SDAGE 2010-2015

WATER FRAMEWORK DIRECTIVE – SDAGE

DISTRICT **Rhin**
Bassins de la Moselle
de la Sarre et du
Rhin supérieur

SUMMARY
OF THE MANAGEMENT PLAN
AND THE PROGRAMME OF MEASURES
FOR THE "RHINE" BASIN FRENCH PART

eau 2015 RHIN ET MEUSE

COMITÉ DE BASSIN
RHIN•MEUSE

SUMMARY
OF THE MANAGEMENT PLAN AND THE PROGRAMME OF MEASURES FOR THE "RHINE" BASIN FRENCH PART

April 2008 Version

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1. Introduction

1.1. Connection between the four planning tools arising from the WFD

Implementation of the WFD rests on four planning documents:

- **The Status Report,** drawn up in 2005, which has the role of defining the important questions relating to water management and making a diagnosis of the factors which influence the status of aquatic environments.
- The **Management Plan** (included in the SDAGE for the French part of basins regarding France), which defines, in particular, **the environmental objectives** arising from the WFD, and therefore sets the level of ambition for the quality of aquatic environments to be achieved and the corresponding deadlines.
- The **Programme of Measures**, which defines the concrete national or local actions, whether statutory or not, to achieve this level of ambition.
- The **Monitoring Programme**, which will be used, among other things, to check that the environmental objectives are actually achieved.

The environmental objectives of the WFD are:
- The objectives relating to water bodies: non-deterioration, attainment of good status in 2015;
- The objectives relating to toxic substances: reduce or eradicate the substances referred to in the WFD (41 substances or families of substances) 20 years subsequent to adoption of the specific Directive dedicated to this issue, still at the drafting stage;
- The objectives relating to protected areas within the meaning of the WFD: comply with prevailing European standards in these areas.

The Programme of Measures thus renders the SDAGE (Management Plan) operational. The two documents are therefore indissociable.

Furthermore, these two documents arise directly from the Status Report and provide answers to the important questions which it has brought to light.

1.2. Structure of the SDAGE (Management Plan) and correspondence with Annex VII to the WFD

The SDAGE comprises 3 chapters, 2 annexes and 10 accompanying documents (See SDAGE, preamble, for details on these items).

As the management plan required by the WFD, it contains all of the elements stipulated in Annex VII to the latter.

Figure 1a:

Points required by Annex VII to the WFD "river basin management plan"	Reference in the SDAGE
A1. General description of the characteristics of the river basin district required under Article 5 and Annex II	**Accompanying document No 1:** Concise presentation of water management in the "Rhine" / "Meuse and Sambre" basin **Cartographical annex**
A2. Summary of significant pressures and impact of human activity on the status of surface water and groundwater	**Accompanying document No 1:** Concise presentation of water management in the "Rhine" / "Meuse and Sambre" basin
A3. Identification and mapping of protected areas as required by Article 6 and Annex IV	**Accompanying document No 1:** Concise presentation of water management in the "Rhine" / "Meuse and Sambre" basin
A4. Map of the monitoring networks established for the purposes of Article 8 and Annex V	**Accompanying document No 4:** Summary of the Monitoring Programme for the "Rhine" / "Meuse and Sambre" basin
A5. List of the environmental objectives established under Article 4 for surface waters, groundwaters and protected areas, including in particular identification of instances where use has been made of Article 4,(4), (5,) (6) and (7), and the associated information required under that Article	**SDAGE, Chapter 2**
A6. Summary of the economic analysis of water use as required by Article 5 and Annex III	**Accompanying document No 2:** Provisions made on water pricing and cost recovery in order to contribute to the attainment of SDAGE objectives in the "Rhine" and "Meuse and Sambre" basins
A7. Summary of the Programme or Programmes of Measures adopted under Article 11, including the ways in which the objectives established under Article 4 are thereby to be achieved	**Accompanying document No 3:** Summary of the Programme of Measures for the "Rhine" / "Meuse and Sambre" basin
A8. Register of any more detailed programmes and management plans for the river basin district dealing with particular sub-basins, sectors, issues or water types, together with a summary of their contents	**Accompanying document No 1:** Concise presentation of water management in the "Rhine" / "Meuse and Sambre" basin, mapping of the SAGE underway
A10. List of competent authorities	**SDAGE, Chapter 1**
A.11. Contact points and procedures for obtaining the background documentation and the information referred to in Article 14, paragraph 1.	**SDAGE, Chapter 1**

Chapter 3 of the SDAGE, in addition to the elements required by the Management Plan, also contains the fundamental guidelines, which constitute the major focus of water policy, as far as each basin is concerned, and the associated provisions, which specify the operational terms for their implementation. These elements lay down the administrative framework requirement at local level to set up balanced management of water resources. The fundamental guidelines and provisions arising from issues related to the WFD are an integral part of the Programme of Measures and are reiterated in Chapter 3, paragraph 3.2.1 of that document. The other fundamental guidelines and provisions constitute elements specific to France, which are included

in the SDAGE but are not part of the Management Plan or the Programme of Measures.

1.3. Structure of the Programme of Measures and correspondence with Annex VI to the WFD

The Programme of Measures is presented in detail in Chapter 1 of that document, which specifies:
- The purpose of the Programme of Measures and its connection with the SDAGE;
- The contents and general organisation of the Programme of Measures;
- The procedure used to draw up the Programme of Measures;
- Inclusion of the Programme of Measures in the programming of administrative services.

The Programme of Measures contains:
- **National measures,** which constitute the basic measures within the meaning of Article 11.3 of the WFD;
- **Local measures,** which correspond both:
    - To the implementation of the basic measures at basin level, bearing local contexts in mind;
    - And the supplementary measures (within the meaning of Article 11.4 and Annex VI of the WFD, Part B).

The latter include the **supplementary "administrative instrument" type measures,** which are mentioned in Chapter 3.2 of the Programme of Measures and detailed in Chapter 3 of the SDAGE. The other local measures are called **key actions**. These are actions which, in addition to the national measures and the local "administrative instrument" type measures, are *a priori* necessary and sufficient to achieve all of the environmental objectives laid out in the WFD, including exemptions.

The Programme of Measures does not therefore contain all of the actions to be conducted in the field of water, but only those used to achieve the environmental objectives of the WFD.

Among the actions helping to achieve the environmental objectives of the WFD, the Programme of Measures only mentions those which are truly significant and necessary to achieve these objectives. To establish the level of ambition of the SDAGE (Management Plan) and the Programme of Measures, the actions have been costed. This is based on the identification of individual actions which are not pertinent when undertaken individually, but which provide a pertinent estimate of the overall costs. These individual actions must therefore in no event be considered as the components of an operational action plan. Such an action plan will have to be drawn up by 2012, in close collaboration with the clients concerned.

The Programme of Measures contains all of the elements stipulated in point 7 of Annex VII to the latter.

Figure 1b:

Points required by Annex VII to the WFD "river basin management plan"	Reference in the SDAGE
7.1. Measures required to implement Community legislation for the protection of water	**Programme of Measures, Annex 1,** summary of national measures
7.2. Report on the practical steps and measures taken to apply the principle of recovery of the costs of water use	**Accompanying document No 2:** Provisions made on water pricing and cost recovery in order to contribute to the attainment of SDAGE objectives in the "Rhine" and "Meuse and Sambre" basins
7.3. Protective measures for the abstraction of the current or future drinking water supply	**Programme of Measures, Annex 1,** summary of national measures **Programme of Measures, Chapter 3, key actions T2-M14 and T2-M15** **Programme of Measures, Chapter 3**, "administrative instrument" type measures corresponding to the following fundamental guidelines and provisions of the SDAGE: T1-O1, T2-O6, all of theme 3, and particularly T3-O3 and T3-O7
7.4. Summary of the controls on abstraction and impoundment of water, including reference to the registers and identifications of the cases where exemptions have been made under Article 11 (3)(e)	**Programme of Measures, Annex 1,** summary of national measures
7.5 Summary of the controls adopted for point source discharges and other activities with an impact on the status of water in accordance with the provisions of Article 11 (3)(g) and 11(3)(i)	**Programme of Measures, Annex 1,** summary of national measures
7.6 Identification of the cases where direct discharges to groundwater have been authorised in accordance with the provisions of Article 11 (3)(j)	**Programme of Measures, Annex 1,** summary of national measures
7.7. Summary of the measures taken on priority substances	**Programme of Measures, Chapter 3,** key actions "Industry and small businesses": T2-M4 to T2-M12; and "agriculture" measures: T2-M15 **Programme of Measures, Annex 1,** summary of national measures **Programme of Measures, Chapter 3**, "administrative instrument" type measures corresponding to the following fundamental guidelines and provisions of the SDAGE: T2-O1.1., T2-O1.2, T2-O2, T2-O3-2.1, T2-O4, T2-O5, T2-O6 and the associated provisions.
7.8. Summary of the measures taken to prevent or reduce the impact of accidental pollution incidents	**Programme of Measures, Chapter 3,** key actions "Sanitation": T2-M2 "Industry and small businesses": T2-M4 **Programme of Measures, Annex 1**, summary of national measures **Programme of Measures, Chapter 3**, "administrative instrument" type measures corresponding to the following fundamental guidelines and provisions of the SDAGE T2-O1.2 and T2-O.4.2 and the associated provisions.

7.9. Summary of the measures taken under Article 11 (5) for water bodies which are unlikely to achieve the objectives set out under Article 4	Supplementary measures in the event of delays or difficulties observed half way (Art. 21 Decree of 16 May 2005): this part can only be fleshed out therefore after the half way progress report.
7.10. Details of the supplementary measures identified as necessary in order to meet the environmental objectives established	**Programme of Measures, Chapter 3,** all key actions: T3-M1 to T3-M6 and T2-M1 to T2-M15 **Programme of Measures, Chapter 3**, all "administrative instrument" type measures
7.11. Details of the measures taken to avoid increase in pollution of marine waters in accordance with Article 11 (6)	N/A in the basin

1.4. Title of the measures

The 6 themes developed by the "administrative instrument" type measures, which are described in detail in Chapter 3 of the SDAGE, are:

- **Theme 1 – Water and health**
- **Theme 2 – Water and pollution**
- **Theme 3 – Water, nature and biodiversity**
- **Theme 4 – Water and scarcity**
- **Theme 5 – Water and territorial planning**
- **Theme 6 – Water and governance**

Only the themes "water, nature and biodiversity" and "water and pollution" need to be listed under key actions. For the other themes, it has not been considered necessary to go beyond the national measures and the fundamental guidelines and associated provisions to achieve the environmental objectives pertaining to them.

We refer to as pressures those activities or practices which are likely to have a negative impact on aquatic environments and which are likely to influence the attainment of the environmental objectives.

The principal types of pressure identified for the Rhine basin are:

- 1. Pollutant substances discharged in waste domestic water, which is the responsibility of the local communities (point pollutions);
- 2. Pollutant substances discharged by industries or other companies, including small businesses (point pollutions);
- 3. Pollutant substances related to agricultural activities (point or diffuse pollutions);
- 4. Alteration of the morphology of rivers, which corresponds to all physical modifications to the banks or to the bed of a river likely to modify the way it functions.

The key actions are therefore broken down into 4 headings, corresponding to these pressures, entitled:

- 1. Sanitation;
- 2. Industry and small businesses;
- 3. Agriculture;
- 4. Hydromorphology.

The headings "local communities", "industry and small businesses" and "agriculture" come under the theme "water and pollution" , and the heading "hydromorphology" comes under the theme "water, nature and biodiversity" in the SDAGE.

The “hydromorphology” measures are intended to:
- Assist in the non-deterioration of surface water bodies;
- Improve the ecological status of surface water bodies;
- Implement the objectives relating to protected areas like Natura 2000.

The “sanitation” measures are intended principally to improve the ecological status of surface water bodies.
In the Programme of Measures, this means going further than the measures corresponding to the implementation of the basic measures when this is required to achieve good status.
On this basis, the key actions proposed are described in detail below. They only affect local communities whose domestic discharges impact water bodies which have not achieved good status by 2010.

The “industry and small businesses” measures are intended principally to:
- Improve the ecological status (measures M4 to M8) and chemical status (measures M4 to M9) of surface water bodies, and the chemical status of groundwater bodies (measures M8, M10 and M11);
- Reduce or eradicate priority or hazardous substances (measures M4 to M11).

They aim to reduce the pollution discharged by industrial establishments and other companies, including in particular service companies and the activities of small businesses.
On this basis, they only concern establishments which impact water bodies which have not achieved good status by 2010.

The “agriculture” measures are intended to:
- Improve the chemical status of groundwater bodies (measures M13, M15);
- Improve the ecological and chemical status of surface water (measures M12, M13).

Figure 1 c:

Fundamental guideline	Code of the measure	Title of the measure
Hydromorphology		
T3-O3; T3-O5	T3-M1	Improved ecological continuity in rivers
T3-O3; T3-O4; T3-O5	T3-M2	Restoration of rivers
T3-O3; T3-O4	T3-M3	Reintroduction of nature to rivers
T3-O2; T3-O3; T3-O4	T3-M4	Regular maintenance of rivers
T3-O2; T3-O4; T3-O7	T3-M5	Management of lakes
T3-O7	T3-M6	Acquisition of wetlands
Sanitation		
T2-O1	T2-M1	Optimisation of the wastewater treatment plant (treatment)
T2-O1; T2-O3	T2-M2	Optimisation of wastewater networks (networks)
T2-O1; T2-O3	T2-M3	Introduction of a suitable network, to be defined (shared or non-shared)
Industry and small businesses		
T2-O1	T2-M4	Reinforced prevention of accidental spill
T2-O1; T2-O2; T2-O3	T2-M5	Clean technology
T2-O1; T2-O2	T2-M6	Improved collection and treatment of industrial discharges
T2-O1; T2-O2	T2-M7	Management and treatment, if necessary, of contaminated industrial sites
T2-O1; T2-O2	T2-M8	Control of rain pollution of industrial origin
T2-O2; T2-O3	T2-M9	Reduction of emissions of toxic substances by small businesses (general mechanics, silk-screen printing, automobile mechanics, surface treatment)
T2-O1	T2-M10	Reduction of pollution from chlorides
T2-O2	T2-M11	Reduction of emissions of chloride solvents
T2	T2-M12	Studies, awareness and education
Agriculture		
T2-O1; T2-O4	T2-M13	Upgrading of farm buildings
T2-O4	T2-M14	Securing premises likely to contain liquid nitrogen fertilizers
T2-O4; T2-O6	T2-M15	Reduction of diffuse pollution from agricultural practices (nitrates and pesticides)

1.5. How do the SDAGE and the Programme of Measures deal with the important questions arising from the Status Report?

The fundamental guidelines and provisions arising from the WFD, i.e. those which appear in Chapter 3 of the SDAGE which are taken up in paragraph 3.2.1. of the Programme of Measures, and the key actions described in paragraph 3.2.2. of the Programme of Measures form the basis of the important questions in the Status Report.

Figure 1d:

Important question in the Status Report	Taken on board by the SDAGE and the Programme of Measures (PDM)
1. Standard pollution: no break for purification	SDAGE, Theme 2 PDM, key actions T2-M1, T2-M2, T2-M3, T2-M13, T2-M14 SDAGE, Theme 5
2. Diffuse pollution: change our practices	SDAGE, Theme 2 PDM, key action T2-M15 SDAGE, Theme 5 SDAGE, Theme 3
3. Ecological balance: must be re-established at all costs	SDAGE, Theme 3 PDM, key actions T3-M1 to T3-M6 SDAGE, Theme 5
4. New pollutants: a challenge for our health	SDAGE, Theme 1 SDAGE, Theme 2 PDM, key actions T2-M4 to T2-M12, T2-M15
5. Sewage sludge: achieve zero error	SDAGE, Theme 2
6. Water, a finite resource: a balance between usages is needed	SDAGE, Theme 4 SDAGE, Theme 5
7. Artificial resources post-mining: requires sustainable restoration	SDAGE, Theme 1 These issues are covered by the SAGE
8. Water without borders: to achieve true shared management with our neighbours	SDAGE, Theme 6
9. Heritage of our facilities: to be managed over time	SDAGE, Theme 6
10. Funding of water policy: rebalancing is necessary	SDAGE, Theme 6
11. Water and territory: give water and the environment their rightful place and bring them closer to citizens and decision-makers	SDAGE, Theme 5 SDAGE, Theme 6
12. Information and awareness: a means of involving citizens and young people in water planning policy	SDAGE, Theme 6

These twelve important questions take up the stakes identified in terms of the international basin.

The following tables provide a more accurate presentation of the way in which the SDAGE and Programme of Measures projects have incorporated the international stakes.

Figure 1e: Stakes common to the entire international basin

	International stakes	Taken on board by the SDAGE and the Programme of Measures (PDM)
International Rhine basin	1. Re-establish biological continuity; increase habitat diversity	SDAGE, Theme 3 PDM, key actions T3-M1 to T3-M6 SDAGE, Theme 5B
	2. Reduce diffuse discharges altering surface water and groundwater (nutrients, pesticides, metals, hazardous substances from historical and other pollution)	SDAGE, Theme 2 PDM, key action T2-M15 SDAGE, Theme 3 SDAGE, Theme 5
	3. Continue the reduction of traditional pressures due to point industrial and community discharges	SDAGE, Theme 2 PDM, key actions T2-M1 to T2-M12
	4. Reconcile water use (navigation, energy production, flood protection, usages which have a significant impact on surface and other management) with the environmental objectives of the WFD	SDAGE, Theme 5A, B and C SDAGE, Theme 6
	5. Information and public involvement will play an important role in the analysis of these management questions	SDAGE, Theme 6

Figure 1f: Stakes more specific to each of the two work sectors, Upper Rhine and Moselle-Sarre

	International stakes	Taken on board by the SDAGE and the Programme of Measures (PDM)
Upper Rhine sector	1. Reconcile future development of use of water from the Rhine and territorial development policies in line with the environmental objectives of the WFD, in particular regarding navigation, energy production and flood protection	SDAGE, Theme 5A, 5B and 5C SDAGE, Theme 6
	2. Re-establish ecological balance by restoring and conserving Rhineland ecosystems	SDAGE, Theme 3 PDM, key actions T3-M11 to T3-M6 SDAGE, Theme 5B
	3. Improve the physical and chemical quality of rivers by continuing, in particular, the efforts made regarding the purification of traditional pollutions and reducing diffuse pollutions	SDAGE, Theme 2 PDM, key action T2-M1 to T2-M15
	4. Absorb the consequences of former mining operations, particularly for chloride pollution in the southern part of the Upper Rhine	SDAGE, Theme 2 PDM, key action T2-M10 SDAGE, Theme 4

	5. Eradicate diffuse pollutions from the groundwater in the Upper Rhine trench, particularly for nitrate and pesticide pollution	SDAGE, Theme 2 PDM, key action T2-M15 SDAGE, Theme 3 SDAGE, Theme 5B
	6. Develop the monitoring of pollutions present in the Rhine, particularly new, still little known forms (e.g. medicinal products, endocrine disruptors, or other chemical substances)	SDAGE, Theme 1 SDAGE, Theme 2 SDAGE, Theme 6
Moselle Sarre Sector	1. Traditional pollutions, particularly nutrients (nitrogen and phosphorous) and diffuse discharges have an impact on surface waters	SDAGE, Theme 2 PDM, key actions T2-M1 to T2-M3 and T2-M13, T2-M14
	2. Continuity is not guaranteed on the Moselle and the Sarre, which disrupts fish migration	SDAGE, Theme 3 PDM, key action T3-M1
	3. The uses of water from the Moselle and the Sarre and territorial development policies are not always in line with the environmental objectives of the WFD, particularly regarding navigation, energy production and flood protection	SDAGE, Theme 2 SDAGE, Theme 5A, 5B, 5C SDAGE, Theme 6
	4. Diffuse discharges damage groundwaters (pesticides, nitrates, historical pollutions and metals)	SDAGE, Theme 2 PDM, key action T2-M7, T2-M15 SDAGE, Theme 5A
	5. The balance of aquatic environments is disrupted by mining operations (coal and iron basins)	SDAGE, Theme 4 SDAGE, Theme 5B
	6. Pollution by hazardous substances is still too high in certain parts of the catchment basin	SDAGE, Theme 1 SDAGE, Theme 2 SDAGE, Theme 6

2. Concise presentation of the principal causes of deterioration to water bodies and environmental objectives

2.1. Groundwater bodies

2.1.1 Summary of the current status of groundwater bodies and the principal causes of deterioration

The good status of groundwater bodies is achieved when they have both good chemical and quantitative status.

- ***Chemical status of groundwater bodies***

In the Rhine basin, pesticides and nitrates are the principal substances standing in the way of achieving the good chemical status of groundwater. Certain specific sectors in the basin are affected by pollution by chlorides (alluvia from the Moselle, Alsace groundwater) or sulphates (iron basin).

The current status of the groundwater bodies has been estimated on the basis of the framework elements provided by Directive 2006/118/EC of 12 December 2006 (“daughter Directive”) on the protection of groundwater and by WFD Circular 2006/18 on the definition of "good status" for groundwater.

Assessment of the current status of water bodies is based on the analysis results available, i.e. those collected from the basin networks in place since 1999, regional inventories, “nitrates Directive” networks and data from the departmental Directorates of Health and Social Affairs (DDASS) on crude and distributed water.

On these bases, 9 water bodies out of a total of 15 in the Rhine basin[1] are not currently in good chemical status (their status is referred to as “mediocre” in the WFD framework).

We observe significant deterioration by pesticides (8 water bodies of mediocre status for this group of parameters).

Nitrates represent the second cause of deterioration (4 water bodies of poor status and 5 water bodies in which we observe upward trends). In effect, a rise in nitrate content was noted over the period 2003-2006. This is partly explained by the mild autumns fostering mineralisation, but deeper studies should be conducted in order to identify the respective weighting of the “climate” and “practices” parameters.

[1] Groundwater bodies may underlie several basins. They are nonetheless attached to only one of them, the one which they predominantly overlap. The figures on groundwater in the Rhine Programme of Measures only incorporate the water bodies which are officially attached to it. For the other water bodies underlying the Meuse basin: No 2013 Oxfordian Limestone and No 2018 lower Lias Sandstone at Hettange Luxembourg, we should refer to the Meuse Programme of Measures.

The measures proposed for this diffuse pollution are based on guideline T2 - O4 in the SDAGE, which aims to reduce pollution by nitrates and pesticides.

Furthermore, the areas in which an upward trend regarding nitrates has been observed correspond to the vulnerable areas identified in the context of the nitrates Directive. The reversal of this trend will therefore need to be included in the action programmes implemented under this Directive. Guideline T2 - O4.3 and provision T2 - O4.3 - D1 in the SDAGE refer to these programmes.

Pollution by chlorides and sulphates is also a significant cause of deterioration. Diffuse pollution by chlorinated solvents has also been discovered in the Alsace groundwater body (2001) by regional inventories on groundwater quality. This pollution remains at a very low content level in the order of 10% of the standard. It does not bring about declassification of the water body.

Details on the causes of deterioration of water bodies are given in figure 2.

Figure 2: Table showing the causes of deterioration of groundwater bodies (in numbers of water bodies)

Causes of deterioration				
Nitrates	Pesticides	Sulphates	Chlorides	All causes combined
4	8	1	2	9

- ***Quantitative status of groundwater bodies***

The quantitative status is defined as the balance between the water samples taken from a groundwater body and its natural capacity to recharge itself.
No water bodies overall are of poor quantitative status in the Rhine basin, even though local problems exist to the right of the water distribution area (WDA) on water body No 2005 of the captive, non-mineralised Vosges Sandstone, also called the lower Trias sandstone groundwater. The resolution of these problems is covered by guideline T1 - O1 and the special provisions T1 - O1.2 - D3 to D4 in version 2 of the SDAGE.

- ***Overall status of groundwater bodies***

Details on the current status of water bodies are given in figure 3.

Figure 3: Table showing the current status of groundwater bodies (in numbers of water bodies)

	Good status	Mediocre status
Quantitative status	15	0
Chemical status	6	9
Overall status	6	9

2.1.2 Summary of the status objectives assigned to groundwater bodies

The hypotheses used

Regarding the less stringent objectives, only the natural conditions have been invoked and this for a single water body (No 2026, Mining Reservoir – Lorraine Iron Basin). Apart from this case, the only kind of exemption invoked consists in a postponement of the deadlines.

The measures intended to reduce diffuse pollution from agriculture (measure T2-M15 described in Chapter 3) are the only ones to be used in setting the postponement of the deadlines to the good status objective 2015 for groundwater bodies.

To set this postponement of the deadlines, the following rules have been adopted:

- ***Setting deadlines related to technical feasibility***

None of the measures intended to improve groundwater status justifies postponement of the deadlines to the good status objective 2015 related to technical feasibility.

- ***Setting deadlines related to natural conditions***

Whenever measures are put in place on the surface to limit pollution to groundwater (reduction of nitrate and pesticide discharges), it occasionally takes a number of years before they affect the groundwater. This environmental response time varies, for example, depending on the depth of the groundwater and the nature of the geological layers traversed before reaching it. This factor has led to the attainment of good status 2027 being postponed for certain groundwater bodies.

- ***Setting deadlines related to disproportionate costs***

The same rules as for surface water have been applied (see paragraph 2.1.2.2).

The results obtained

- The Lorraine Iron Basin water body (No 2026) has been granted a less stringent objective on good status for the sulphates parameter (mediocre status in 2015 for this parameter), as the times to reclaim contaminated aquifers after flooding will extend beyond 2027 (see figure 4). This water body is located in the work sector, Moselle-Sarre.

- For the Rhine basin, 7 groundwater bodies out of 15 are subject to a deadline postponement until 2027. For each of them, the natural conditions and disproportionate costs are accumulating.

Figure 4 gives details of the objectives.

Figure 4: Table showing the status objectives for groundwater bodies (in numbers of water bodies)

Good status 2015	Good status 2027	Less stringent objective
7	7	1

2.1.3 Summary of the objectives on upward trend reversal

Five water bodies have been given the objective to reverse trends upwards in the Rhine basin.

2.2. Surface water bodies

2.2.1 Summary of the current status of surface water bodies and the principal causes of deterioration

Good status of surface water is achieved when they have both good ecological and chemical status. For artificial or significantly modified water bodies, good ecological status is replaced by good ecological potential, which corresponds to the best ecological status possible, given the usages that we wish to maintain in them.

The parameters taken into account in the ecological status are organic, nitrogenous and phosphorous matter and biology (animal and plant populations). In the absence of information on the latter, hydromorphology is considered an indicator of biology. Eventually, certain chemical substances which may turn out to be pertinent could be added.

The parameters taken into account in chemical status are the 33 substances considered priority defined by the WFD[2] to which are added 8 substances covered in previous Directives. For the Rhine, the problematic parameters in terms of achieving good chemical status for surface water are certain pesticides and certain heavy metals.

*** Lakes**

In view of the data available, no lakes are considered as not currently being of good status.

Vocabulary used

The word “lakes” corresponds to the official term laid down by the WFD and includes artificial or shallow stretches of water.

[2] Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing a list of priority substances in the field of water policy and amending Directive 2000/60/EC.

*** Rivers**

In the Rhine basin, the status of “river” water bodies (469 water bodies) is little affected by the chemical status parameters. As knowledge on the environment currently stands, only 4% of water bodies do not meet the provisional threshold values which currently define good chemical status. The deteriorated status of water bodies is therefore due mainly to factors which determine the ecological status: organic matter, biology and hydromorphology. Thus, 57% of surface water bodies in the Rhine basin are not currently of good ecological status.

Details of the current chemical and ecological status of river water bodies for the Rhine basin and for the work sectors are given below (figures 5, 6, 7, 8, 9 and 10).

Figure 5: Graph of the current chemical status of rivers (as a percentage and in numbers of water bodies (WB))

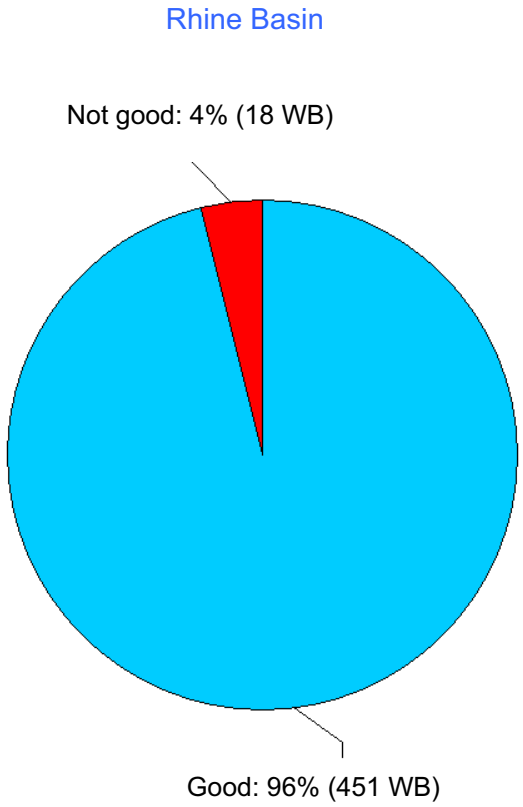


Figure 6: Graph of the current chemical status of rivers (as a percentage and in numbers of water bodies (WB))

Moselle-Sarre Work Sector

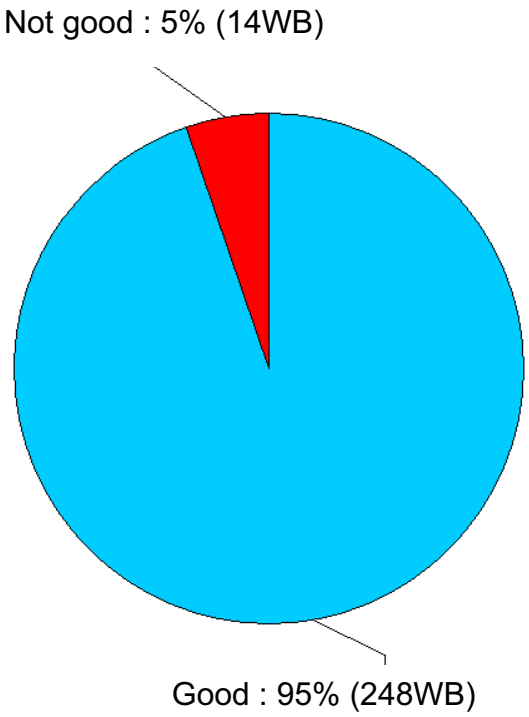


Figure 7: Graph of the current chemical status of rivers (as a percentage and in numbers of water bodies (WB))

Upper Rhine Work Sector

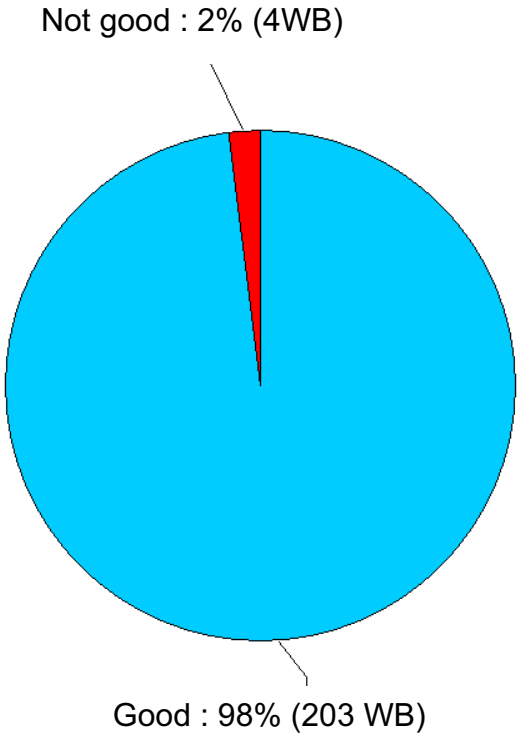


Figure 8: Graph of the current ecological status of rivers (as a percentage and in numbers of water bodies (WB))

Rhine Basin

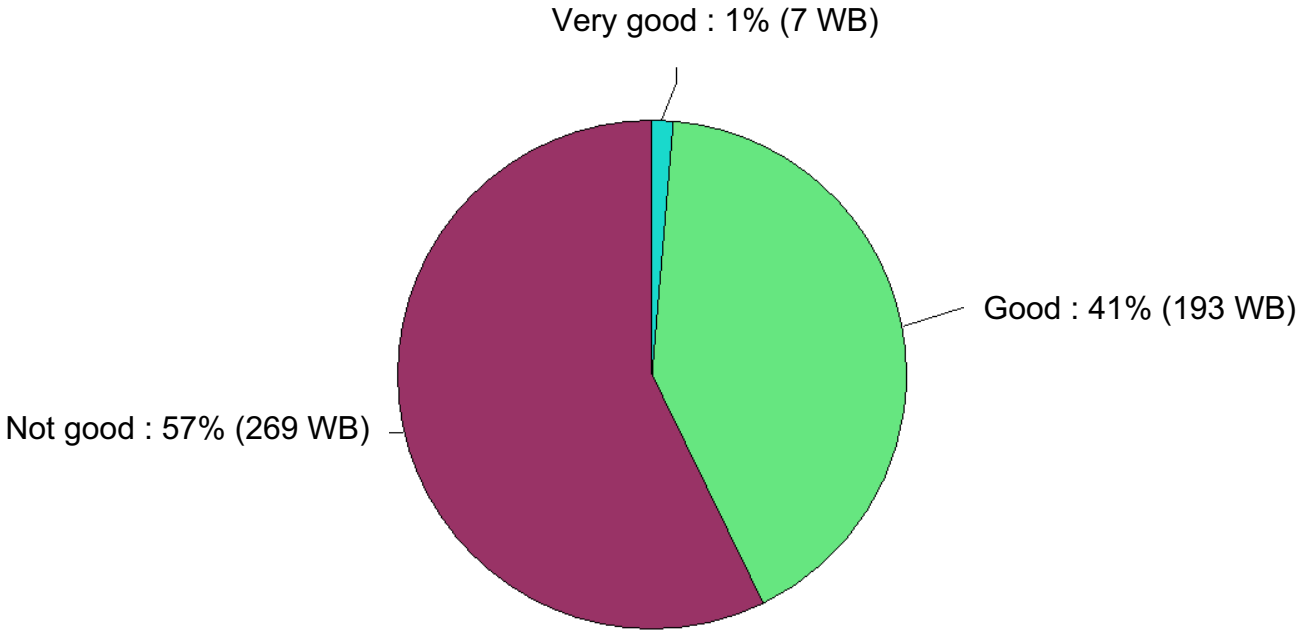


Figure 9: Graph of the current ecological status of rivers (as a percentage and in numbers of water bodies (WB))

Moselle-Sarre Work Sector

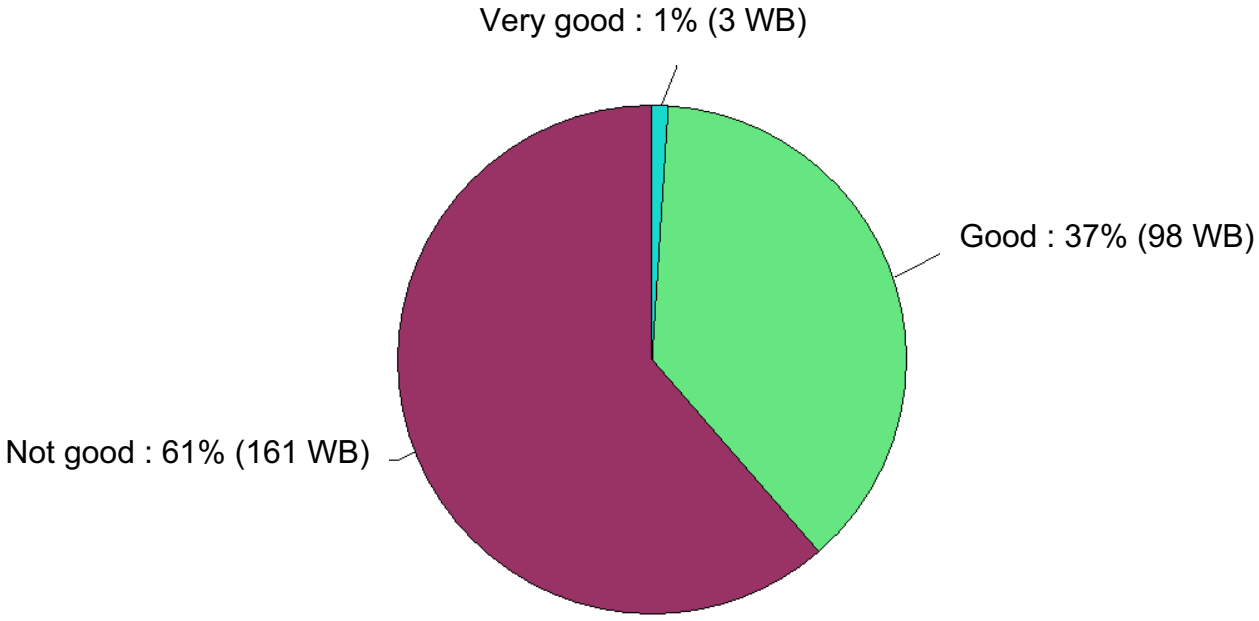
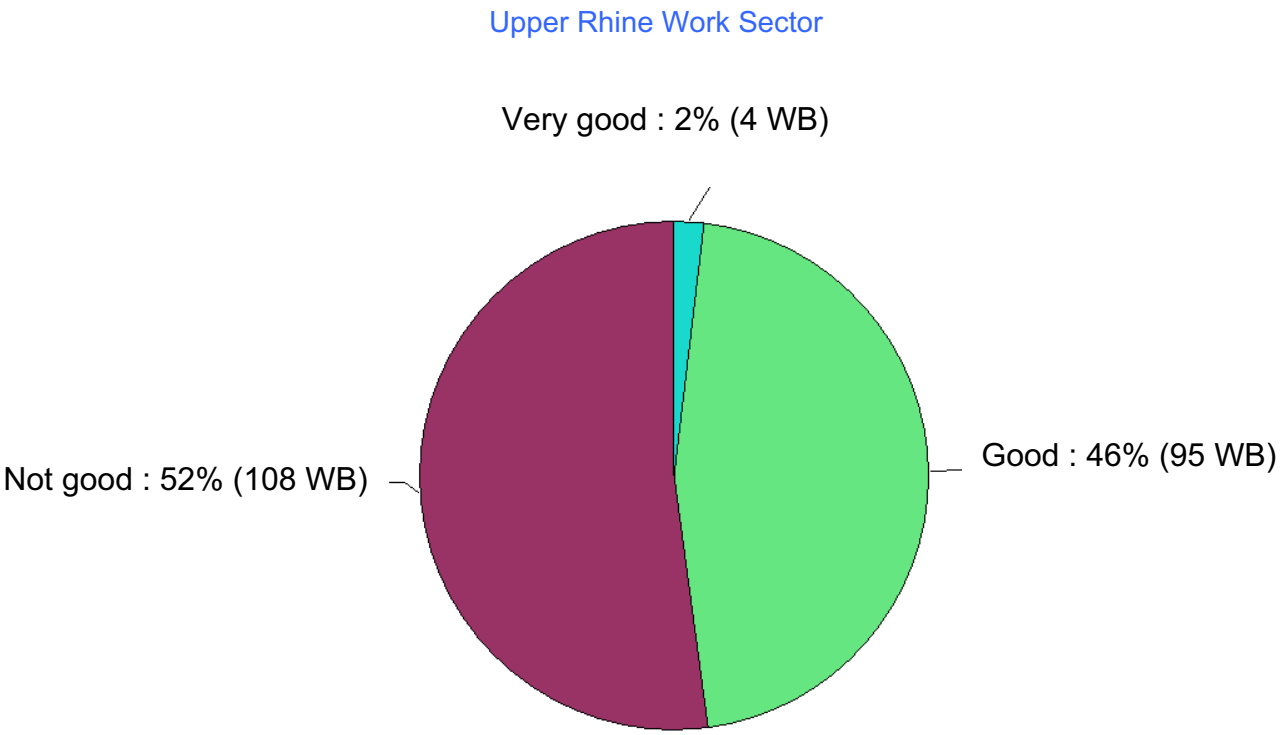


Figure 10: Graph of the current ecological status of rivers (as a percentage and in numbers of water bodies (WB))



2.2.2 Summary of the status objectives assigned to surface water bodies

*** Lakes**

For natural lake water bodies, there is no current referential defining good ecological status. As things stand, only an expert assessment, possibly based on the few data available, can be made. At the present time, it does not justify the postponement of objectives. A good status objective in 2015 is therefore proposed at this stage.

For artificial or considerably modified water bodies, the good ecological potential objective is not defined *a priori*. The pragmatic approach to setting environmental objectives in these environments will rely on the measures which can be implemented, given the associated human activities. As things stand, there is no reason to justify a postponement of the objective. An objective of good ecological potential and good chemical status in 2015 is therefore proposed at this stage.

*** Rivers**

The hypotheses used

All measures identified in the Rhine basin and detailed in Chapter 3 have an impact on river status and have been taken into account in setting their status objectives.

No less stringent objectives are justified for the surface waters in the Rhine basin. All water bodies must therefore achieve good status.

The only reason for exemption invoked consists in a postponement of the deadlines. The good status objective can therefore be achieved in 2015, 2021 or 2027.

To determine whether a water body can achieve good status in 2015, 2021 or 2027, for each of the key actions in the Programme of Measures impacting the status of surface waters, the deadlines related to its technical feasibility, the natural conditions or its cost have been taken into account as follows:

➢ *Setting deadlines related to technical feasibility*

For all types of measures, a deadline postponement until 2027 regarding "technical feasibility" has been requested in cases in which none of the measures known at the present time made it possible to achieve good status. This is the case, for example, when pollution from upstream is such that it renders the attainment of good status impossible, regardless of the technical solutions envisaged. In this case, it has not been decided to set a less stringent objective as we cannot exclude the possibility of new technological solutions being identified and implemented between now and 2027.
This case of "technical impossibility" aside, the only measures justifying a deadline postponement on grounds of "technical feasibility" are the measures intended to improve the hydromorphology. Indeed, the preparatory phase for the work may be quite lengthy, as it includes the appointment of a client and preliminary studies to come to an optimum definition of actions. It has therefore been considered that certain actions would begin only in 2016. For the other types of measures ("sanitation", "industry and small businesses", "agriculture"), the clients are known and the definition of actions easier. It has therefore been considered that they were technically feasible between now and 2015.

➢ *Setting deadlines related to natural conditions*

For surface water, the only measures supporting a deadline postponement related to the natural conditions are "hydromorphology" measures. Indeed, we must consider the time required for plants to grow, for the hydrodynamic balance to be re-established, etc.

➢ *Setting deadlines related to disproportionate costs*

To determine whether the costs were disproportionate, economic indicators have been defined type of measure by type of measure (see figure 1).
If these indicators exceed certain thresholds, which have been discussed with those involved, the costs are considered disproportionate. The good status objective is then postponed until 2021.
This does not mean that no action will be taken between now and 2015, but that only those actions should be initiated between now and 2015 which correspond to an acceptable cost. These actions have therefore been calculated in the cost of the first Programme of Measures (period 2010-2015).
In addition, it has been considered that certain measures alone, even though their cost was disproportionate, could not justify a deadline postponement regarding the good status objective. These are measures the cost of which includes a significant number of actions which do not concern themselves solely with the good status of the water. This is the case of the measures intended to limit toxic substances as they are intended, over and above good status, to reduce or even eradicate the emission of certain substances. Likewise, the measures intended to upgrade farm buildings are the response to statutory obligations. Good status can be achieved more quickly by targeting the most effective measures in relation to this objective.

➢ *Setting the overall deadline*

Further to the analysis of these three reasons, a maximum deadline for achieving the good status objective has been included for each water body, type of measure by type of measure.
To define the deadline for attainment of good status of the water body, a threshold value of more than 20% of the total cost has been considered as having the greatest impact for a category of measures.

Here is a concrete example of this approach:
Let's consider that, for water body X, the deadline required to eliminate the causes of deterioration treated by the "hydromorphology" measures is 2021, the deadline required for the "sanitation" measures 2027, the deadline required for the "industry and small businesses" measures 2015, and the deadline required for the "agriculture" measures 2015:
- If the sanitation measures represent more than 20% of the cost of all of the measures, the objective set is "good status 2027";
- If the "sanitation" measures alone represent less than 20% of the total cost but the combined cost of the "hydromorphology" and "sanitation" measures represents more than 20%, the objective set is "good status 2021";
- If the combined cost of all of the measures requiring deadlines after 2015("sanitation" + "hydromorphology") is less than 20%, the objective set is "good status 2015".

The results obtained

In the Rhine basin, the measures implemented will make it possible to achieve good status for 59% of water bodies in 2015, for 19% in 2021 and for 21% in 2027 (see figures 11, 12 and 13).

Figure 11: Graph showing the overall status objectives for "river" water bodies (as a percentage and in numbers of water bodies (WB))

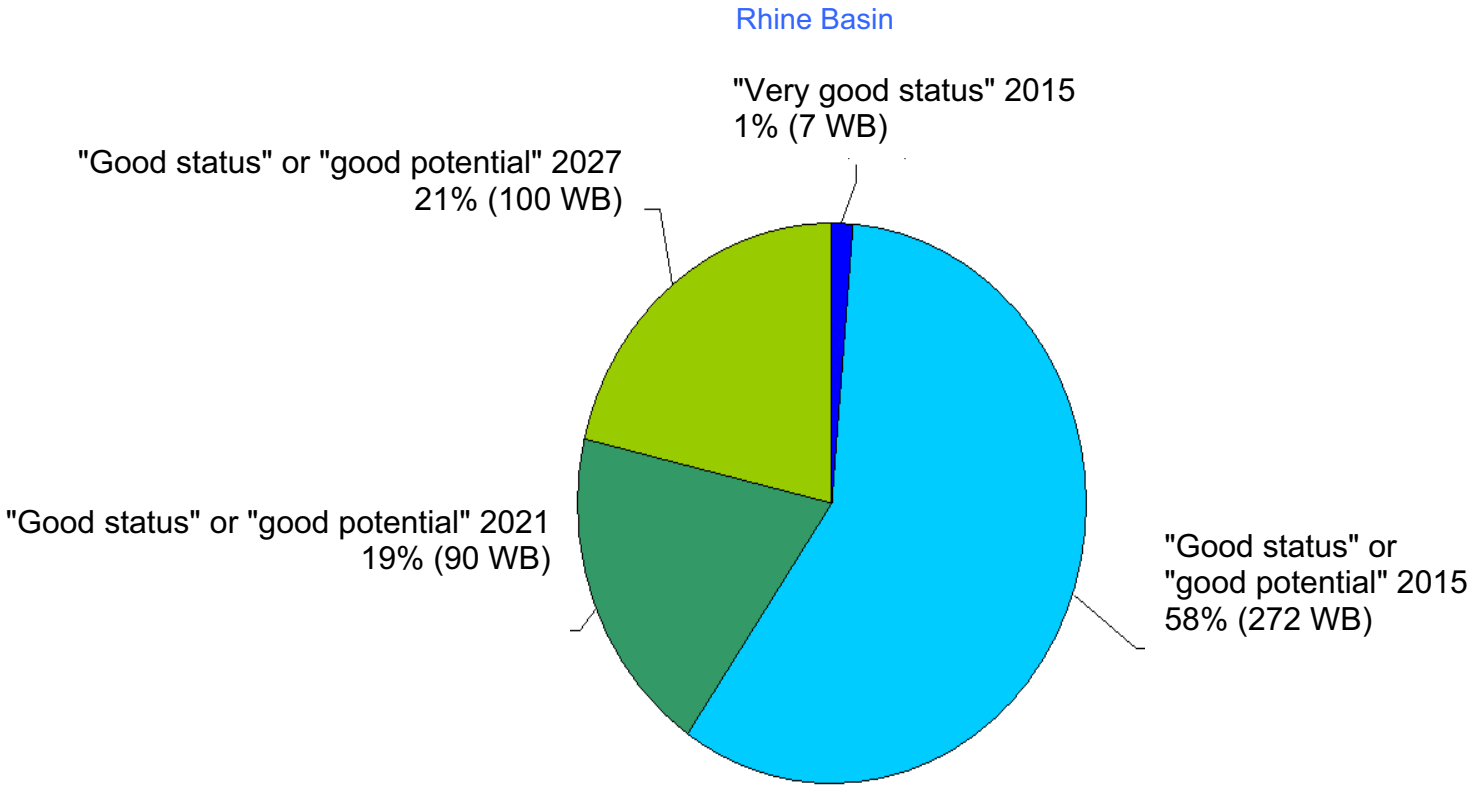


Figure 12: Graph showing the overall status objectives for "river" water bodies
(as a percentage and in numbers of water bodies (WB))

Moselle-Sarre Work Sector

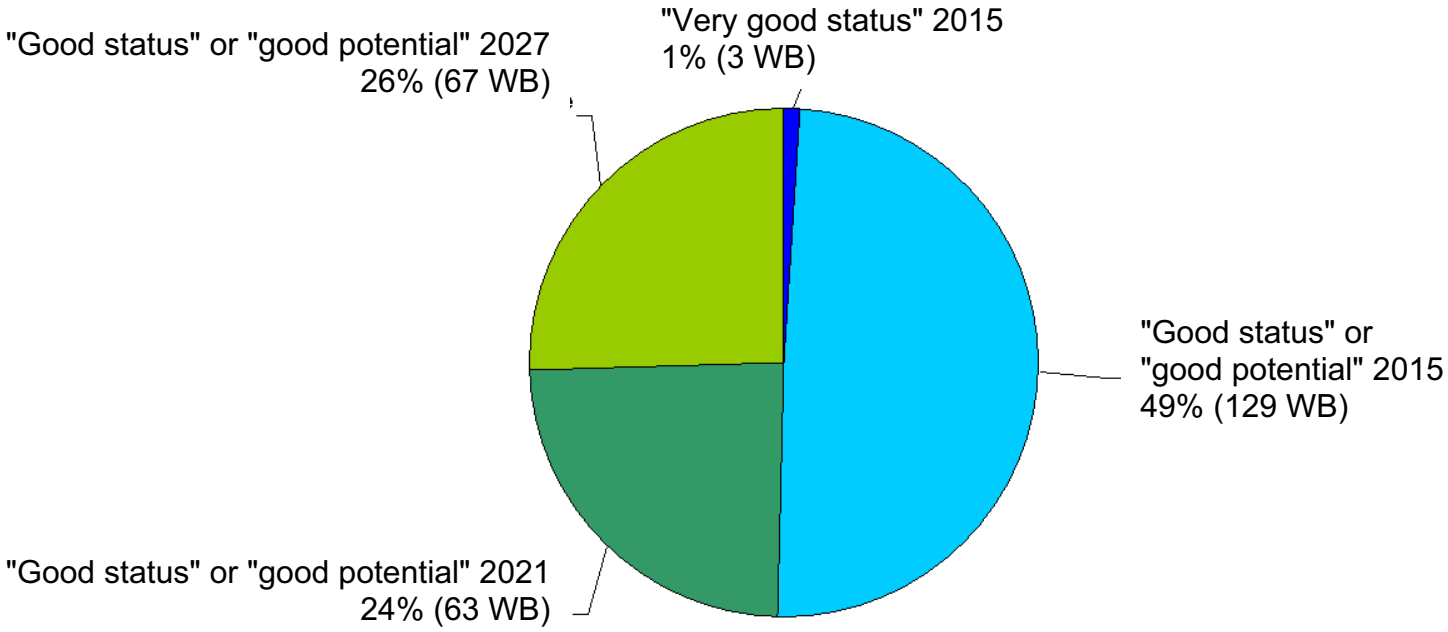
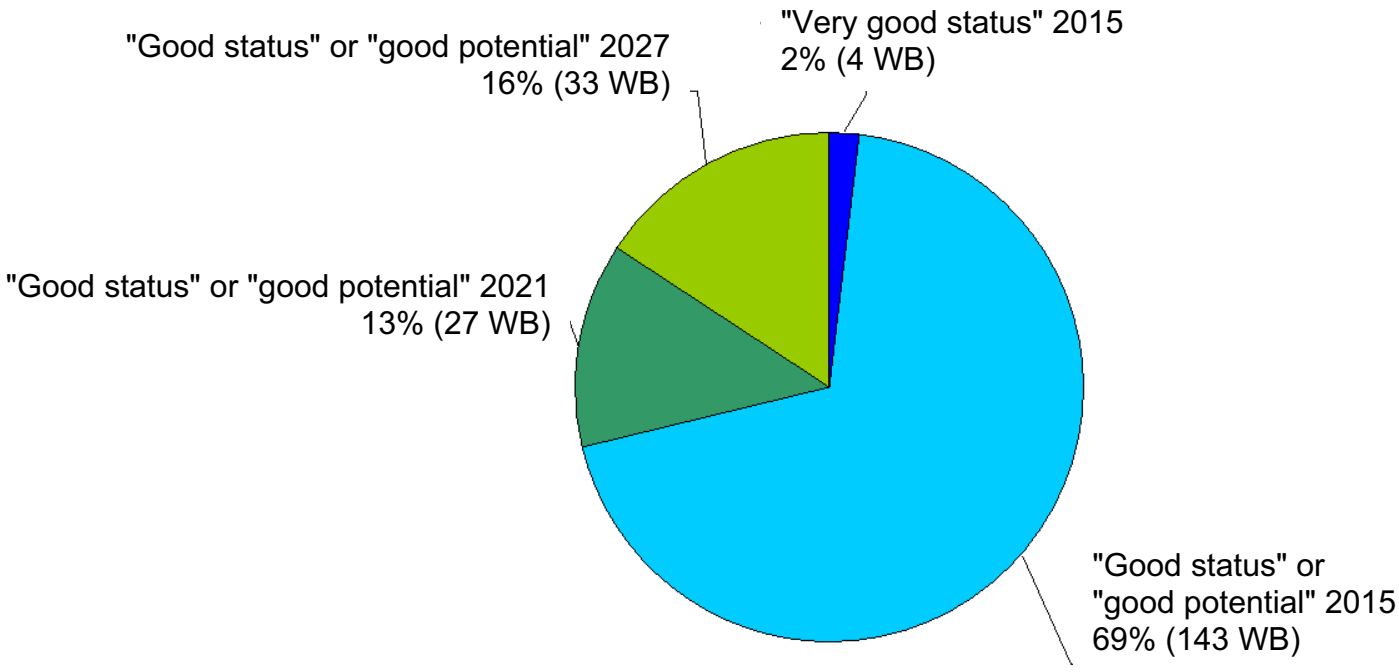


Figure 13: Graph showing the overall status objectives for "river" water bodies
(as a percentage and in numbers of water bodies (WB))

Upper Rhine Work Sector



Deadline postponements concern ecological status in the main. The measures justifying a deadline postponement relation to insufficient ecological status are, in order of importance, the "sanitation" measures, the "hydromorphology" measures and, finally, of equal importance, come the "industry and small businesses" and "agriculture" measures (see figures 14, 15 and 16).

Figure 14: Graph showing the type of measures justifying a deadline postponement for the overall good status of rivers (as a percentage of the number of water bodies affected by a deadline postponement)

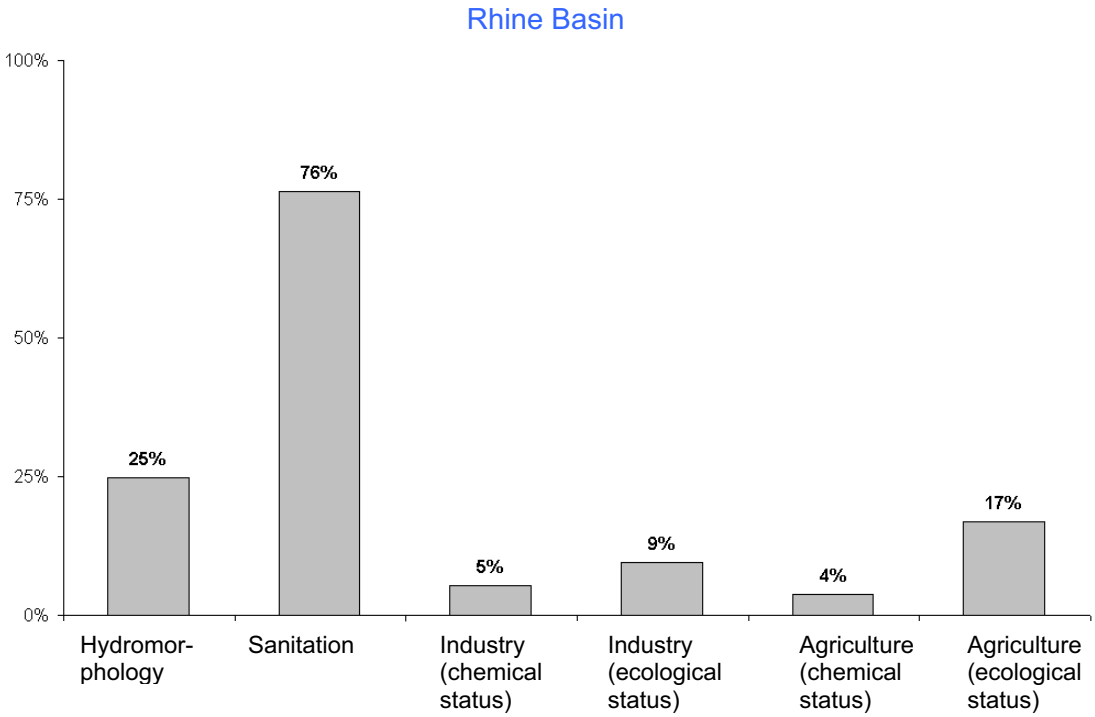


Figure 15: Graph showing the type of measures justifying a deadline postponement for the overall good status of rivers (as a percentage of the number of water bodies affected by a deadline postponement)

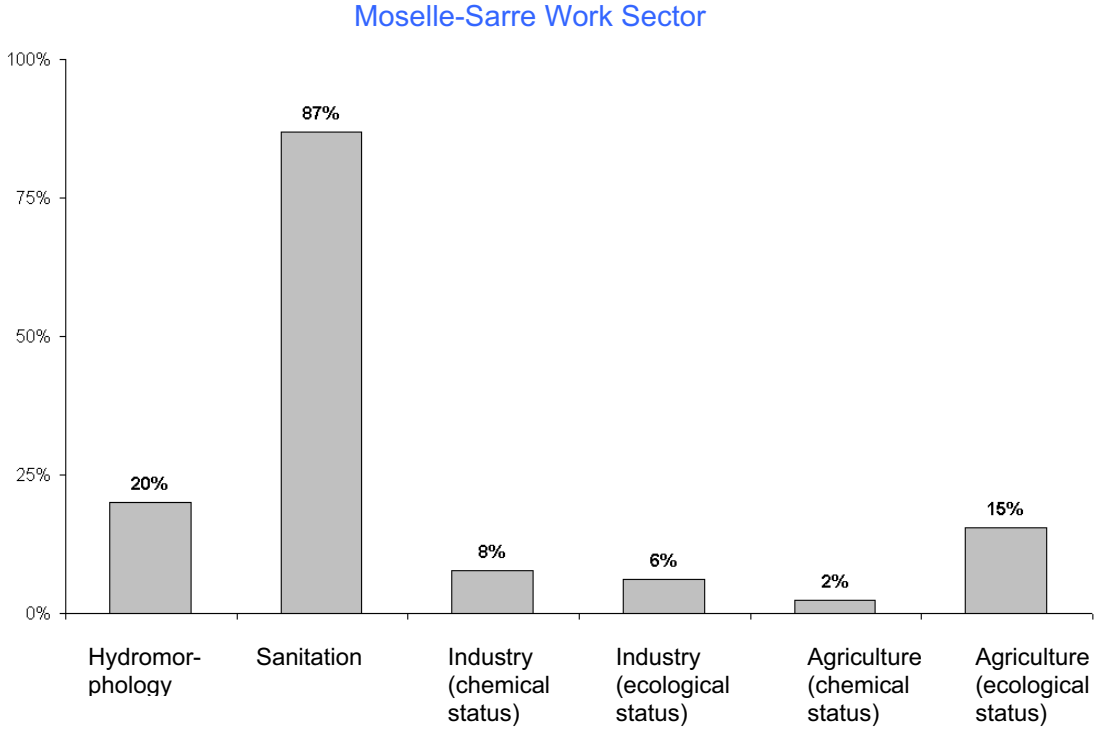
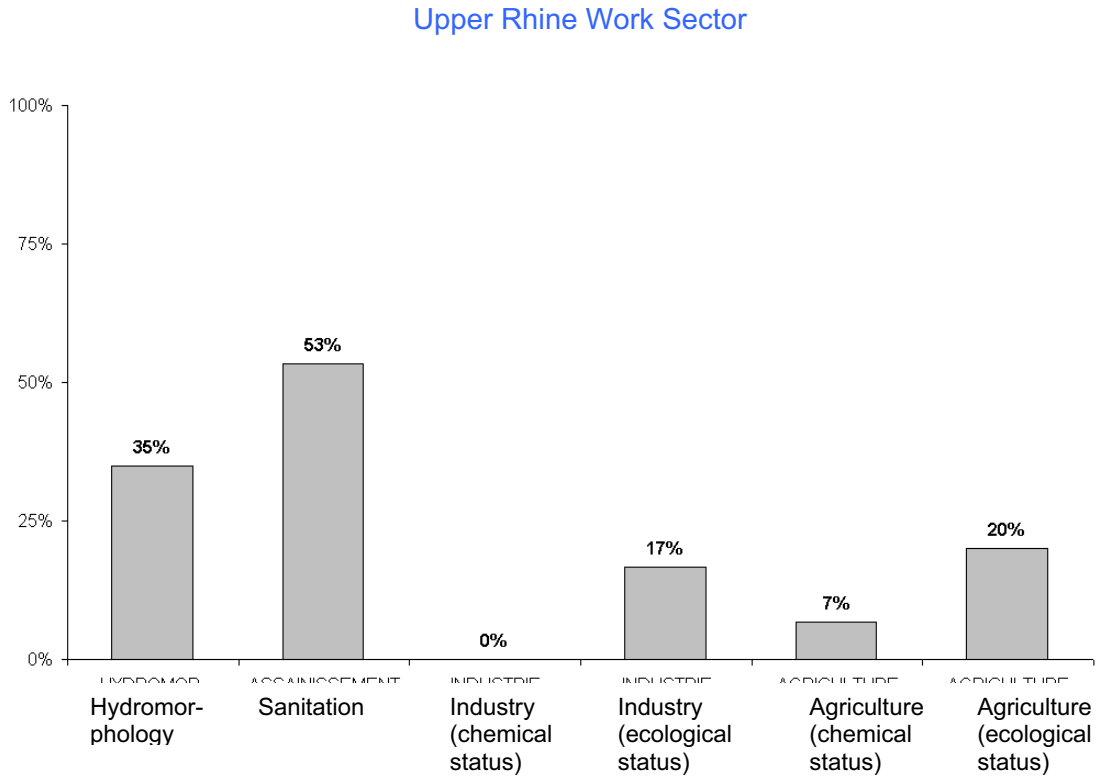


Figure 16: Graph showing the type of measures justifying a deadline postponement for the overall good status of rivers (as a percentage of the number of water bodies affected by a deadline postponement)



Overall, regardless of the type of measures, the principal reasons invoked are technical feasibility and disproportionate cost (see figures 17, 18 and 19).

Figure 17: Graph showing the reasons for postponing deadlines for the overall good status of rivers (as a percentage of the number of water bodies affected by a deadline postponement)

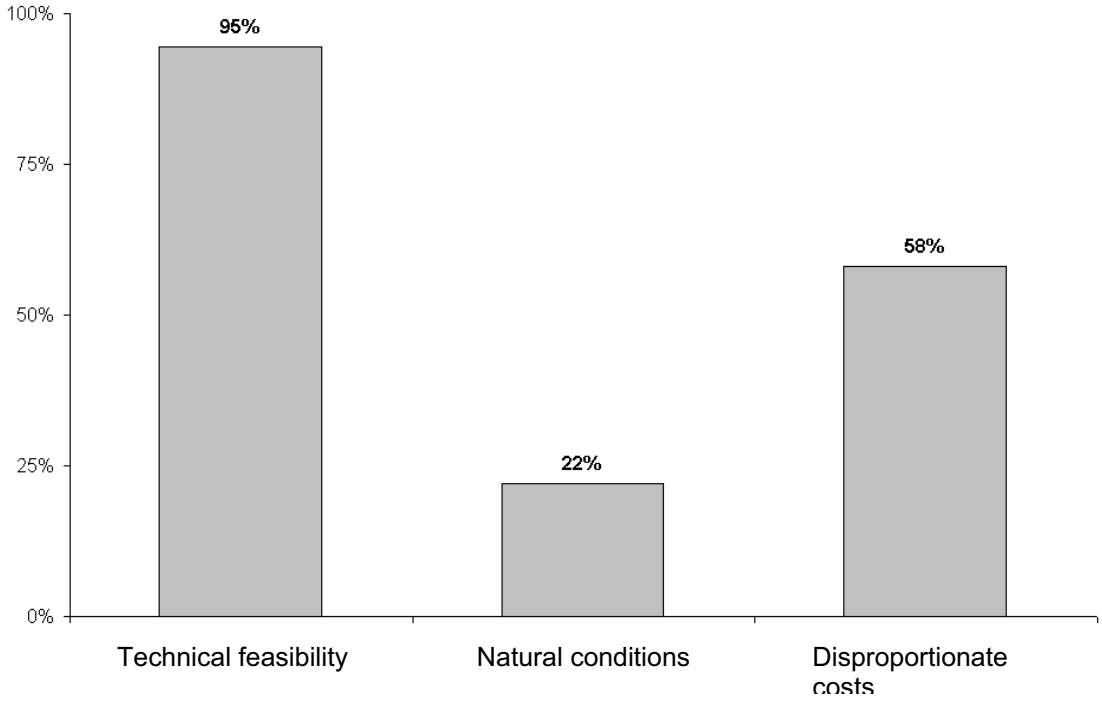


Figure 18: Graph showing the reasons for postponing deadlines for the overall good status of rivers (as a percentage of the number of water bodies affected by a deadline postponement)

Moselle-Sarre Work Sector

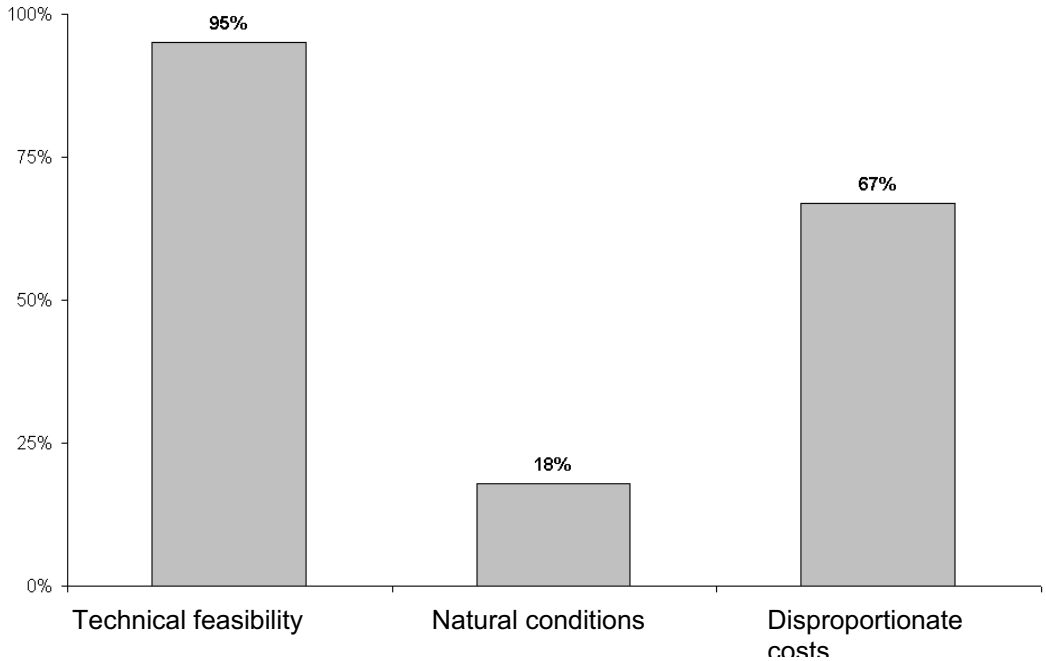
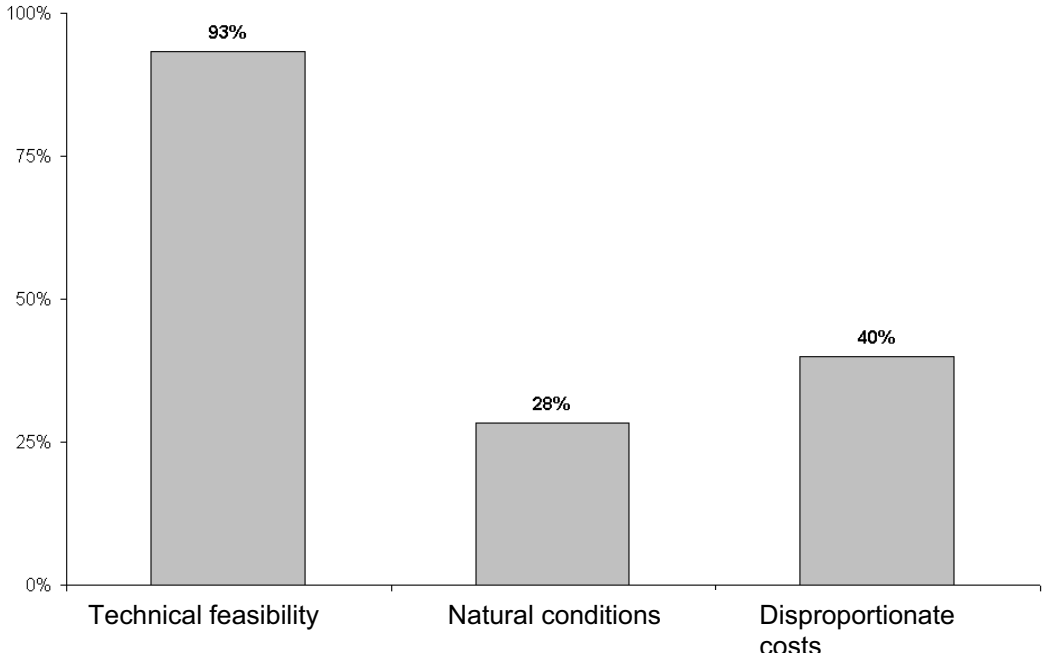


Figure 19: Graph showing the reasons for postponing deadlines for the overall good status of rivers (as a percentage of the number of water bodies affected by a deadline postponement)

Upper Rhine Work Sector



It is important to underline that staggering the objectives in no way means that the combined actions must be deferred. To achieve good status in 2021 or 2027, it is essential that measures and the necessary funding be put in place immediately.

2.2.3 Summary of the objectives on reduction of substances

Among the 189 substances likely to present a risk for or *via* the aquatic environment, 63 have a set objective for emission reduction. This concerns 41 substances or families of substances referred to directly or indirectly in the WFD (i.e. 51 substances in total) and 12 other substances posing local problems. These last 12 correspond to substances referred to in the "National Programme of Action against the Pollution of Aquatic Environments by Certain Hazardous Substances", detected in the water, sediments or pollutant emissions (e.g.: at the outlet of a purification station) in the French part of the Rhine basin and for which the current concentrations in the environment are higher that the Environmental Quality Standards (EQS).

It will eventually be necessary to add to this substances which pose a problem in the areas of the basin located downstream, which are currently the subject of discussions at international level.

For the other substances, monitoring and knowledge improvement measures are planned.

Figure 20: Summary of the objectives to reduce substances in surface water (in number of substances)

	Deadline		
Reduction objective	2015	2021	Total
60%		13	13
50%	14		14
30%	21	3	24
15%	4	8	12
Total	**39**	**24**	**63**

The 14 substances given an objective of 50% of their emissions between now and 2015 are shown in figure 21.

Figure 21: List of substances given an objective of 50%

Substance	**Family**
Benzo(a)pyrene	PAH
Benzo(b)fluoranthene	PAH
Benzo(k)fluoranthene	PAH
Benzo(g,h,i)perylene	PAH
Indeno(1,2,3-cd)pyrene	PAH
Anthracene	PAH
Mercury and compounds	Metals
Cadmium and compounds	Metals
Hexachlorobenzene	
Tetrachloroethylene	
Trichloroethylene	
Pentabromodiphenylether	
Nonylphenols	
4 -para-nonylphenol	

3. Concise presentation of the cost of the measures

The following graphs (figures 22, 23 and 24) present the investment cost of the various types of measure. Shown in grey are the total provisional costs necessary to achieve the environmental objectives, spread over the period 2006-2027. Shown in white are the part of these costs which will have to be borne during the first Programme of Measures (PDM), i.e. during the period 1 January 2010 to 31 December 2015. These costs take into account the economic acceptability of the cost of the measures, estimated on the basis of the economic indicators chosen by the River Basin Committee and include only those measures which are totally or partially feasible from a technical point of view between now and 2015.

Figure 22: Graph showing the cost of the measures (in million euro)

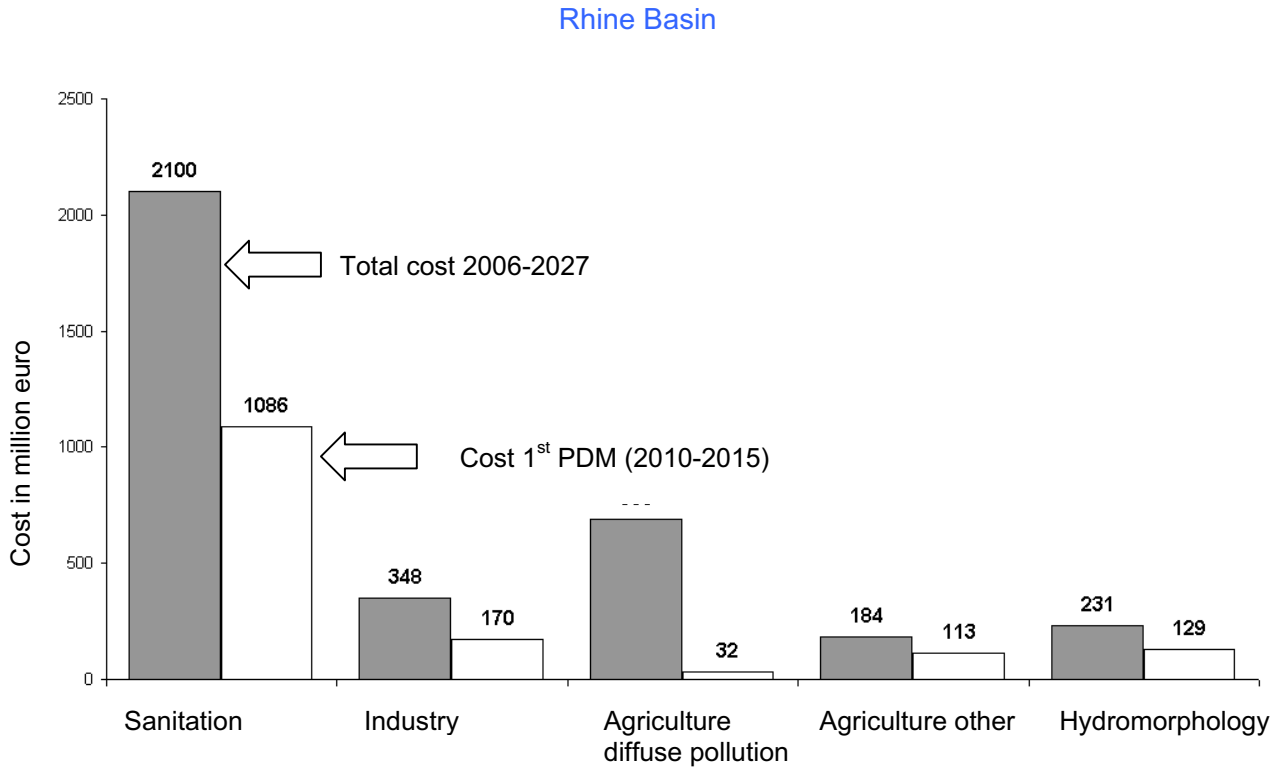


Figure 23: Graph showing the cost of the measures (in million euro)

Moselle-Sarre Work Sector

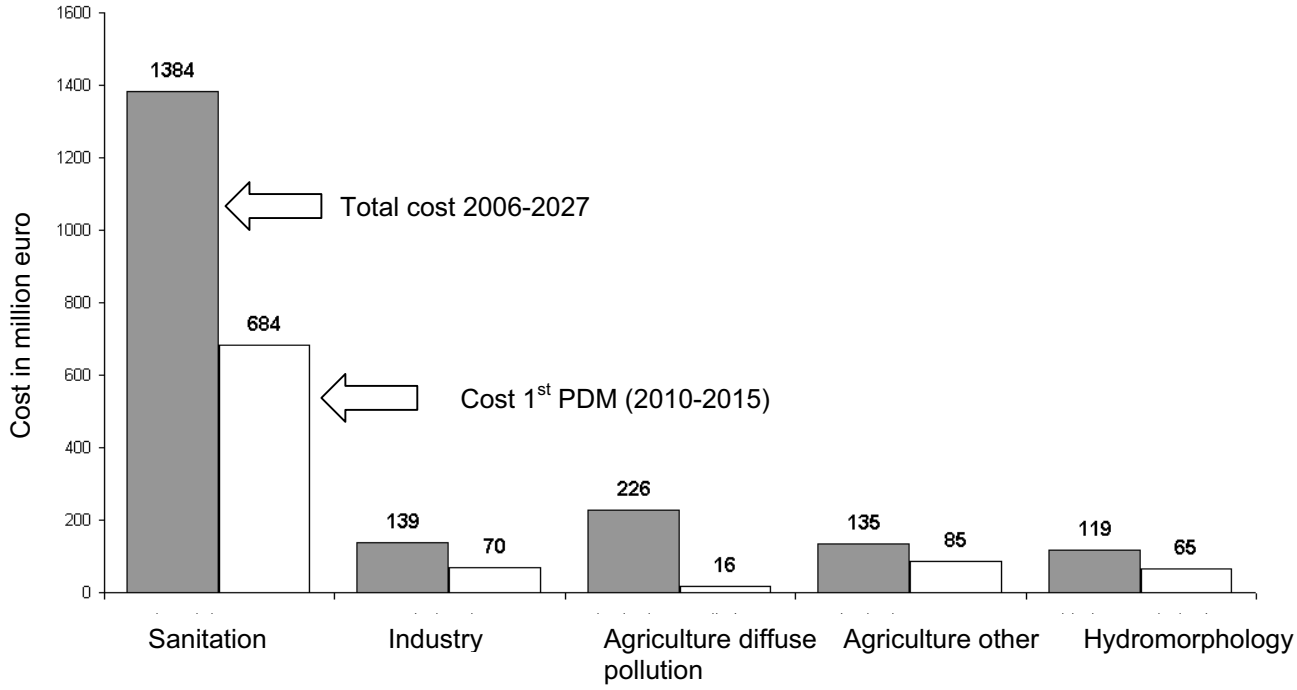
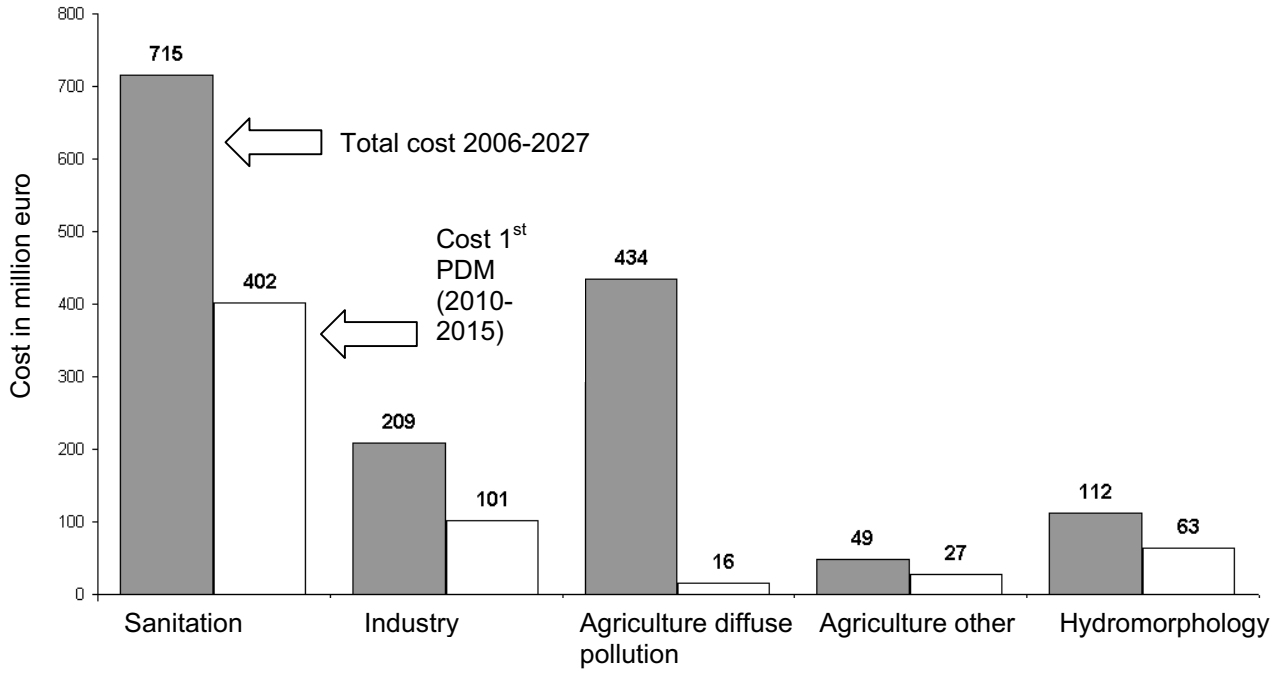


Figure 24: Graph showing the cost of the measures (in million euro)

Upper Rhine Work Sector



The total investment cost of the first Programme of Measures for the Rhine (period 2010-2015) is 1530 million euro, which represents € 69 per annum per inhabitant.
The estimate of the total investment cost necessary to achieve the environmental objectives spread over the period 2006-2027 is 3523 million euro, which represents € 43 per annum per inhabitant (see figure 25).

Figure 25: Total investment cost and annual cost per inhabitant
Rhine Basin

	Total investment cost (in million euro)	Annual cost per inhabitant of the Rhine basin* (in euro)
Period 2006-2027	3552	44
Period 2010-2015	1530	69
*** 3,704,683 inhabitants**		

Figures 26 and 27 stipulate the share in the costs devolving on each work sector.

Figure 26: Total investment cost and annual cost per inhabitant
Moselle-Sarre Work Sector

	Total investment cost (in million euro)	Annual cost per inhabitant of the Moselle-Sarre sector* (in euro)
Period 2006-2027	**2003**	**46**
Period 2010-2015	**921**	**77**

**** 1,980,975 inhabitants***

Figure 27: Total investment cost and annual cost per inhabitant
Upper Rhine Work Sector

	Total investment cost (in million euro)	Annual cost per inhabitant of the Upper Rhine sector* (in euro)
Period 2006-2027	**1549**	**41**
Period 2010-2015	**609**	**59**

**** 1,723,708 inhabitants***

4. Measures

4.1 National measures

Details of these measures are given in Annex 1 to the Programme of Measures.

This Annex contains a table presented in three columns:
- The first column contains the full list of "basic measures" as defined in Article 11-3 of the WFD.
- The second column identifies the French legislative and statutory references corresponding to each basic measure, mentioning the original text and, where it exists, the codified version of the text.
Internet addresses to access the texts are provided.
- The third column presents the substrate of the French provisions identified in the second column in order to enable readers to obtain an overview of the principal legal mechanisms implemented to guarantee the effectiveness of the basic measures of Article 11-3.

Regarding attainment of the objective of non-deterioration of water bodies, the basic measures taken are on the one hand Article L. 212-1 of the Environmental Code (point IV) establishing the principle of compatibility of government decisions in the field of water to the provisions of the SDAGE and, on the other hand, the incorporation in the SDAGE of the water quality and quantity objectives. For the national measures, it has not seemed necessary to go further than these structural measures to achieve the objective of non-deterioration, as the Monitoring Programme combined with follow-up on pressures will make it possible to check their effectiveness.

4.2 Local measures

4.2.1 Local “administrative instrument” type measures within the meaning of Annex VI to the WFD

4.2.1.1 The fundamental guidelines and provisions of the SDAGE

The fundamental guidelines and provisions of the SDAGE, with the exception of those regarding aspects which do not arise from the WFD, such as drinking water supply and the safety of people in the event of flooding, constitute, as administrative instruments, complementary measures to achieve the environmental objectives arising from the WFD and are therefore an integral part of this Programme of Measures.
Administrative decisions in the field of water and, for the fundamental guidelines, the Territorial Coherence Scheme (SCOT), the Local Town Planning Plans (PLU) and communal maps, must be compatible with them.

Therefore, by relying on existing regulations and without creating new ones, they stipulate the administrative framework and improve it in order that it make it possible to achieve the environmental objectives.

Only the fundamental guidelines relating to issues arising from the WFD and the associated provisions are part of the Programme of Measures.

The list of fundamental guidelines and provisions of the SDAGE arising from the WFD is as follows:

Theme 1 – Water and health:
Guideline T1 – O.1.1 and the following provisions:
T1 - O.1.1 - D6
T1 - O.1.1 - D7
T1 - O.1.1 - D8
T1 - O.1.1 - D9

Theme 2 – Water and pollution:
All fundamental guidelines and associated provisions.

Theme 3 – Water, nature and biodiversity:
All fundamental guidelines and associated provisions.

Theme 4 – Water and scarcity:
Guidelines T4 – O.1.3 and T4 – O.1.4 and associated provisions.

Theme 5 – Water and territorial planning:
Guideline T5A – O.2.1
Guideline T5A – O.2.2
Guideline T5A – O.2.3
All fundamental guidelines from parts T5B and T5C.

Theme 6 – Water and governance:
All fundamental guidelines and associated provisions.

4.2.1.2. Deadlines for implementation of the SDAGE

The measures used to set the implementation deadlines of the SDAGE are as follows:

- Administrative decisions impacted by the SDAGE (administrative decisions on the field of water, Local Town Planning Plans, Territorial Coherence Schemes and communal maps) in force upon enactment of SDAGE 2010-2015 are brought into line with the latter before 31 December 2012.

- Administrative decisions impacted by the SDAGE involved in the implementation of actions arising from the Programme of Measures are handed down within a period compatible with their enactment before 2015.

- The State services and public establishments concerned draft prior to 1 January 2012 a precise, shared action plan to implement the SDAGE and the Programme of Measures.

4.2.2 Definition of key actions

NB: The key actions and their cost are summarised in the key action summary files per elementary basin in paragraph 3.3.
Key actions are actions which, in addition to the national measures and the local "administrative instrument" type measures, are *a priori* necessary and sufficient to achieve all of the environmental objectives laid out in the WFD.

As stated above, the environmental objectives are:

- The objectives applying to water bodies, i.e. the objective of non-deterioration and the status objectives;

- The objectives applying to substances. For groundwater, it is a question of preventing or limiting pollutant discharges of any kind. For surface water, it is a question of reducing or eradicating the priority or priority hazardous substances defined by the WFD within a maximum period of 20 years after the entry into force of the Daughter Directive on hazardous substances currently being drafted.

- The objectives related to protected areas, which consist in the implementation of the prevailing European standards and concern more particularly the Natura 2000 sites related to aquatic environments and protected areas for the drinking water supply.

The key actions do not correspond to individual actions (e.g. constructing a purification station in commune X) but to a type of action, associated with a level of ambition translated by its cost.

The key actions have been defined to make it possible to deal with the pressures identified in the Status Report used to define the stakes and the fundamental guidelines set out in the SDAGE. Each key action is therefore associated with a theme and one or more fundamental guidelines in the SDAGE.

The 6 themes of the SDAGE are:

Theme 1 – Water and health
Theme 2 – Water and pollution
Theme 3 – Water, nature and biodiversity
Theme 4 – Water and scarcity
Theme 5 – Water and territorial planning
Theme 6 – Water and governance

Only the themes "water, nature and biodiversity" and "water and pollution" need to be listed under key actions. For the other themes, it has not been considered necessary to go beyond the national measures and the fundamental guidelines and associated provisions to achieve the environmental objectives pertaining to them.

We refer to as pressures those activities or practices which are likely to have a negative impact on aquatic environments and which are likely to influence the attainment of the environmental objectives.

The principal types of pressure identified for the Rhine basin are:

- 1. Pollutant substances discharged in waste domestic water, which is the responsibility of the local communities (point pollutions);
- 2. Pollutant substances discharged by industries or other companies, including small businesses (point pollutions);

- 3. Pollutant substances related to agricultural activities (point or diffuse pollutions);
- 4. Alteration of the morphology of rivers, which corresponds to all physical modifications to the banks or to the bed of a river likely to modify the way it functions.

The key actions are therefore broken down into 4 headings, corresponding to these pressures, entitled:

- 1. Sanitation;
- 2. Industry and small businesses;
- 3. Agriculture;
- 4. Hydromorphology.

The headings “local communities”, “industry and small businesses” and “agriculture” come under the theme “water and pollution” , and the heading “hydromorphology” comes under the theme “water, nature and biodiversity” in the SDAGE.

4.2.2.1 Key actions under the heading “hydromorphology”

The "hydromorphology" measures target the following environmental objectives:
- Assist in the non-deterioration of surface water bodies;
- Improve the ecological status of surface water bodies;
- Improve the chemical status of waters through their self-purification function;
- Implement the objectives relating to protected areas like Natura 2000.

Measure T3 - M1: Improved ecological continuity in rivers

- Creation of free spaces
This is about creating a space to allow the fluvial dynamic to express itself. It will facilitate optimal functioning of ecosystems, which translates as the mobilisation of sediments, the creation of islets, oxbows and diverse, varied environments likely to host significant biodiversity.

- Reduction of the impact of building works (dams, weirs) on natural environments
The management of existing constructions concerns older or more recent dams or weirs, in good or poor status, on which work is required, depending on current uses, to reduce their impact on the river bed. This impact may mean smoothing out of through-flows, sloughing (or silting) upstream of the construction, and evening out the beds and profiles of rivers. Works which may be considered are the removal of the construction, lowering it or replacing it with a development that has less impact (e.g.: rockfill ramp).

- Restoration of the free circulation of fish
Constructions may also result in a partitioning of the aquatic environment for migratory or non-migratory species of fish. Indeed, migratory fish live in different places during and outside their period of reproduction. They must therefore alternately swim up or down rivers in the course of their life. Works which may be considered are the installation of fish ways to allow the spawning run and downstream migration slides to allow fish to swim back down rivers.
For the time being, the cost of these actions has only been very partially incorporated in the proposed estimates. Indeed, these actions require the international coordination currently underway.

- Installation of additional weirs
Conversely, the installation of additional weirs must occasionally be considered. This is the case when we want to arrest the phenomenon of regressive erosion of the river bed, diversify through-flow and the aspect of the bed or replace a larger construction with a succession of lower weirs which have less impact. The techniques used are the installation of a rockfill weir or a wooden weir (logs, planks). These weirs must not only be crossable to fish, but also improve the diversity of the banks and the bed.

Measure T3 – M2: Restoration of rivers

The objective of restoration is to put in place or maintain an acceptable compromise between the river's ecological functioning and maintaining through-flow or other conditions necessary to the uses to which a river is put.
Restoration consists in managing the ripisylve, the formation of woodland on the river bank, and obstacles hindering through-flow referred to as logjams (made by a tree across a river, for example). We can add to this the protection of the banks using planting techniques (e.g.: cuttings, plaiting, fascining) when there is a requirement to protect public property threatened by bank erosion. These planting techniques are used to recreate biologically functional banks.

Measure T3 – M3: Reintroduction of nature to rivers

Included in this measure are restoration works which are more ambitious than those outlined in the previous measure. The objective of reintroducing nature is to recreate an ecologically functioning whole and a biological diversity of the bed, the banks, the through-flow, etc., damaged by hydraulic works or other human interventions.

- The purpose of plantings is to reconstitute the ripisylve to restore a certain number of functionalities to the river which are essential to its good status (self-purification, shade over the bed to limit eutrophication, natural upkeep of the banks, filtration of pollutants trickling through the flood plain (agricultural pollution), diversification of terrestrial and aquatic habitats for the flora and fauna and increase in biodiversity).

- The reconnection of oxbows includes earth-moving operations and planting, and consists in linking a former arm of the river, disconnected from the main river, back to the river. Reconnection must make it possible to recreate reproduction zones for various species of fish (e.g.: salmon). We can also recreate oxbows. These operations are essential to the extent that the natural creation of oxbows practically does not occur at the present time owing to the anthropic modifications affecting the way rivers function.

- Rediversification of the low-water channel consists in varying the width, the depth and the through-flow and thus in creating (or recreating) a diversity of aquatic habitats and increasing the river's self-purification functions. The techniques used are the installation of wooden or rockfill groynes, planted banks, submerged rustic weirs, and earthworks to modify the profile of the bed and the banks.

- Re-embankment operations consist in terracing steep banks (particularly following the sinkage of the river) to reduce their gradient and allow planting or other vegetal techniques.

- The recreation of the river's meanders concerns totally or partially rectified rivers. It must make it possible to recreate biodiversity, often reduced to a minimum as far as habitats are concerned, and to encourage the reproduction of certain species of fish.

- The creation of the minor bed of a river necessitates earth-moving operations and the installation of groynes or planted banks to recreate a through-flow section closer to the natural course of the river in over-enlarged sectors, particularly in urban areas. This makes it possible to limit warming and evaporation and therefore to prevent the accelerated eutrophication and dehydration of rivers in summer.

- Land control (land acquisition)
This kind of intervention means acquiring an area of land in order to have control over it and to be able to protect it from future destruction or deterioration. Land control is necessary if we are looking to recreate a meander but also if we are trying to protect wetlands associated with a river or an exceptional sector.

Measure T3 – M4: Regular maintenance of rivers

It is necessary to look after rivers on a regular basis in order to maintain a compromise between usages and biodiversity (management of vegetation, logjams, etc.). By preserving a certain balance, regular maintenance prevents heavy-duty operations to deal with tree stumps or other logjams and therefore the deterioration of water bodies.

Measure T3 – M5: Management of lakes

This is about:
- Limiting the negative impact of certain lakes on rivers (removal of water intake structures, suppression of direct intake lakes);
- Improved lake management to ameliorate their status (actions not costed for the time being).

Measure T3 – M6: Acquisition of wetlands

Wetlands offer numerous services free of charge and contribute to the good status and non-deterioration of water bodies. They are involved, for example, in the provision of groundwater, the self-purification of rivers and flow regulation. They may also include considerable biodiversity, which is tantamount to our life insurance for tomorrow. Acquiring them means controlling and being able to protect them from future destruction or deterioration. This measure also concerns the Natura 2000 sites related to the aquatic environment.

The key actions are summarised in the following table, which details the fundamental guidelines of the SDAGE from which they are taken, their code and their abbreviated title, which will appear in the information files summarising measures per elementary basin (cf. paragraph 3.3).

The key actions are summarised in figure 28:

Figure 28: Key actions under the heading "hydromorphology"

Fundamental guideline	Code of the measure	Title of the measure
T3-O3; T3-O5	T3-M1	Improved ecological continuity in rivers
T3-O3; T3-O4; T3-O5	T3-M2	Restoration of rivers
T3-O3; T3-O4	T3-M3	Reintroduction of nature to rivers
T3-O2; T3-O3; T3-O4	T3-M4	Regular maintenance of rivers
T3-O2; T3-O4; T3-O7	T3-M5	Management of lakes
T3-O7	T3-M6	Acquisition of wetlands

4.2.2.2. Key actions under the heading "sanitation"

The "sanitation" measures are intended principally to improve the ecological status of surface water bodies.

In the Programme of Measures, this means going further than the measures corresponding to the implementation of the statutory provisions arising from the "residual urban water" Directive when this is required to achieve good status.

On this basis, the key actions proposed are described in detail below. They only affect local communities whose domestic discharges impact water bodies which have not achieved good status by 2010.

Measure T2 - M1: Optimisation of the wastewater treatment plant (treatment)

Sanitation agglomerations which already have a purification station within the framework of the "residual urban water" Directive but whose discharges are located in water bodies which are not currently in good ecological status will have to improve the performance of the purification station over and above the requirements of the Directive:
- By putting nitrogen treatment in place;
- And/or by putting phosphorous treatment in place;
- And/or by bolstering the previous two processes;
- And/or by completely changing their water treatment process.

Measure T2 – M2: Optimisation of wastewater networks (networks)

Sanitation agglomerations which already have a sanitation network in compliance with the "residual urban water" Directive but whose uncollected wastewater affects water bodies which are not currently in good ecological status will have to improve the performance of their network over and above the requirements of the Directive, including the treatment of pollution in rainy weather.

This measure also includes the case of communes which may be required to transport their wastewater discharges in order to transfer their water either to a less sensitive water body or to the purification station in another community. This possibility will have to consider and compensate for any water shortages caused by this transfer.

Measure T2 – M3: Introduction of a suitable network, to be defined (shared or non-shared)

In certain communes whose discharges are located in water bodies which are not currently in good ecological status, it is not possible to determine *a priori* what methods will be used to improve their sanitation system without first carrying out a detailed study. In these communes, improvement of the sanitation network or installation of non-shared sanitation will have to be considered.

The key actions are summarised in the following table, which details the fundamental guidelines of the SDAGE from which they are taken, their code and their abbreviated title, which will appear in the information files summarising measures per elementary basin (cf. paragraph 3.3).

The key actions are summarised in figure 29:

Figure 29: Key actions under the heading "sanitation"

Fundamental guideline	Code of the measure	Title of the measure
T2-O1	T2-M1	Optimisation of the wastewater treatment plant (treatment)
T2-O1 and T2-O3	T2-M2	Optimisation of wastewater networks (networks)
T2-O1 and T2-O3	T2-M3	Introduction of a suitable network, to be defined (shared or non-shared)

4.2.2.3. Key actions under the heading "industry and small businesses"

The "industry and small businesses" measures mainly target the following environmental objectives:
- Improve the ecological status (measures T2-M4 to T2-M8), the chemical status (measures T2-M4 to T2-M9) of surface water bodies, the chemical status groundwater bodies (measures T2-M8, T2-M10 and T2-M11);
- Reduce or eradicate priority or priority hazardous substances (measures T2-M4 to T2-M11).

The key actions aim to reduce the pollution discharged by industrial establishments and other companies, including in particular service companies and the activities of small businesses.

On this basis, the key actions proposed are the following. They only concern establishments which impact water bodies which have not achieved good status by 2010.

Measure T2 – M4: Reinforced prevention of accidental spill

The majority of actions relating to controlling accidental spill are basic statutory measures and are therefore not mentioned in the complementary actions required to achieve the objectives to be set by the SDAGE.
Only actions which go further than this statutory base are therefore included in this measure.

Measure T2 – M5: Clean technology

Rather than treat water once it has been polluted, it is preferable, whenever possible, to limit pollution at source. To do this means putting clean technologies in place, such as replacing a product toxic to the water by another product or recycling process water.

Measure T2 – M6: Improved collection and treatment of industrial discharges

For pollution which is impossible to eliminate at source, it means improving its collection and treatment.
To do this, we suggest:
- Creating or improving industrial wastewater discharge collection networks (e.g.: connection of an industry to a sanitation network, restructuring the industry's internal network, pre-treatment);
- Improving the treatment of polluted water discharges by improving or creating new pollution control structures (e.g.: buffer basin, improvement of the sludge line, tertiary treatment).

Measure T2 – M7: Management and treatment, if necessary, of contaminated industrial sites

Some industrial sites are contaminated. It is sometimes necessary and possible to carry out management and treatment actions at contaminated sites (e.g.: confinement of the pollution, extraction and treatment of pollution).

Measure T2 – M8: Control of rain pollution of industrial origin

These measures are intended to limit the transfer of pollution by leaching or overflow in rainy weather.

Measure T2 – M9: Reduction of emissions of toxic substances by small businesses (general mechanics, silk-screen printing, automobile mechanics, surface treatment)

The nature of the actions to be carried out is similar to those in other companies. Measure T2-M9 therefore includes the same kind of actions as measures T2-M4, 5, 6, and 7. The actions costed for small businesses are nonetheless aimed at the reduction of concentrations in the water of priority substances and priority hazardous substances, particularly heavy metals and polycyclic aromatic hydrocarbons.

Measure T2 - M10: Reduction of pollution from chlorides

Salt concentrations which are too high in certain sectors of the Rhine basin are incompatible with using the resource for drinking water. Regarding chloride pollution in Moselle alluvia downstream of the confluence with the Meurthe, measures to lessen it are currently being defined are have not yet been costed. Regarding chloride pollution in Alsace groundwater, the sites polluted by operational sylvinite residues rich in NACL have already been subject to leak proofing and dissolution measures. In future, only pumping and monitoring operations should be carried out. These costs, which constitute operations, are incorporated in the calculation for the Rhine Programme of Measures.

Measure T2 - M11: Reduction of emissions of chloride solvents

Chloride solvents are a group of chemical products which, because of their excellent cleaning power, are used a great deal in industry and small businesses. It concerns mainly methylene chloride, trichlorethylene and perchlorethylene. They are used in particular in metal working, the treatment of metal surfaces, mechanics and construction activities for appliances, car garages, the manufacture or application of paints and varnishes, textile businesses, siderurgy, cleaning activities, printing activities, chemistry, electricity and electronics, and a few agri-food activities (use of solvents to extract flavourings, oils, etc.).
To limit their emission, the Programme of Measures provides for actions intended to reduce leakage related to the storage and handling of these products, collect used solvents or waste containing solvents, adopt clean technologies to reduce the use of solvents or which do not use solvents at all (detergent degreasing, use of a substitute product, etc.). It provides for effluent treatment actions, on-site soil decontamination if there is a high risk of accumulation of products owing to a past activity, and putting monitoring measures in place.

Measure T2 - M12: Studies, awareness and education.

Certain studies are necessary before an action can be precisely defined and put in place. Likewise, training or awareness actions may prove essential.

The key actions are summarised in figure 30:

Figure 30: Key actions under the heading "industry and small businesses"

Fundamental guideline	Code of the measure	Title of the measure
T2-O1	T2-M4	Reinforced prevention of accidental spill
T2-O1 and T2-O2 and T2-O3	T2-M5	Clean technology
T2-O1 and T2-O2	T2-M6	Improved collection and treatment of industrial discharges
T2-O1 and T2-O2	T2-M7	Management and treatment, if necessary, of contaminated industrial sites
T2-O1 and T2-O2	T2-M8	Control of rain pollution of industrial origin
T2-O2 and T2-O3	T2-M9	Reduction of emissions of toxic substances by small businesses (general mechanics, silk-screen printing, automobile mechanics, surface treatment)
T2-O1	T2-M10	Reduction of pollution from chlorides
T2-O2	T2-M11	Reduction of emissions of chloride solvents
T2	T2-M12	Studies, awareness and education

4.2.2.4. Key actions under the heading "agriculture"

The "agriculture" measures mainly target the following environmental objectives:
- Improve the chemical status of groundwater bodies (measures T2-M13, T2-M15);
- Improve the ecological status of surface water (measures T2-M12, T2-M13, T2-M14, and T2-M15).

Measure T2 - M13: Upgrading of farm buildings

Animal droppings contain nitrates which disrupt the functioning of aquatic environments, by fostering the proliferation of certain vegetals.
Directive 91/676/EEC on nitrates implies an upgrading of farm buildings which includes building work and a phase preparatory to this work. These actions are intended to reduce nitrate emissions into water.

Measure T2 - M14: Securing premises likely to contain liquid nitrogen fertilizers

This statutory measure aims to prevent leakage during storage and therefore accidental spill which may become chronic.

Measure T2 - M15: Reduction of diffuse pollution from agricultural practices (nitrates and pesticides)

For the first Programme of Measures, the reduction of diffuse agricultural pollution will be targeted in deteriorated drinking water supply abstraction areas. For human health reasons, these areas are, in fact, a priority. Initially, this measure therefore targets areas protected for the drinking water supply. Indeed, for economic reasons, it is not feasible to provide systematic treatment before 2015. The agricultural areas located outside these areas will be targeted at a later date and progressively as of 2016. However, improved practices must be encouraged through training and advice such that the latter become progressively compatible with the good status objective for water bodies.

Over the entire potential agricultural surface in the supply abstraction areas, for which inspections highlight an exceedance of the standards for nitrates (> 50 mg/l) or pesticides (> 0.1 µg/l), one or more of the following measures will have to be put in place (figure 31).

Figure 31: List of measures

Objective	Possible actions	Pollutants concerned	Surfaces and areas concerned
Limitation of discharges	Limitation of total fertilisation	Nitrates	Surfaces under annual crops
	Reduction of pesticide use	Pesticides	Surfaces under annual crops
	No pesticide treatment for weed control	Pesticides	Surfaces under annual crops
	Conversion to and maintenance of organic farming	Pesticides and nitrates	Surfaces under annual crops
	Conversion of arable land back to permanent meadowland	Pesticides and nitrates	Surfaces under annual crops
	Maintenance of land under grass in deteriorated areas	Pesticides and nitrates	Surface converted back to permanent meadowland
Limitation of transfers	Plantation of intermediate crops in transfer risk periods	Nitrates	Surfaces with spring crop rotation (Maize-Wheat in Alsace, Maize-Wheat-Barley in Lorraine/ Ch.Ardenne)
	Offsetting of discharges in relation to transfer risk periods	Pesticides and nitrates	Surfaces under annual crops located in areas deteriorated by pesticides and nitrates
	Cover planting of vines	Pesticides and nitrates	Surfaces under vines located in areas deteriorated by pesticides and nitrates
	Extension of cover planting strips, buffer zones	Pesticides and nitrates	Surfaces under crops located in areas deteriorated by pesticides and nitrates
	Prevention of accidental spill (securing installations and equipment, management of spray effluents)	Pesticides	All potential agricultural areas
Training / Awareness	Awareness campaigns and general information (folders…)	Pesticides and nitrates	All potential agricultural areas
	Presentations, collective advice	Pesticides and nitrates	All potential agricultural areas
	Individual training	Pesticides	All potential agricultural areas
	Technical supervision, customised advice	Pesticides and nitrates	All potential agricultural areas

The key actions are summarised in figure 32:

Figure 32: Key actions under the heading “agriculture”

Fundamental guideline	Code of the measure	Title of the measure
T2-O1 and T2-O4	T2-M13	Upgrading of farm buildings
T2-O4	T2-M14	Securing premises likely to contain liquid nitrogen fertilizers
T2-O4 and T2-O6	T2-M15	Reduction of diffuse pollution from agricultural practices (nitrates and pesticides)

4.3. Summary files on key actions

The Programme of Measures contains a general summary file for the basin as a whole and a file per elementary basin. In this summary, only the general file and an elementary basin file are given as examples.

- A summary of the stakes on each elementary basin, which outlines the intensity of the four principal pressures identified (alteration of the hydromorphology, pollution by towns, pollution by industries and other companies, pollution by agricultural practices). The symbol + means that the pressure is low, the symbol +++ means that it is very high.

- A summary of the objectives for the water bodies in each elementary basin.

- A summary of the key actions and the associated costs
The "key actions and associated costs" part of the file comprises a table which, for each key action, specifies:
- Its code (column "key action code");
- Its title (column "abbreviated title of the key action");
- The type of client associated to it (column "client");
- Its cost (column "costs of the key action"), differentiating between investment sums and annual operating costs;
- Its implementation methods (column "implementation") C means that the measure has been implemented by contractual means, I by financial incentive, R by statutory means.

The investment costs presented in this table correspond:
- *Column "2010-2015"*: To the total expenditure which needs to be earmarked for the period 2010-2015 to achieve the environmental objectives. For the actions for which the economic analysis has concluded the necessity to stagger them after 2015 in order that they can be borne by those involved to the period 2010-2027, only the part corresponding to the period 2010-2015 has been calculated in this Programme of Measures. The part calculated over 2010-2015 corresponds to the share of the expenditure "bearable" in view of the economic indicators. This means that, even on water bodies which have a good status objective in 2021 or 2027, it will be desirable to initiate the necessary actions or at least to earmark the corresponding sums.
- *Column "2006-2027"*: To an estimate of the investment costs necessary to achieve the environmental objectives, particularly to achieve good status everywhere. This therefore corresponds to the costs it will be necessary to earmark for the period 2006-2027.

The annual operating costs presented in this table correspond to those it will be necessary to earmark when all actions for the period 2006-2027 have been finalised.

The costs relating to measures dedicated to the protection of drinking water supply abstraction areas are marked in the "investment" columns even though they correspond neither to operating costs nor to traditional investment costs. In effect, this is the annual cost overrun related to the changes in practice necessary to limit diffuse pollution (nitrates, pesticides) of agricultural origin.

NB1*:* Stretches of water are part of the category "lakes" in the WFD, even when they are artificial or shallow.
NB2*:* Summary files for the entire Rhine basin and for each of the two work sectors are also presented.

OBJECTIVES FOR WATER BODIES

		Very good status 2015	Good status 2015	Deadline Postponement	Less stringent objective	TOTAL
Surface water bodies	Rivers	7	272	190	0	**469**
	Lakes	0	33	0	0	**33**
Groundwater bodies		0	8	8	1	**17**
TOTAL		7	313	198	1	**519**

MEASURES AND ASSOCIATED COSTS

KEY ACTION CODE		ABBREVIATED TITLE OF THE KEY ACTION	CLIENT	COST OF THE KEY ACTION			IMPLEMENTATION*
				INVESTMENT		ANNUAL OPERATIONS	
				2010-2015	2006-2027		
Hydromorphology	T 3-M1	Improved ecological continuity in rivers	Local Communities	11 249 127 €	19 620 000 €	0 €	C, I
	T 3-M2	Restoration of rivers	Local Communities	25 241 822 €	45 064 000 €	0 €	C, I
	T 3-M3	Reintroduction of nature to rivers	Local Communities	79 755 321 €	143 396 000 €	0 €	C, I
	T 3-M4	Regular maintenance of rivers	Local Communities	0 €	0 €	5 090 400 €	C, I
	T 3-M5	Management of lakes	Local Communities	1 217 136 €	2 100 000 €	0 €	C, I
	T 3-M6	Acquisition of wetlands	Local Communities	11 626 101 €	20 782 000 €	0 €	C, I
			Total Cost	**129 089 508 €**	**230 962 000 €**	**5 090 400 €**	
Sanitation	T2-M1	Optimisation of the wastewater treatment plant (treatment)	Local Communities	117 616 260 €	228 404 068 €	18 961 611 €	I, R
	T2-M2	Optimisation of wastewater networks (networks)	Local Communities	692 948 566 €	1 282 053 973 €	10 989 782 €	I, R
	T2-M3	Introduction of a suitable network, to be defined (shared or non-shared)	Local Communities	275 228 146 €	589 315 674 €	14 567 019 €	I, R
			Total Cost	**1 085 792 973 €**	**2 099 773 715 €**	**44 518 413 €**	
Industry and small businesses	T2-M4	Reinforced prevention of accidental spill	Industries	155 625 €	265 000 €	0 €	I, R
	T2-M5	Clean technology	Industries	13 793 386 €	26 620 000 €	943 600 €	
	T2-M6	Improved collection and treatment of industrial discharges	Industries	90 607 583 €	201 323 791 €	25 045 247 €	I, R

	T2-M7	Management and treatment, if necessary, of contaminated industrial sites	Industries	763 636 €	2 200 000 €	0 €	I, R
	T2-M8	Control of rain pollution of industrial origin	Industries	0 €	0 €	0 €	I, R
	T2-M9	Reduction of emissions of toxic substances by small businesses (general mechanics, silk-screen printing, automobile mechanics, surface treatment)	Small Businesses	31 503 684 €	53 748 635 €	19 423 752 €	I, R
	T2-M10	Reduction of pollution from chlorides	Industries	0 €	0 €	367 045 €	I, R
	T2-M11	Reduction of emissions of chloride solvents	Industries and Small Businesses	27 312 510 €	52 702 220 €	1 130 569 €	I, R
	T2-M12	Studies, awareness and education	Industries and Small Businesses	6 246 978 €	11 480 700 €	0 €	I, R
			Total Cost	**170 383 402 €**	**348 340 346 €**	**46 910 213 €**	
Agriculture	T2-M13	Upgrading of farm buildings	Farmers	80 047 745 €	151 719 228 €	0 €	R
	T2-M14	Securing premises likely to contain liquid nitrogen fertilizers	Farmers	32 767 181 €	32 767 181 €	0 €	I, R
	T2-M15	Reduction of diffuse pollution from agricultural practices (nitrates and pesticides)	Farmers	32 340 000 €	688 226 683 €	0 €	C, I
			Total Cost	**145 154 926 €**	**872 713 093 €**		
				1 530 420 810 €	**3 551 789 154 €**	**96 519 027 €**	

* This column describes the way in which the measures will be implemented --> C : Contractual ; I : Financial Incentive; R : Statutory

Ill Rhine Groundwater

STAKES

HYDROMORPHOLOGY	SANITATION
++	+
Industry and small businesses	AGRICULTURE
+++	+++

OBJECTIVES FOR WATER BODIES

		Very good status 2015	Good status 2015	Deadline Postponement	Less stringent objective	TOTAL
Surface water bodies	Rivers	0	29	17	0	**46**
	Lakes	0	2	0	0	**2**
Groundwater bodies		0	1	3	1	**4**
TOTAL		0	32	20	1	**52**

MEASURES AND ASSOCIATED COSTS

		ABBREVIATED TITLE OF THE KEY ACTION	CLIENT	COST OF THE KEY ACTION			IMPLEMENTATION*
				INVESTMENT		ANNUAL OPERATIONS	
				2010-2015	2006-2017		
Hydromorphology	T 3-M1	Improved ecological continuity in rivers	Local Communities	426 690 €	711 150 €	0 €	C, I
	T 3-M2	Restoration of rivers	Local Communities	2 405 043 €	4 008 405 €	0 €	C, I
	T 3-M3	Reintroduction of nature to rivers	Local Communities	21 723 744 €	38 291 306 €	0 €	C, I
	T 3-M4	Regular maintenance of rivers	Local Communities	0 €	0€	538 759 €	C, I
	T 3-M5	Management of lakes	Local Communities	0 €	0 €	0 €	C, I
	T 3-M6	Acquisition of wetlands	Local Communities	1 564 439 €	2 660 689 €	0 €	C, I
			Total Cost	**26 119 916 €**	**45 671 550 €**	**538 759 €**	
Sanitation	T2-M1	Optimisation of the wastewater treatment plant (treatment)	Local Communities	22 819 470 €	38 593 341 €	3 763 803 €	I, R
	T2-M2	Optimisation of wastewater networks (networks)	Local Communities	83 972 031 €	141 739 048 €	1 344 245 €	I, R

	T2-M3	Introduction of a suitable network, to be defined (shared or non-shared)	Local Communities	13 266 458 €	22 110 763 €	271 311 €	I, R
			Total Cost	**120 057 959 €**	**202 443 152 €**	**5 379 359 €**	
Industry and small businesses	T2-M4	Reinforced prevention of accidental spill	Industries	72 000 €	120 000 €	0 €	I, R
	T2-M5	Clean technology	Industries	4 424 045 €	7 970 000 €	388 000€	
	T2-M6	Improved collection and treatment of industrial discharges	Industries	26 417 168 €	50 151 000 €	6 424 000 €	I, R
	T2-M7	Management and treatment, if necessary, of contaminated industrial sites	Industries	300 000 €	500 000 €	0 €	I, R
	T2-M8	Control of rain pollution of industrial origin	Industries	0 €	0 €	0 €	I, R
	T2-M9	Reduction of emissions of toxic substances by small businesses (general mechanics, silk-screen printing, automobile mechanics, surface treatment)	Small Businesses	8 296 537 €	13 873 766 €	5 051 901 €	I, R
	T2-M10	Reduction of pollution from chlorides	Industries			367 045 €	I, R
	T2-M11	Reduction of emissions of chloride solvents	Industries and Small Businesses	5 130 797 €	8 756 580 €	169 651 €	I, R
	T2-M12	Studies, awareness and education	Industries and Small Businesses	1 266 777 €	2 142 400 €	0 €	I, R
			Total Cost	**45 907 326 €**	**#N/A**	**#N/A**	
Agriculture	T2-M13	Upgrading of farm buildings	Farmers	6 003 315 €	10 060 062 €	0 €	R
	T2-M14	Securing premises likely to contain liquid nitrogen fertilizers	Farmers	673 920 €	673 920 €	0 €	I, R
	T2-M15	Reduction of diffuse pollution from agricultural practices (nitrates and pesticides)	Farmers	4 620 000 €	193 837 644 €	0 €	C, I
			Total Cost	**11 297 235 €**	**204 571 626 €**		
				203 382 436 €	**536 200 074 €**	**18 318 716 €**	

* This column describes the way in which the measures will be implemented --> C : Contractual ; I : Financial Incentive; R : Statutory

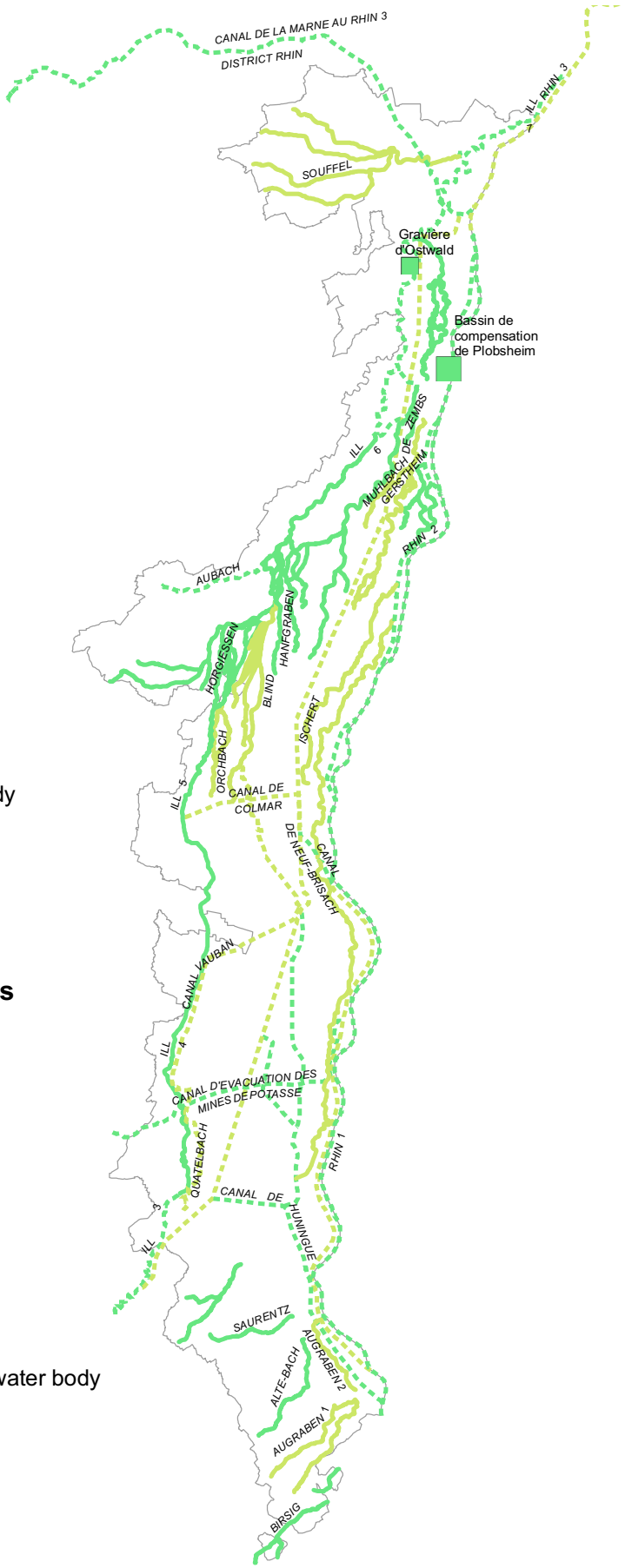
OVERALL STATUS OBJECTIVES
SURFACE WATER BODIES
ELEMENTARY BASIN

III – Rhine – Groundwater

N

Kilometres

0 10 20



Rivers

Objectives

- "Good status" objective 2015
- Deadline Postponement
- Less stringent objective

Origin of water bodies

- Natural water body
- Artificial water body or significantly modified water body

Lakes

Objectives

- "Good status" objective 2015

Size and origin of water bodies

- from 0.5 to 1 km²
- from 1 to 10 km²
- from 10 to 100 km²

- Natural water body
- Artificial water body
- Significantly modified water body

AGENCE DE L'EAU RHIN-MEUSE

WATER FRAMEWORK DIRECTIVE – SDAGE

RHINE RIVER BASIN DISTRICT