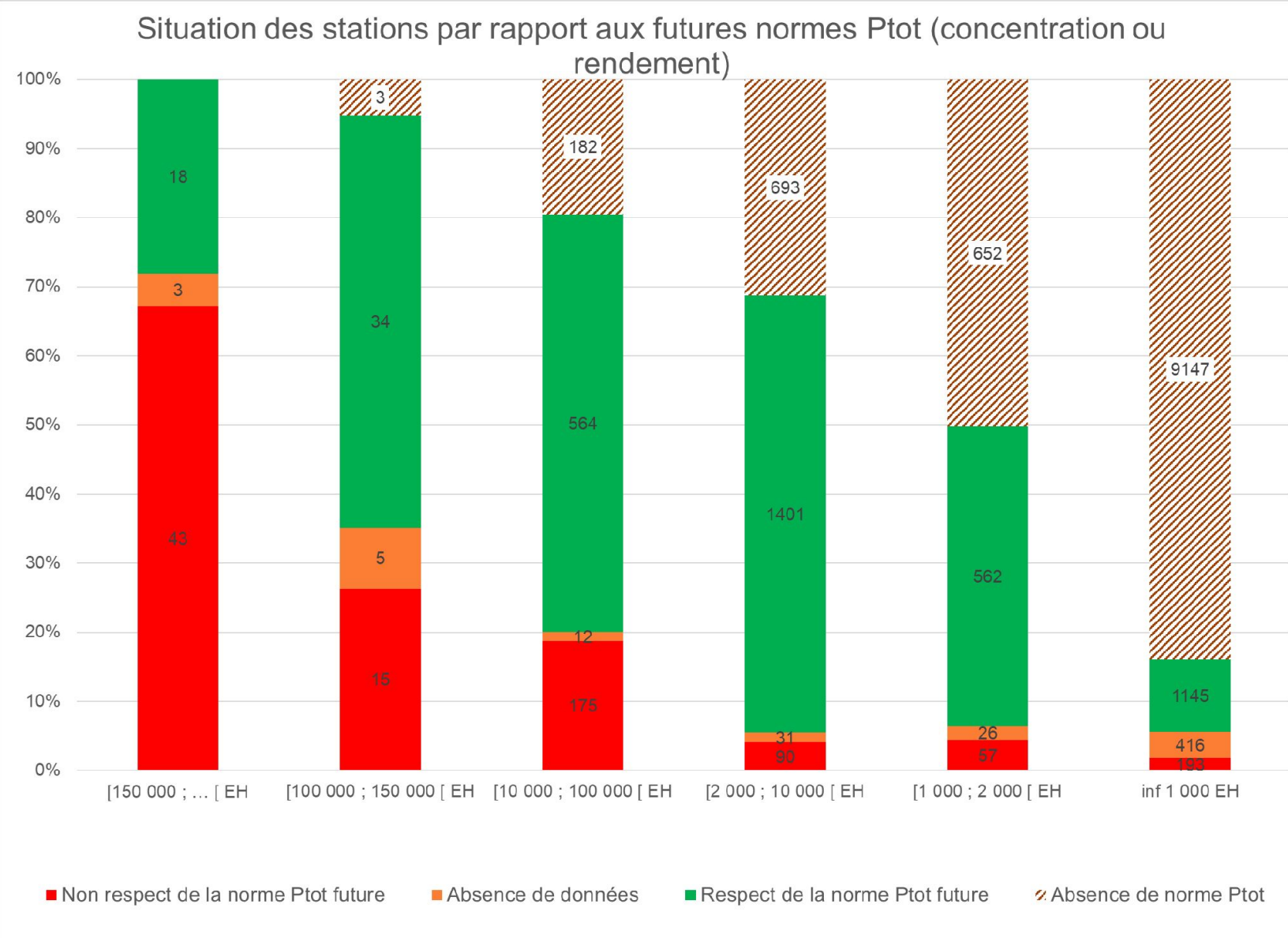
More than 60% of plants > 150,000 PE do not comply with the future UWWTD

About 20-30% of plants in sensitive areas > 10,000 PE do not comply with the future UWWTD

Assumptions:

No change to the sensitive areas mapping

If current standards are stricter than future standards, current standards are retained



III.2. TERTIARY TREATMENT

Treatment **Phosphorus** – Future situation

Note that, even though many plants do not yet comply with the future standard, since phosphorus treatment is most often carried out by adding a coagulant reagent (ferric chloride, aluminum chloride, etc.), it is generally possible, by increasing the treatment rate (higher reagent consumption), to remove a larger amount of phosphorus and thus meet the future discharge standard.

At present, with a discharge standard less stringent than that of the future UWWTD, WWTP operators treat phosphorus at the regulatorily required level, without overdosing reagent, in a logic of reagent economy.



III.2. TERTIARY TREATMENT

Nitrogen treatment – Cost estimate

Nitrogen treatment – agglomeration WWTPs > 10,000 PE:

Works recommended if:

- Non-compliance with the future TN standard
- Organically saturated WWTP (COD load > 75% of nominal)

Use of a specific chart for WWTPs < 50,000 PE and cost analysis of large WWTPs that recently underwent works for WWTPs > 50,000 PE

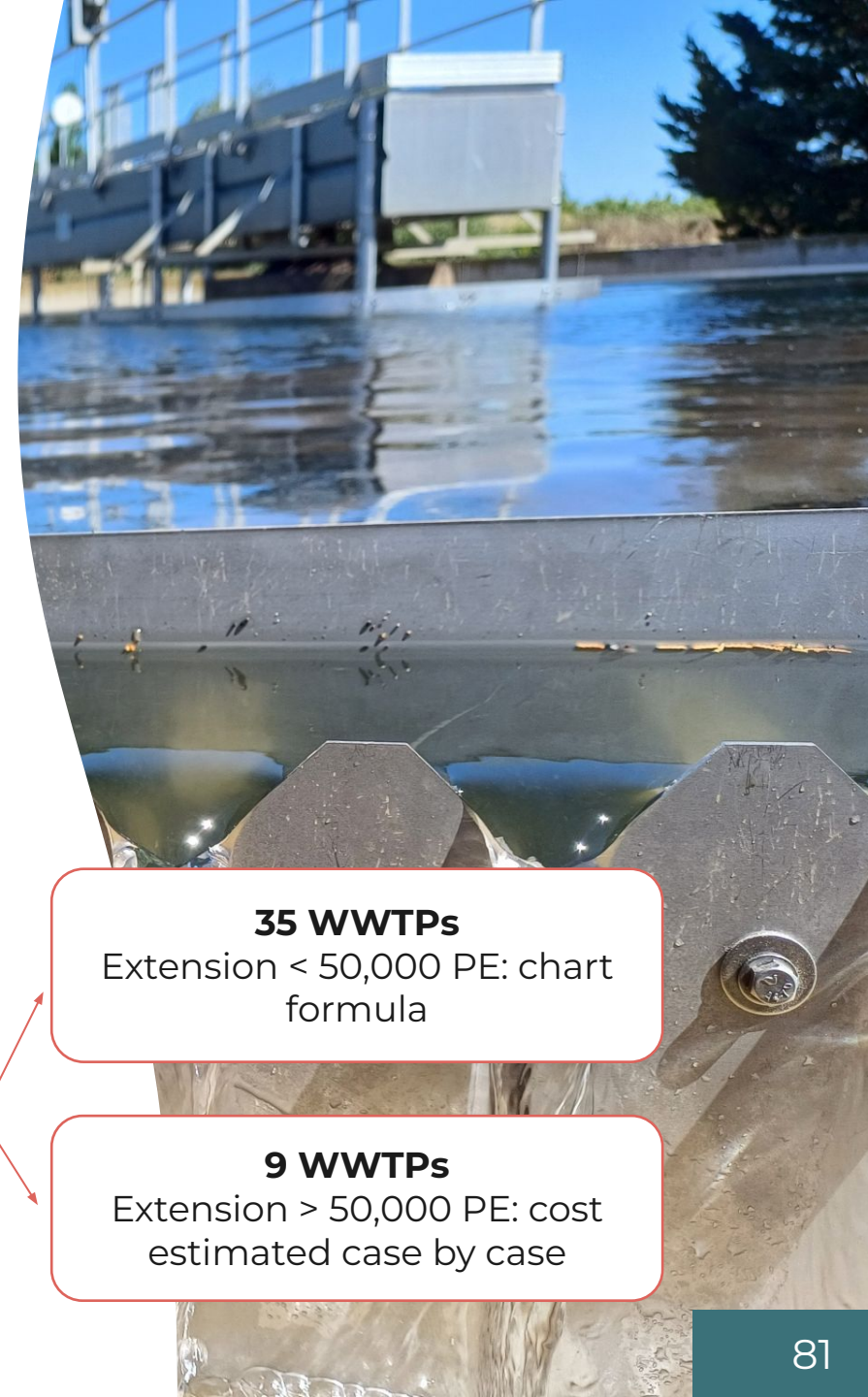
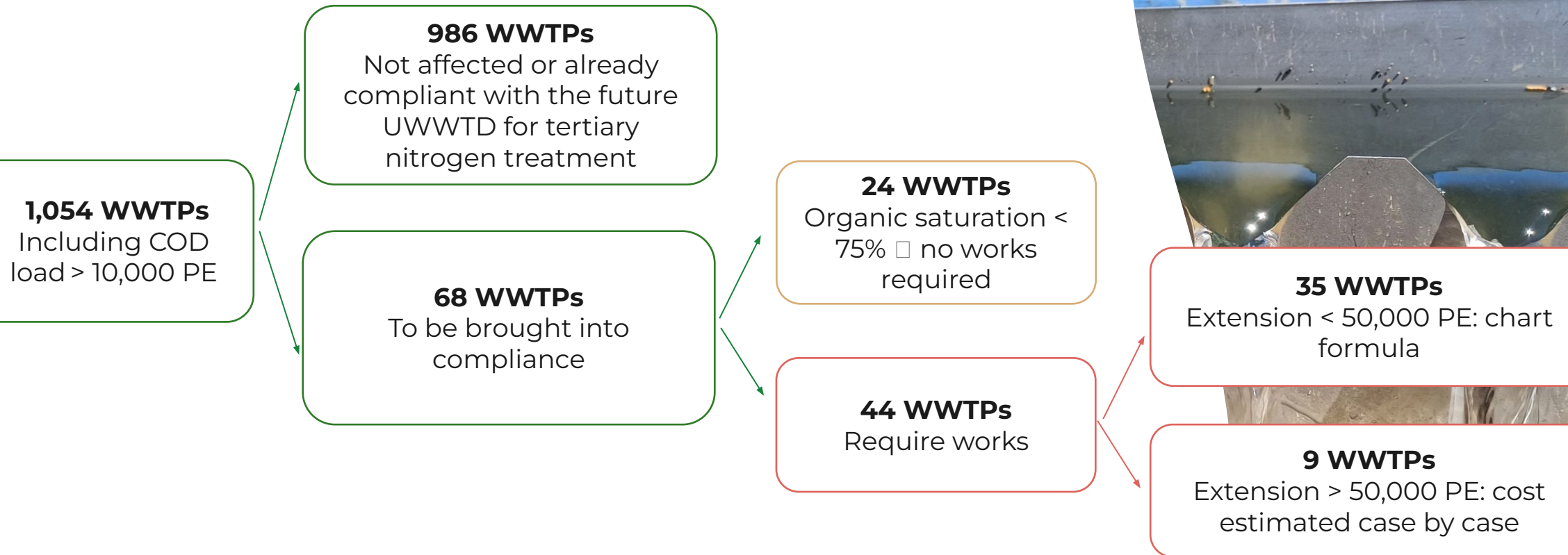
Special cases / assumptions:

- Biofilters with tertiary treatment: increased methanol consumption considered sufficient to meet UWWTD 2 targets -> no works required
- Carbon biofilters and medium/high-load activated sludge -> increase in treatment volumes to switch to N/DN low-load



III.2. TERTIARY TREATMENT

Nitrogen treatment – Cost estimate



III.2. TERTIARY TREATMENT

Nitrogen treatment – Cost estimate

Financial estimate:

€700 to 3,000* M excl. tax (see note below)

For 44 plants to be optimized for nitrogen treatment: switching to low-load activated sludge, nitrifying/denitrifying biofilters, optimization of aeration capacity...

*** /\ Very wide range due to strong uncertainties (available land, specific local constraints, phasing, etc.). However, a cost close to the upper limit of the estimate seems most likely: many known plants for which this tertiary treatment optimization will be very complex.**

Recommendation:

Specific studies to be launched at each site as soon as possible

III.2. TERTIARY TREATMENT

Treatment **Phosphorus** – Cost estimate

Phosphorus treatment – WWTPs > 150,000 PE:

Works recommended if:

- Non-compliance with the future total P standard

Costing based on cost analysis of recent large WWTPs

Special cases:

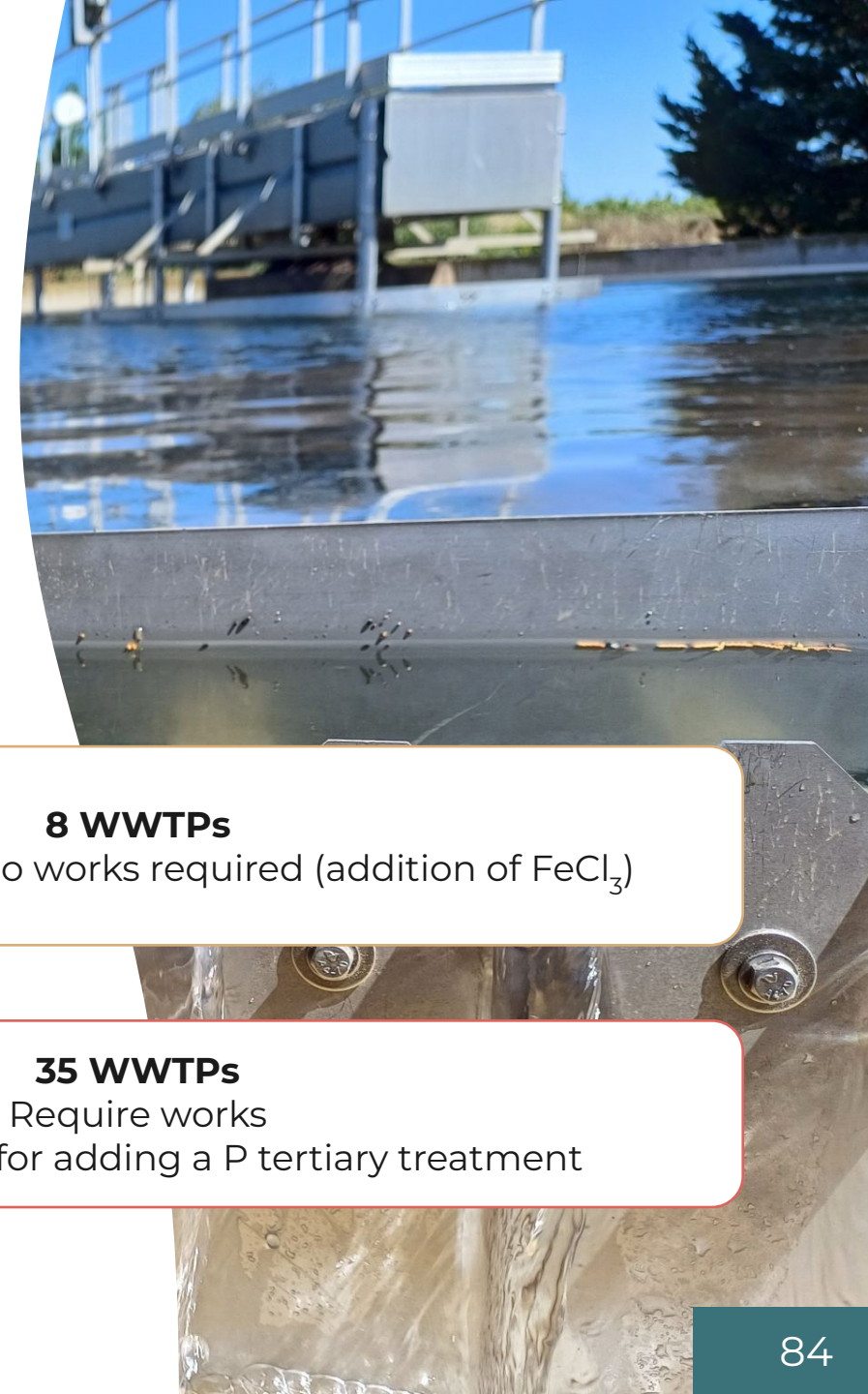
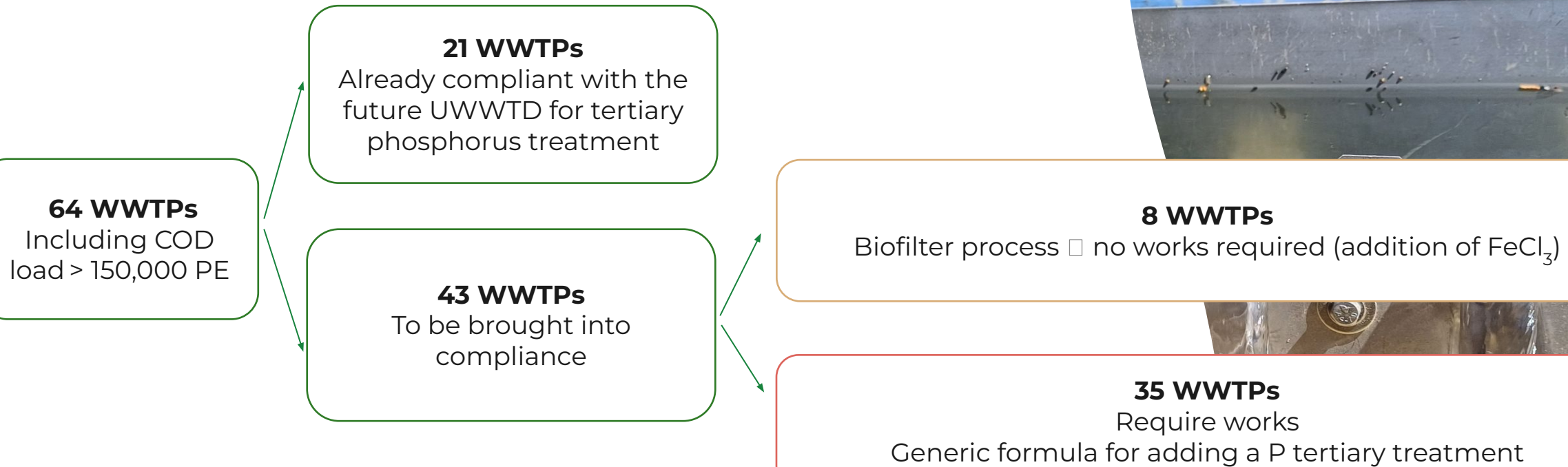
- Biofilters -> no works required, phosphorus removal on primary settling
- WWTPs > 10,000 and < 150,000 PE -> increase in $\text{AlCl}_3/\text{FeCl}_3/\dots$ treatment rate to reach the required performance (87.5% / 0.7mg/L)

□ **Works on 35 plants**



III.2. TERTIARY TREATMENT

Treatment **Phosphorus** – Cost estimate



III.2. TERTIARY TREATMENT

Treatment **Phosphorus** – Cost estimate

Financial estimate:

€460 M excl. tax

For 35 plants to be equipped with a phosphorus polishing treatment (coagulation / flocculation / filtration)



Recommendation:

Dialogue with the operator/project owner for a site-by-site performance study

III.2. TERTIARY TREATMENT

Tertiary treatment – 2045 horizon: Estimate of environmental benefits

Estimate of the reduction in impact on aquatic environments from the tightening of UWWTD 2 discharge standards:

Type of water body	Tonnes of TN avoided per year	Tonnes of total P avoided per year
R - river	10 141	1 101
T - transitional	2 516	106
L - lakes	9	0
C - coastal	8 815	737
G - groundwater	55	7
Total RTLCCG	21 536	1 952
not specified	1	0
Total	21 537	1 952

Note that about **half of the reductions shown above occur in the Rhône / Méditerranée / Corse basin** (notably due to the tertiary treatment requirement for plants > 150,000 PE currently without tertiary treatment)



III.2. N/P TERTIARY TREATMENT

Recommendations

Clarify the definition of "existing tertiary treatment" in the transposition decree

Launch studies without delay on large WWTPs (>150,000 PE) without tertiary treatment: study and works lead times cannot be compressed

Set up national oversight of the compliance upgrade schedule

Smooth the scheduling of optimizations on WWTPs with existing tertiary treatment

Plan the compliance upgrade of WWTPs between 10,000 and 150,000 PE starting now

Initiate a dialogue with project owners and their operators for a plant-by-plant performance confirmation study (10,000–150,000 PE)



III. TREATMENT: OPERATIONAL IMPACT

Summary on tertiary treatment

Significant effort on WWTPs > 150,000 PE:

- WWTPs without tertiary treatment: N and P to be treated, often starting from a low baseline (current discharges, when measured, at 30-40 mg/L for a future target of 8 mg/L)
- WWTPs **with** tertiary treatment : effort mainly focused on phosphorus treatment
- First deadline (2033) easily achievable, but watch out for the 2039 deadline which will affect all WWTPs!

==> Anticipate the launch of studies starting now

Moderate effort on WWTPs > 10,000 PE and < 150,000 PE

- 1991 UWWTD efforts already bring plants close to the 2045 targets
- Favorable situation, but still about 200 plants to be optimized within 20 years (10/year)

Recommendation:

Launch studies now on priority systems / without tertiary treatment
--> complex cases

Recommendation:

Smooth the effort starting now on WWTPs with tertiary treatment
--> scheduling to be carried out

Recommendation:

Smoothed planning of the implementation of optimizations on WWTPs > 10,000 and < 150,000 PE

III.3. QUATERNARY TREATMENT

III.3. QUATERNARY TREATMENT

Quaternary treatment: reminder of the directive's requirements

Quaternary treatment (micropollutants) – WWTPs > 150,000 PE and WWTPs > 10,000 PE and < 150,000 PE in areas of concern (to be defined)

Reminder of the expected treatment levels:

80% removal efficiency on 12 target substances

Reminder of the deadlines:

2033: 20% of WWTPs > 150,000 PE // 10% of WWTPs > 10,000 PE in an area of concern

2036 : 30% of WWTPs > 10,000 PE in an area of concern

2039 : 60% of WWTPs > 150,000 PE // 60% of WWTPs > 10,000 PE in an area of concern

2045 : 100% of WWTPs > 150,000 PE // 100% of WWTPs > 10,000 PE in an area of concern



III.3. QUATERNARY TREATMENT

Quaternary treatment: reminder of the directive's requirements

Horizon 2045:

Zones to be mandatorily considered – health criterion:

- Catchment protection zones
- Bathing waters (unless the profile indicates no impact)
- Aquaculture zones (unless the authorities consider there to be no impact)

Zones to be considered on the basis of a risk assessment - environmental criterion:

- Lakes
- Rivers with a dilution rate < 10
- Natura 2000 areas
- Coastal, transitional, marine waters

Recommendation:

Scope the micropollutant risk assessments required for establishing the zoning

III.3. QUATERNARY TREATMENT

Quaternary treatment: methodology

Works recommended if:

- WWTP > 150,000 PE
- WWTP discharging into a coastal, transitional, lake or groundwater body (environmental criterion)
- WWTP discharging into a river less than 5 km from a bathing use (health criterion)
- WWTP discharging within a near or distant drinking water catchment protection perimeter (health criterion)

□ **GIS processing to determine the plants concerned**

Recommendation:

Recommendation:

Mapping of sensitive areas to be produced as soon as possible
The 31/12/2030 deadline seems very far off – risk of delay in achieving compliance

Recommendation:

Is reasoning by zone relevant?
Should we not instead reason by WWTP via a specific study based on downstream uses?

III.3. QUATERNARY TREATMENT

Quaternary treatment: methodology

Cross-referencing of databases:

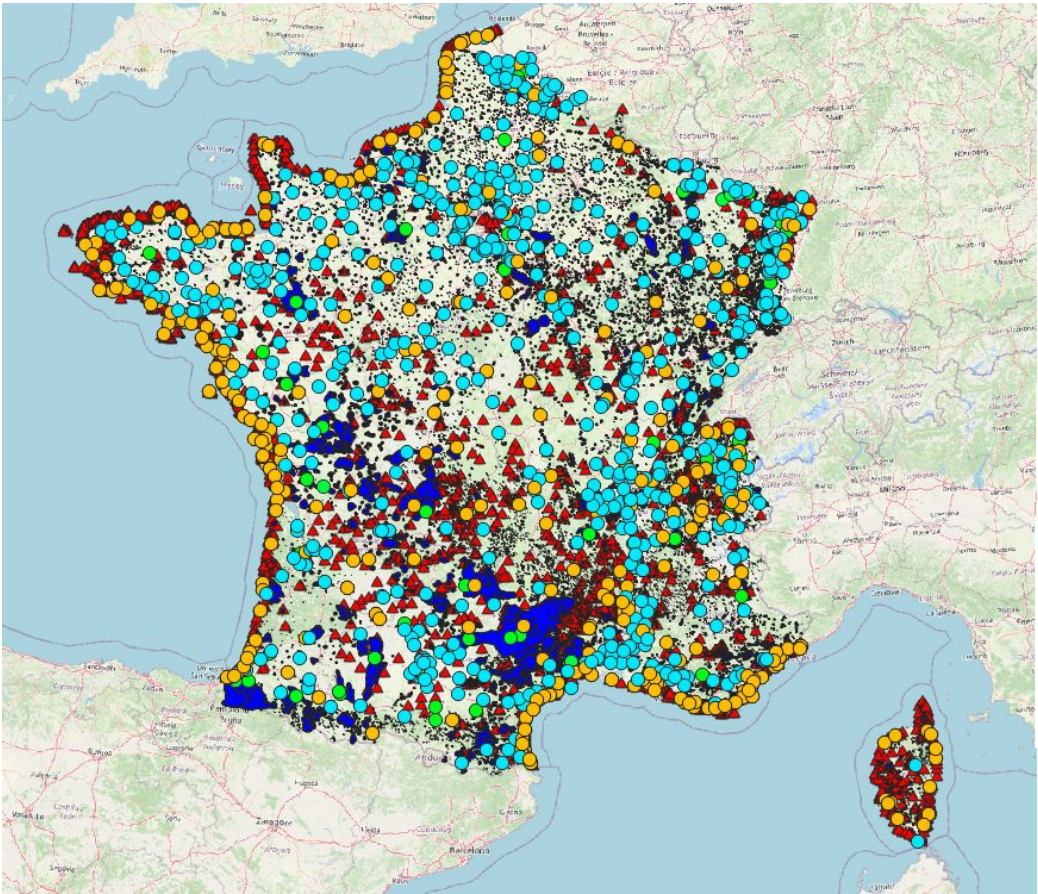
- Coordinates of the treatment system's discharge points
 - Zoning of water bodies
 - Zoning of catchment protection perimeters
 - Coordinates of bathing areas
-
- All discharges into coastal, transitional, lake or groundwater bodies □ quaternary treatment required
 - All discharges within a near or distant catchment protection perimeter □ quaternary treatment required
 - Point-by-point study of river discharges to verify hydraulic continuity with the nearby bathing use (mainland France and DROM)



III.3. QUATERNARY TREATMENT

Quaternary treatment: methodology

Cartographic output of this GIS analysis



- ☒ Périmètre de protection de captage
- ☒ Périmètre de protection immédiate
- ☒ Périmètre de protection rapprochée
 - ☒ ppr
- ☒ Périmètre de protection éloignée
 - ☒ ppe
- ☒ Zones de baignade
 - ☒ zone_baignade_fr
- ☒ pts_rejet_station
 - ☒ A proximité d'une zone de baignade
 - ☒ Situé dans un PPR et un PPE
 - ☒ Situé dans un PPR
 - ☒ Situé dans un PPE
 - ☒ Non concerné

Point of attention:
Very advanced C/N/P/micropollutant treatment at the plants => increases the need to know and optimize the operation of collection networks in order to limit overflows

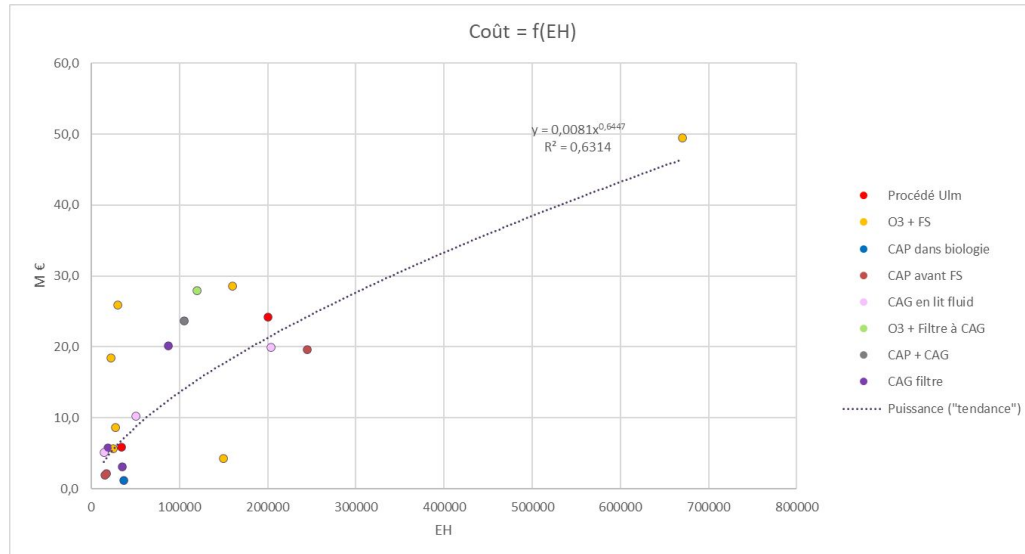


III.3. QUATERNARY TREATMENT

Quaternary treatment: cost estimation (method)

CCosting based on the updated Swiss feedback (REX) + initial French costings

- Switzerland: data collected on 23 systems + consideration of specific features (use of existing structures, ancillary works included, etc.)



- France: recent costings from Master Plans carried out for example on the Nantes – Petite Californie and Pau – Lescar systems



III.3. QUATERNARY TREATMENT

Quaternary treatment: cost estimation - horizon 2045

Cost calculation:

Quaternary treatment:

€2,440 M excl. tax for the 64 plants > 150,000 PE

€860 M excl. tax for the 119 plants > 10,000 PE and < 150,000 PE discharging near drinking water supply perimeters or river bathing areas

€1,680 M excl. tax for the 210 plants > 10,000 PE and < 150,000 PE discharging into coastal, transitional, lake or groundwater bodies

□ **€4,980 M excl. tax in total**

/!\ Amount excluding issues related to land acquisition or high complexity of installation on an existing site

(+ €103 M in annual operating cost per year once all the facilities are in operation - assumption: GAC treatment)

Note that financial estimates from the Baden-Württemberg region were also obtained during the study. Adding this data to the existing database has a limited impact on the financial estimate given above (-5%).



III.3. QUATERNARY TREATMENT

Quaternary treatment: cost estimation - horizon 2045

Comparison with the Directive's Impact Assessment (IA) (EC, 2022) and its update (JRC 2025):

- Updated costs of **€95 M / year** (€135 M/year in the IA), i.e. **€1.89 Bn over 20 years**
- Data from the present study: **€249 M / year** (i.e. 2.5 times more), i.e. **€4.98 Bn over 20 years**

Yet the assumptions are relatively similar:

- 35% of plants > 10,000 PE and < 150,000 PE concerned according to the JRC
 - 33% according to the present study
 - Consistent cost per PE/year (€5 to €8/PE/year depending on the methods presented)
- Different basis? Different depreciation period? We lack details on the calculation method...

Note that the study carried out by Synteau and published in early 2026 arrives at a relatively similar financial estimate for its median scenario (€4.6 to €5.4 Bn).

Discussion:

If possible, question the producers of the Impact Assessment to understand the discrepancies

III.3. QUATERNARY TREATMENT

Recommendations

Produce the mapping of areas sensitive to micropollutants as soon as possible (31/12/2030 deadline: risk of delay in achieving compliance)

Scope the micropollutant risk assessments needed to establish the national zoning

As a reminder: financing of at least 80% of investment and operating costs by an Extended Producer Responsibility (EPR) mechanism to be put in place by 31/12/2028

"producers placing on the Union market products containing substances which, at the end of their life, end up as micropollutants in urban wastewater shall bear responsibility for the additional treatment required to remove these substances generated in the course of their professional activities." (Paragraph 20)



III.4. TREATMENT: ENERGY NEUTRALITY OF WWTPs

III.4. TREATMENT: ENERGY NEUTRALITY

Energy neutrality: reminder of the directive's requirements

Energy neutrality - horizon 2045:

Energy audits to be conducted every 4 years on WWTPs of more than 10,000 PE

Energy production component:

Anaerobic digestion:

--> estimate of the biogas production expected at these plants

Solar energy:

--> available surface area generally allowing 20-30% of plants' electricity needs to be met (buildings, sludge storage areas, etc.) for medium-sized plants (5,000 – 15,000 PE). For the largest ones, it will only be a few percent...

Heat recovery:

--> definition of the conditions for proper implementation to come. Strong potential, but for what uses?

Derogation:

--> up to 35% of externally purchased non-fossil energy if all energy efficiency measures and all measures needed to enhance renewable energy production have been implemented

Discussion:

Scoping of energy audits to be produced as soon as possible

III.4. TREATMENT: ENERGY NEUTRALITY

Calculation and monitoring scope

- 1 ☐ **Definition of the scope** over which neutrality is calculated
- 2 ☐ **Item to be included in future operating reports** in the same way as monitoring of treatment performance. Creation of an "energy compliance" indicator with total energy consumed / total energy produced
- 3 ☐ **Centralized calculation of neutrality** in the existing databases

Recommendation:

Scope for calculating energy neutrality to be defined

III.4. TREATMENT: ENERGY NEUTRALITY

Energy sobriety as a preliminary step to neutrality

The first recommendation would be to create a consumption grid for WWTPs in order to analyze energy efficiency:

Energy consumption per m³ of treated water; per kg of BOD5 removed; per kg of TN removed; per kg of TP removed; per kg of DS produced...

The aim is to compare the operation of each WWTP and determine whether savings can be implemented **to reduce energy consumption in the first place.**

These energy savings can be achieved through: "smart" monitoring, more recent controls/instrumentation, high-efficiency motor or pump technologies, etc.

A process change may possibly be considered in certain cases.

□ Note that this smart management, which makes it possible to optimize existing assets (energy, process, etc.), must be authorized by the regulations (less restrictive standards during rainy periods, for example...)

Recommendation:

Produce an "energy sobriety map" of WWTPs

III.4. TREATMENT: ENERGY NEUTRALITY

Energy sobriety vs Carbon Footprint

As WWTP treatment is scaled up, particularly for advanced nitrogen treatment: aeration management (and therefore energy management) must achieve the best compromise between:

- A controlled aeration time and power in order to minimize energy consumption □ minimum target setpoint
- A controlled aeration time and power in order to maximize the transformation of nitrogen into the form N_2 □ maximum target setpoint

Indeed, energy neutrality must not come at the expense of greenhouse gas (GHG) emissions; however, if denitrification is incomplete, it results in the emission of N_2O (nitrous oxide), a gas whose global warming potential (GWP) is 273 times higher than that of CO_2 .

Recommendation:

Energy neutrality and carbon footprint to be considered together

III.4. TREATMENT: ENERGY NEUTRALITY

Anaerobic digestion for plants loaded above 30,000 PE:

30,000 PE of received load = 700 tDS of sludge produced per year

--> current threshold of technical and economic feasibility for installing anaerobic digestion at a WWTP (already at least 72 WWTPs with digesters in service across the country)

According to the Roseau database, 244 plants are concerned in France in 2023 (> 700 tDS/year), for a total of nearly 750,000 tDS to be recovered.

If only biological sludge is produced, biomethane production of around 0.9 TWh/year (115 Nm³ CH₄/tDS)

If mixed sludge is produced (primary + biological), biomethane production of around 1.8 TWh/year (225 Nm³ CH₄/tDS)

Note the lack of centralized data on this aspect



III.4. TREATMENT: ENERGY NEUTRALITY

Anaerobic digestion for plants loaded above 30,000 PE:

Energy production through anaerobic digestion at these WWTPs: **from 0.9 to 1.8 TWh/year**

As a reminder and for order of magnitude, French annual natural gas consumption is around 300 TWh/year.

Electricity consumption of French plants: in the absence of data reported in the national databases, we produce an estimate based on INRAE data: Assumptions:

- 3.2 kWh/kg BOD5 removed
- 50% average load rate of French WWTPs

□ Consumption of all WWTPs estimated at 3.3 TWh/year

The potential for energy self-sufficiency through anaerobic digestion at WWTPs therefore lies **between 27 and 54%**.

Note that a significant proportion (> 50%) of the sludge produced is already digested and that the resulting biogas is then recovered at these WWTPs, either through cogeneration or grid injection.

Recommendation:

Retrospective integration of new elements into the national databases

III.4. TREATMENT: ENERGY NEUTRALITY

Anaerobic digestion for plants loaded above 30,000 PE:

Costing:

Use of a chart derived from a recent price database making it possible to estimate the cost of an anaerobic digestion unit based on the size of the plant

- *€2,740 M to equip all French WWTPs (loaded above 30,000 PE) with sludge anaerobic digestion units (excluding primary settling)*

In practice, once the database is cleaned of plants already known to have an anaerobic digestion unit, the cost is estimated at:

- **€1,350 M to equip the remaining plants**

Note: the amount above is probably still overestimated (the full inventory of anaerobic digestion units is not known, especially for cogeneration units)

Also note that many "small" treatment systems remain to be equipped, at the edge of the technical and financial viability threshold for installing an anaerobic digestion unit



III.4. TREATMENT: ENERGY NEUTRALITY

Anaerobic digestion for plants loaded above 30,000 PE:

Reminder of current obstacles:

- An anaerobic digestion unit is classified as an ICPE (regulated facility) if it receives external sludge inputs (strong constraints in terms of distance from waterways, from residents, and retention volumes) --> it is difficult to operate current anaerobic digestion units at their full potential despite external sludge sources sometimes being available
- Ban on mixing sludge with biowaste --> no possibility of pooling, no possibility of boosting the performance of a sludge anaerobic digestion unit with biowaste...
- Attention required regarding societal acceptance of this type of facility, particularly in urban areas

==> for extensive development of sewage sludge anaerobic digestion, thought must be given to these obstacles. Without this, there is a high risk of not being able to leverage this avenue toward WWTP energy neutrality to its full potential



III.4. TREATMENT: ENERGY NEUTRALITY

**Anaerobic digestion for plants loaded above 30,000 PE:
associated production and revenue**

Costing:

In practice, database cleaned of plants already known to have an anaerobic digestion unit:

- ▣ **€1,350 M to equip the remaining plants**
- ▣ **For these plants considered without anaerobic digestion, total production of around 0.4 to 0.8 TWh/year, i.e. around 12 to 25% of WWTPs' electricity consumption, in addition to existing production**

Revenue associated with this production:

- At €150 excl. tax / MWh of biomethane, **from €60 to €120 M excl. tax per year**



III.4. TREATMENT: ENERGY NEUTRALITY

Electricity production by photovoltaic panels:

At medium-sized WWTPs (10,000 to 30,000 PE), photovoltaics can cover 20 to 30% of the plant's electricity needs.

At large WWTPs, this share drops to a few percent (example of Seine Centre – Colombes (900,000 PE), where covering all roofs with tilted panels would cover 1.5% of the plant's electricity needs...)

Probably a solution to deploy when large spaces are available (roofs or undeveloped areas on site or nearby) □ case-by-case study to be included in energy audits, as indicated in the European text



III.4. TREATMENT: ENERGY NEUTRALITY

Electricity production by photovoltaic panels - costing

Costing:

Use of a chart to estimate the area of photovoltaic panels that can be installed based on the size of the treatment plant (for example: from around 700 m² for a 10,000 PE plant to 6,000 m² for a 1,000,000 PE plant)

Assumption of a panel cost of €300/m² (installation included)

- **€465 M to cover all the roofs of French treatment plants of more than 10,000 PE**

Note that the amount above is probably overestimated (the number of WWTPs already equipped with photovoltaic panels is not known)

- **Total production of around 285 GWh/year, i.e. around 9% of WWTPs' electricity consumption (assumptions: 200 Wp/m² and 950 kWh/year/kWp)**

Savings associated with this electricity self-consumption:

At €190 excl. tax / MWh of electricity, **around €54 M excl. tax per year**



III.4. TREATMENT: ENERGY NEUTRALITY

Heat recovery from treated wastewater (sewage heat recovery): context

The potential is significant and attractive, but the costs and construction lead times for a heating network are substantial, and needs are variable / less constant throughout the year

- Prioritize feasibility studies in areas already equipped with heating networks / Factor in a WWTP's potential contribution to a future heating network during opportunity studies
- Note the Amorce Guide for launching such projects

Significant energy resource estimated at 1.1 TWh recoverable according to the AMORCE Guide (March 2021), or even **12.7 TWh/year** according to CEREMA (October 2024) across more than 2,200 WWTPs of more than 2,000 PE.

Of this 12.7 TWh/year:

- 4.9 TWh/year have been identified as being able to supply a heating network to be developed
- 5 TWh/year have been identified as being able to supply an existing heating network



III.4. TREATMENT: ENERGY NEUTRALITY

Heat recovery from treated wastewater: context

The various assumptions and existing literature confirm the existence of real potential, but the difficulty in projecting lies in the fact that solutions will always be designed on a case-by-case basis.

NB: in certain cases, the heating capacity of the water can be used for cooling, but only by verifying that the resulting rise in wastewater temperature does not subsequently compromise the receiving environment. This is why we have not factored in this use in our calculations.



III.4. TREATMENT: ENERGY NEUTRALITY

Summary on achieving the target

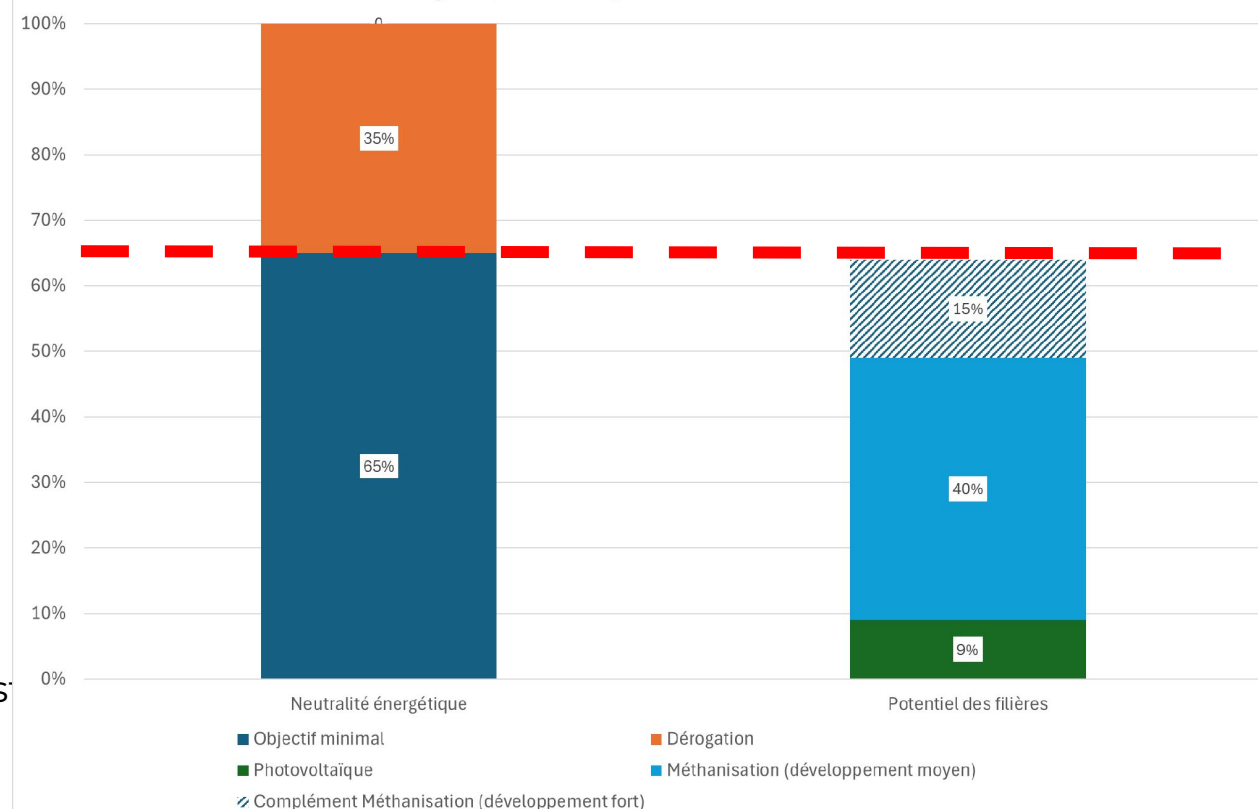
Excluding sewage heat recovery, **photovoltaics together with strong development of sewage sludge anaerobic digestion would make it possible to approach the target of 65% energy self-sufficiency** (35% of non-fossil energy to be purchased separately under the derogation). See *chart opposite*

Sewage heat recovery alone, via existing heating networks, could provide 150% of the target --> this is therefore a very promising avenue for achieving WWTP energy neutrality.

Note nonetheless that this sewage heat recovery potential may run up against the variability and seasonality of demand for its use.

Likewise, in terms of financing, setting up a heating network, which will serve as an outlet for recovering heat from treated wastewater, will represent a very substantial cost: an average cost of €670/linear meter, strongly linked to pipe diameter and thermal density (source: CEREMA).

Part des solutions techniques dans l'objectif d'atteinte de la neutralité énergétique des systèmes de traitement



III.4. TREATMENT: ENERGY NEUTRALITY

Summary of the various mechanisms that can be deployed

Lever	Potential production	Share of WWTP consumption (based on 3.3 TWh/year)	Investment	Revenue / Savings	Main barriers
Energy sobriety	— (consumption reduction)	Prerequisite (to be quantified via audits)	Low (instrumentation, control, high-efficiency motors)	Direct savings on electricity bill	No centralized data; requires audits; trade-off between sobriety and GHG (N ₂ O risk if aeration is insufficient)
Anaerobic digestion (WWTP ≥ 30,000 PE received load)	0.4 to 0.8 TWh/year (plants to be equipped) 0.9 to 1.8 TWh/year (total fleet potential)	12 to 25% (plants to be equipped) 27 to 54% (total potential)	€1,350 M (244 WWTPs still to be equipped)	€60 to 120 M excl. tax/year (at €150/MWh biomethane)	ICPE classification if external sludge; ban on mixing sludge/bio-waste; many small WWTPs at the limit of viability; lack of centralized data
Photovoltaic (WWTP ≥ 10,000 PE)	0.285 TWh/year (285 GWh/year)	~ 9 % (20-30% for medium-sized WWTPs; a few % for large WWTPs)	€465 M (roofs of all WWTPs ≥ 10,000 PE at €300/m ²)	~ €54 M excl. tax/year (self-consumption at €190/MWh elec.)	Very limited coverage for large WWTPs (e.g. 1.5% at Colombes); requires available surface area; case-by-case study
Wastewater heat recovery (recovery of heat from wastewater)	5 TWh/year (existing heat networks) 12.7 TWh/year (total potential, CEREMA 2024)	~ 150% of the target (existing networks) Potential largely in surplus	Very high (heat network ~ €670/linear metre) Not costed overall	Not costed (sale of heat to networks)	Construction costs and timelines heat networks; seasonality of needs and therefore of recovery opportunities; case-by-case solutions
Exemption (purchase of non-fossil energy)	Up to 35% of needs	Supplement to reach 100%	Cost of purchasing renewable energy (OPEX)	—	Conditional on the implementation beforehand of all measures for efficiency and renewable energy production

III.4. TREATMENT: ENERGY NEUTRALITY

Conclusions / Lessons Learned / Recommendations (1/2)

- **Importance of anaerobic digestion in achieving the target** + value of primary sludge for the case for implementing the process
- "Energy Neutrality" compliance at what scale? France? Water Agency basin? Département? EPCI? Reporting to the EU at France scale
- Need for a national strategy, with research actions to be launched now, particularly on small-scale anaerobic digestion
- **Prioritization of heat recovery** at plants located near an existing heat network
- **Current regulatory barriers to be re-assessed regarding anaerobic digestion** to achieve compliance on this criterion: ICPE classification when accepting external sludge to maximize output from the existing fleet (no additional construction cost), ban on mixing sludge/bio-waste... A European benchmarking exercise should be launched.
- **Energy sobriety and performance:** detailed assessment of energy expenditure items to prioritize (pump efficiency, system control...)
 - > **Challenges of upcoming audits**



III.4. TREATMENT: ENERGY NEUTRALITY

Conclusions / Lessons Learned / Recommendations (2/2)

The energy audits could be an opportunity, for local authorities wishing to take it up, to carry out additional audits of their treatment system: electromechanical audit, civil engineering diagnostic...

This would provide a comprehensive view of the treatment facility, and avoid overlooking important aspects (is it worth installing highly energy-efficient equipment on facilities with degraded civil engineering structures?)

In addition, these supplementary audits could investigate ways to maintain continuity of service (bypassable structures? parallel treatment trains?) for works on both the Energy component and the Treatment component.



III.4. ENERGY NEUTRALITY

Recommendations

Launch the scoping of energy audits on WWTPs >10,000 PE as soon as possible

Establish an "energy sobriety map" of WWTPs (reference consumption grid)

Retrospectively integrate new performance data into the national databases



III.5. TREATMENT: SUMMARY OF COST ESTIMATES (CAPEX)

III.5. TREATMENT: SUMMARY OF COST ESTIMATES (CAPEX)

Summary of cost estimates (CAPEX)

Secondary treatment objectives

€1,000 M excl. tax (50% uncertainty linked to new WWTPs > 1,000 PE and to WWTPs with no data reported in current databases, included in this cost at present)

Tertiary treatment objective (Nitrogen and Phosphorus)

€1,200 to 3,500 M excl. tax --> wide range linked to uncertainties specific to each project (land, regulatory, etc.)

Quaternary treatment target (Micropollutants)

€5,000 M excl. tax

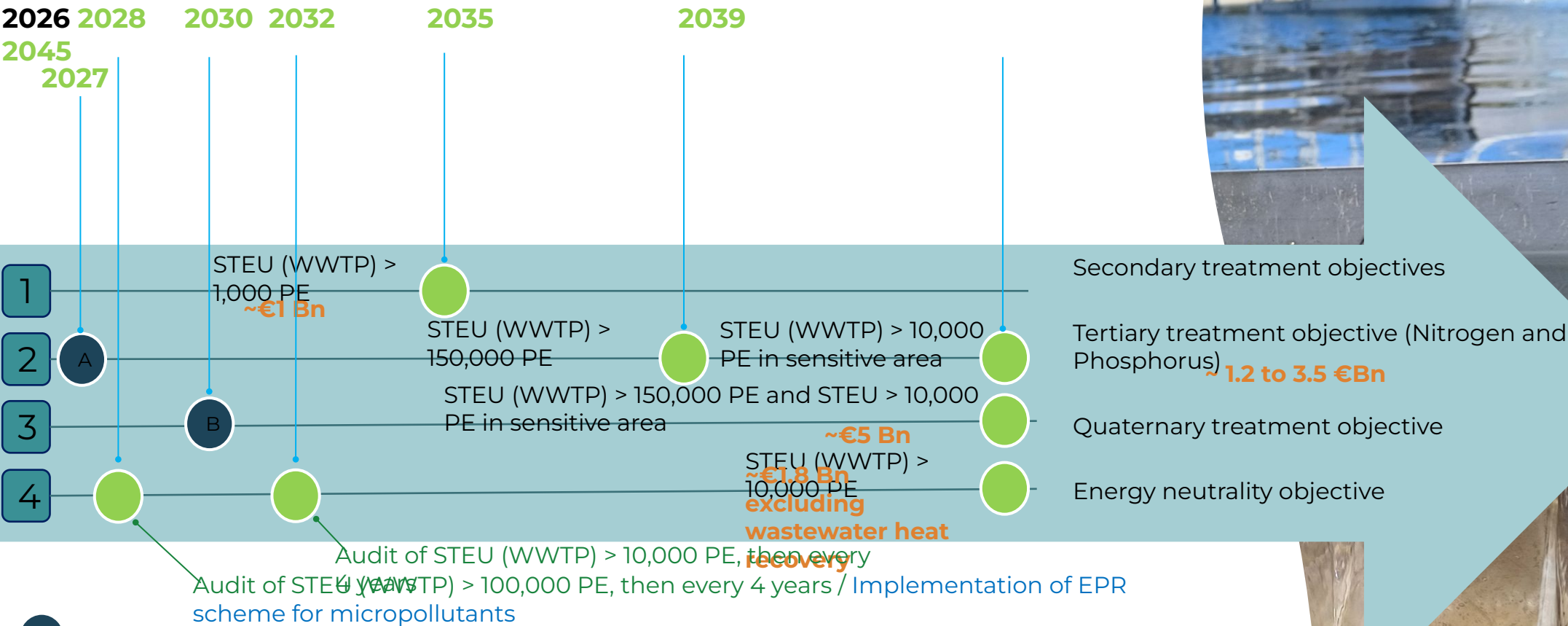
Energy neutrality objective

€1,800 M excl. tax : photovoltaic and anaerobic digestion, excluding wastewater heat recovery



III.5. TREATMENT: SUMMARY OF COST ESTIMATES (CAPEX)

Summary (timeline) of cost estimates (CAPEX)

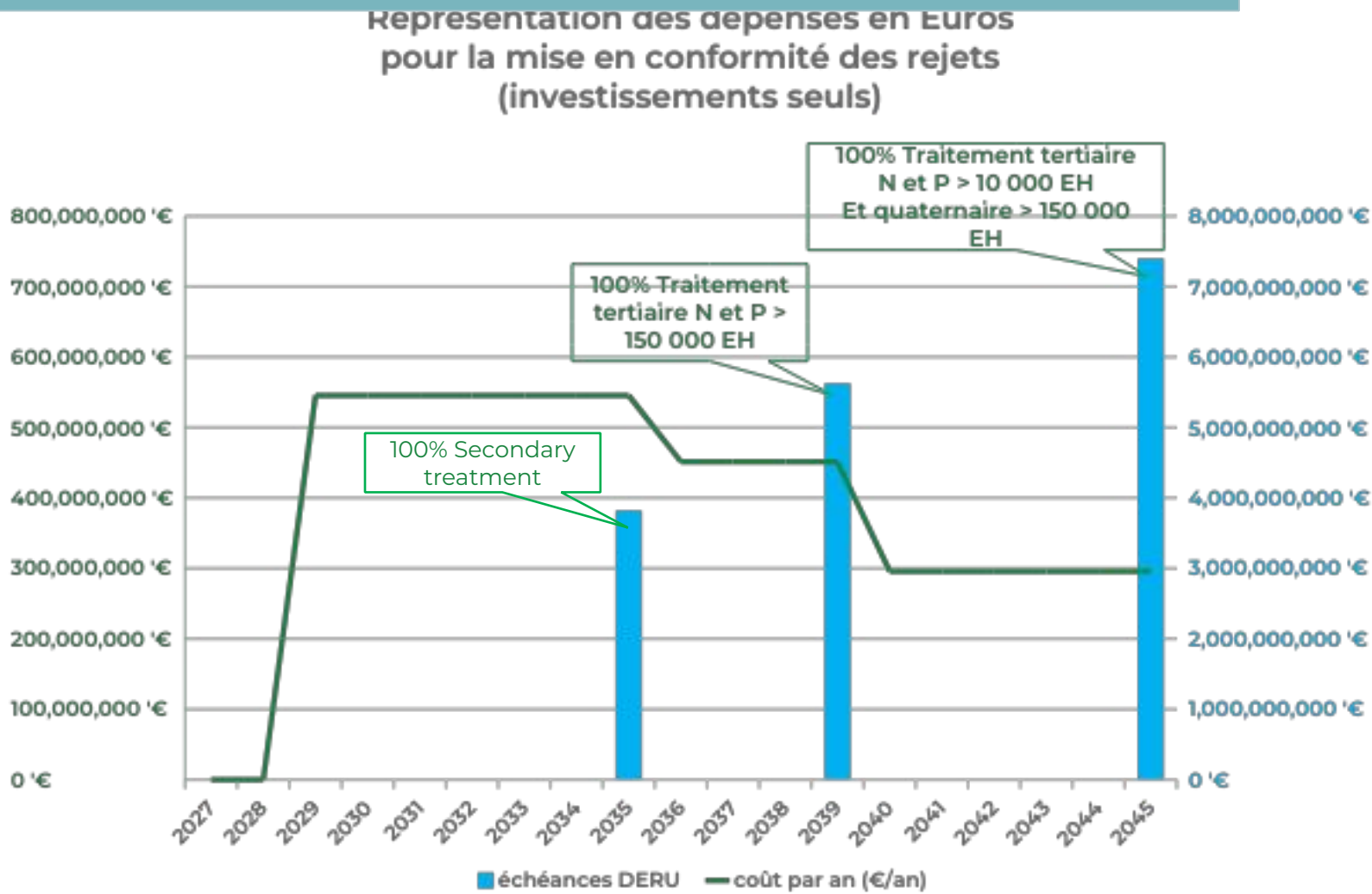


- A Mapping of N/P sensitive areas to be carried out by the Ministry
- B Mapping of micropollutant priority areas to be carried out by the Ministry



III.5. TREATMENT: SUMMARY OF COST ESTIMATES (CAPEX)

Annual cost trend over 2028-2045

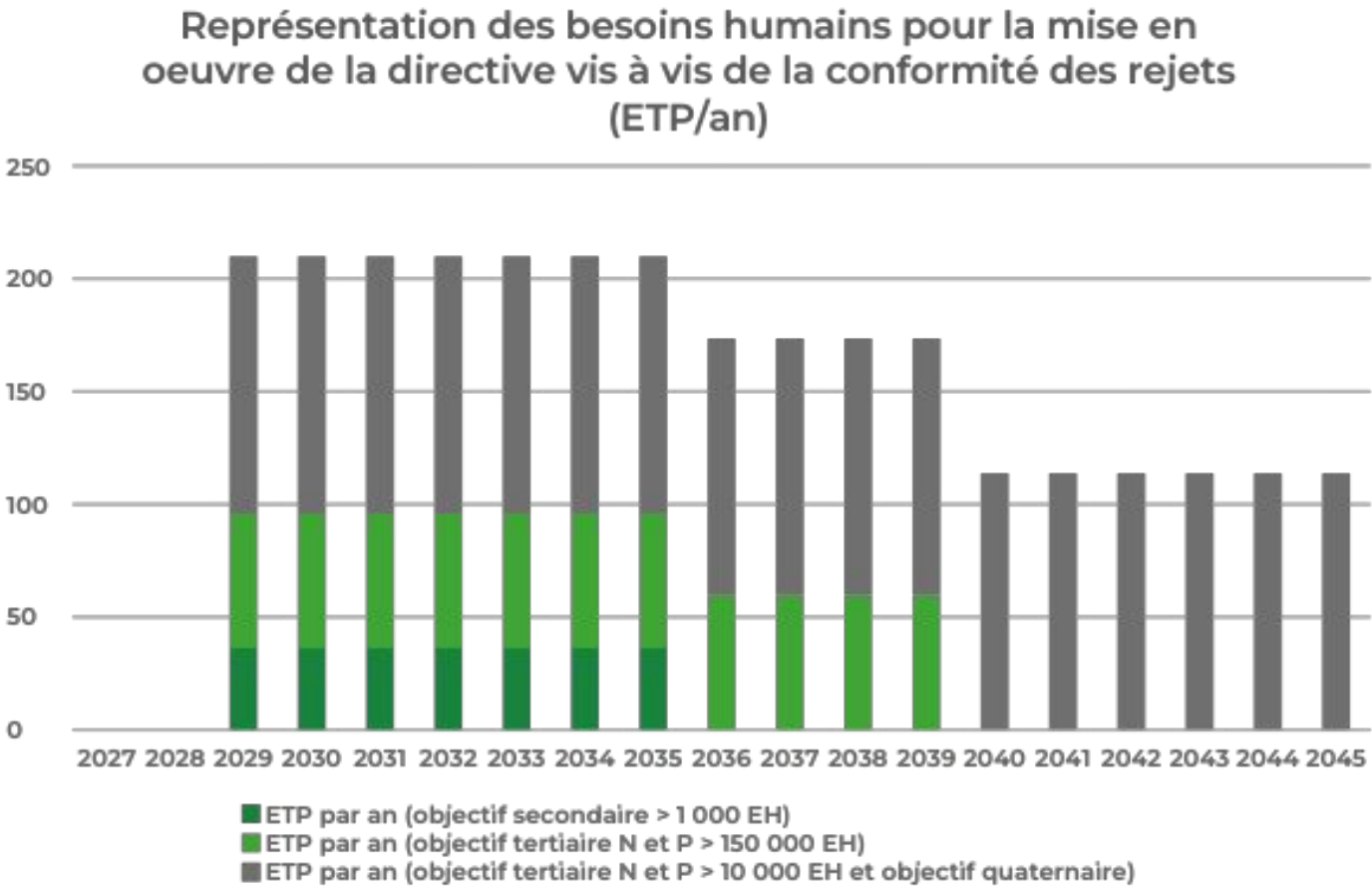


Note: works on new systems of treatment > 1,000 PE are not included



III.5. TREATMENT: SUMMARY OF HUMAN RESOURCE NEEDS

Engineering resource needs for project management



*** assumption: project management rate averaging 5%*



III.6. TREATMENT: FINANCIAL AND ENVIRONMENTAL IMPACT IN OPERATION

III.6. TREATMENT: IMPACT IN OPERATION

Environmental benefits – see Part IV for the use of these figures

Benefits in tonnage of N/P not discharged to water bodies

Estimate based on the Roseau database (current discharged volumes and concentrations):

- Approximately 20,000 T of total nitrogen avoided per year
- Approximately 2,000 T of total phosphorus avoided per year

These avoided tonnes end up in the sludge for total phosphorus, and partly in the sludge for nitrogen (a large share is released back to the atmosphere in the form of N_2 or N_2O)

Nutrient recovery, particularly phosphorus, from sludge is a route for financial value creation under DERU 2 □ however, these technologies are still rarely implemented (outside of land spreading and composting)

Point of attention:

Note the share of total nitrogen released back to the atmosphere; depending on the process, a fraction may be emitted in the form of N_2O , whose emission factor is 273 times higher than that of CO_2

III.6. TREATMENT: IMPACT IN OPERATION

Costing of Operations component (electricity, reagents, etc.)

Methanol injection for advanced nitrogen treatment at biofilter plants with treatment already in place:

- ratio of 3 gCH₃OH/gN-NO₃ removed
- Additional methanol quantity for 49 identified WWTPs: 20,000 T CH₃OH/year
- This addition of methanol induces additional sludge production



III.6. TREATMENT: IMPACT IN OPERATION

Costing of Operations component (electricity, reagents, etc.)

Ferric chloride injection (commercial product at 41%) for advanced phosphorus treatment at activated sludge plants:

- ratio of 15 gFe/gP to be removed (in polishing treatment)
- ratio of 5 gFe/gP to be removed (in physico-chemical phosphorus removal)
- Additional FeCl_3 quantity estimated = 97,500 T/year
- This addition of ferric chloride induces significant additional sludge production through formation of FePO_4 and $\text{Fe}(\text{OH})_3$



III.6. TREATMENT: IMPACT IN OPERATION

Costing of Operations component (electricity, reagents, etc.)

Increase in electricity consumption :

- Larger volumes of wastewater pumped (especially where tertiary or quaternary treatments are implemented)
- Larger volume of sludge to be treated
- *Aeration of the basins would not constitute a significant increase in consumption, as advanced denitrification uses part of the combined oxygen instead of the O₂ supplied by aeration. Furthermore, it is considered that the implementation of fine-tuned controls (control loops, digital twin, etc.) will offset any potential increase in consumption for this item.*



III.6. TREATMENT: IMPACT IN OPERATION

Costing of Operations component (electricity, reagents, etc.)

Increase in **fuel consumption** :

- Non-negligible volumes of reagents transported (sum of commercial FeCl_3 and methanol = 93,000 m^3 of reagents transported. Assumption: 15 m^3 truck; i.e. 6,200 trucks on the roads)
- Larger volume of sludge to be removed, but more contrasted scenarios if in-situ treatments are implemented or if recovery routes are available...



III.6. TREATMENT: IMPACT IN OPERATION

Costing of Operations component (electricity, reagents, etc.)

Carbon impact of implementing the technical solutions:

Methanol emission factor = $521 \text{ kg}_{\text{eq}} \text{CO}_2 / \text{T produced}$ (Base Carbone)

*The consumption of 20,000 T of additional methanol emits **10,000 T_{eq}CO₂/year***

Ferric chloride emission factor = $330 \text{ kg}_{\text{eq}} \text{CO}_2 / \text{T produced}$ (ASTEE)

*The consumption of 97,500 T of FeCl₃ additional emits **32,000 T_{eq}CO₂/year***

Freight transport emission factor = $0.14 \text{ kg}_{\text{eq}} \text{CO}_2 / \text{T.km}$ (Base Carbone)

*The transport of 117,500 tonnes of reagents over an average distance of 100 km produces an emission of **1,645 T_{eq}CO₂/year**.*



III.6. TREATMENT: IMPACT IN OPERATION

Costing of Operations component (electricity, reagents, etc.)

Carbon impact of implementing the technical solutions:

Emission factor for granular activated carbon (GAC) = $10.5 \text{ kg}_{\text{eq}} \text{CO}_2 / \text{kg}$ produced if of mineral origin, and $3.3 \text{ kg}_{\text{eq}} \text{CO}_2 / \text{kg}$ if of vegetable origin (Base ASTEE)

*The use of 41,000 T of granular activated carbon emits between **135,000 and 430,000 T_{eq} CO₂/year** depending on the origin of the carbon*

==> Importance of the carbon's origin and of establishing GAC regeneration facilities in France/Europe to limit the associated GHG emissions (emissions reduced by a factor of 3 to 8 between new and regenerated GAC)



III.6. TREATMENT: IMPACT IN OPERATION

Additional sludge production

Between 20,000 and 25,000 T DS/year linked to nitrification/denitrification (including methanol addition)

Between 55,000 and 100,000 T DS/year linked to physico-chemical phosphorus removal (calculation assumption: reagent used = FeCl_3 at 41%)

Data from 7,699 WWTPs give a current total sludge quantity of 1.144 million T DS/year, **which would represent an increase in sludge quantity of between 6% and 10% by 2045**, linked to the implementation of more advanced treatment.

Note that in France, since sewage sludge is mostly recovered through land return (70% on average, via direct land spreading or composting), it will be important to **avoid setting up processes where the activated carbon used for micropollutant treatment ends up mixed with the sludge**, rendering it unfit for material recovery.



III.6. TREATMENT: IMPACT IN OPERATION

Financial impact of implementing the technical solutions:

- 20,000 tonnes of methanol / year: **€8 M excl. tax / year** at €400 excl. tax/t
- 97,500 tonnes of FeCl₃ / year: **€12 M excl. tax / year** at €125 excl. tax/t
- Activated carbon for micropollutant treatment: **€103 M / year** at €2,500 excl. tax/t
- 100,000 tonnes of sludge DS (average value) to be recovered (assumption: 45% land spreading at €35/t wet sludge, 35% composting at €75/t wet sludge, 30% incineration at €175/t wet sludge): **€47.25 M excl. tax / year**



III.7. TREATMENT: FOCUS ON THE SIAAP CASE

FIRST ANALYSIS OF THE ENVIRONMENTAL BENEFITS INDUCED BY THE REVISION OF THE DERU IN THE ÎLE-DE-FRANCE AREA

Recommendations R2, R4 and R8 were taken into account as part of a first study carried out by SIAAP on the Paris metropolitan area (to be published in a forthcoming issue of *TSM*)¹

- Territorialized study of the Paris Metropolitan Area
- Analysis of the 1991 – 2045 trajectory:
 - Observation of the benefit linked to DERU1 compliance
 - Simulation of the benefit linked to DERU 2 compliance
- Macropollutant scope, primary factors in the physico-chemical quality of water bodies

Objective:

Draw up an inventory of the quality of Île-de-France rivers to identify the priority areas for improvement and investment

¹ GUERIN, S. et al. (2026. Forthcoming): "The European Urban Waste Water Directive viewed through the lens of the quality of Île-de-France rivers. Analysis of the 1991 – 2045 trajectory, for a first assessment of the environmental benefits induced by the revision of the DERU.", Techniques Sciences Méthodes.



FIRST ANALYSIS OF THE ENVIRONMENTAL BENEFITS INDUCED BY THE REVISION OF THE DERU IN THE ÎLE-DE-FRANCE AREA

Results:

1. Data from the *MeSeine* observatory covering the past trajectory show that investments in SIAAP's infrastructure to achieve **DERU1 compliance enabled a major qualitative leap**, in particular the good physico-chemical status threshold has been consolidated or approached over most of the length of the Île-de-France Seine since 2010.

2. Simulations carried out with the *ProSe* model, projecting to 2039, show that **the environmental benefits expected following the plants' compliance with DERU 2 are very limited**, with only a slight downward shift in orthophosphate concentration (resulting from the adjustment of operating conditions) and a gain of around 15% on its 90th percentile, as well as smaller gains on the other parameters.

Conclusion of the article: - The priority of investments (plural, regarding DERU 2) must be defined in light of this type of prospective study, **the investment strategy needing to maximize environmental benefits for the receiving environment.**



III.8. TREATMENT: RECOMMENDATIONS / POINTS OF ATTENTION

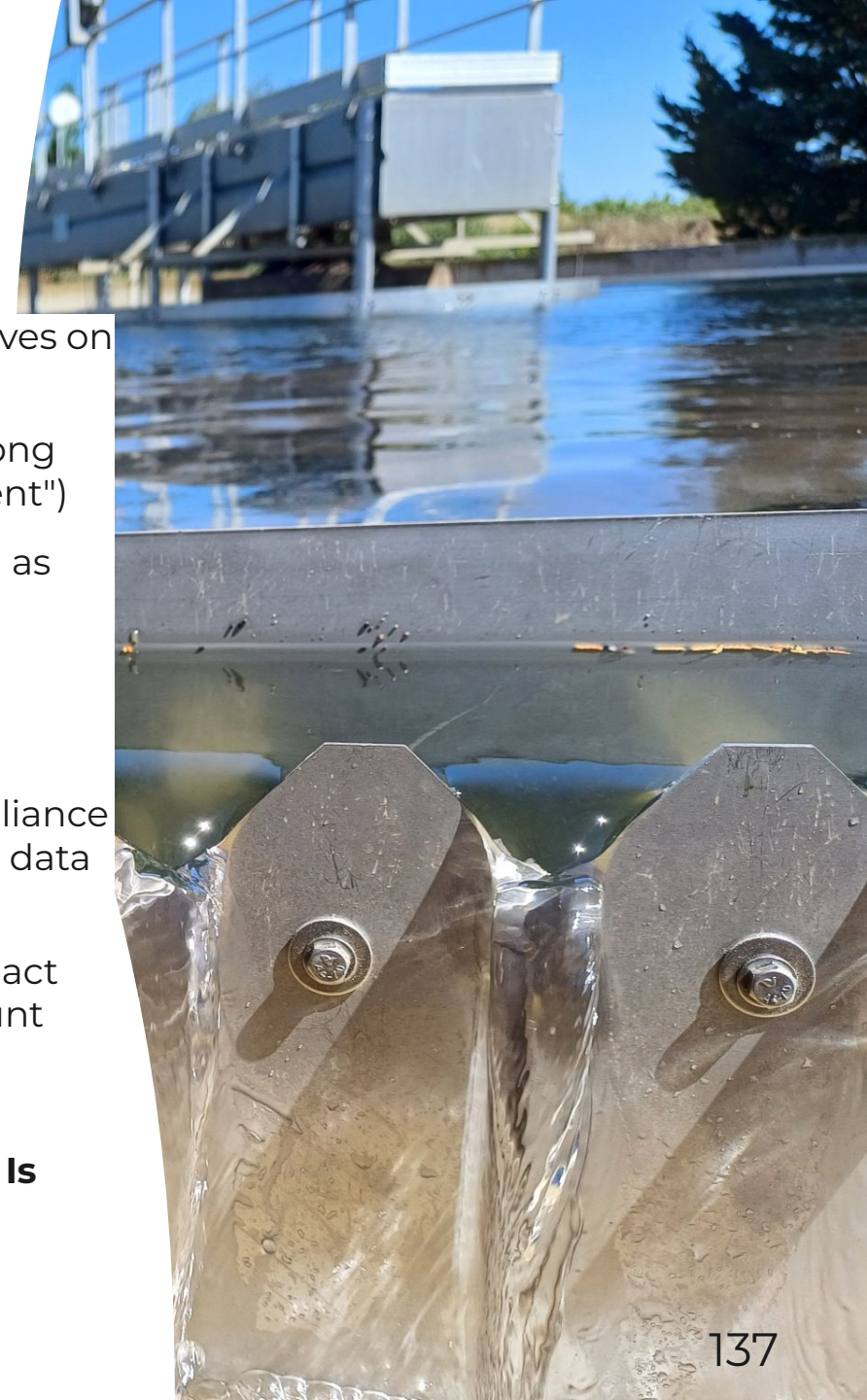
III.6. TREATMENT: RECOMMENDATIONS

Initial lessons learned

- **DERU 1 investments already provide good progress** relative to the DERU 2 objectives on the Treatment component
- **Attention needed regarding certain definitions / wordings** which may have a strong impact on the timeline (example: definition of a plant "not applying tertiary treatment")
- **Importance of mapping the areas with micropollutant issues** >>> to be produced as soon as possible

As highlighted by IGEDD:

- Importance of a **complete, up-to-date database** for tracking progress on the compliance of French sanitation systems (Make existing data more reliable by refocusing on the data needed for Europe reporting + compliance)
- Attention needed regarding **nutrient recycling / reuse** (EU Commission delegated act expected by early 2028 at the latest concerning phosphorus): to be taken into account when sizing future treatment trains
- What about plants discharging into the Mediterranean that will now have to treat nutrients? The environmental benefit needs to be confirmed --> **France's position? Is negotiation conceivable? to be confirmed...**



III.6. TREATMENT: RECOMMENDATIONS

Recommendations on the concepts to be defined

- **Clearly establish the concept of "existing tertiary treatment"** : linked to the system's order (N/P standards at the level of DERU I requirements)? To the plant's current performance? To its location in an area sensitive to eutrophication?
 - **Clarify how the areas with micropollutant issues are defined** : reasoning by zone does not necessarily seem the most relevant, except in certain territories, and an approach by sanitation system would be more precise... but also more complex to implement
 - **Define the calculation scope for energy neutrality**, as well as the equivalences by type of energy (electric, gas, heat), and the expected content of the audits.
 - **Define the compliance scale for the energy neutrality requirements** : France? EPCI? River basin agency?
- A France-wide approach without precise steering at the national level risks diluting responsibilities and causing delays. Conversely, an overly local approach risks putting certain EPCIs in difficulty, some of which might for example have only a single medium-sized plant.



III.6. TREATMENT: RECOMMENDATIONS

Plan the upgrading to standards

- Satisfactory level of tertiary compliance for agglomerations > 10,000 PE and < 150,000 PE
-> however, **do not wait until 2039 to launch the upgrading of the last systems** without anticipating
- **Risk of a significant spike in works between 2036 and 2039** on WWTPs > 150,000 PE not compliant with DERU 2 but already having tertiary treatment
- **Mapping of areas with micropollutant issues to be produced + financing mechanism (EPR) to be put in place as soon as possible:** the 31/12/30 deadline is very far off --> risk of delay in achieving compliance (only 15 years to upgrade around 400 plants, excluding the additional time linked to any industrial appeals against the implementation of EPR)



III.6. TREATMENT: RECOMMENDATIONS

Plan the upgrading to standards

- Based on the consolidated inventory, **request an annual progress report from the local authorities concerned** (studies, works...)
- **Impose the schedule for carrying out the works**, with priority given to:
 - o DERU I upgrading works (already under way)
 - o N/P treatment studies on WWTPs without tertiary treatment
- Spread the upgrading across all categories of plants and prioritize the works **according to local studies (basin/SAGE/EPCI scale) of the associated environmental benefits (CBA).**
- Identify works already planned / under way and ensure the consistency of their impacts on DERU 2 compliance



STEERING COMMITTEE OF 2/6/26: SUMMARY OF THE MAIN CHANGES / DISCUSSION POINTS

DISCUSSION POINTS

Following the comments submitted:

- Approach regarding network condition to be validated (exfiltration aspect)
Proposal to strengthen asset management --> see general conclusion - "Consolidate" section:
"It seems important that the asset management of networks be improved: knowledge of the condition of wastewater collection networks should be advanced in order to identify any disorders and to plan the required works where applicable."
- Governance proposal for steering the DERU 2 upgrade to be validated. At this stage, the report states: "Establish national steering of the upgrade schedule"
Is the Steering Committee OK with detailing what would be desirable to put in place?
Proposal:
"Led by the DEB, incorporating regular local reporting (minimum annual frequency) from the DDT/DDTM, in contact with the contracting authorities (MOA)."

Thank you for the other feedback --> responses / additions incorporated into the report



II AND III. SUMMARY OF COSTS (CAPEX) COLLECTION+TREATMENT

II AND II. SUMMARY OF CAPEX COSTS



Initial lessons learned

o The following table offers a summary of the estimated costs for parts II and III of the document.

Section	Focus area	Low CAPEX (€M excl. tax)	High CAPEX (€M excl. tax)	Median CAPEX (€M excl. tax)	Deadline	Cost/inhabitant, low (€/inhabitant)	Cost/inhabitant, high (€/inhabitant)	Cost/inhabitant, median (€/inhabitant)
II. Collection	II.1. Integrated management plans (PGI)	225	288	256.5	2033 (>=100k PE) / 2039 (>=10k PE)	€3.3/inhabitant	€4.2/inhabitant	€3.7/inhabitant
II. Collection	II.2. Lowering the collection threshold to 1,000 PE	1 528	1 720	1624	2035	€22.1/inhabitant	€24.9/inhabitant	€23.5/inhabitant
II. Collection	II.3. Wet-weather discharges (2% target)	12 300	27 360	19 830	2039 (>=100k PE) / 2045 (>=10k PE)	€178.3/inhabitant	€396.5/inhabitant	€287.4/inhabitant
II. Collection	Collection subtotal in €M	14 053	29 368	21 711		€203.7/inhabitant	€425.6/inhabitant	€314.6/inhabitant
III. Treatment	III.1. Secondary treatment	1 000	1 000	1 000	2035	€14.5/inhabitant	€14.5/inhabitant	€14.5/inhabitant
III. Treatment	III.2. Tertiary N/P treatment	1 200	3 500	2 350	2039 (>=150k PE) / 2045 (>=10k PE)	€17.4/inhabitant	€50.7/inhabitant	€34.1/inhabitant
III. Treatment	III.3. Quaternary treatment	5 000	5 000	5 000	2033 -> 2045 (progressive)	€72.5/inhabitant	€72.5/inhabitant	€72.5/inhabitant
III. Treatment	III.4. Energy neutrality	1 800	1 800	1 800	2045	€26.1/inhabitant	€26.1/inhabitant	€26.1/inhabitant
III. Treatment	Treatment subtotal	9 000	11 300	10 150		€130.5/inhabitant	€163.8/inhabitant	€147.2/inhabitant
	OVERALL TOTAL	€23,053 M	€40,668 M	€31,861 M	2028-2045	€334.2/inhabitant	€589.4/inhabitant	€461.8/inhabitant

Costs per inhabitant are established on the basis of 69 million inhabitants. This does not mean, however, that all of the financing must go through the domestic user.

Expressed per inhabitant per year, over the 2028-2045 period, this represents from €18.6/inhabitant/year (low assumption) to €32.7/inhabitant/year (high assumption), passing through **€25.6/inhabitant/year** (median), i.e. between 8 and 14% of the average annual water bill.

IV. THE BENEFITS OF THE DERU 2 DIRECTIVE FOR FRANCE

COST-BENEFIT ANALYSIS (CBA)

IV. CONTEXT AND SCOPE OF THE ANALYSIS

The 6 new DERU 2 obligations for France

Directive 2024/3019/EU (DERU 2) imposes on France six new categories of obligations compared with Directive 91/271/EEC (DERU I). These obligations constitute the scope of analysis of this CBA.

Article	Obligation	Application threshold	Main deadlines
Art. 8	Quaternary micropollutant treatment + EPR (80%)	> 150,000 PE (then > 10,000 PE in sensitive areas)	2033 (20 %) → 2045 (100 %)
Art. 7	Enhanced tertiary N & P treatment	> 10,000 PE in eutrophication-sensitive areas	2033 (20 %) → 2045 (100 %)
Art. 11	Energy neutrality of WWTPs	> 10,000 PE (renewable production = consumption)	2030 (20 %) → 2045 (100 %)
Ann. V	Stormwater management & PGI (2% discharge target)	> 100,000 PE systematic; > 10,000 PE if at risk	2033 plans; 2% target → 2039/2045
Art. 3	Collection and treatment of small agglomerations ≥ 1,000 PE	1,000 – 2,000 PE (extension from 2,000 PE)	2035
Art. 15	Circular economy: water reuse, sludge/nutrient recovery	All systems	Assessment from 2028

Institutional framework and status of current non-compliances

- 78 sanitation agglomerations are subject to active European litigation for non-compliance with the 1991 DERU (Source: Government Instruction of 4 July 2025, NOR TECL2518006J);
- 610 agglomerations are in breach of Art. 4 and/or 5 of the DERU — an unfavorable starting point for transposition;

IV. FRAMEWORK PARAMETERS OF THE CBA MODEL

Parameter	Central value	Low / high range	Source / Justification
Discount rate — France (central scenario)	3,0 %	2,5 % / 4,0 %	France Stratégie / Quinet Report (2021) — reference socio-economic rate
Discount rate — EC (international comparability)	2,5 %	2,0 % / 3,0 %	EC SWD(2022) 402 — recommendation for environmental projects, 30 years
Analysis horizon	2026–2045 (19 years)	19 / 25 years	The EC uses 30 years; a conservative horizon was adopted. NPV for N&P calculated over 25 years
Reference population of France	69 million inhabitants	68 / 70 M	INSEE RP 2023 — 68.2 M rounded to 69 M
France / EU share (population + pollutant load)	15 %	13 % / 17 %	Eurostat 2022–2023: 69/447 M inhabitants
Shadow value of carbon (2030)	€250/tCO ₂ e	200 / 350 €/t	Quinet Report — France Stratégie / CGDD 2021. Trajectory: €350/t in 2040
Unit value of Nitrogen (N)	€21/kg avoided (conservative, EU median)	15 / 40 €/kg	EC SWD(2022) 402 + OECD 2017–2020. Value weighted by type of water body
Unit value of Phosphorus (P)	€68/kg avoided (conservative, EU median)	50 / 150 €/kg	EC SWD(2022) + IFREMER coastal eutrophication. P = limiting nutrient in freshwater
Expected N reduction (tertiary treatment)	21,537 t N/year	—	Excluding coastal discharges to sea — NAIADES/SANDRE baseline to be validated (IGEDD 2025)
Expected P reduction (tertiary treatment)	1,952 t P/year	—	Excluding coastal discharges into the sea — same basis

Point of caution: the N and P parameters (unit values of nutrients) and P_INERIS (range €439–1,770 M/year) are the most sensitive parameters of the model. The INERIS range alone can cause the B/C ratio to vary from 0.91 to 1.57. **A DERU 2 attribution coefficient of 30–40% must be applied to the INERIS value to isolate the share strictly attributable to the directive (see model SENSITIVITY). It is not applied in the reference scenario.**

IV.1. THE COSTS OF IMPLEMENTING DERU 2 IN FRANCE

**ANNUALIZED CAPEX BY WORKSTREAM +
ADDITIONAL OPEX²**

IV.1. ANNUALIZED INVESTMENT COSTS (CAPEX) BY DERU 2 WORKSTREAM AND PROJECTION

Calculation methodology

CAPEX is annualized by dividing the total investment amount (high and median costs) by the implementation period of each workstream (between 15 and 18 years depending on regulatory deadlines). This approach gives the annual flow mobilized. The same exercise is applied to the costs of inaction and the estimated annual benefits.

DERU 2 workstream	Cost line	High CAPEX (in €M)	Median CAPEX (in €M)	Duration (years)	Annualized CAPEX €M/year (high)	Annualized CAPEX €M/year (median)
Stormwater management (PGI + 2%)	Networks, storage, NbS — 374 agglomerations	27 360	19 830	18	1 520	1 102
Quaternary treatment (Art. 8)	66 WWTPs >150k p.e. + 1,148 WWTPs >10k p.e.	5 000	5 000	15	333	333
Tertiary N & P treatment (Art. 7)	197 phosphorus WWTPs + 55 nitrogen WWTPs	3 500	2 350	17	206	138
Energy neutrality (Art. 11)	Anaerobic digestion, PV, heat recovery	1 800	1 800	18	100	100
Collection 1,000–2,000 p.e. (Art. 3)	253 municipalities — 11.9 linear m/inhabitant × €330/linear m	1 720	1 624	18	96	90
Secondary treatment > 1,000 p.e.	550 non-compliant BOD5/COD plants + new plants	1 000	1 000	18	56	56
Integrated Management Plans (PGI — studies)	707 agglomerations concerned (Case 2 sensitive areas)	288	256.5	13	22	20
	TOTAL	€40,668 M	€31,861 M		€2,332 M/year	€1,839 M/year

TOTAL annualized CAPEX: from €2,332 M/year excl. VAT (high assumption) to €1,839 M/year (median assumption)

Recommendation / Point of caution

The dominant item (68%) is the reduction of wet-weather discharges (2% target — Annex V DERU 2), estimated at €27 Bn. This figure must be weighed against 29 agglomerations >100,000 p.e. by 2039 and 345 additional ones by 2045 (CSF Phase 2 Study). The uncertainty is ±30% on this item alone.

IV.1. ADDITIONAL OPERATING COSTS (OPEX) AND PROJECTION:

Why OPEX is structural in the DERU 2 CBA

Additional OPEX corresponds to the recurring annual charges specific to the new DERU 2 obligations, which are absent from the current operation of French WWTPs. If not included, they constitute a structural underestimation of total costs and reduce the reference B/C ratio from 1.36 to 1.22.



Additional OPEX item	Calculation basis	€M/year r low	€M/year central	€M/year high	Main source
Granular activated carbon (GAC) Quaternary treatment Art. 8	41,000 t GAC/year (Treatment Section, CSF Phase 2 — slide 128); 69 WWTPs>150k p.e. + WWTPs in sensitive areas. Price: €1,500–3,500/t market. Median calculation: 41,000 × €2,512/t = €103 M/year	61,5	103	143,5	ASTEE/FP2E — feedback from Strasbourg, Nantes, Lyon WWTPs. Synteau — Technical note on quaternary treatment (Feb. 2026)
Tertiary reagents — methanol + FeCl ₃ Enhanced N & P treatment Art. 7	Methanol 20,000t×€400/t = €8 M; FeCl ₃ 97,500t×€125/t = €12 M	10	20	30	ASTEE — phosphorus treatment report 2022. OFB ROSEAU database — biofiltration WWTPs. ICIS 2024 reagent prices
Additional sludge — GAC +15–25% sludge volume — dedicated disposal route required	100,000 tDM/year composite (slide 128)	20	47,5	55	ADEME — Overview of sludge management sectors (2022). Synteau — regulatory constraints on land-spreading of GAC sludge
Analytical monitoring & reporting Art. 15–17 DERU 2 — 12 indicator substances	28,000 micropollutant analyses/year €1,200/analysis (COFRAC-accredited) + Art. 16 reporting software	7	15	25	LCSQA/COFRAC — 2024 water laboratory price schedule. SISPEA — existing self-monitoring costs (comparison basis)

TOTAL additional OPEX: €185 M/year (central) — Range: €100–254 M/year — i.e. €2,650 M — €38/inhabitant over the period

Caution on the OPEX carbon footprint: chemical reagents (activated carbon 135,300 plant-based to 430,500 min. tCO₂eq) + methanol 10,000 + FeCl₃ 32,000 + transport 1,645 = 179,540 tCO₂eq/year) exceed the 200,000 tCO₂eq/year saved by energy neutrality. The directive's net GHG balance is positive: +20,460 (plant-based) or NEGATIVE if min. tCO₂eq/year. A complementary reagent decarbonization strategy (bio-sourced carbon, ozonation, UV) is essential from the transposition stage onward. Source: Consortium expertise + ADEME Carbon Database 2024.

IV.2. PROJECTION OF ESTIMATED BENEFITS OF DERU 2 IN FRANCE

OVERVIEW OF BENEFITS — 7 CATEGORIES, €3,079 M/YEAR

Summary table — central values and ranges

Foc us area	Benefit category	€M/year central	€M/year low	€/inhabit ant/year	Method	Main source
0	SES & environmental benefits (natural capital maintained, good chemical status)	1 280	439	18,6 €	Value transfer (avoided losses)	INERIS (2020) — range €439–1,770 M/year
1	Health & drinking water treatment — quaternary treatment (avoided drinking water supply extra costs, micropollutants)	32	15	0,46 €	Revealed preference	INERIS 2020 Phase 2 — €28 M/year updated
2	Energy neutrality (solar + biomethane + sales, net of reagents –€82 M)	214	150	3,1 €	Avoided cost + sale	IGEDD 2025 + ADEME + CRE 2024
3	Bathing, coastal areas & public health (PGI, overflows, shellfish farming, tourism)	1 041	550	15,1 €	Avoided cost + value EC benchmark value	EC SWD(2022) + DIRM + Agreste 2022
4	Tertiary N & P treatment (reduction of eutrophication, securing of uses)	371	280	5,4 €	N&P unit value (EC SWD 2022)	21,537 t N/year + 1,952 t P/year × values €/kg
5	Small agglomerations 1,000–2,000 p.e. (local health, water intakes, failing on-site sanitation)	20	10	0,29 €	EU ratio/inhabitant (transferred to FR)	EC Impact Assessment — €10.06/inhabitant/year
6	TOTAL gross benefits (prudent central scenario): €3,079 M/year — €44.6/inhabitant/year — Low range: €1,640 M/year					

=> Dominant parameter: the INERIS value (Workstream 0, range €439–1,770 M/year) alone accounts for 42% of gross benefits and can significantly affect the B/C ratio. A DERU 2 attribution coefficient (30–40%) must be applied. Workstreams 0, 3 and 4 account for 88% of gross benefits and present overlap risks documented below.

WORKSTREAM 0 — ENVIRONMENTAL BENEFITS AND ECOSYSTEM SERVICES (SES)

Value adopted: €1,280 M/year (updated median) — Range: €439–1,770 M/year

This workstream represents the value of the natural capital maintained through the good chemical status of water bodies. It cuts across all 6 DERU 2 obligations and reflects the non-market value of aquatic ecosystems and associated ecosystem services (self-purification, regulation, biodiversity, recreational uses, existence value).

Documentary basis and monetization method

Source	Value for France	Method	Coverage / Scope
INERIS (2020) — Good chemical status benefits	€439 to 1,770 M/year (median €1,104 M/year updated to €1,280 M/year in 2026 based on a 2.5% rate × 6 years)	Avoided environmental losses + revealed preference + existence value	All of France including overseas departments and territories. Coverage: inland, estuarine, and coastal water bodies. Does not distinguish specific ecosystem services by type of water body.
Updated value adopted (CBA model, this document)	$1,104 \times (1 + 2.5\%)^6 = €1,280 \text{ M/year}$ (parameter P_INERIS)	Value transfer (median updating)	Updated at the EC rate for international comparability (GVA 2022, 2023)

Critical limitations and points for reinforcement

– High risk of double counting

– with Workstreams 3 (PGI/bathing — €900 M/year EC) and 4 (tertiary N&P — €371 M/year): eutrophication and recreational uses are valued from several angles. Estimated overlaps to be deducted: €448 M/year (25% eutrophication + 10% bathing of €1,280 M) — see Part III;

– Absence of an explicit DERU 2 boundary:

– the €1,280 M/year cover overall good chemical status, **not only the share attributable to DERU 2 obligations**. An attribution coefficient of 30–40% would be recommended based on the WFD status assessments of the Water Agencies;

– Need for a supplementary study:

– OFB DEDR (results expected 2026–2027) for the non-use value of inland aquatic biodiversity.

Recommendation / Point of caution

High priority: apply a DERU 2 attribution coefficient of 30–40% (to be justified?) to the INERIS value of €1,280 M/year, giving an input value of €384–512 M/year under a strict DERU 2 scenario. This would significantly reduce the risk of double counting in Scenarios 1 and 2.

WORKSTREAM 1 & WORKSTREAM 2 — QUATERNARY TREATMENT & ENERGY NEUTRALITY

Workstream 1 — Health & drinking water treatment: €32 M/year (floor benefit)

- Value of naturally clean water vs. treated water:
 - €28 M/year (2020 value, updated to €32 M/year based on a 2.5% rate × 6 years) — Source: INERIS 2020 Phase 2. This value reflects the difference in drinking-water treatment cost between a clean intake (not exposed to micropollutants) and a degraded intake;
 - This is a floor value: it does not cover chronic health impacts linked to endocrine disruptors and pharmaceutical residues (INSERM/SPF — results pending), nor intake closures, resource substitutions, or interconnections related to PFAS (BRGM/OFB 2025).

Workstream 2 — Energy neutrality: €251 M/year net (deduction –€45 M)

Sub-item	Calculation	€M/year adopted	Source
Solar self-generation (PV)	285 GWh/year × €190/MWh	€54 M/year	Consortium expertise / IGEDD Report 2025
Biomethane self-generation (WWTP digestion)	0.6 TWh/year × €150/MWh (+ existing production 0.5 TWh/year)	€75 M/year	Consortium expertise + ADEME Biogas Overview 2023
Sale of surplus energy (biomethane surplus)	1 to 3 TWh/year at the 2024 grid-injection tariff of €90–120/MWh (CRE): median value adopted €200 M/year	€167 M/year	ADEME 2022 + CRE 2024
Energy sobriety	Neutralized: efficiency gains = extra energy costs of advanced treatments	€0 M/year	Consortium expertise / IGEDD
Avoided GHG emissions (substitution of FR mix, 50 gCO2/kWh)	200,000 tCO2/year × €250/t	+€50 M/year	Quinet Report + RTE 2023 assessment
Additional reagent GHG emissions (to be deducted)	GAC 135,300 (plant-based 3.3 kg/kg ASTEE) to 430,500 (mineral-based 10.5 kg/kg) + methanol 10,000 + FeCl3 32,000 + transport 1,645 = 179,540 tCO2eq	–€45 M/year	Consortium expertise + ADEME Carbon Database 2024
TOTAL WORKSTREAM 2 (net of reagent GHG emissions)	54 + 75 + 167 + 50 – 45 = €301 M/year	€301 M/year	This CBA Model — parameter D. ENER

Critical point: granular activated carbon (GAC, the dominant item at 135,300 (plant-based) to 430,500 (mineral-based) tCO2eq/year). DERU 2's net carbon balance is POSITIVE IF plant-based (+20,460 tCO2eq/year). This does not call into question the energy neutrality of WWTPs, but requires a reagent decarbonization strategy (bio-sourced carbon, ozonation, UV) to be built in from the transposition stage. A full life-cycle assessment (extraction–transport–regeneration of GAC) could double the current estimate.

WORKSTREAM 3 — WET-WEATHER MANAGEMENT, BATHING & PUBLIC HEALTH: €1,041 M/YEAR

Composition of Workstream 3 — detail of the 5 sub-items

Sub-item	Sourced annual estimate for France	Value adopted €M/year	Main source	Risk
Tourism & leisure: avoided revenue losses (beach closures)	€70 Bn/year coastal tourism spending × 40% coastal share (DGE) × 5% non-compliant sites → €87 M/year gross → €4.3 M/year adopted (5% non-compliant ratio)	4,3	INSEE + Santé Baignades + DGE — Ministry of Health	Very high
Avoided health costs at bathing areas	€1,385 M/year extrapolated for France + Bay of Biscay (monitoring, surveillance, prevention, mitigation, shellfish decontamination) → 5% adopted	€69 M/year	DIRM Sud-Atlantique — Annex 2C	Very high
Avoided penalties for non-compliant bathing areas	249 'red' sites × €75,000/discharge (Légifrance)	€18.7 M/year	Légifrance + IGEDD Wastewater Collection 2013	Moderate
Public health — damages avoided from reduced discharges	€6 Bn/year EU × 15% FR share = €900 M/year (EC SWD(2022) — includes eutrophication, bathing, urban runoff)	€900 M/year	EC Impact Assessment COM(2022)541 — SWD(2022)402	Very high (double counting)
Avoided losses to the coastal shellfish farming economy	6% of €508 M/year turnover (losses from health crises) + 58% of €31.9 M/year degradation costs, DIRM MEMN 2018	€49 M/year	Agreste Primeur 2022-6 + DIRM MEMN (2018)	High

TOTAL Workstream 3: €1,041 M/year (including €900 M/year from EC source — dominant item, 87% of the workstream)

There is a risk of double counting: the €900 M/year from EC SWD(2022) is an EU aggregate that explicitly includes eutrophication (valued under Workstream 4 at €371 M/year) and bathing-related health benefits (partly valued in the €4.3 M and €69 M of Workstream 3). The deduction estimated in Scenario 3 is €252 M/year + €54 M/year = €306 M/year on this item alone. The causal chain between bathing non-compliance, wet-weather discharges and loss of tourist spending remains poorly documented on a site-by-site basis; there is a strong need for territorialization.

FOCUS AREAS 4, 5 & 6 — TERTIARY N&P, SMALL AGGLOMERATIONS, CIRCULAR ECONOMY

Focus Area 4 — Eutrophication reduction and securing of water uses (N & P): €371M/year

This focus area values the reduction in nutrient flows into water bodies using EC SWD(2022) unit values: €20/kg of nitrogen and €30/kg of phosphorus (conservative values). The calculation is performed by water body type (rivers, transitional, coastal, groundwater, lake) based on SANDRE physical flow data.

Type of water body	N avoided (t/year)	P avoided (t/year)	N Benefit €M/year	P Benefit €M/year	Total €M/year
R — Rivers (bathing/drinking water impact)	10 141	1 089	€203M	€76M	€279M
T — Transitional (sensitive estuaries)	2 516	106	€38M	€8.5M	€46M
C — Coastal (shellfish farming/tourism)	8 815	797	€264M	€47.8M	€312M
L — Lake (high eutrophication)	9	0	€0.2M	—	€0.2M
G — Groundwater (drinking water treatment)	55	7	€0.8M	€0.3M	€1.1M
TOTAL (excluding discharges to sea)	21 537	1 952	€506M	€133M	€371M/year

Focus Area 5 — Small agglomerations 1,000–2,000 PE: €20M/year

Base: €10.06/inhabitant/year (EU ratio transposed to France)
– EC Impact Assessment — aggregated EU value €224M/year × 15% France share = €20M/year. Population concerned: 2.1M inhabitants with failing on-site sanitation (SANDRE 2023) — 3,750 agglomerations of 1,000–2,000 PE.
Benefit: local health, remediation of soils and water intakes polluted by failing on-site sanitation.
High priority: validate the actual population concerned (SANDRE data) and the benefit/inhabitant ratio for France.

Focus Area 6 — Circular economy (water reuse + sludge): €84M/year

Water reuse: €60M/year
– 120 Mm³/year substituted (assumption: 2% of SISPEA treated volumes: 6–7 billion m³/year) × €0.5/m³ (marginal cost of alternative water — WFD central value). Current: only 0.3%.
Sludge/fertilizer valorization: €23.5M/year
– 23,489 t N+P recovered × €1,000/t (FAO/World Bank 2023-24 market price). The value includes mineral fertilizer substitution + avoided carbon. Risk of partial double counting with Focus Area 4 N&P to be monitored.

Focus Areas 4, 5 and 6 are the most methodologically robust. Focus Area 4 benefits from the best physical data (SANDRE + NAIADES). These three focus areas will be used as references for overlap corrections (Part III).

IV.3. CBA RESULTS — THE THREE SCENARIOS

SCENARIO 1 — CAPEX ONLY: B/C = 1.67 / 1.32

Description and results

Only annualized CAPEX is included in the costs; a simple double-counting correction is applied on the benefits side, but it is not complete due to a lack of validated ratios for France.

Indicator	Value	Comment
Gross benefits (€M/year)	€3,079M/year	Conservative central scenario — 7 families, no correction
Total annualized CAPEX costs (€M/year)	€1,839M/year (median C costs) €2,332M/year (high C costs)	IGEDD 2025 + CSF Study Phase 1 & 2
Additional OPEX	€0 M/year	Not included — structural underestimation of costs
B/C ratio (annual)	1.67 (median C) / 1.32 (high C)	Benefits > Costs: directive economically justified
€/inhabitant/year — net benefits	€44.6/inhabitant	Based on 69M inhabitants (INSEE RP 2023)
€/inhabitant/year — total costs	€26.7/inhabitant/year (median C) €33.8/inhabitant/year (high C)	Based on 69M inhabitants
NPV (rate 3.0%, horizon 2055)	Median NPV (median CAPEX €1,839M/year): +€12,400M (+ €180/inhabitant) High NPV (high CAPEX €2,332M/year): +€4,845M (+ €70/inhabitant)	France Stratégie / Quinet rate (2021)
Approx. IRR (2055 outlook)	Median IRR: 8.1% High IRR: 4.7%	Slightly above the 3.0% reference rate

Recommendation / Point of caution

Scenario 2 (CAPEX + OPEX) is the RECOMMENDED scenario for the economic justification of the transposition.

SCENARIO 2 — CAPEX + ESTIMATED OPEX (RECOMMENDED): B/C = 1.52 / 1.22

Recommended central scenario — the most realistic without methodological over-correction

The addition of €185M/year in additional OPEX (activated carbon, tertiary reagents, analytical monitoring) reduces the B/C. The directive remains clearly justified economically.

Indicator	Value	Comment
Gross benefits (€M/year)	€3,079M/year	Unchanged vs Scenario 1 — no double-counting deduction applied
Annualized CAPEX (€M/year)	€1,839M/year (median C costs) €2,332M/year (high C costs)	Unchanged between scenarios
Additional OPEX (€M/year)	+€185M/year	activated carbon (200) + reagents (45) + monitoring (15)
Total costs (€M/year)	€2,024M/year (median C costs) €2,517M/year (high C costs)	CAPEX + OPEX — represents €36.3/inhabitant/year
B/C ratio (annual)	1.52 (median C) / 1.22 (high C)	Directive economically justified (benefits > costs)
€/inhabitant/year — net benefits	€44.6/inhabitant	Unchanged (€3.69/inhabitant/month at full operating phase 2041)
€/inhabitant/year — total costs with OPEX	€29/inhabitant/year (median C) €36.5/inhabitant/year (high C)	
NPV (rate 3.0%, horizon 2055)	Median NPV (CAPEX 1,839 + OPEX 185.25 €M/year): + €10,267M (+€149/inhabitant) High NPV (CAPEX 2,332 + OPEX 185.25 €M/year): + €2,712M (+€39/inhabitant)	Time lag between costs/benefits — OPEX included in annual flows
Approx. IRR (2055 outlook)	Median IRR: 7.3% / high IRR: 4.0%	Below the Quinet reference rate (3.0%) — justifiable over the long horizon

Scenario 2 — DERU 2 shows a real net benefit in annual flows (B/C = 1.52 for median C). The positive NPV of +€10,267M reflects the 7.3% IRR and is consistent with the long-term nature of environmental and health benefits.

SCENARIO 3 "STRICT" — STRICT CORRECTIONS OF ALL POTENTIAL DOUBLE COUNTING: B/C = 1.20/0.96

The most demanding but least robust scenario at this stage: incorporates all possible corrections

This scenario incorporates: (1) the more conservative but yet-to-be-justified deduction for SES/PGI/N&P overlaps (–€754M/year), (2) the retention of OPEX (€260M/year), (3) the addition of the baseline benefit (+€100M/year). The resulting B/C ratio is 1.20 or 0.96 — close to 1. The directive remains economically justifiable provided that benefits not yet included (non-use biodiversity, chronic health effects of endocrine disruptors, overseas territories) are taken into account.

Detail of corrections (–€754M/year)

Potentially double-counted component	Source focus area	Gross amount €M/year	Deducted rate	Deduction €M/year	Justification
Eutrophication — INERIS 2020 (in Focus Area 0)	Focus Area 0 vs Focus Area 4	320 (25% × 1 280)	100 %	320	The N&P reduction (Focus Area 4 — €371M/year) is the direct mechanism of the eutrophication valued in INERIS
Bathing water quality — INERIS 2020 (in Focus Area 0)	Focus Area 0 vs Focus Area 3	128 (10% × 1 280)	100 %	128	Recreational bathing uses are explicitly valued in Focus Area 3 (tourism + health)
Eutrophication — EC PGI €900M (in Focus Area 3)	Focus Area 3 vs Focus Area 4	252 (28% × 900)	100 %	252	SWD(2022) explicitly includes eutrophication within the EU's €6 billion/year

* The deduction percentages (25%, 10%, 28%) are documented based on SWD(2022) and the INERIS 2020 study. They represent the best available estimate but are not derived from a dedicated econometric study. The variation range is +/-50% on each rate = uncertainty of €200 to 400M/year on the total deduction.

Indicator	Scenario 3	vs Scenario 2
Gross benefits after correction	3,079 – 754 + 100 (baseline) = €2,425M/year	–€654M/year after double-counting correction and baseline addition
B/C ratio	1.20 (median C) / 0.96 (high C)	down from 1.22: limited margin
NPV (rate 3.0%, horizon 2055)	Median NPV: +€1,647M (+€24/inhabitant) High NPV: –€5,907M (–€86/inhabitant)	Positive / negative (high): directive not justified under high costs alone.

Interpretation of B/C = 0.96 for costs taken at the highest level: this result does NOT mean the directive is not justified. It means that benefits not yet quantified (OFB 2026–2027 non-use biodiversity, INSERM/SPF chronic health effects, IFRECOR overseas benefits, coastal property value) are necessary to maintain the economic justification. The safety margin of only 4% requires strengthening the model with more robust studies,

COMPARATIVE TABLE OF THE 3 SCENARIOS: SUMMARY OF KEY INDICATORS

Indicator	Scenario 1: CAPEX only (reference)	Scenario 2: CAPEX + OPEX RECOMMENDED	Scenario 3 "strict": corrected B + OPEX
Gross benefits (€M/year)	€3,079M/year	€3,079M/year	2,325 (–€754M double counting)
Methodological deduction	—	—	–€754M/year
Baseline benefit (avoided inaction)	—	—	+€100M/year
Net benefits used (€M/year)	€3,079M/year	€3,079M/year	€2,425M/year
Annualized CAPEX (€M/year)	€1,839M/year (median C costs) €2,332M/year (high C costs)	€1,839M/year (median C costs) €2,332M/year (high C costs)	€1,839M/year (median C costs) €2,332M/year (high C costs)
Additional OPEX (€M/year)	0	+185	+185
Total costs (€M/year)	€1,839M/year (median C costs) €2,332M/year (high C costs)	€2,024M/year (median C costs) €2,517M/year (high C costs)	€2,024M/year (median C costs) €2,517M/year (high C costs)
B/C RATIO (with high CAPEX and median CAPEX)	1.67 (median C) / 1.32 (high C)	1.22 (median C) / 1.22 (high C)	1.20 (median C) / 0.96 (high C)
€/inhabitant/year — benefits	44,6 €	44,6 €	35,1 €
€/inhabitant/year — costs	€26.7/inhabitant/year (median C) €33.8/inhabitant/year (high C)	€29/inhabitant/year (median C) €36/inhabitant/year (high C)	€29/inhabitant/year (median C) €36/inhabitant/year (high C)
NPV (rate 3.0%, horizon 2055)	Median/high NPV (€M): Scen. 1: +12,400 / +4,845	Scen. 2: +10,267 / +2,712	Scen. 3: +1,647 / –5,907
Approx. IRR (2055 outlook)	Median/high IRR (%) : Scen. 1: 8.1% / 4.7%	Scen. 2: 7.3% / 4.0%;	Scen. 3: 3.7% / 0.7%

Complementary reading of the three scenarios

The three scenarios are not alternatives but complementary. Scenario 1 = without OPEX. **Scenario 2 = recommended realistic view.** Scenario 3 = analytical lower bound, valid if and only if the unquantified benefits (biodiversity, chronic health, overseas territories) prove to be genuinely negligible.

BASELINE SCENARIO — THE COST OF INACTION: €100M/YEAR (CENTRAL)

Methodological principle of the inaction scenario

A complete CBA must compare the directive against its counterfactual: the inaction scenario. In this scenario, France maintains the status quo of the 1991 UWWTD, with the accumulation of non-compliance costs and the trending degradation of the environment. These costs add to the direct benefits of the directive to obtain the total net benefit.



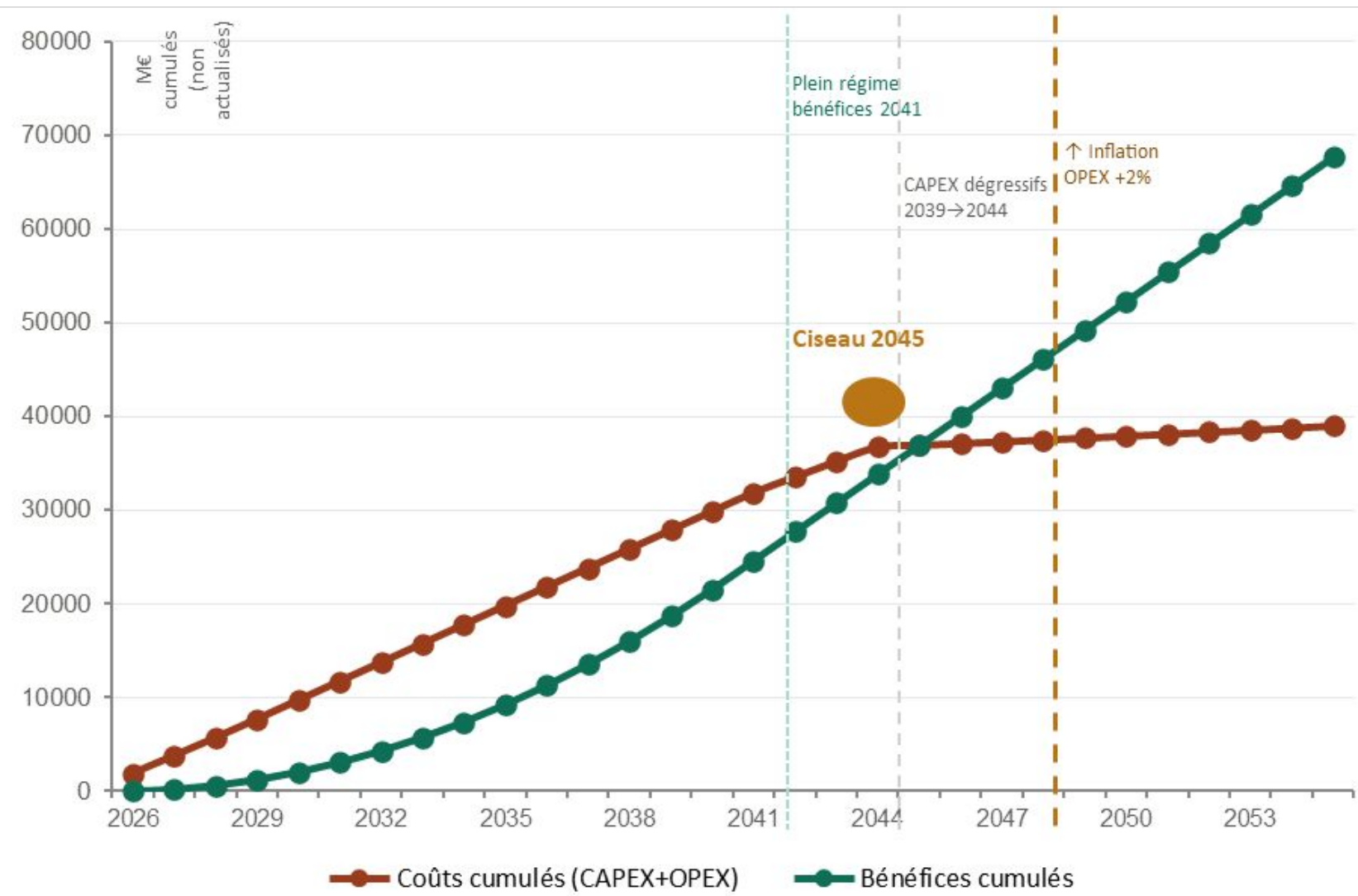
Recommendation / Point of caution

The cost of inaction constitutes the missing reference scenario in the DERU 2 CBA. **It is recommended to carry out a rigorous assessment of the cost of inaction (environmental/health/economic/social) at the France scale to strengthen this item, currently estimated by analogy and order of magnitude.**

Item — cost of inaction	€M/year central	€M/year low	€M/year high	Horizon	Main source
CJEU fines — 2 active infringement proceedings against France 2020–2025 (non-compliant collection + treatment)	€40M	€15M	€80M	Recurring if non-compliance persists	CJEU, rulings Commission v. French Republic (2020, 2022) — periodic penalty €50,000–300,000/day + lump sum
Loss of access to European ERDF/EMFAF funds (environmental conditionality Art. 15 Reg. 2021/1060)	€10M	€5M	€30M	2027–2045 if non-compliance	E.g. suspension of ERDF drinking water funding in Poland (2021): €40M/year
Trending drinking water treatment cost overruns (micropollutants, PFAS, pharmaceutical residues, degraded water intakes)	€10M/year additional (trend +3–5%/year)	€5M	€30M	Trend 2026–2045	OFB/SDES 2025: 44% of water bodies stagnant since 2010. BRGM: progressive PFAS/nitrate contamination of groundwater
Trending shellfish farming losses (recurring health crises worsened by climate change)	€5M/year additional	€3M	€15M	Recurring — upward trend	Agreste 2022: €508M/year turnover × 6%/year losses. IFREMER: Thau lagoon report 2023
Trending tourism losses (beach closures, algae, image — cf. Paris 2024 Olympics)	€15 M/year additional	€8 M	€50 M	Structural trend	CGDD THÉMA 2017: –5 points in Brittany tourist attendance during algae peaks. INSEE 2024: growing tourist sensitivity
Deferred biodiversity costs (future irreversible restoration — each year of delay multiplies the TEEB cost)	€20 M/year (deferred costs)	€10M	€75 M	Long term — deferred costs	TEEB (2010) — OFB DEDR 2026 (aquatic biodiversity assessment underway)
TOTAL additional benefit (avoided cost of inaction)	€100 M/year	€46M	€280 M	To be added to direct DERU 2 benefits for a complete B/C ratio	BASELINE



DERU 2 FORESIGHT — SCISSOR EFFECT 2026–2055
SCENARIO 2 — RECOMMENDED



Ciseau

2045

Fin décaissement CAPEX

B/C médian

1,52

3 079 / 2 024 M€/an

Bénéfices/an

3 079 M€

à plein régime (2041)

CAPEX+OPEX/an

2 024 M€

1 839 + 185 M€ (2026–39)

Solde net 2055

+28 735 M€

non actualisé

VAN méd. 2055

+10 267 M€

actualisé 3 % — Quinet 2021

IV.4. MODEL LIMITATIONS AND METHODOLOGICAL RECOMMENDATIONS

**PRIORITY STRENGTHENING POINTS FOR THE
ROBUSTNESS OF THE CBA**

LIMITATIONS OF ESTIMATES BY AXIS: TABLE OF STRENGTHENING POINTS

Focus area	Amount retained €/year	What is NOT taken into account	Robustness risk	Priority
0 – Cross-cutting SES	1 280	No breakdown by specific SES, nor distinction between mainland/coastal/overseas (DROM). No isolated DERU 2 share.	Very high risk of double counting with Axes 3&4. Strict boundary needed (non-use value only).	Very high
1 – Quaternary drinking water supply (AEP)	32	Chronic health impacts from endocrine disruptors and pharmaceutical residues. Intake closures, substitution, PFAS.	INERIS database interpreted as revealed preferences — not an observed extra cost. Indirect DERU 2 causality.	Very high
2 – Energy (reagent GHGs)	–82 (deduction)	Equipment life-cycle emissions. Technology variants (ozone vs GAC). Construction/renewal emissions.	The GAC item (285,000 tCO ₂ eq) reverses the sign of the carbon benefit. A reagent LCA is essential.	Very high
3 – IMP public health	900	The FR bathing-water share strictly attributable to urban discharges via CSOs is not isolated. EU sub-components not broken down.	EC aggregate of €6 Bn = health + environmental benefits mixed together. Rebasings on the health component alone plus a robust FR allocation key.	Very high
3 – IMP tourism	4,3	Inland sites, off-season losses, coastal real estate. Long-term losses (repeated blooms).	5% ratio applied to €70 Bn of coastal tourism = very simplistic. Causal chain to be documented site by site.	Very high
4 – Tertiary N&P	371	Discharges to sea (removed from the calculation). Non-market biodiversity. Certain fishing uses.	Among the most solid. Residual double-counting risk with Axes 0&3, to be secured by a spatial exclusivity rule.	High
5 – Small municipalities	20	Organizational costs, SPANC inspection, acceptability. Environmental benefits outside intake areas.	Population concerned needs to be made more reliable (SANDRE). Unit benefit very stylized, derived from the EU.	High
6 – Water reuse (REUT)/Sludge	84	Territorial variability, distribution costs, health constraints. Volatile fertilizer prices.	2% REUT assumption very ambitious (currently 0.3%). Partial double-counting risk with Axis 4 N&P.	High

Recommendation / Point of caution

The 3 priorities: (1) LCA of chemical reagents (GAC in particular). (2) DERU 2 attribution coefficient applied to the INERIS value (30–40% via water agencies' WFD baseline assessments). (3) Validation of physical N&P flows (21,537 t N/year) against NAIADES/Hub'eau data × the IGEDD 2025 report.

METHODOLOGICAL RECOMMENDATIONS FOR THE DERU 2 CBA

R1

Develop a 3-tier portfolio CBA

Do not produce a single national CBA but rather a CBA structured into: (1) national macro CBA (order-of-magnitude B/C ratio); (2) CBA by family of DERU 2 obligations (treatment, micropollutants, stormwater, energy); (3) trade-off on instruments and timeline. This would make it possible to identify investment priorities relative to risk/cost.

R2

Carry out territorialized CBAs, or CBAs by river basin

Absolute priority: a CBA on a representative sample plus national extrapolation. Prioritize investments where risks are highest (health issues, sensitive areas, degraded water bodies, vulnerable blue economy) and deploy them cost-effectively at the basin scale.

R3

Apply a 'State-standard' CBA framework with 3 scenarios

Reference scenario (inaction / minimal DERU I compliance); 'trend with climate change' trajectory; DERU 2 scenario (additional gain vs DERU I). Prioritization by size and risk, by technological options — standard recommended by the CGDD for public policies with high health stakes.

R4

Carry out a cost-effectiveness analysis per obligation

Cost per kg of N/P avoided, per 'micropollutant equivalent' avoided, per reduction in regulatory exceedances, per avoided overflow episode. This approach is explicitly recommended in the EC's institutional communication on the revised directive and is compatible with the CBA-WFD framework.

R5

Make the technology choice objective through cost-effectiveness analysis

Compare the options (ozonation vs GAC, biofilters vs activated sludge) on their total cost (CAPEX + OPEX + GHG externalities) per unit of pollutant removed. GAC shows an unfavorable GHG ratio that may disqualify the option compared with ozonation or UV in certain contexts.

R6

Integrate the WFD / biodiversity / climate linkage

Align the DERU 2 CBA with the objectives of the Water Framework Directive (2027 baseline assessment), biodiversity plans (SNB 2030), decarbonization trajectories (SNBC) and climate resilience plans (PNACC). DERU 2 must be analyzed as a mitigation/adaptation policy and not solely as a sectoral compliance policy.

R7

Build a national investment prioritization table

Multi-criteria matrix: health axis (health/bathing/intakes), ecosystems axis (WFD good status, degraded water bodies), economic axis (cost/benefit by area), climate axis (drought/flood vulnerability). This would allow priority investments to be geolocated and would meet the expectations of the IGEDD 2025 report.

R8

Reason in terms of the 'DERU 2 increment' versus DERU I

The CBA must measure the net benefit of **WHAT IS NEW in DERU 2 relative to the DERU I obligations already committed to. A large part of the tertiary N&P and secondary obligations are already covered by existing programs.** The strict DERU 2 increment mainly concerns quaternary treatment, wet-weather management (2%), energy neutrality and IMPs.

IV.5. TRANSPOSITION & APPLICATION OF DERU 2

**CONCLUSIONS AND RECOMMENDATIONS FOR
PUBLIC AUTHORITIES**

MESSAGES FOR FRENCH TRANSPOSITION — DERU 2

Immediately launch the 4 priority studies to strengthen the CBA

Priority	Study to be launched	Impact on the CBA model	Horizon
P1 — Very high	Full LCA of chemical reagents — GAC as priority: the extraction–transport–regeneration footprint could double the current estimate (285,000 tCO ₂ eq/year).	Could reverse the carbon benefit of the energy block (currently –€32 M/year net). Essential for the climate credibility of the directive.	2025–2026
P2 — Very high	DERU 2 attribution coefficient applied to the INERIS value of €1,280 M/year. Application of 30–40% via the water agencies' 2027 WFD baseline assessments.	Would bring the INERIS value down to €384–512 M/year in the strict scenario. Strengthens the model's robustness against EC questions.	2026–2027
P3 — Very high	Validation of physical N&P flows against NAIADES/Hub'eau: 21,537 t N/year and 1,952 t P/year. Cross-checking with the IGEDD 2025 report.	Validates (or corrects) the basis of Axis 4 (€371 M/year). Direct impact on the N&P NPV (€11 Bn over 25 years).	2025–2026
P4 — High	Territorialized CBAs by river basin: cost-effectiveness per obligation (€/kg N/P avoided, €/overflow avoided) plus geographic prioritization of investments.	Make geographic priorities objective. Demonstrate proportionality to local authorities and the State.	2026–2028

Carbon footprint: without an LCA of reagents (Priority 1), DERU 2 risks showing a negative GHG balance in environmental assessments. This point must be consolidated in a context of carbon sobriety. A reagent decarbonization strategy (biosourced carbon, ozonation, UV) must be integrated from the French implementing texts onward.

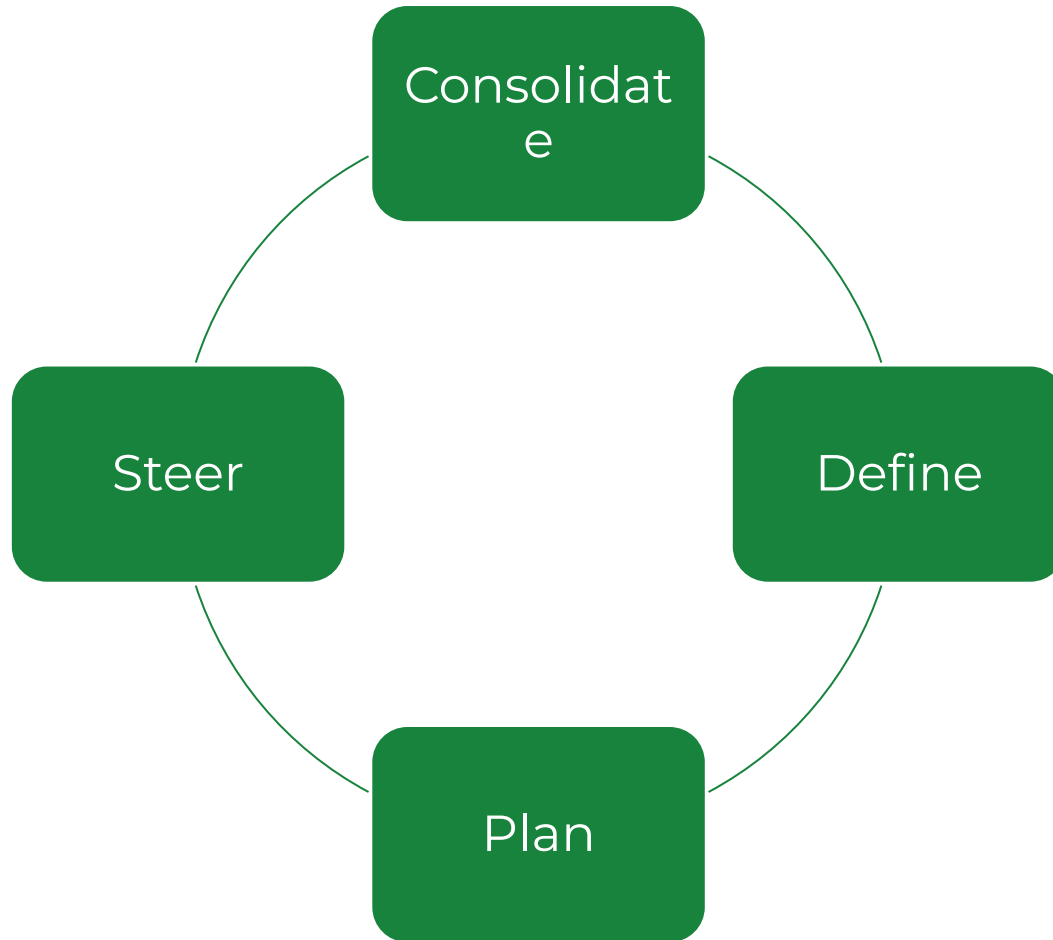
Recommendation / Point of caution

These 4 studies must be launched: a prerequisite for a robust CBA that is defensible before stakeholders and the European Commission.

V. CONCLUSIONS / GENERAL RECOMMENDATIONS

V. CONCLUSIONS: RECOMMENDATIONS

4 major axes:



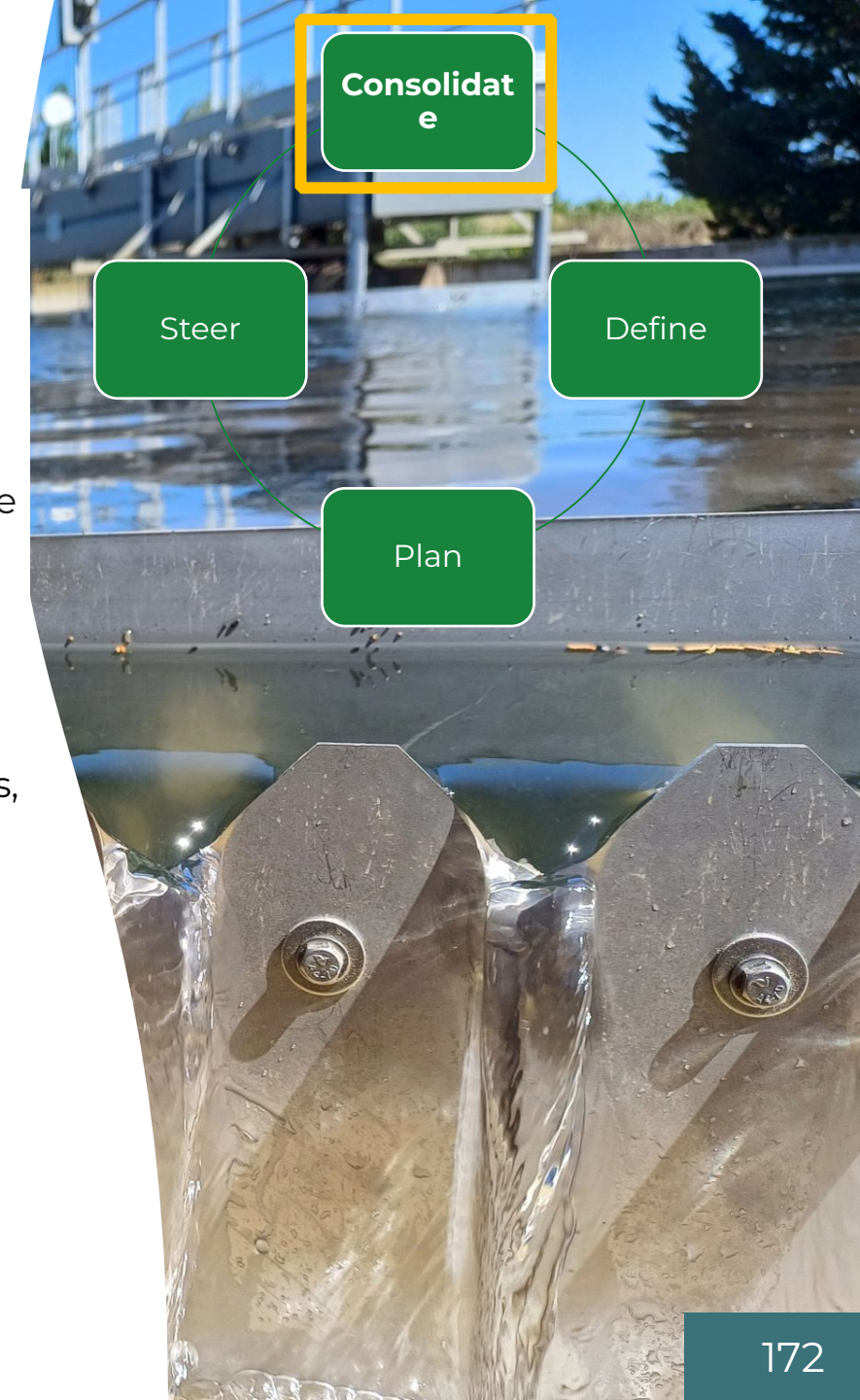
V. CONCLUSIONS: SUMMARY OF RECOMMENDATIONS

No.	Recommendation
1	Publish all sensitive areas and the applicable rules simultaneously, by 31/07/2027 at the latest (transposition date). Otherwise, local authorities will not be able to commit on the basis of incomplete obligations alone.
2	Smooth out the works to avoid an investment wall in the mid-2030s (DERU 1 delays, aging asset base, DERU 2 impact); prioritize planning for municipalities not compliant with DERU 1.
3	Complete the national databases (collection and treatment) through collaborative work with stakeholders; establish a regular, pragmatic and non-time-consuming reporting process.
4	Clarify the terms of the 2% requirement and its monitoring (e.g. moving to 5% by flow then 2% on sensitive areas, in line with current French regulation and depending on conclusions regarding IMPs and sensitive areas), taking climate change into account.
5	Define clear and simple calculation rules: method for calculating dry-weather flow, calculation of energy neutrality, definition of tertiary treatment
6	Clarify the terms for municipalities between 1,000 and 2,000 PE that must set up a collection system (inhabitant/ha ratio + techno-economic calculation), while maintaining the possibility of carrying out an analysis for territories that wish to do so.
7	Break down the energy neutrality objective at the local level by allowing local authorities to group together to facilitate collaboration between territories.
8	Provide for additional funding arrangements for works related strictly to stormwater (not covered by the sanitation service).
9	Accelerate IMPs, network works and rural-urban area complementarities, in continuity with sanitation and stormwater master plans and water agency contracts.
10	Anticipate employment and training needs in order to address FTE or engineering-skills shortages across the entire value chain of the water sector.
11	Integrate a decarbonization strategy when choosing solutions. Under this study's assumptions (conservative on this aspect), DERU 2's carbon balance appears negative unless granular activated carbon is reactivated; an LCA of chemical reagents and the use of alternatives (biosourced, reactivatable carbon, ozonation, UV) are necessary.
12	Forward-looking studies on benefits: launch three to four key studies to strengthen the Cost-Benefit Analysis (CBA): LCA of chemical reagents (including GAC), a study of the DERU 2 attribution coefficient applied to the INERIS value, validation of N & P flows using the NAIADES database.
13	Structure CBAs as a 3-tier portfolio (national macro, by family of obligations, by river basin) and carry out territorialized CBAs by river basin for the 6 water agencies, and if possible at the local scale.
14	Drive a national sanitation plan modeled on, or complementary to, the Plan Eau (Water Plan).
15	Reconnect the general public with natural water — rivers, groundwater and oceans — through efficient sanitation services and easily accessible information.

V. CONCLUSIONS: RECOMMENDATIONS

Consolidate the baseline assessment:

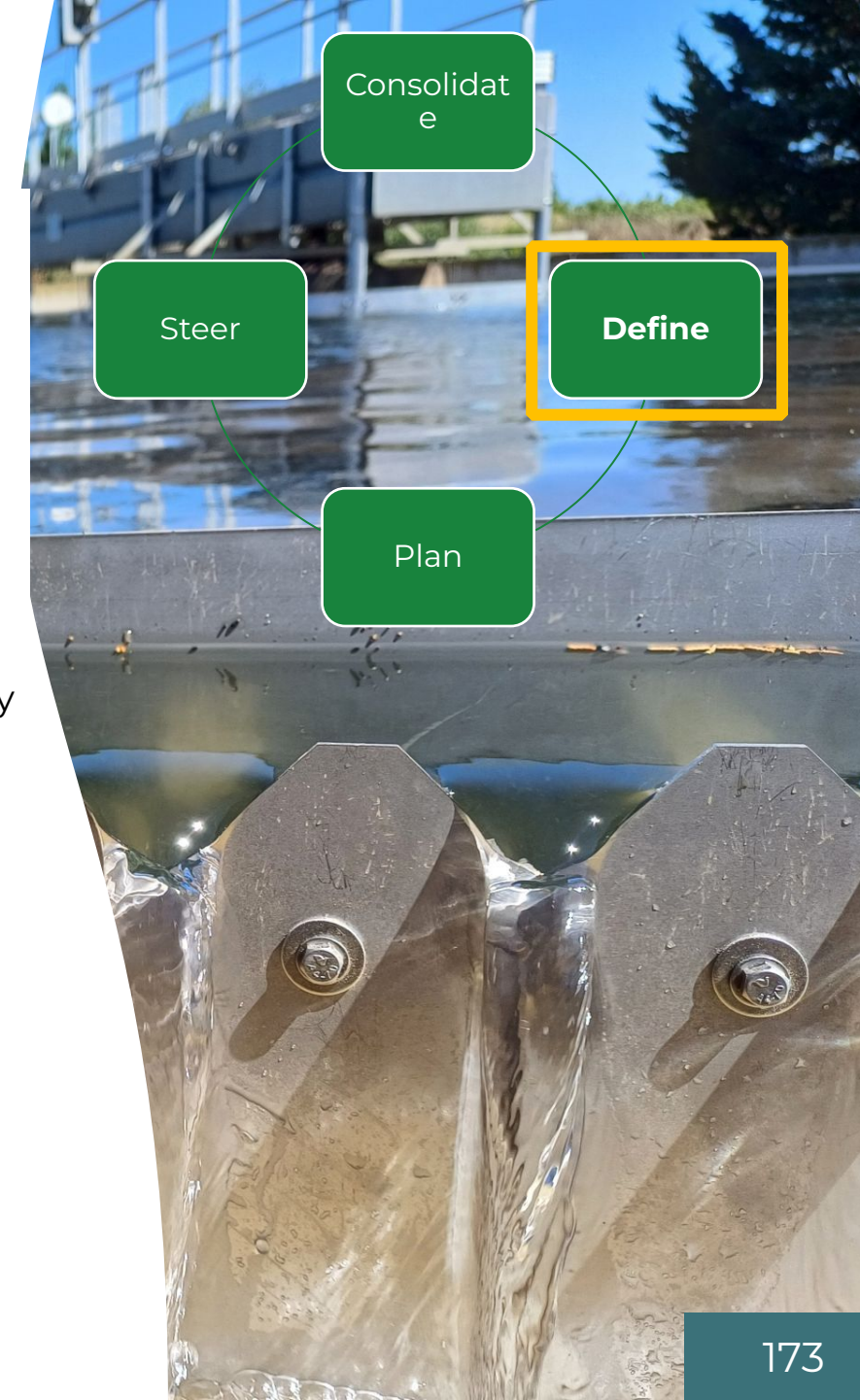
- Develop and make available a **complete, robust and verified national database**, particularly for the collection component (database administered by State services).
It seems important that asset management of networks be improved: knowledge of the condition of wastewater collection networks should be advanced in order to identify any faults and plan the works required where applicable.
- **Add supplements to it** in order to meet the new DERU requirements for public information (per Annex VI), but also as needed to steer the national strategy and its monitoring (e.g. construction/rehabilitation date of each treatment stage of the WWTPs, total electricity consumption, per m3 treated, etc.).
- In addition to the technical monitoring data, **this database could incorporate financial data** (IMP amounts, amounts of collection and treatment works financed, etc.)
- Lastly, studies enabling **the Cost-Benefit Analysis presented here to be made more robust and complete** are necessary



V. CONCLUSIONS: RECOMMENDATIONS

Precisely define, as soon as possible, certain concepts:

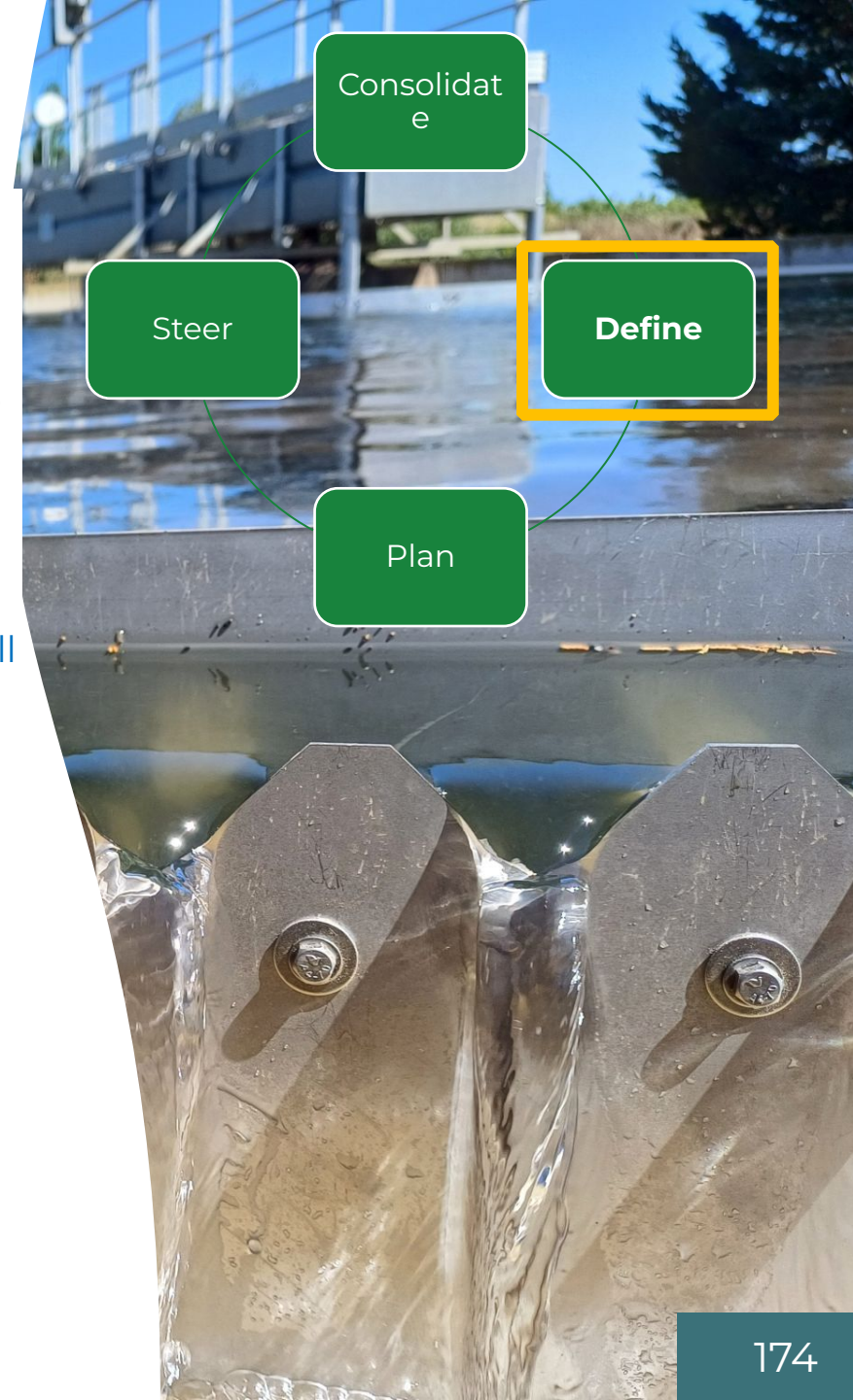
- Establish **clearly the concept of "existing tertiary treatment"**: linked to the system's operating permit (N/P standards at the level of DERU I requirements)? To the plant's current performance? To its location in an area sensitive to eutrophication?
 - Preference for a combination of the first 2 criteria
- Clarify the **method for defining micropollutant priority areas**: reasoning by zone does not necessarily seem the most relevant, except in certain territories, and an approach by sanitation system would be more precise... but also more complex to implement



V. CONCLUSIONS: RECOMMENDATIONS

Precisely define certain concepts:

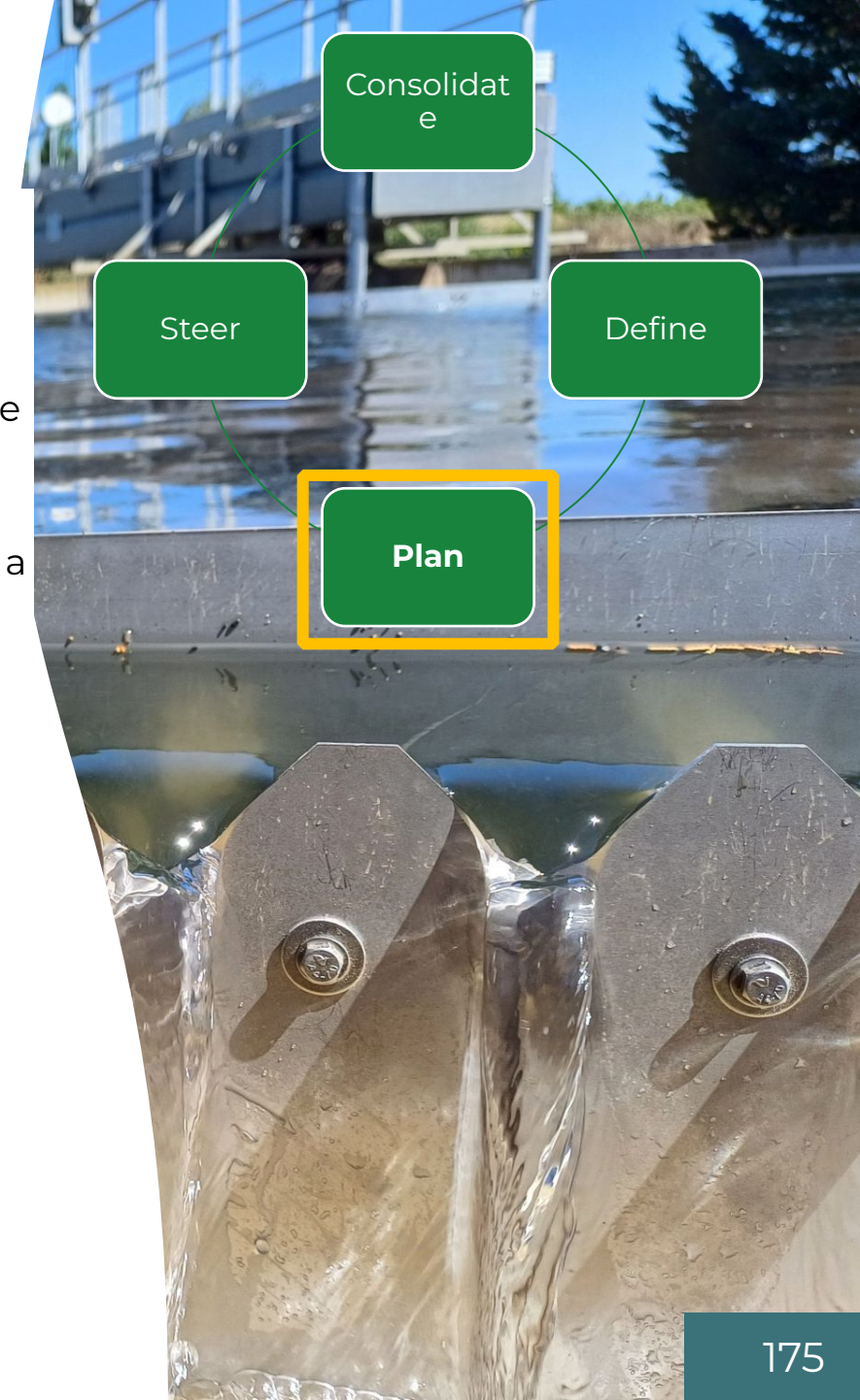
- Clarify the calculation method for "2% collection compliance", and the arrangements for its monitoring.
- Define the calculation scope of energy neutrality, as well as the equivalences between energy types (electricity, gas, heat), and the expected content of audits. [A simple mechanism is desired in terms of calculations, equivalences and reporting \(a subject still under discussion at EU level\).](#)
- Define the compliance scale for energy neutrality requirements: France? EPCI? River basin agency?
 - A France-wide approach without precise steering at the national level risks diluting responsibilities and causing delays. Conversely, an overly local approach risks putting certain EPCIs in difficulty, some of which might for example have only a single medium-sized plant.



V. CONCLUSIONS: RECOMMENDATIONS

Plan the upgrade to standards:

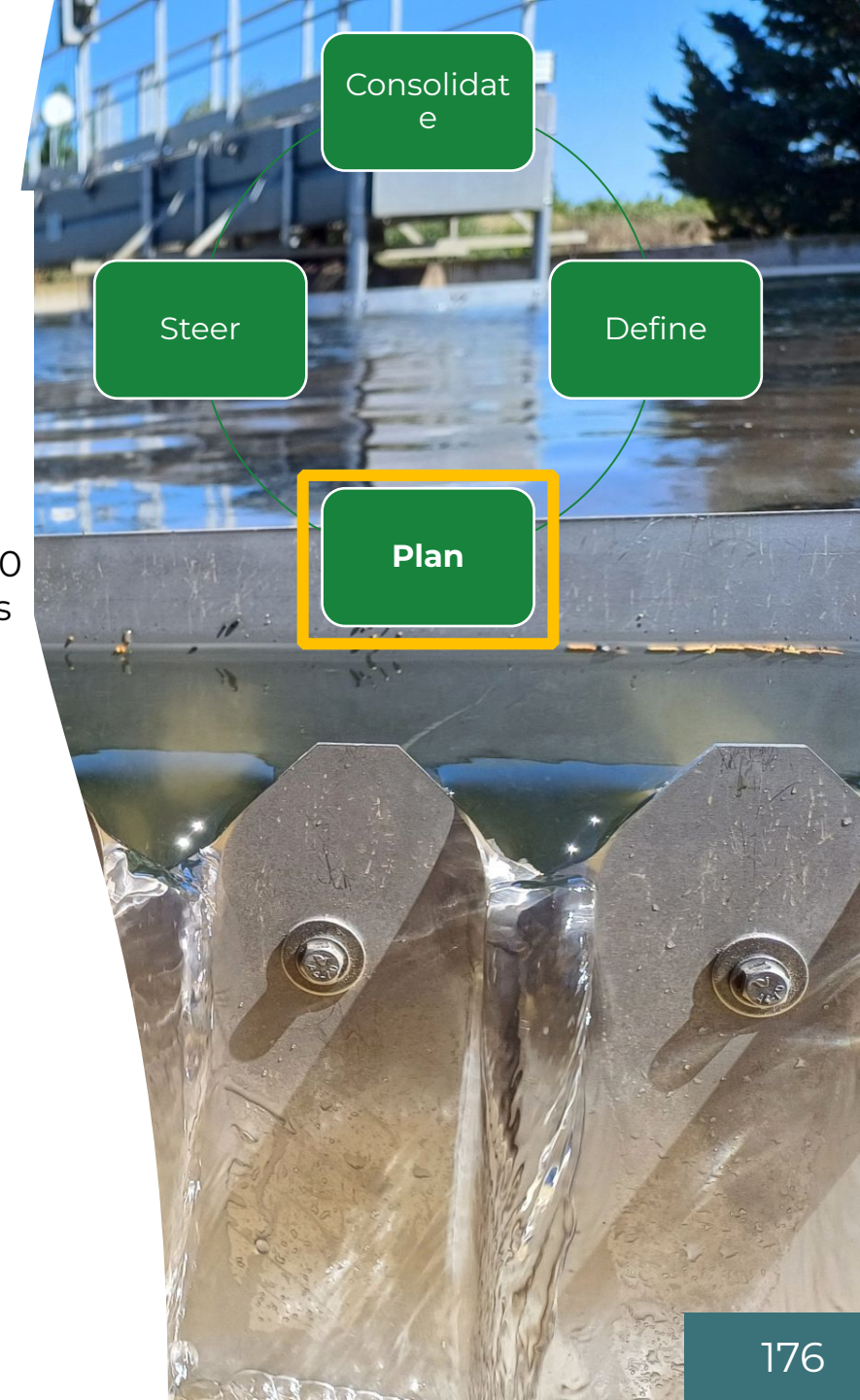
- Rely on the first IMP cycle to set a strategic dimension for the 2045 horizon, then use the 6-yearly IMP cycle to ensure tactical and operational adjustment against this objective.
- 5% collection target to be aimed for initially, then tightened toward 2% on systems with a proven significant impact (priority areas)
- Satisfactory tertiary compliance level for municipalities > 10,000 PE and < 150,000 PE -> however, do not wait until 2039 to launch the upgrade of the last systems without anticipating



V. CONCLUSIONS: RECOMMENDATIONS

Plan the upgrade to standards:

- Risk of a major spike in works between 2036 and 2039 on networks and WWTPs > 150,000 PE not compliant with DERU 2 but already having tertiary treatment
- Mapping of micropollutant priority areas to be produced as soon as possible: the 31/12/30 deadline is very far off □ risk of delays building up in achieving compliance (only 15 years to bring around 400 plants up to standard)

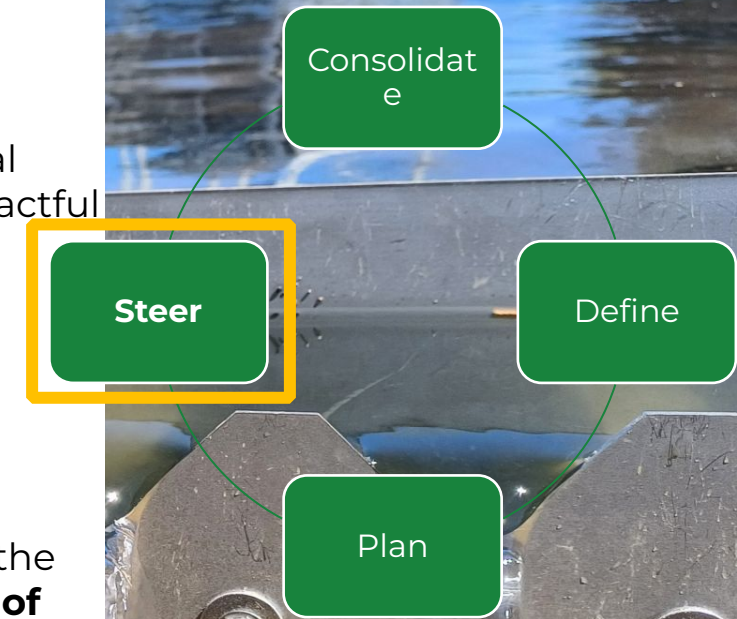


V. CONCLUSIONS: RECOMMENDATIONS

Steer the upgrade to standards:

- Based on the consolidated baseline assessment, request an annual progress report from the local authorities concerned (studies, works, etc.) plus an update of the national database's data
- Impose a schedule for carrying out the works (based on identified risk/health issues and local difficulties) to direct funding as a priority toward the IMPs, various studies and the most impactful works, including in particular:
 - o DERU I upgrade works (already underway — current litigation risk)
 - o Upgrade of the most impactful collection networks
 - o N/P treatment studies on WWTPs without tertiary treatment
- Smooth the compliance upgrade across all categories of networks and plants and prioritize the works **based on overall studies (SDAGE scale) then more local studies (SAGE/EPCI scale) of the associated environmental benefits (CBA).**

This smoothing must also be designed so that the industrial effort (training, studies, execution, etc.) can be absorbed humanly, technically and financially by the entire sector (engineering firms, works contractors, project owners, etc.)



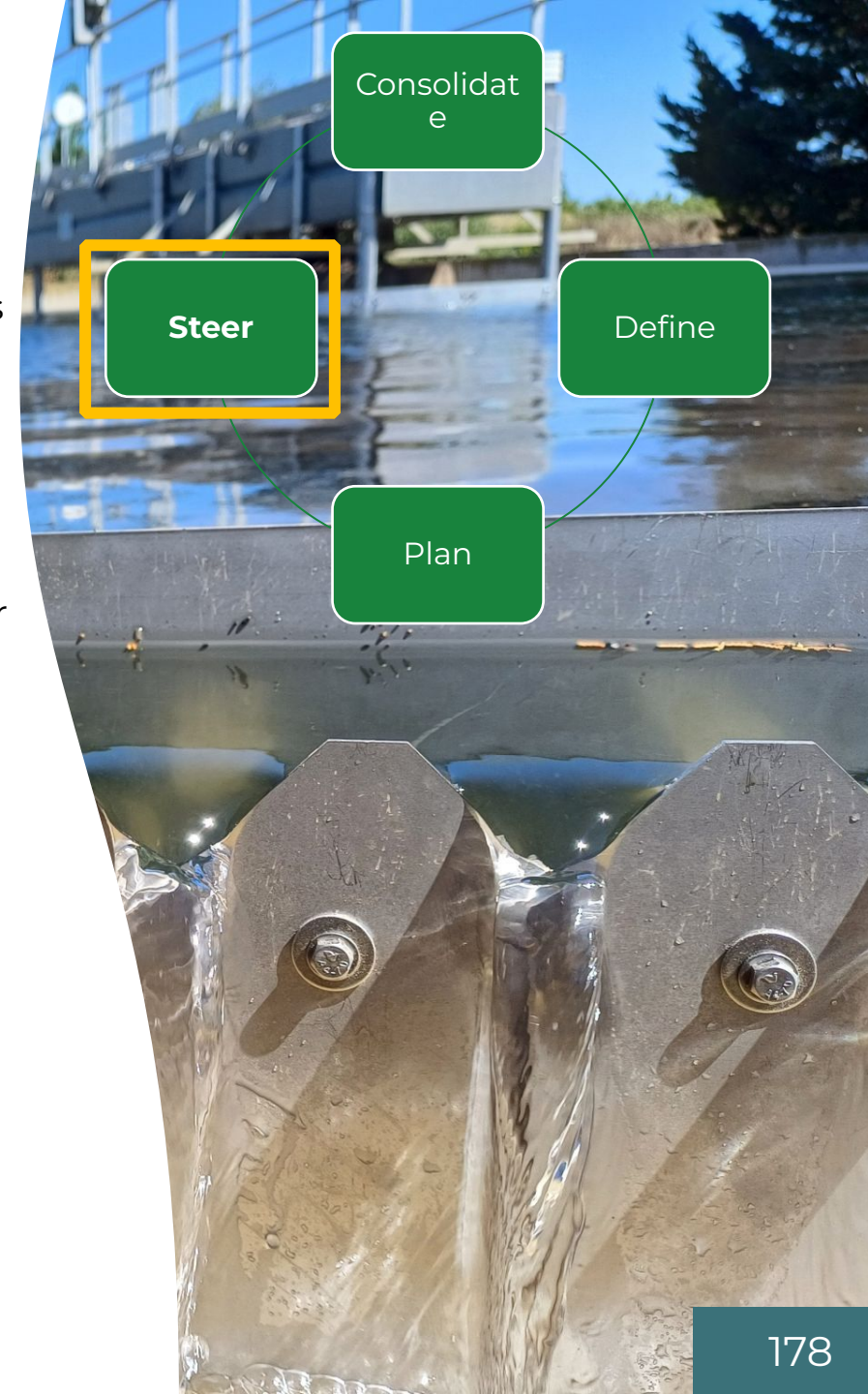
V. CONCLUSIONS: RECOMMENDATIONS

Steer the upgrade to standards:

- Identify works already planned / under way and ensure the consistency of their impacts on DERU 2 compliance
- Set up the Micropollutants EPR scheme as soon as possible, as it will provide the majority of funding for investments related to quaternary treatment
- The investments related to the rollout of DERU 2 represent very substantial amounts for local authorities.

Generally speaking, in order to get the most out of this new regulation, investments should be prioritized and then carried out in the territories where they will have the greatest impact

- Lastly, as a complement, following the transposition of DERU 2 into French law, launch the study/update of related texts (stormwater management, WWTP methanization, etc.)...
- And not lose sight of the fact that **sanitation is sometimes far from being the main contributor to the degradation of water body quality** : the contribution of other sectors should be strengthened



VI.A. APPENDICES: DETAILS ON THE DATABASES USED AND/OR BUILT

IMPACT ON COLLECTION (WASTEWATER)

Working databases for the impact study on collection

SANDRE databases (via the Verseau/Roseau portal or equivalent) to determine the systems impacted by DERU 2. This centralized database is fed by SANDRE-format data provided by sanitation departments.

>>> we found that this database was deficient in that it lacked a number of pieces of information necessary for the study

=> Creation of a sample-based knowledge base with the support of engineering firms that are members of Syntec-Ingénierie. *This sample was compiled anonymously, based on historical data (collected between July and October 2025), and used only in aggregated form.*

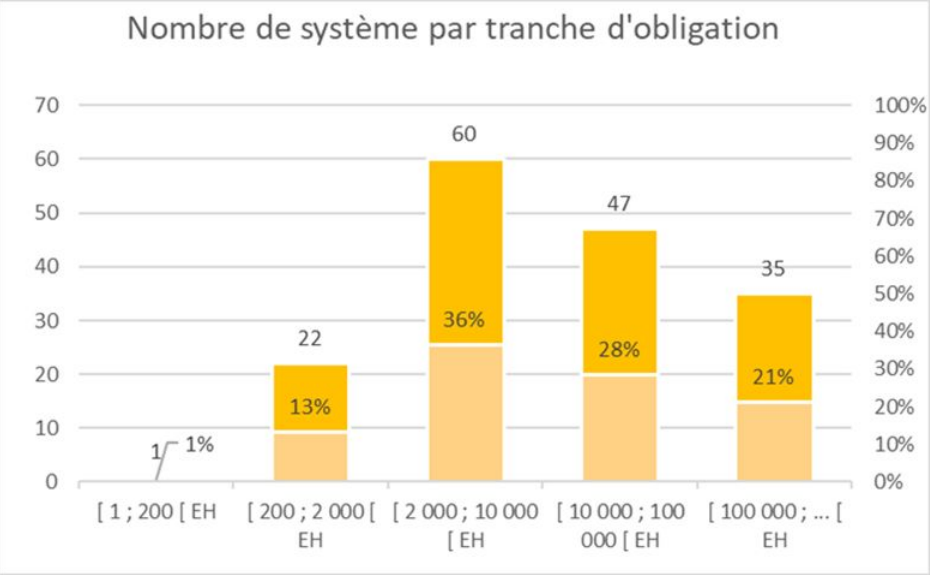
- Objective: Build a cost reference framework: IMP + Compliance upgrade
- Compiled July–Oct. 2025. Number of entries: 172 / Number of usable entries: 165

Nomb d'habitants	Prix de l'assainisseme TTC (Sispea)	Collecte	Nombre système assainisseme nt concerné(s)	Nomb de ST	Linéaire (km) réseau E UN	Nomb PR	Nomb DO	Taille Agglomératio (EH)	Objectif du programme de travaux	Critère de conformi té collecte visé	Année de réalisation l'étude (lancement)	Coût de l'étude (schéma directeur) en HT						Programme de travaux HT issu de l'étude - SDA	
									DERU 1 ou DERU 2			Inventaire patrimoine / géoréférencement	Métrologie	Etude milieu récepteur	ITV / autres investigations	Ingénierie/étude	Total	Coûts mise en conformité STEU	Coûts mise en conformité collec
9 276	2.80 €	6290	1	1	64.8	36	6	[10 000 ; 100 000 [EH	DERU 1	0 % séparatif	2023	11 502 €	18 750 €	-€	12 190 €	18 560 €	61 002 €	- €	2 176 6
5 203	2.80 €	3230	1	1	21.6	5	1	[2 000 ; 10 000 [EH	DERU 1	0 % séparatif	2023	19 320 €	18 750 €	5 600 €	12 190 €	15 950 €	71 810 €	32 400 €	2 918 2
9 863	2.80 €	4650	1	1	65.8	17	3	[2 000 ; 10 000 [EH	DERU 1	0 % séparatif	2023	52 374 €	18 750 €	-€	12 190 €	18 560 €	101 874 €	1 291 500 €	539 4
7 084	2.65 €	3435	7	7	60.9	16	43	[2 000 ; 10 000 [EH	DERU 1	NSP	2022	61 000 €	76 300 €	-€	14 800 €	17 700 €	169 800 €	15 000 €	1 944 0

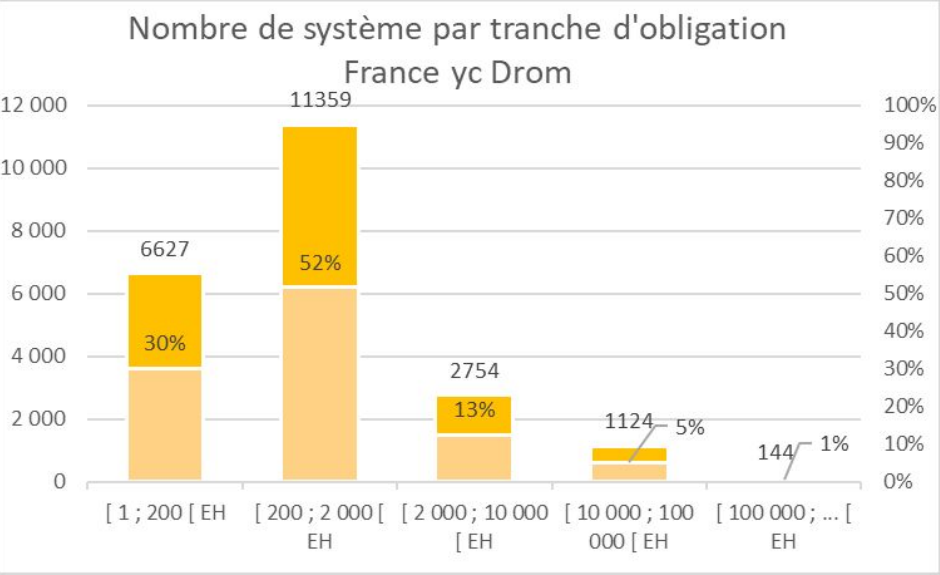
COLLECTION: APPENDICES

Analysis of the compiled sample and comparison with the national Roseau database

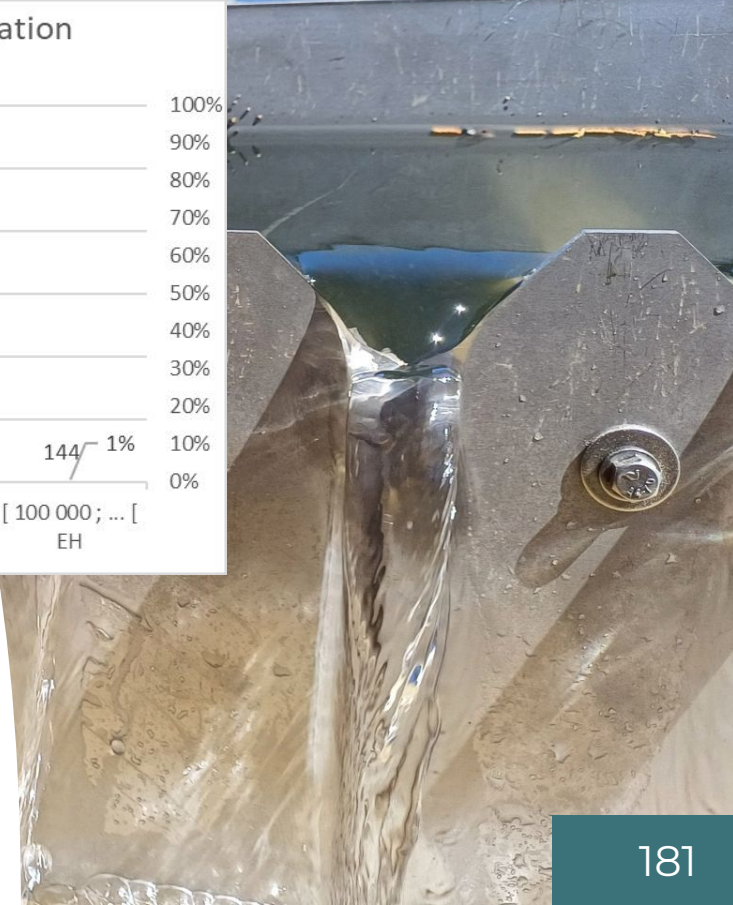
Representation of the sample: number of systems by obligation bracket



Left figure: Compiled sample (internal database, 165 units)



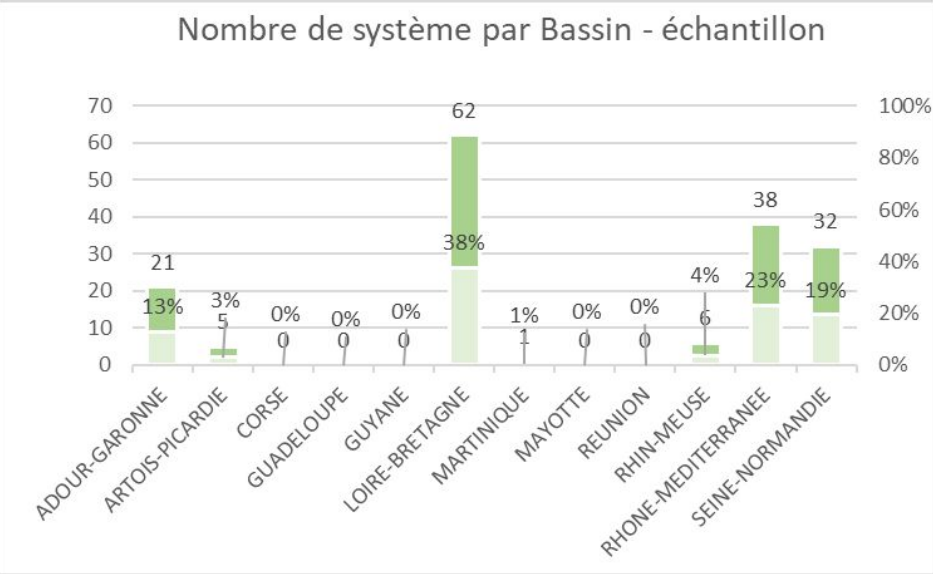
Right figure: Distribution across all of France (reprocessed Roseau data, 22,008 units)



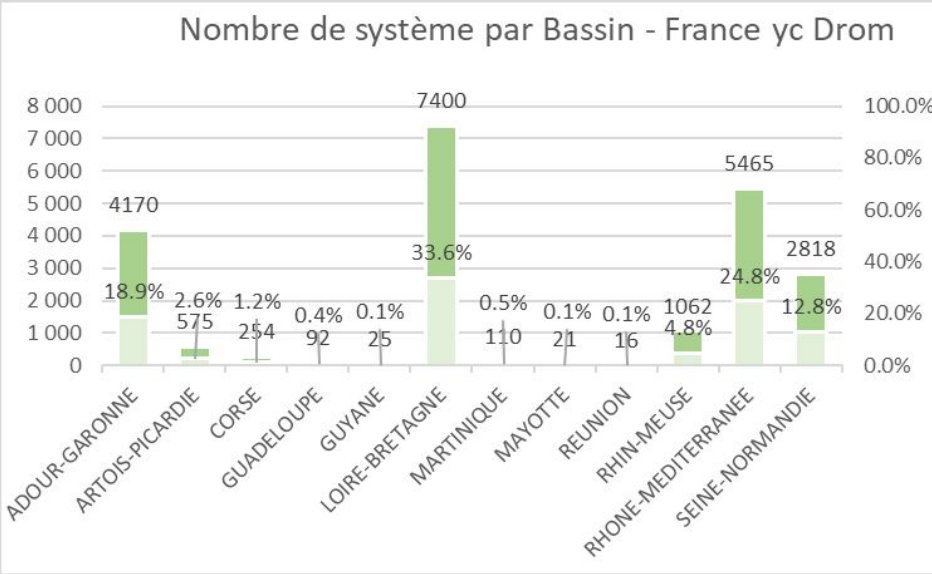
COLLECTION: APPENDICES

Analysis of the compiled sample and comparison with the national Roseau database

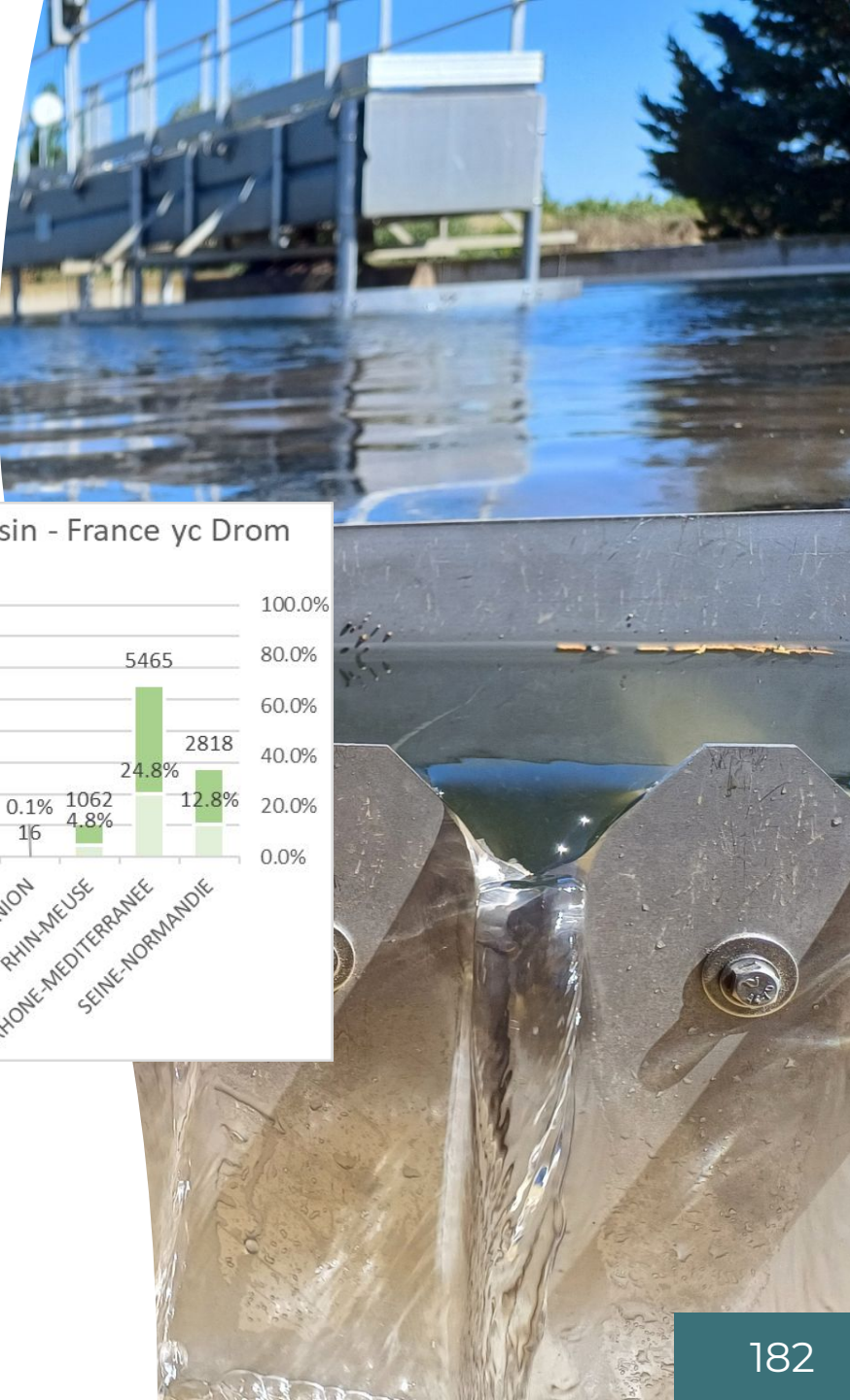
Representation of the sample: number of systems by river basin agency



Left figure: Compiled sample (internal database, 165 units)

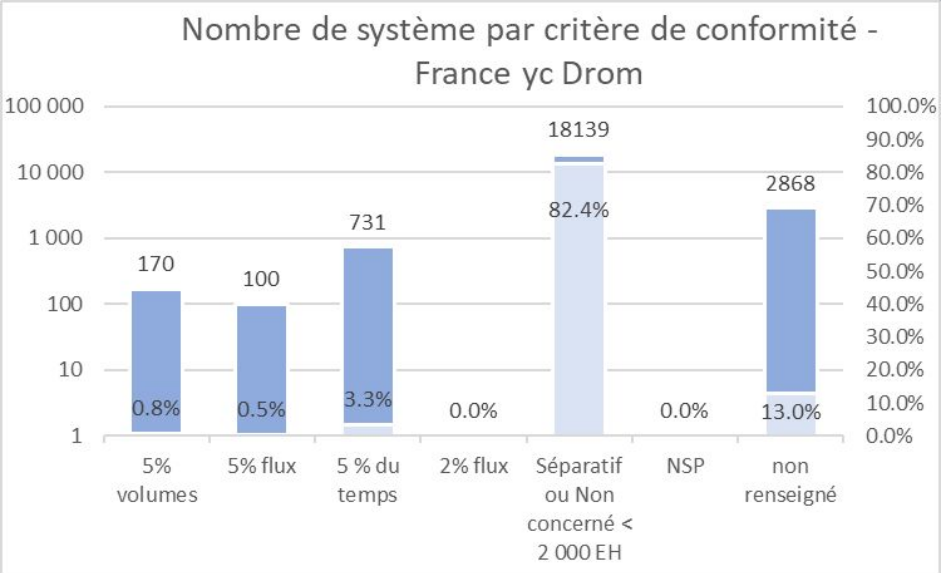
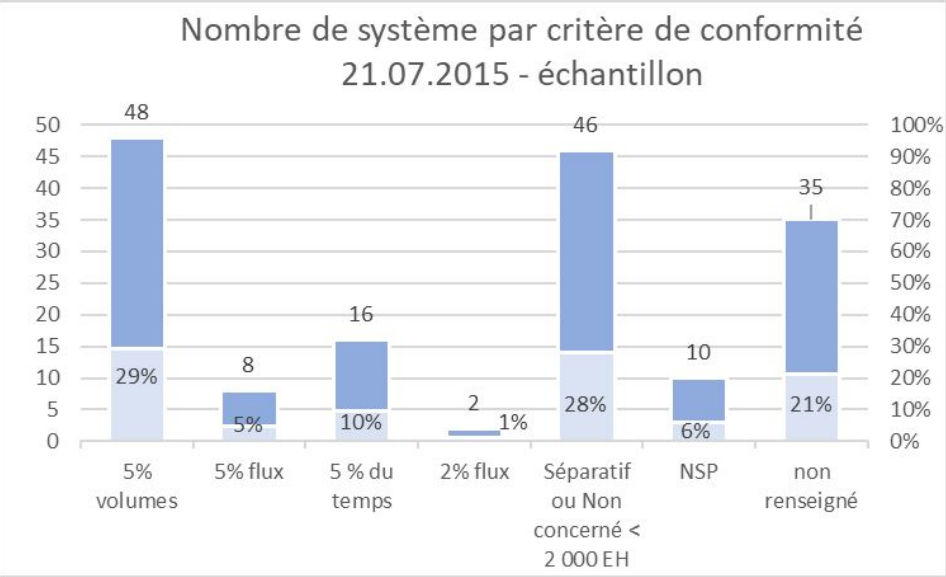


Right figure: Distribution across all of France (reprocessed Roseau data, 22,008 units)



COLLECTION: APPENDICES

Analysis of the compiled sample and comparison with the national Roseau database
Representation of the sample: number of systems by 21.07.2015 compliance criterion



Left figure: Compiled sample (internal database, 165 units)
Right figure: Distribution across all of France (reprocessed Roseau data, 22,008 units)

COLLECTION: APPENDICES

Analysis of the compiled sample

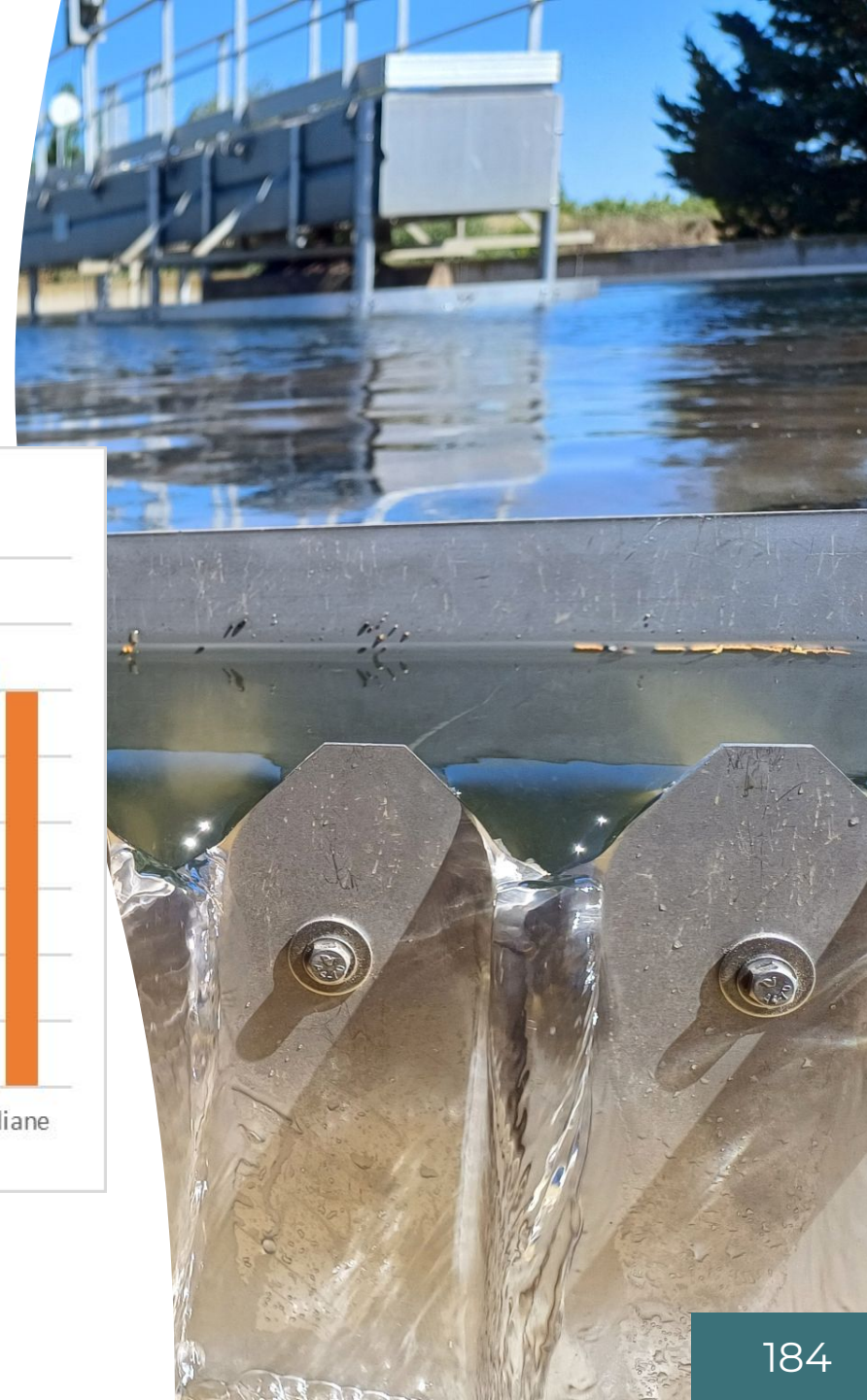
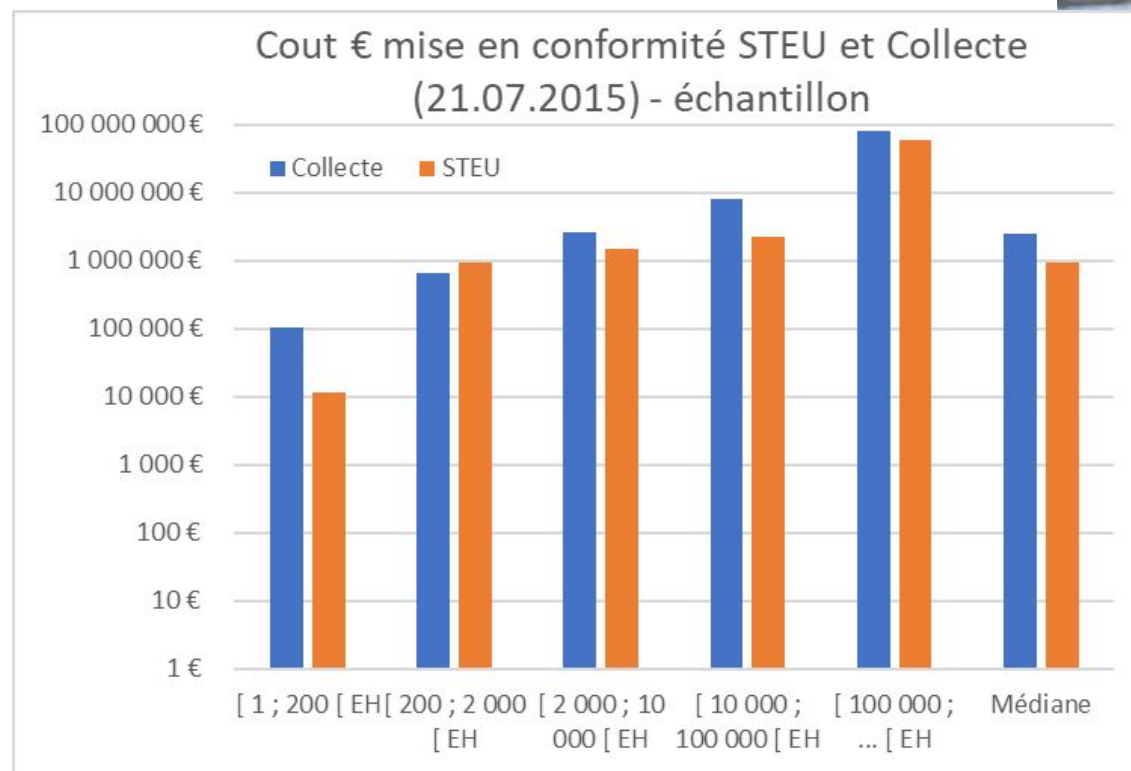
Costs of collection compliance upgrade under 21.07.2015 (and WWTPs).

Collection median = €2,515,000

=> i.e. €450 / PE collected

WWTP median = €956,000

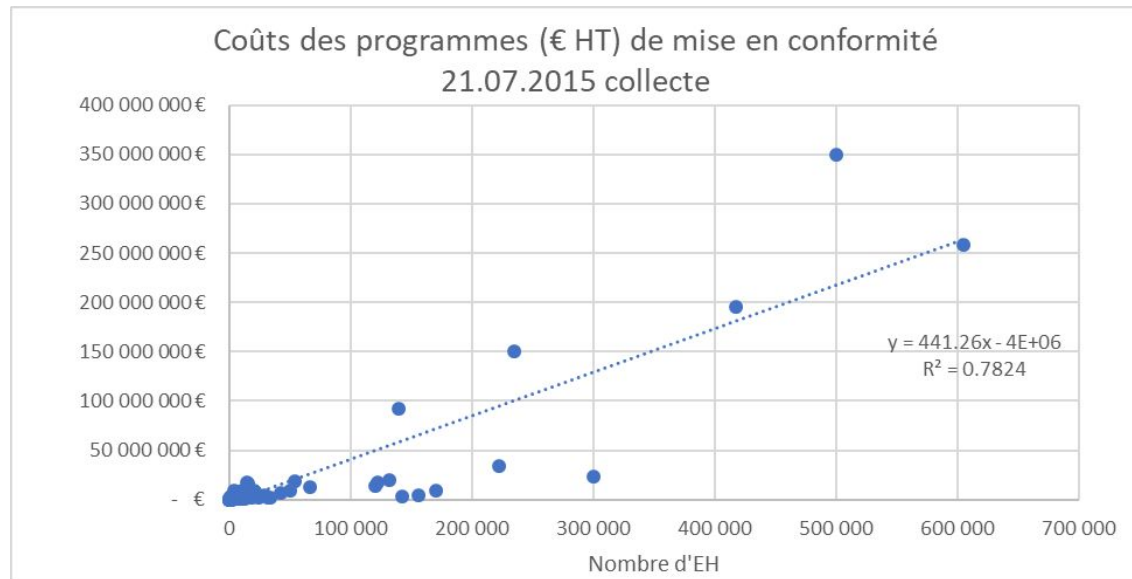
=> i.e. €295/PE treated



COLLECTION: APPENDICES

Analysis of the compiled sample

Costs of collection compliance upgrade under 21.07.2015

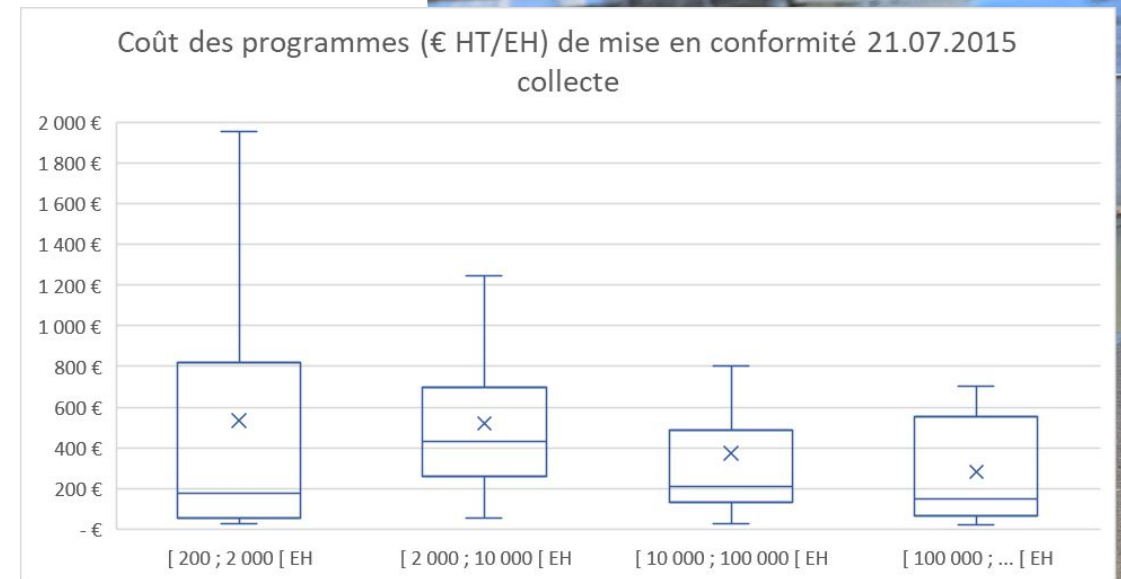


Collection median = €385/PE

Collection average = €450/PE

Sample minimum: €24/PE

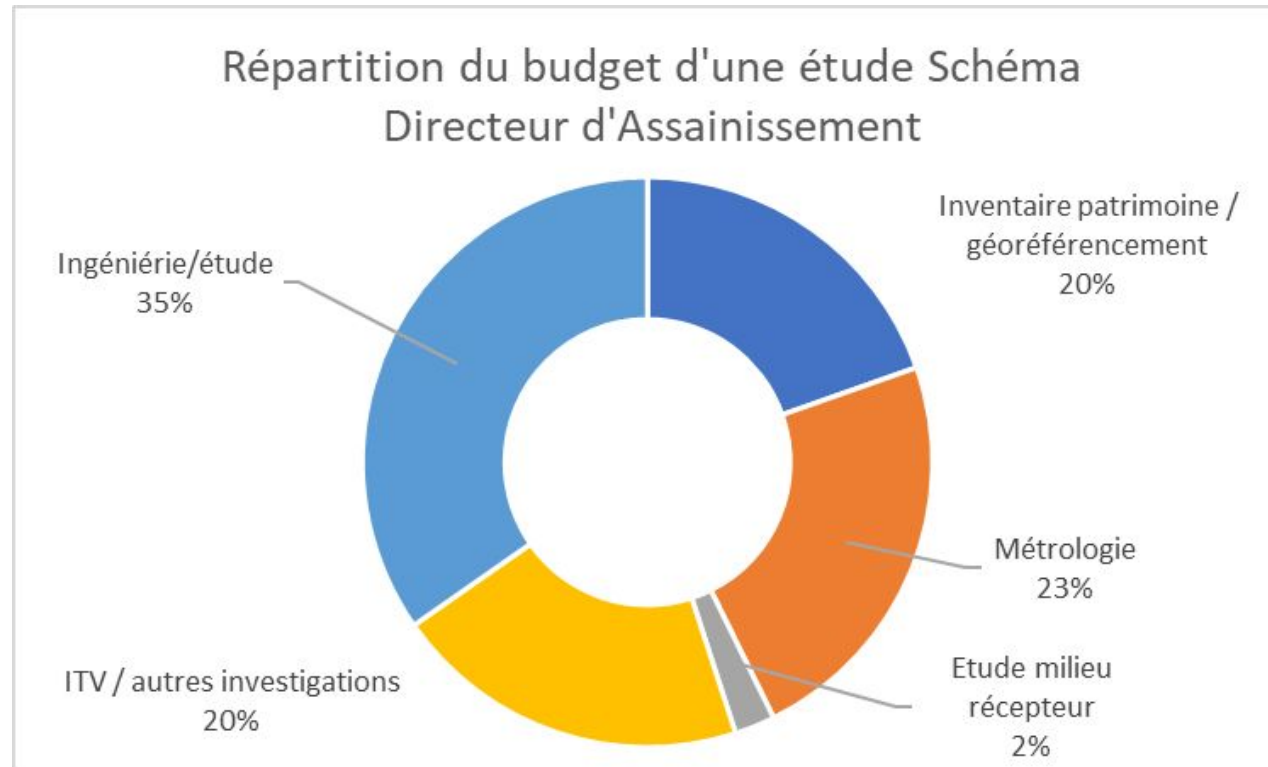
Sample maximum: €2,420/PE



COLLECTION: APPENDICES

Analysis of the compiled sample

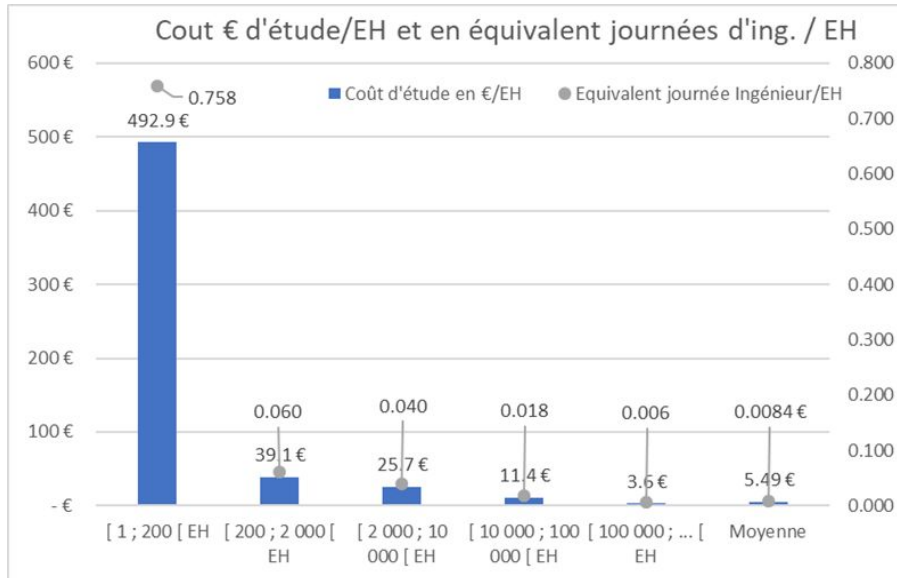
Costs of sanitation master plan studies



COLLECTION: APPENDICES

Analysis of the compiled sample

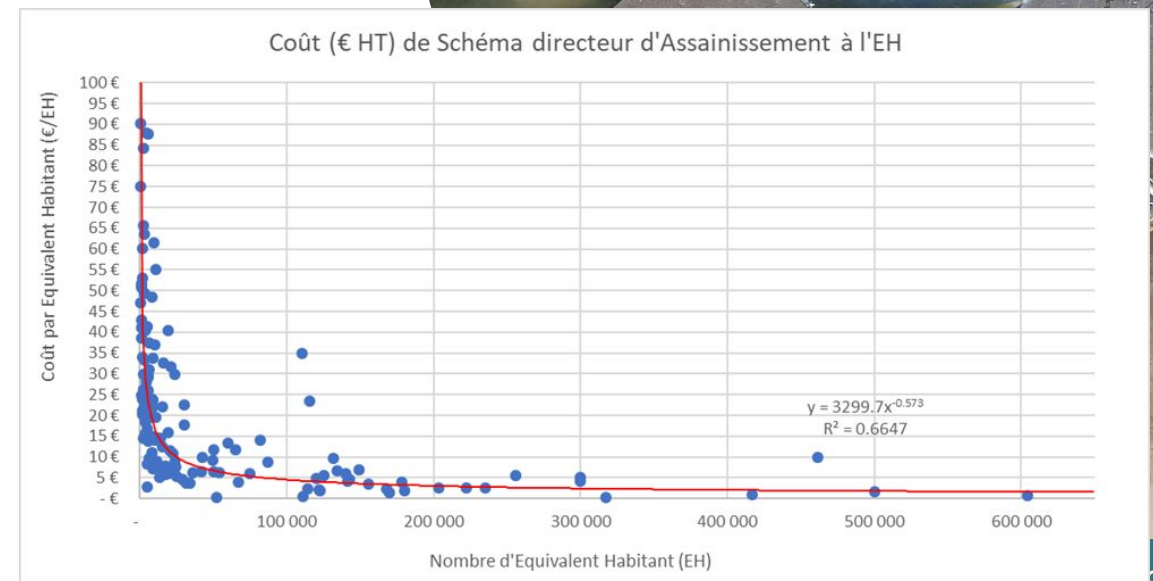
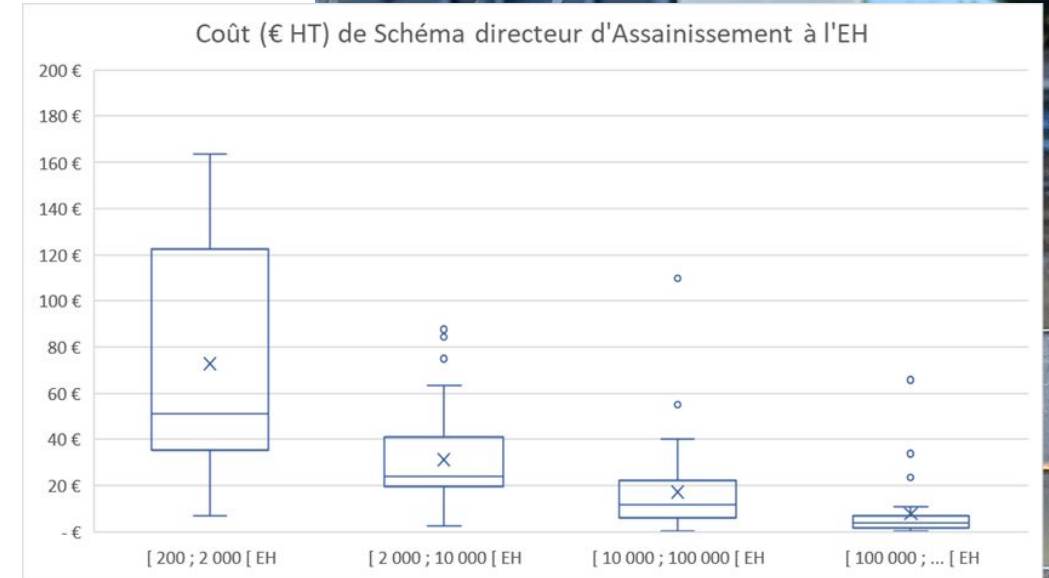
Costs of sanitation master plan studies



Average study cost = **5.5 €/PE** (~0.009 Eng.days/PE*)

Averages by agglomeration class:

- 200-2000 PE: €39/PE
- 2000-10000 PE: €26/PE
- 10000-100000: €11.4/PE
- > 100,000 PE: €3.6/PE



COLLECTION: APPENDICES

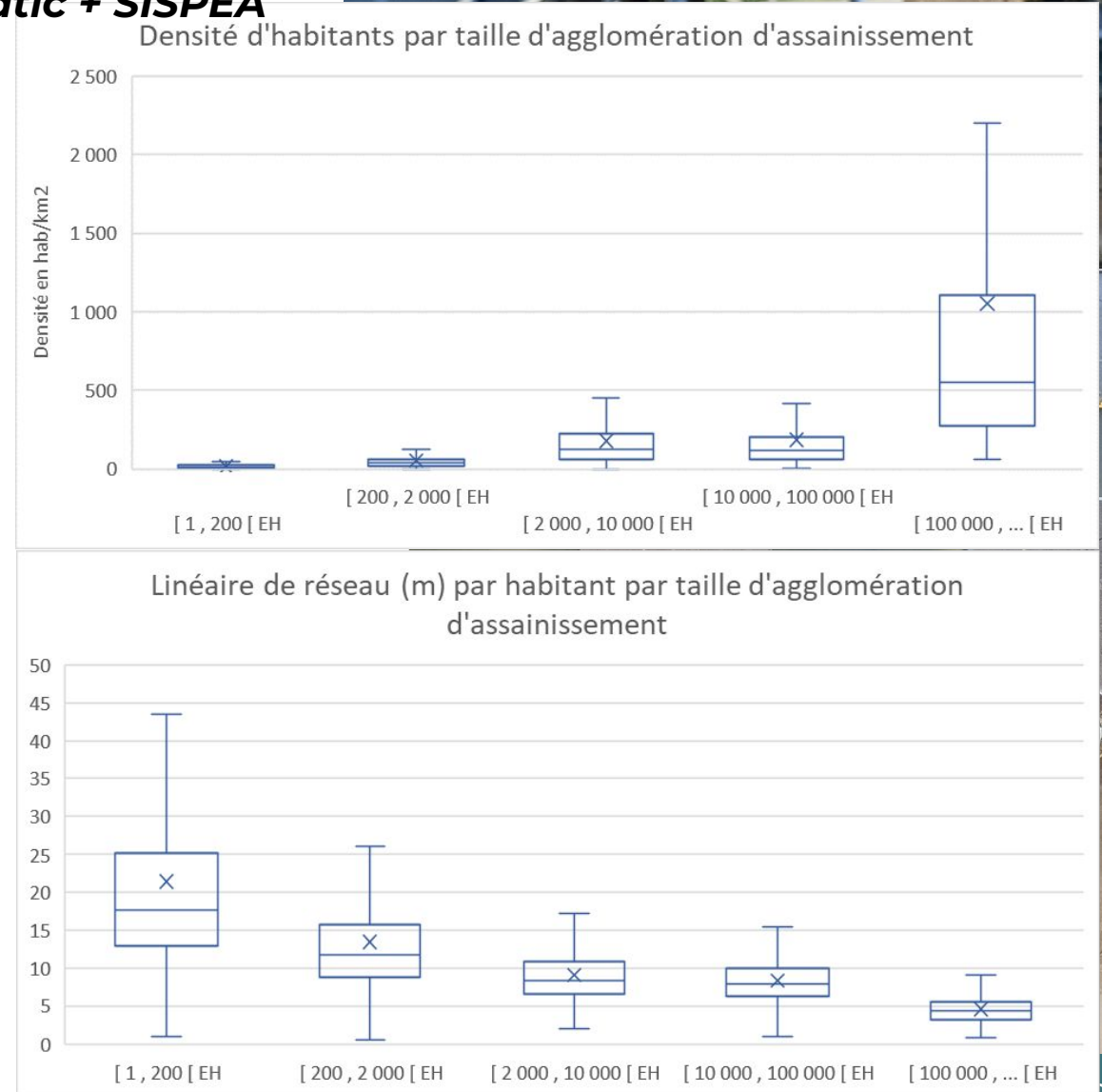
Analysis of the sample from the national Roseau + Banatic + SISPEA database (2023)

Average and median population densities per km² by agglomeration class with centralized sanitation:

- 0-200 PE: 17.8 / 14.5 inhab/km²
- 200-2000 PE: 53.8 / 39 inhab/km²
- 2000-10000 PE: 181 / 128 inhab/km²
- 10000-100000: 187 / 121 inhab/km²
- > 100,000 PE: 1,053 / 554 inhab/km²

Average and median lengths of collection network by agglomeration class with centralized sanitation:

- 0-200 PE: 21.4 / 17.6 meters
- 200-2000 PE: 13.5 / 11.9 meters
- 2000-10000 PE: 9.1 / 8.3 meters
- 10000-100000: 8.3 / 7.9 meters
- > 100,000 PE: 4.6 / 4.4 meters



VI.B. APPENDICES: CBA – BIBLIOGRAPHIC STUDY – LITERATURE REVIEW

VI.B. BENEFITS: LITERATURE REVIEW

Source: IGEDD (2025) – Ex-ante assessment of DERU 2 for France

- No monetary value is produced by IGEDD 2025.
The report validates the use of carbon values (Quinet), WFD values (CBA-WFD), and INERIS micropollutant studies, but does not itself quantify the benefits.
- Monetizable by transfer – no direct IGEDD value.

Benefit / indicator	Quantified data	Unit	Page / section
Order of magnitude of the environmental and health benefits expected from DERU 2 (France)	Not monetized overall – qualitative approach + EU references	—	Summary and chap. 3
Climate/energy benefits (reduced energy consumption, GHG)	Explicit reference to tutelary carbon values (Quinet) for monetization	€/tCO ₂ e (external reference)	Chap. 3.3 "Energy and climate"
Health benefits (pathogens, micropollutants)	Explicit acknowledgment of the lack of robust French values; cost-effectiveness recommended	—	Chap. 3.2
Differential DERU 1 / DERU 2	Qualitative identification of additional benefits (quaternary treatment, energy, water reuse, stormwater)	—	Chap. 2 and 3

So-called "transfer" monetization method used in environmental economics for environmental benefits (indirect, non-market)

VI.B. BENEFITS: LITERATURE REVIEW

Source: INERIS (2020). Study on the cost of the presence of micropollutants in water.

Central source for monetizing DERU 2 "micropollutants - quaternary treatment" benefits:

- Values already existing,
- Methodologically recognized,
- Explicitly French

AVOIDED LOSSES and willingness-to-pay method for indirect, non-market environmental benefits.

Limitations of the revealed preferences method, based on stakeholder statements rather than quantification of avoided costs.

Benefit / indicator	Data	Unit	Page / section
Cumulative monitoring costs + positive actions (France, since the 2000s)	Several €bn	€ cumulative	Summary, p. 9–11
Willingness to pay – Switzerland	Approx. CHF 100 / household / year	€/household/year	Chap. 6, p. ~120
Willingness to pay – France	Approx. +5% of the water bill to eliminate a family of micropollutants	% of bill	Chap. 6, p. ~122
Foregone benefits from failing to achieve good status (ecosystem services) or "avoided environmental losses" "with good status"	€439 to 1,770 million/year (France)	€/year	Chap. 7, p. ~145
Value of "naturally clean" water vs. purified water	Approx. €28 million/year (France)	€/year	Chap. 7, p. ~147

VI.B. BENEFITS: LITERATURE REVIEW

Source: European Commission; Impact assessment-COM5412022

Benefit/cost ratio:

The European Commission estimates that benefits in France far exceed costs, with a ratio of **2,82** (€10.06 of benefits for €3.56 of costs per inhabitant)

Cost / benefit category	Estimated amount (€ / year)
Total monetized benefits	€678 million
Total annual costs	€439 million
<u>Cost breakdown by theme:</u>	
<i>Nitrogen (N) treatment</i>	€199 million
<i>Micropollutant treatment (quaternary)</i>	€131 million
<i>Stormwater management (storm overflows/SWO)</i>	€67 million
<i>Phosphorus (P) treatment</i>	€42 million

Annual balance of DERU 2 for France (Horizon 2040): per inhabitant, benefits amount to €10.06/inhab and costs to €3.56/inhab.

The Commission points out that the benefits related to reducing the toxic load (micropollutants) are real but have not been monetized due to the lack of a stabilized shadow price



VI.B. BENEFITS: LITERATURE REVIEW

Source: IGEDD, Collection and treatment of urban wastewater, (2013/202)

Indicator	Quantified data	Unit	Page
Investment and operating costs of SPEA	National orders of magnitude (CAPEX/OPEX)	€bn/year	Part II
DERU I compliance costs	Quantified (France)	€bn cumulative	Part II
Environmental and health benefits	Not monetized	—	Conclusion

Document of data on "costs"; not of "monetized benefits"



VI.B. BENEFITS: LITERATURE REVIEW

Source: CFE (2024) – Overview of water policy financing

No "benefits", but orders of magnitude of avoided costs / residual needs. To be used to contextualize the benefits, showing the economic scale of non-compliance with the WFD / DERU.

+ Documents "cost recovery" (OFB / MTE): No benefit value. Methodological and accounting documents only.

Indicator	Data	Unit	Page
Total water policy expenditure	€23.4bn/year	€/year	p. 6
Share of the small water cycle	€21.5bn/year (92%)	€/year	p. 7
Environmental costs not covered for achieving WFD good status	≥ €5bn/year	€/year	p. 12
Annual investment deficit	€4.6bn/year	€/year	p. 13
Share of micropollutants in the deficit	€0.4bn/year	€/year	p. 13

Avoided-costs method comparing the "status quo" versus "DERU action" scenarios on socio-economic aspects (direct, market, quantifiable benefits)

VI.C. APPENDICES: ANALYSIS OF THE COST OF INACTION – REFLECTIONS AND USE CASE (BATHING WATERS)

BENEFITS: COST OF INACTION

The benefits of DERU 2 are mostly "diffuse, cumulative and cross-sectoral", whereas costs are **concentrated, visible and sectoral**.

The challenge of the national impact assessment is therefore to **rebalance the economic reading**, by incorporating:

- the **avoided costs** (costs of inaction), if the texts are not implemented,
- the **environment-health-economy co-benefits**,
- the **value of secured uses** through better water quality and the impact on each territory.

"MICRO" approach	"MACRO" approach
DERU I	DERU 2
• Bacteriological compliance	• Health + environmental protection
• Flow treatment	• Pressure management
• "Plant" approach	• "System" approach (basins, uses, ecosystem services)
• Little link to biodiversity	• Direct link to biodiversity / climate
• Benefits not very visible	• Territorial and cross-sectoral benefits

DERU 2 makes it possible to reinternalize externalities that DERU I left out of scope, as a key element of the ecological transition rather than a purely sectoral text
This element is structuring for territories and a pilot for future policies.



BENEFITS: COST OF INACTION

Priority political will (France)	Associated issues (uses / environments)	Current political position (France)	Contribution of DERU 2	Limitations / blind spots of DERU 2
1. Improvement in bathing water quality	Bathing, public health, coastal and river attractiveness	Strong priority (Bathing Water Directive, media and tourism pressure)	✓ Reduction of residual urban discharges, ✓ reduction of wet-weather overflows, ✓ lower bacterial loads	Does not address all diffuse sources (urban stormwater outside networks, unconnected recreational uses)
2. Tourist attractiveness of territories	Coastal, river and urban tourism, image of territories	Strong commitment , integrated into territorial policies	✓ Improvement in the quality of receiving environments, ✓ integrated urban water management	Indirect effects, not explicitly quantified; also depends on land-use planning and uses
3. Commercial and recreational fishing	Fish resources, biological continuity, habitats	Structural WFD / biodiversity objective	✓ Reduction of organic and chemical pollution, ✓ improvement of ecological status	Does not directly address ecological continuity (structures, hydromorphology)
4. Aquaculture and shellfish farming	Sanitary quality of coastal and estuarine waters	Economic priority and health	✓ Reduction of urban discharges, ✓ control of micropollutants	Does not cover agricultural and port inputs, which are decisive for certain basins
5. Public health protection	Drinking water, bathing, chronic exposure	Growing political will (drinking water supply costs, PFAS crisis)	✓ Quaternary treatment (micropollutants), ✓ reduction of pathogens, ✓ enhanced monitoring	Health benefits difficult to monetize; also depends on source reduction
6. Reduction of micropollutants (PFAS, pharmaceutical residues)	Drinking water, ecosystems, drinking water treatment costs	Major emerging priority	✓ Quaternary treatment, ✓ EPR schemes for pharmaceuticals/cosmetics	Does not address all substances or all sources (industrial, diffuse)
7. Achieving good status of water bodies (WFD)	Aquatic environments, biodiversity, uses	Central objective , still not achieved	✓ Reduction of urban pressures, ✓ enhanced tertiary N/P treatment	Insufficient on its own: agriculture, hydromorphology and abstractions remain decisive

BENEFITS: COST OF INACTION

Priority political will (France)	Associated issues (uses / environments)	Current political position (France)	Contribution - response of DERU 2	Limitations / blind spots of DERU 2
8. Combating eutrophication	Sensitive areas, estuaries, coastline	Long-standing but still relevant priority	✓ Strengthening of N/P standards, ✓ extension of scope	Agricultural inputs not addressed by the UWWTD
9. Wetlands (WL)	Hydrological regulation, biodiversity, climate	Strong stated commitment (PNZH, SNB)	✓ Indirect effects via improved water quality	No direct protection of wetlands or hydromorphological restoration
10. Ecological continuity	Fish migration, functioning of watercourses	Strong stated political commitment but sensitive	Very indirect	Outside the scope of the UWWTD (addressed by other regulatory frameworks)
11. Climate change management (mitigation)	Energy, GHG, methane	Cross-cutting priority	✓ Sector energy neutrality target, ✓ CH ₄ reduction	Strongly dependent on local implementation and investments
12. Adaptation to climate change	Floods, droughts, urban resilience	Growing priority	✓ Integrated urban water management, ✓ nature-based solutions	Does not address overall quantitative management of the resource
13. Frugality and circular economy	Sludge, nutrients, energy	Strategic direction	✓ Sludge recovery, ✓ nutrient recovery, ✓ energy	Still limited by agricultural and health frameworks
14. Social acceptability of the price of water	Domestic users, local elected officials	Sensitive political line	✓ Diversification of contributors (EPR)	Households remain the main contributors to the small water cycle
15. Territorial solidarity	Small local authorities, rural areas	Strong commitment via Water Agencies	✓ Strengthened role of the Agencies, ✓ equalization	Strong dependence on national financial capacities

VI.C. BENEFITS: COST OF INACTION (BIS)

Box: application to bathing waters

BENEFITS: CASE STUDY

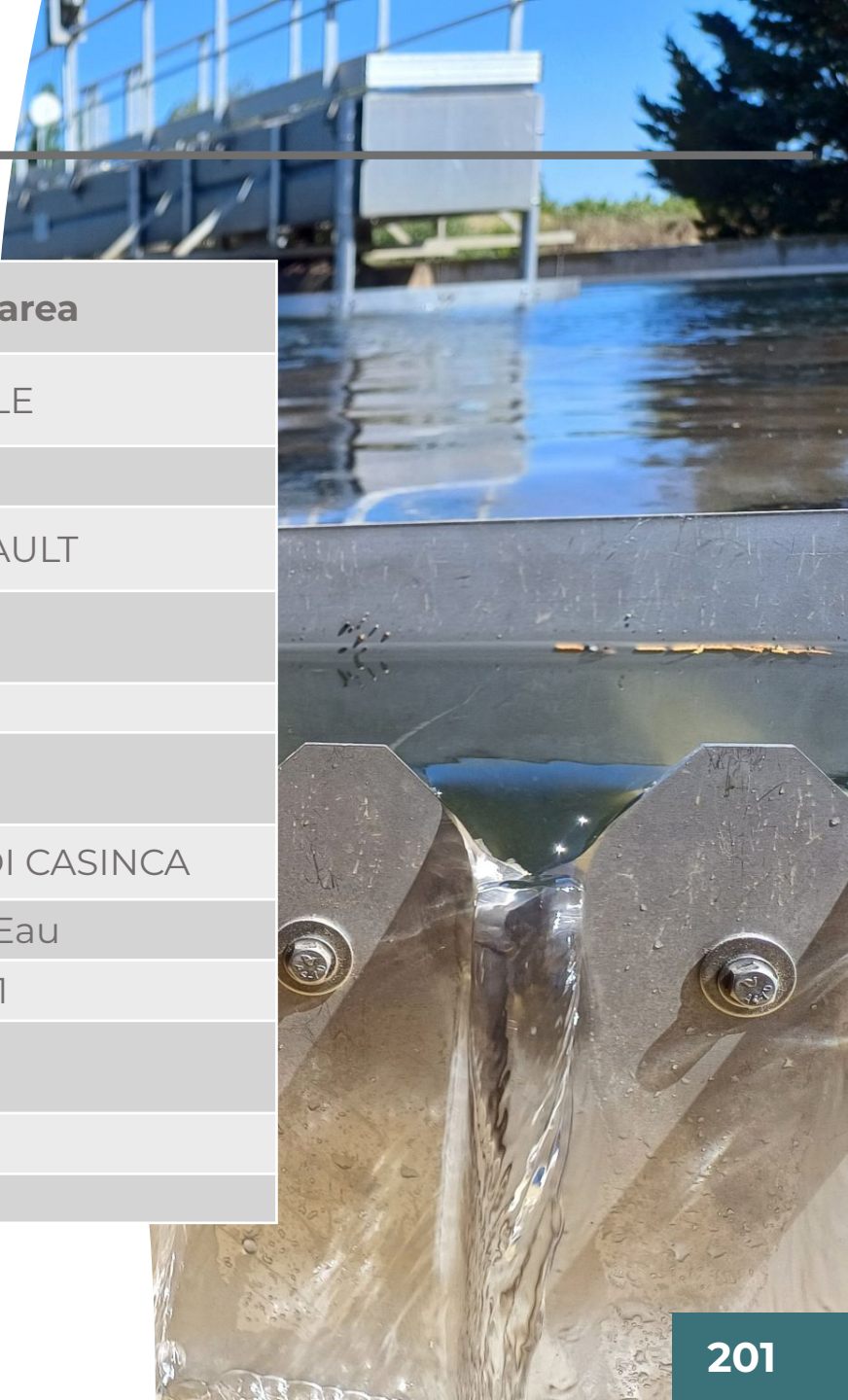
Name of the bathing site	Water body	Associated urban area
ILLIEN	Coastal water	PLOUGONVELIN
PONT MAHE	Coastal water	PENESTIN KERMOURAUD
GORBIO	Coastal water	MENTON
LANSBERG	Coastal water	SAINT-LAURENT-DU-VAR
COUSTEAU	Coastal water	SAINT-LAURENT-DU-VAR
PLAGE DU BARRY	Coastal water	SANARY-SUR-MER
EDEN ROC	Coastal water	SANARY-SUR-MER
LA PAILLOTTE	Coastal water	Fort-de-France - GODISSARD
GRAND MACABOU	Coastal water	Le Marin - SAINT ANNE
PETIT MACABOU	Coastal water	Le Marin - SAINT ANNE
POINTE FAULA	Coastal water	Le Marin - SAINT ANNE
FOND BOUCHER	Coastal water	Fort-de-France - GODISSARD
PLAGE DU GOSSELIN	Coastal water	CAYENNE
PLAGE DE BOURDA	Coastal water	CAYENNE
PLAGE DE TERRE SAINTE	Coastal water	Saint-Pierre REUNION
CROIX	Coastal water	LESNEVEN
BARRACHOU	Coastal water	LESNEVEN

(<https://www.data.gouv.fr/datasets/donnees-de-rapportage-de-la-saison-balneaire-1>)



BENEFITS: CASE STUDY

Name of the bathing site	Water body	Associated urban area
BAIGNADE DU LAC - PLAGE	Lake	Vesoul NOUVELLE
ETANG COMMUNAL	Lake	Nemours
L'ILE CHARLEMAGNE No1 ZONE SUD	Lake	ORLEANSILE-ARRAULT
CENTRE DE LOISIRS KESKASTEL	Lake	Sarralbe
PONTY	Lake	Ussel
LA BEAUME A LA PLAGE DE PEYROCHE	River	RUOMS
PONT D'ACITAJA	River	VescovatoCASTELLARE DI CASINCA
PETIT PEROU	River	Capesterre-Belle-Eau
DOLE	River	BASSE-TERRE-1
LE PLAN D'EAU D'AULAS	River	VIGANLE
AIRE DE LOISIRS	River	VIGANLE
DIANE	River	ABYMES



BENEFITS: CASE STUDY

Economic and health issues

Tourism (accommodation)

Food service & retail

Water sports (schools/rentals)

Ports & marinas

Fishing & aquaculture

Shellfish farming / oyster farming

Nature-based recreation
(fishing/walking/hiking)

**Economic
QUANTIFICATION of
what is under threat**

Environmental, biodiversity and climate issues

Natura 2000 site

ZNIEFF type 1

Marine natural park (PNMI)

Backshore wetlands (biodiversity and
water quality issue)

Pollution issues (including
runoff/watershed) in areas such as
rias/foreshores

Habitats, water quality - groundwater,
aquatic environments and ecological
continuity

Notable pond, Natural site
dune system

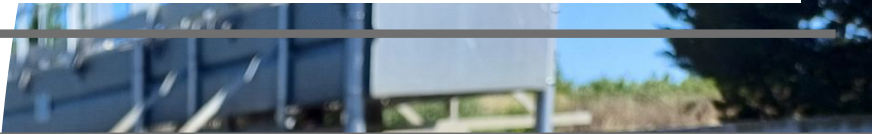
+

**MONETIZATION of ecosystem
services to be preserved or
under threat**



Threatened sectors and ecosystems	Cost of inaction	Cost of action – UWWTD 2 and benefits
Oyster farming sector – revenue losses	One-off but significant losses during microbiological pollution episodes: • approx. €5 million in the Arcachon basin (2024) • –40% turnover for some producers • Other basins (Normandy, Brittany): losses described as "millions of euros" (press review).	Losses avoided through health security of coastal waters; stability of production areas
Sectoral weight of oyster farming	Highly exposed sector: approx. €430 million in annual turnover (oysters, France) → high sensitivity to health crises	Protection of a strategic coastal sector and non-relocatable jobs
Climate & resilience	Increased vulnerability to rainfall episodes (closures after storms, microbiological spikes)	Integrated urban water management; reduction of post-rainfall impacts
Recurring annual cost of repair, restoration or compensation	≥ a few tens of millions of euros / year, plus one-off sectoral losses (oyster farming) that can reach several million euros per event	Planned UWWTD 2 costs (CAPEX/OPEX) – targeted, phased, co-financed (Water Agencies, EPR, EU)

BENEFITS: CASE STUDY



Threatened sectors and ecosystems	Cost of inaction	Cost of Action of UWWTD 2 and benefits
Bathing water quality	Approx. 114 sites/year classified as insufficient; 20 sites persistently "red" (2019–2023) → closures, restrictions	Benefits: Progressive improvement of classifications through reduction of urban discharges and overflows = avoided losses
Direct tourism losses (bathing)	€5 to +€50 million / year (depending on the type of sites affected: rivers/lakes vs major tourist sites)	Losses avoided in the medium term; maintained/increased attendance = benefits
Health costs & crisis management	Recurring costs: enhanced monitoring, bans, communication, delayed decontamination	Costs integrated and planned within CAPEX/OPEX (collection, treatment, integrated urban water management) - less risk and uncertainty
Territorial reputational effects	Lasting damage to image (river bathing, lagoons, coastline)	Benefits: Positive attractiveness effects (reopening / securing of sites)
Well-being / recreational uses	Unrealized benefits (willingness to pay for clean recreational water: tens of €/household/year)	Restored well-being benefits (non-budgetary)



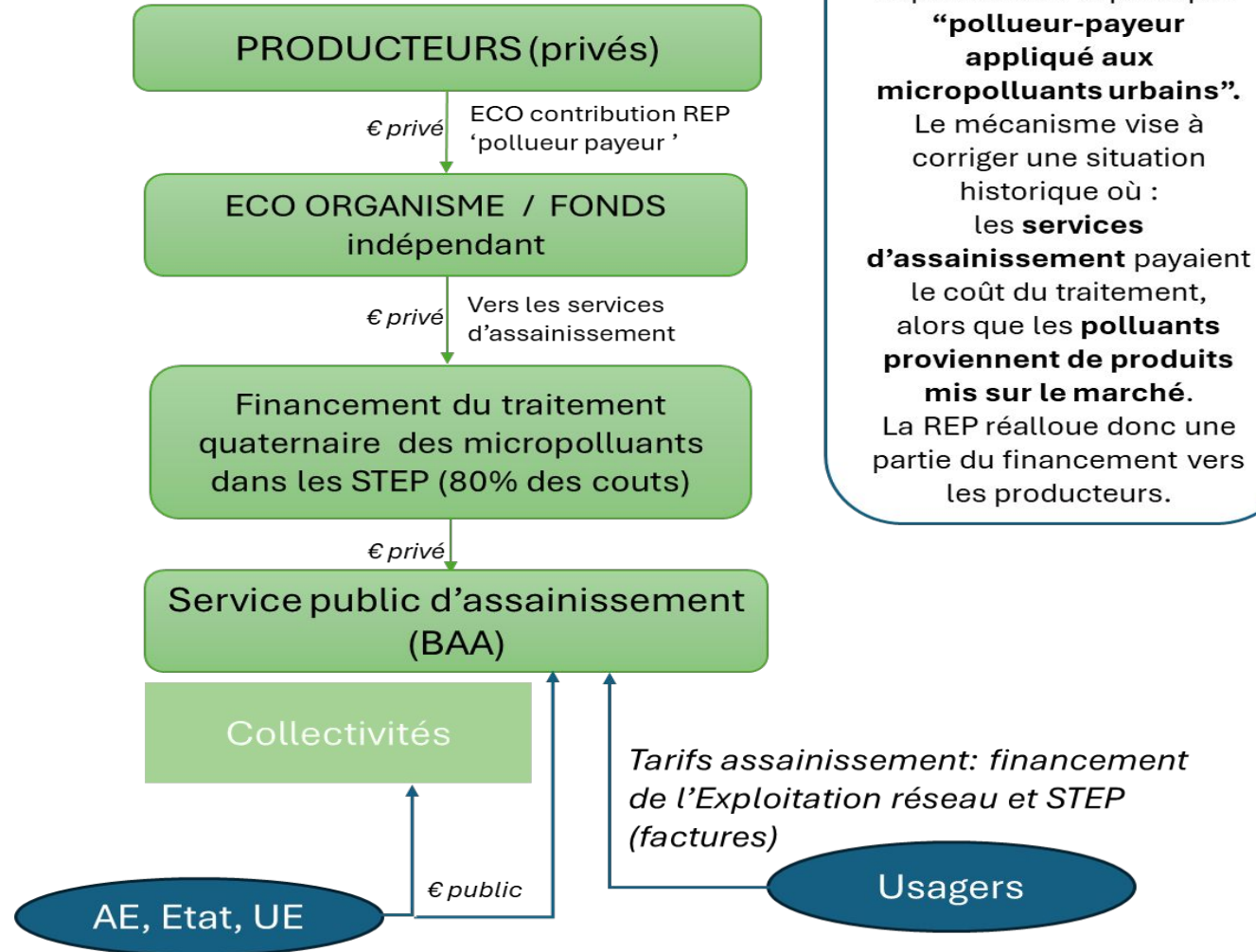
VI.D. APPENDICES: FUNDING MECHANISMS

VI.D. BENEFITS: FUNDING MECHANISMS

Water policy action	Main UWWTD 2 costs	Contributing sectors	"Core" financial instruments	Complementary / innovative / sustainable funding mechanisms
Reduction of urban pollution (discharges, wet weather)	Networks, stormwater overflows, integrated stormwater management plans	Households, local authorities	Sanitation tariffs, Water Agency charges	Seasonal / progressive pricing; inter-municipal equalization; conditionality of Water Agency aid on performance
Water access and quality (WFD good status)	Tertiary N/P treatment, WWTP performance	Households, connected industries	Tariffs, pollution charges	Pricing incorporating the value of uses; payment for environmental performance
Micropollutants (quaternary treatment)	Quaternary treatment CAPEX/OPEX	Industry (pharma, cosmetics), households (residual)	EPR, pollution charges (80%)	Logical extension of EPR; national cost pooling; contractual integration of performance
Integrated urban water management (stormwater, nature-based solutions)	Integrated stormwater management plan studies and works	Local authorities, taxpayer	Local budgets, subsidies	Territorial resilience funds; pooling at the basin scale; coordination between urban planning and water
Energy & climate (2045 neutrality)	Anaerobic digestion, heat, audits	Sanitation services	Tariffs, ADEME grants	Valuation of energy/carbon externalities; energy performance contracts; revenue diversification
Circular economy (sludge, nutrients, water reuse)	Recovery investments	Agriculture, industry, services	Subsidies, take-back contracts	Recovery revenues; multi-use partnerships; contractual water reuse
Resilience & solidarity	Fixed costs, climate hazards	Taxpayer, users	Taxation, grants	Buffer funds; insurance mechanisms; national equalization

VI.D. BENEFITS: EPR FUNDING

Mécanisme de Financement REP (flux financiers)





Planned as part of its strategic sector contract 2024-2027, the cost-benefit impact study of directive 2024/3019/EU (UWWTD 2) in France covers 5 of the 6 pillars of UWWTD 2 (excluding Art. 15 Circular Economy) and 2 cross-cutting axes (benefits and recommendations).

Launched in January 2025 and conducted by 5 engineering consultancies, it draws upon multiple databases and various pre-existing or ongoing works and reports.

This study was funded by:



aquagir



Les entreprises
de l'eau



Comité Stratégique
de la Filière Eau

About CSF Eau:

Created on May 28, 2018, by the Prime Minister and attached to the National Council of Industry, CSF Eau is a tripartite body bringing together the State, businesses, and employee representatives. Its mission is to establish a strategic dialogue to guide the industrial recovery of the sector, formalized in a 2024-2027 sector contract.

Chaired by Xavier Girre (SUEZ), the committee brings together public and private stakeholders in drinking water, sanitation, and wastewater reuse. It relies on the association "La filière française de l'eau" for the operational implementation of its initiatives.

In France, the sector unites over 5,000 companies, 125,000 direct and indirect jobs, and generates a turnover of 22 billion euros, 36% of which comes from exports. This recognized expertise currently serves 128 million people with drinking water and 112 million with sanitation worldwide.