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Control of industrial discharges and emissions

A description of discharge and emission control in Nordrhein-Westfalen (DE), Flanders and the Walloon region (BE) and the Netherlands

Colophon

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Preface

Quick reading note

- This report aims to provide insight into the ways in which industrial emissions (to the air) and discharges (into the water) are controlled in NRW (DE), Flanders and the Walloon region (BE) and the Netherlands.
- Separate chapters contain full descriptions of the different countries and regions (chapters 2 to 4 and Annex A). These chapters all have the same structure.
- Each of these chapters opens with a summarising introduction.
- The final chapter (5) provides a comparative overview.
- For optimal access to all underlying legal and policy documents and monitoring data, the references in the annexes in the report (as well as most of the figures in this report) are linked to the URLs of the source material.

This report deals with the way in which industrial emissions (to the air) and discharges (into the water) are controlled in NRW, Flanders, the Walloon region and the Netherlands. This is a complex and extensive subject matter, touching on a lot of different legislative, policy and organisational topics. In each of the countries, several experts are involved in parts of these control activities. Often, even for them it is not easy to get a proper overview of all aspects that play a role. Since this report is the result of a first, modest exploration, it goes without saying that the descriptions can only touch on the surface of so many aspects. Also, not on all topics the description is equally extensive between the different regions, due to differences in the availability of easily accessible source material and of experts that were willing and able to point to the right sources (a certain lack of which, in the end, also led to the decision to include the Walloon chapter as an annex to this report) . So, this report must be considered as a first, broad overview. Hopefully it will still prove to be helpful to get a first impression and to improve understanding between authorities in the neighbouring countries. Possibly, it may also help to lead the way to important follow-up questions.

Many thanks are due to the people who helped to obtain this overview. Thanks to the German, Belgian and Dutch experts who helped to get an understanding of the issues at hand and who were prepared to answer questions that were sometimes too obvious and sometimes impossible. Their names are listed in the annexes to this report. Thanks to all those who helped to locate the right experts, which proved not always to be an easy task either. And finally, thanks to the policy makers at I&W and the experts of RIVM for all the guidance and help.

Despite all the assistance that was offered, it is still possible that this report contains mistakes. If so, they are the sole responsibility of the author.

Dr. Kees Le Blansch
Den Haag, 22nd July 2019

1. Introduction

1.1 Background of this study

In 2017 Bureau KLB and Ameco were commissioned by Ministry of I&W[1] and the RIVM[2] to carry out a study project to investigate national policies on substances of concern in six selected EU Member States,[3] including Belgium and Germany. As the study's focus was on 'policy efforts that extend beyond, give concrete interpretation to or get ahead of EU and global obligations with regards to substances of concern', its emphasis was on national (and federal and regional) policies, and less on the actual practical side of control of emission and discharge of substances of concern.

Dutch policy makers have a clear interest in understanding the way the control of industrial emissions and discharges is organised and effected elsewhere, and particularly so in the neighbouring countries (BE and DE), if only because the flow of rivers (the Rhine, the Meuse) and the floating of the air do not stop at national borders. Insight into control policies and practices can help to learn from each other's examples and experiences, to pinpoint possible (mis-) matches between national approaches and to know whom to address in the neighbouring countries in case questions or issues arise.

For these reasons Bureau KLB has been commissioned by the ministry of I&W and RIVM to carry out a follow-up study with a focus on emission and discharge control in BE and DE. This report contains the results of this study, that was performed in the last months of 2018 and the first of 2019.

1.2 Purpose of this study

The purpose of the study project was stated as follows.

> The purpose of the project is to provide insight into the ways in which industrial emissions (to the air) and discharges (into the water) are controlled by the (national, federal, regional and/or fluvial) authorities in relevant parts of Belgium and Germany (with an eye to improved understanding and possible exchange between these authorities and those in the Netherlands).

There are some additional remarks to be made in relation to this formulation of the project's purpose.

- The phrase 'relevant parts of Belgium and Germany' refers to those parts of these countries that share most of the water streams and/or air flows with the Netherlands. In this sense, for Belgium both the Flanders (Scheldt; air) and Walloon region (Meuse) are relevant; for Germany this mainly concerns Nordrhein-Westfalen (Rhine; air).
- In order to enable the authorities and informants in the different countries to learn about the outcomes of this study in the other country (or –ies), the working language has been English from the outset.

[1] Dutch Ministry for Infrastructure and Water Management
[2] National Institute for Public Health and the Environment
[3] Le Blansch, C., R. Kleinjans and J. à Campo; *National Policies on substances of concern*. Bureau KLB, 2017.

– Given the underlying objective of mutual learning and exchange, the Dutch emission and discharge control is also described in order to enable an equally footed exchange with the counterpart countries.

It has been noted beforehand that, although the overall goals and leading questions of this study (see next section) are the same for all countries, it is to be expected that for deeper insight into country-specific control practices, different follow-up questions and diverse study methods may need to be applied. This study is therefore to be considered a first step, in which the different countries are approached in the same way and with the same basic questions, leading to similar general overviews. Possibly, afterwards country-specific follow-up questions may be answered with the use of appropriate, tailored study methods.

1.3 The study questions

As was said above, in the first part of the study the different countries are approached in the same way with the same basic questions. In order to get a full understanding of the way in which the control is organised and effected, the questions address framework, organisation and execution issues. Below a general indication is given of the questions that have guided the study.

Questions on framework
Within the framework of the WFD and IED[4] and beyond (based on federal, national and regional initiatives):

– Which (additional) national legislation governs the industrial emissions and discharge control for substances of concern?
– Which (types of) industrial emissions and discharge limit values are used, based on what data / criteria?
– What are the 'ultimate' control goals? (e.g. not exceeding limit values? emission reduction? zero emissions?). In what way is emission minimisation effected? (Best Available Techniques (BAT), otherwise?). To what extent and in which way is a source approach applied? (aiming to reduce risks by measures at source, e.g. through substitution). Is this linked to the permit system?
– What substance(s) (groups) are distinguished, addressed and prioritised?
– Which target groups (types of companies, industry sectors, companies in specific areas) are distinguished?
  • Specifically for emissions to air?
  • Specifically for discharges to water?
– Is there a link with drinking water policies, e.g. protection of drinking water intake points?
– Are there links/relations between the control activities and REACH, CLP on legal and/or policy level?

Questions on organisation
Within the framework of the WFD and IED, and beyond (based on federal, national and regional initiatives):

[4] WFD: Water Framework Directive (2000/60/EC); IED: Industrial Emissions Directive (2010/75/EU)

- What instruments are used for emission and discharge control? (e.g. general rules, permits, financial regulation). (How) is this different for different environmental compartments? (air, water, soil, waste)
- Which roles are distinguished and performed by whom, when it comes to:
  - Granting of permits
  - Monitoring and supervision
  - Enforcement
- Which sanctions can be used, by whom and when (e.g. can industrial emissions be prohibited and/or activities be halted?)
- (How) does monitoring take place of industrial emissions and discharges? Of the impact of control and reduction measures? Of environmental quality?

Questions on execution
- Which numbers of personnel and amounts of budget are allocated to the different control activities? Which costs are paid for by companies? (e.g. for deriving limit values?).
- How many companies from which target groups are being controlled? How often (times per year) are inspections taking place?
- Which types of industrial emissions and discharges have required the most attention and why? Accidents? Which bottlenecks are encountered? What lessons have been learned, what new solution have been developed?

1.4 Method of the study

As mentioned above, for this study countries/regions have been approached in the same way and with the same basic questions, in order to obtain similar general overviews.

The general approach of the study consisted of five steps.

1. Identification of, and contacting informative contact persons
First, for all regions contact persons were identified who could guide the study towards the right legal, policy and monitoring documents. It turned out that in all regions different contact persons were needed for the industrial discharges (water) and emissions (air) domains, since these appear to be quite different fields of expertise. Besides, in several cases information on legislation, policies, permitting and inspection practices was to be found in different departments, often also involving different informants.

In most of the regions there was a clear interest in participating in this study and engaging in mutual exchange of information. However, due to organisational and capacity issues not all regions were able to participate as intensively. Particularly in the Walloon region it proved to be almost impossible to identify a suitable and available contact person to guide the study into the control of industrial discharges in the Walloon region. In the end, this has led to the decision to include the Walloon chapter as an annex to this report.

The Dutch reference chapter has been written by Lise de Boer from RIVM, in close cooperation with the author of this report.

All in all, the following number of contact persons have been involved.

	Informants	**Interviewees**
Nordrhein-Westfalen, DE	4	4
Flanders, BE	4	2
Walloon region, BE	1	-
The Netherlands	1 Author of the reference chapter	

2. First scan on relevant legislation and policies
With the assistance of the contact persons, the most relevant legal, policy and monitoring documents and internet sources were located. They were used to distil first general answers to the study questions. Subsequently, the available information was summarised in a schematic overview (in PowerPoint), showing both preliminary answers to the study questions, follow-up questions and still blank spaces.

3. Checks and follow-up questions
These schematic overviews, follow-up and open questions were shared with the contact persons, for them to check the proper understanding of the national/regional system and to add additional or new information were required. In some regions this exchange happened only once; in other regions questions, answers and follow-up questions went to-and-fro several times.

4. Interview with contact persons
By the time the overall picture was more or less clear, an appointment was made for an interview (if possible). In this interview some final open issues were discussed, and a more general insight was obtained into the backgrounds, peculiarities and experiences with the regional systems and practices.

5. Reporting, final check on definitive text and comparative overview
The final step consisted of the drafting of the overall report (= this report), including a final comparative overview chapter; of distributing the final overview chapter to all contact persons for a final check; of discussing the draft overall report with the commissioning organisations (ministry of I&W and RIVM); and of processing all comments, suggestions and additional information into the final version of the report.

1.5 This report

The following three chapters describe the control of industrial discharges and emissions in Nordrhein-Westfalen (DE) (chapter 2), Flanders (BE) (chapter 3) and The Netherlands (chapter 4). Since for the Walloon region on certain aspects (inside) information is missing and/or information has not been checked by national experts, it has been decided to include the chapter on the control of industrial discharges and emissions in the Walloon region as Annex A to this report.
The three chapters and Annex A all have the same structure, and deal with (a) the general background and legal framework of the emission control, (b) the way in which industrial discharges to water and (c) industrial emissions to air are controlled; and (d) the way in which environmental inspections on these emissions takes place.

Chapter 5 contains the comparative overview. It briefly describes in a comparative way the legal frameworks, the control of industrial discharges to water, the control of industrial emissions to air; the environmental inspection, the availability of public information and the issues and priorities in the different regions/countries.

At the end of the report there are four additional annexes (B to E), one for each studied region, that contain lists of consulted experts, an overview of the literature and documents that were studied, as well as links and URLs of websites where all these legal, policy and monitoring documents and information can be found.
Annex F provides explanations of the abbreviations that are used in this report.

For optimal access to all underlying legal and policy documents and monitoring data, the references in the annexes in the report (as well as most of the figures in this report) are linked to the URLs of the source material.

2. Control of industrial discharges and emissions in Nordrhein-Westfalen (NRW, DE)

2.1 Main features

Main features of the control of industrial discharges and emissions in Nordrhein-Westfalen (NRW, DE) are:

- Longstanding tradition of environmental regulation, strong in expertise and relatively well-staffed and resourced
- Two separate legal bases for control of industrial discharges to water and for control of industrial emissions to air
- The basis for control of industrial discharges to water lies in three laws:
  - The Law on Water Management; requiring permits for discharging to water
  - The Wastewater Regulation; with 57 annexes with wastewater emission limits and requirements for 57 sectors and branches
  - The Surface Water Regulation; with surface water quality standards
- The basis for control of industrial emissions to air lies in one law, the Federal Law on Immission Protection. It prescribes permit and monitoring requirements, as well as an obligation for companies to issue emission declarations (apart from EU obligations).
  - This law comes with – at present – 35 regulations, one of which (nr. 4) describes in detail which type of facility requires what type of permit.
  - Technical instructions for permits, including immission and emission limits, are elaborated in a guidance document, TA Luft.
  - Emission of all CMR and PBT substances to air must be limited as much as possible.
- Emission limits to water and air can be tightened in case the additional load of discharges or emissions exceed immission limits or environmental quality standards.
- Water quality is monitored rather intensively by authorities, also for historical reasons. There are several requirements for companies to monitor emissions to air. In future companies must also carry out and pay more for monitoring discharges to water.
- Environmental inspections take place according to risk-based planning and are cross-media (water, air, soil, etc.)
- All individual inspection reports are made public. The same holds true for (public) monitoring data. The practice of making permits public is developing.

2.2 General background and legal framework

2.2.1 General background of the way in which industrial discharges and emissions are controlled in NRW

Historically, NRW is both an industrial and a densely populated area. The German industrialisation started in NRW. As an example, the first blast furnace in Germany was located at Aachen (NRW). Consequently, NRW was one of the first regions *('Länder')* that had to face environmental problems caused by industry. This gave rise to early NRW state intervention. NRW was one of the first *Länder* that introduced legislation on emissions and discharges, and later also on odour. These regulations were later 'exported' to other

German *Länder*. Thus, the NRW authorities have a long-standing expertise in dealing with industrial emissions and discharges.

NRW is still an industrial area, with mainly (heavy) chemical industry and brown coal power stations. Twenty percent of the German industry is located in NRW. When it comes to controlling industrial emissions and discharges, the authorities still have a lot of expertise in this area, as well as a lot of cooperation with external experts. For example, TüV shares all soil and groundwater measurement data (also from privately commissioned measurements). Expertise is passed on relatively well to new colleagues within NRW (although it is remarked that knowledge management could be improved).

The resources and personnel capacities of the NRW environmental authorities are relatively good.[5] In the latest decennia, additional staff was hired in relation to requirements related to the implementation of the IED and following on a number of industrial accidents. Inspection capacity was a political priority of the *'Grünen'*; when this party entered NRW government, inspection capacity was enlarged with 100 additional staff members. All in all, recent years have brought 300 extra personnel for inspection in NRW.

At present, there is some political pressure to speed up the permitting process. A successful pilot was held in NRW, which showed that for speeding up the process no change in or simplification of regulation is required. First and foremost, it requires a different type of interaction, with more capacity, expertise and commitment from both sides (authorities and enterprises).

2.2.2 A common legal basis for the control of industrial discharges and emissions in NRW?

In Germany, the overall regulation of industrial discharges and emissions is Federal. Additional regulation (on issues that are not covered by Federal law), execution (i.e. permitting, monitoring) and inspection are the competence of the *Länder*.

The control of industrial discharges and the control of industrial emissions have separate legal bases. Facilities with emissions to air and discharges to surface water, must have two types of permits.

- Principally, the Law on water management *('Gesetz zur Ordnung des Wasserhaushalts')* prescribes the requirement of a permit *(called 'Erlaubnis'* or *'Bewilligung')* for making use of waters (*'Benutzung eines Gewässers')*. This will further be described in the next paragraph (2.3).
- The Federal Law on Immission Protection (the *'Bundes-Immissionsschutzgesetz')* prescribes which facilities require which type of permit (called *'Genehmigung')* to ensure prevention of pollution and nuisance (concerning air pollution, noise, vibrations and similar aspects), precaution, prevention and reuse of waste and energy saving. This will further be described in paragraph 2.4 of this report.

[5] In a report of the *Umwelt Bundesamt* (UBA, texte 21 / 2018) it is stated that: "Resource and personnel capacities as well as a lack of expertise in the competent authorities are two of the biggest problems in emission protection. While authorities are quick to issue permits for industrial facilities, the regular monitoring of facilities is insufficient in several federal states, due to a lack of capacity." It appears, however, that this conclusion does not apply to NRW.

2.3 Control of industrial discharges to water in NRW

2.3.1 Legal basis

The three laws providing the legal basis for the control of industrial discharges in NRW are (1) the Law on water management *('Gesetz zur Ordnung des Wassershaushalts')*, (2) the Wastewater regulation *('Abwasser-Verordnung')* and (3) the Surfacewater regulation *('Oberflächengewässer-Verordnung')*.

(1) The Law on water management ('Gesetz zur Ordnung des Wassershaushalts'; WHG) is the main German law on general water management. As mentioned above, this law prescribes the requirement of permits for making use of waters (§ 8, 1). One defined type of 'making use of waters' is the introduction and discharging of substances into waters (*'das Einbringen und Einleiten von Stoffen in Gewässer'*) (§ 9, 4). The WHG states that permits must be denied if the intended use leads to (expected) harmful changes in the water (that cannot be avoided or compensated) (§ 12, 1). Also, permits must be denied if the use takes place in a water protection area or in an intake area for public water supply (§ 13a, 1). An exception to this is made for the Rhine. However, for drinking water intake from the Rhine drinking water companies must comply with the strictest purification requirements.

(2) The Wastewater regulation (*'Abwasser-Verordnung'; AbwV*) specifically regulates the discharge of industrial wastewater. Its requirements can be included in a permit, but the monitoring values (limit values) are in any case directly applicable for each facility (*'unmittelbar'*). As a basis, it only allows wastewater to be discharged when the pollutant load is kept as low as possible (through specified wastewater treatment measures, excluding dilution).

The largest part of the regulation consists of 57 annexes containing requirements for 57 (mostly industrial) sectors and branches, including limits for discharges of relevant substances (at the discharge point). Each annex describes for a separate sector (for as far as applicable):

a) The scope of application
b) General requirements (on top of the above)
c) Wastewater requirements for the discharge point (concentration and load limit values and other requirements)
d) Requirements for wastewater before mixing
e) Requirements for sampling at the place where the wastewater is produced
f) Requirements for existing discharges (from plants legally operating before 1 June 2000)
g) Operator obligations (*'betriebliche Pflichten'*) (e.g. monitoring, sampling, analytics) (especially obligations following from the IED)

Figure 1 provides an impression of the sectors and branches to which the annexes apply.

Next to these sectoral requirements, the AbwV defines measurement procedures for more than 100 different parameters (mainly DIN and ISO norms (elaborated in *Anlage 1*)). It also requires that compliance to the AbwV is documented in an operational wastewater register, in an operation diary or in another appropriate way. Anlage 2 of the AbwV contains specific requirements for such documentation.

Figure 1. Examples of the annexes of AbwV

(3) The Surfacewater regulation *('Oberflächengewässer-Verordnung'; OGewV*) aims to protect surface waters and to enable an economic analysis of uses of the water. The OGewV also embodies the transposition of the Water Framework Directive (2000/60/EC), as well as (older) water quality legislation and (priority) substances directives). The regulation includes prescriptions for:

- Location, boundaries and allocation of surface water bodies
- Identification of pressures and impacts of water pollution and assessment of its effects
- Classification, monitoring and presentation of:
  - Ecological status
  - Ecological potential
  - Chemical status
  - Substances on the observation list

2.3.2 Classes of permits and facilities

As far as discharges to water are concerned, no distinctions are made in terms of classes of permits (*'Erlaubnis'* or *'Bewilligung'*). Facilities are categorized into 57 branches or sectors (see above).

2.3.3 Categories of substances

In the 57 annexes of the AbwV large varieties of substances and substance groups are listed that are to be expected in the wastewater from the source (*'die bei der jeweiligen Branche im Abwasser zu erwarten sind'*). No specific hazard related categories are distinguished, however.

Annex 6 and 8 of OGewV contain the environmental quality standards for a large amount of substances; Annex 6 deals with river basin specific pollutants to assess the ecological status and the ecological potential and concerns 67 substances. Annex 8 deals with the

assessment of the chemical status and concerns the priority (hazardous) substances from the European priority substances directive. Some of the latter substances are categorized as ubiquitous substance. According to the interviewed experts, originally, Germany had its own lists of substances for which such standards were determined. Part of these are now (also) prescribed by EU.

2.3.4 Limits to discharges

Primarily, the emission limit values for industrial discharges to water are defined by the AbwV. The concentration and load limit values in the annexes concern (groups of) substances that are relevant for the respective sectors. According to the interviewed experts, analysis has shown that in principle all relevant (groups of) substances are covered. Sometimes extra analyses are required from *'Einleiter'* (dischargers), which in turn may lead to extra technical or monitoring requirements

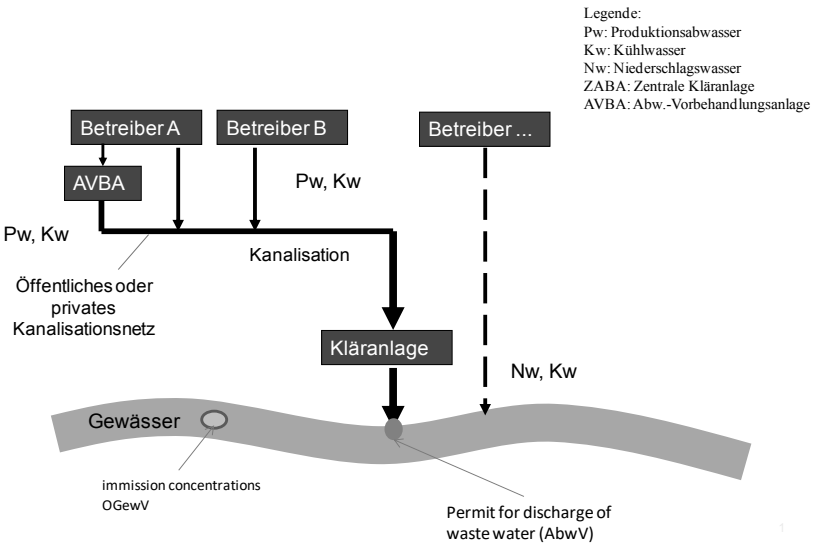
Figure 2 provides an example of the sectoral requirements in the annexes of the AbwV. The example is annex 24 (marked in yellow), that concerns the sector for iron, steel and malleable foundry *('ijzer, staal en smeedwerk gieterijen')*.

Figure 2: Illustration: requirements of annex 24 of AbwV concerning the sector for iron, steel and malleable foundry

The AbwV limit values are fixed general emission limits, independent of the waters to which the wastewater is discharged. However, the facility specific limit values in the permit (the *'Erlaubnis'*) are based on a combination of emission and immission requirements. Therefore, they can be stricter. Particularly for smaller receiving waters, immission limits (environmental quality standards; EQS) are also taken into account. For smaller waters with a known preload, measurements are carried out after the discharge point in order to determine the potential impact on the ecological or chemical status. For waters where preload is not known and/or there are no EQSs, measurements above and below the discharge point are required in order to establish additional load and causality. If the discharge leads to a degradation of the ecological or chemical status as compared to the environmental quality standard (as defined in annex 6 and 8 of OGewV), stricter emission limits are included in the permit.

Figure 3 illustrates the relation between AbwV (on discharges) and OGewV (on immission).

Figure 3. Basics of wastewater disposal in NRW / Germany



2.3.5 Monitoring of discharges and of water quality

Monitoring of discharges and water quality takes place on behalf of authorities, of dischargers and through self-monitoring by the owners of sewer systems.

In NRW water quality is intensively monitored on behalf of the authorities, by laboratories that do both the sampling and analytics. The intensive monitoring and the presence of plenty of specialised laboratories have their historical background in the sewage financing system. In this system the discharger (*'Einleiter'*) pays for discharging on the basis of quantity (m^3) and quality (*'Schadstoffen'*) of the wastewater. Next, if applicable and possible, he passes these costs on to the households and enterprises. These payments are also used to finance the laboratories. At present, these laboratories also measure water quality (e.g. for the Water Framework Directive)

Monitoring of discharges takes place according to prescriptions in the permits, with a legal basis in the Water Resources Act and the 'Landeswasser Act'. This is either done by (institutes commissioned by) dischargers (sampling and analysis by external private laboratories), or on behalf of authorities by the laboratory of NRWs *LANUV*.[6] According to the interviewed experts, in the past the public laboratories have provided monitoring support (on behalf of the authorities) as much as possible. In the future, however, more burden will be laid on the shoulders of dischargers *('Einleiter')*, who will have to carry out the monitoring themselves (and will also have to pay for the costs).

The self-monitoring of sewer systems in NRW is regulated by the *'Selbstüberwachungs-Verordnung Abwasser'*. This is the NRW regulation that obliges public owners of *('kommunale')* sewer systems and private owners (industry; particularly industry-parks) to self-monitor the state and functioning of the sewers. It prescribes
- The systems, scope, frequency, method and quality of the monitoring
- The way monitoring data (Überwachungsbericht') must be documented and kept
- The need of repair of sewage systems
- Expertise ('Sachkunde') requirements

A regulation for self-monitoring of industrial discharges and wastewater treatment plants is yet to be developed.

2.3.6 Priorities and issues

At present there are several priorities in discharge control:
- Pyrazole
- Perfluoro compounds
- Pharmaceuticals
- Legionella

An important issue is the fact that the annexes of the AbwV must be adapted to new technical and emission standards (e.g. BAT conclusions). This is done by a 'Bundes'-working group in a legislative operation. However, progress is slow and delayed, amongst others because of stakeholder involvement. There is, however, an institutional fallback option. If EU BATs are not included in AbwV within 4 years after their conclusion, they become directly applicable via EU law (based on the strictest values).

2.4 Control of industrial emissions to air in NRW

2.4.1 Legal basis

The law providing the legal basis for the control of industrial emissions to air in NRW is the *Bundes-Immissionsschutzgesetz (BImSchG)* (= Federal Law on Immission Protection). This law is operationalised in several *Verordnungen zum BImSchG* (= regulations on BImSchG). Technical instructions for air pollution control (with guidelines for granting permits and requiring measures) are provided for by the *Technische Anleitung zur Reinhaltung der Luft (TA Luft)*. BImSchG and its regulations are directly applicable to the facilities and activities they target; TA Luft is applied through permit requirements.

[6] *Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein-Westfalen*

(1) The Federal Law on Immission Protection *(Bundes-Immissionsschutzgesetz (BImSchG)*) prescribes which facilities require which type of permit (called *'Genehmigung')* for (amongst other activities)[7] their construction and operation, in order to ensure pollution and nuisance prevention (concerning air pollution, noise, vibrations and similar aspects), precaution, prevention and reuse of waste, and energy saving. BImSchG also serves to implement the IED (2010/75/EU) in Germany.

Permits as prescribed by BImSchG (can) contain:
- Technical requirements
- Limits for emissions *(referral to decree (i.e. TA Luft) and IED)* (and conditions for energy use)
- Requirements related to limits for immissions
- Proofs of safety
- Requirements for restoring environmental conditions
- Plus: requirements following from BAT

BImSchG determines that facilities can be ordered to carry out measurements of emissions, either at the start of operations and at intervals (every 3 years), or continuously (see further paragraph 2.4.5 of this report). Also, BImSchG states that facilities can be ordered to provide an emissions declaration, starting from 2008, every 4 years.

N.b.: The BImSchG 'emissions declaration' is not the same as the E-PRTR declaration that is required from companies all over the EU. These declarations have different backgrounds, requirements and timing. Some companies must produce both (and other) declarations.

Finally, BImSchG determines that the Federal government decides on immission and emission limits and on procedures to measure/determine emissions and immissions. This, in fact, concerns the TA Luft.

(2) There are 35 regulations related to BImSchG *(Verordnungen zum BImSchG)*, numbered from 1 to 43, with some numbers obsolete; nr. 44, which will transpose the EU MCP Directive (EU 2015/2193) into German law, is in preparation.[8]

Some BImSchG regulations are fundamental for the operation of the German emission control system.
- One important example is Regulation 4 that determines which types of facilities require which types of permit (*'genehmigungsbedürftige Anlagen'*) (see paragraph 2.4.2 below).
- Another example is Regulation 11, that determines which types of facilities must provide what type of Emission declaration (specified subgroups of permit-requiring facilities; a requirement to report on specified classes of substances (i.e. all substances with emissions limits); to be declared when emissions are above specified mass flows).

[7] These activities include the manufacture, placing on the market and introduction of installations, fuels and substances; equipment, operation and testing of motor vehicles and their trailers and of rail, air and water vehicles and the construction of public roads, railways trams.
[8] See: http://dip21.bundestag.de/dip21/btd/19/040/1904080.pdf

Other regulations concern the implementation of EU Directives, sector-specific requirements or procedural prescriptions.

(3) The technical instructions for air pollution control *(Technische Anleitung zur Reinhaltung der Luft; TA Luft)* is one of the older technical guidance's in Europe for granting permits and requiring measures. As such, it has been adopted as a model by several other countries (including the Netherlands and Flanders). The TA Luft is a so-called *Verwaltungsvorschrift*. It is not directly applicable to facilities but is applied through permit requirements.

Some important elements of TA Luft for control of industrial emissions are:
- It defines immissions
  - In units of mass concentration or deposition; in year, day or hourly values
- It defines emissions
  - In units of mass concentration, mass flow, numbers of fibres, emission factor or odour concentration
  - Emission values are the basis for emission limits
- It describes requirements for establishing *'protection of the environment':*
  - Immission limits
  - Requirements for determining pre-, additional and total load
  - Evaluation of immissions by comparison with immission limits
  - Plus check on special circumstances
- It describes requirements for establishing '*precaution against harming the environment':*
  - Emission limits that can be met with state-of-the-art technology
  - Conditions for limiting emissions, in accordance with state-of-the-art technology
  - Other precautionary measures to prevent harm from air pollution (Procedure for determining emissions and requirements for deduction of exhaust gases). (N.b.: the National Emission Ceiling Directive (2016/2284/EU) can lead to additional requirements (i.e. *de facto* lower emission limits)
- It describes special regulations for certain types of facilities

2.4.2 Classes of permits and facilities

BImSchG determines that there are three types of facilities, requiring either regular (G)[9] or light (V)[10] permits, or no permit at all *('Nicht genehmigungsbedürftige Anlagen';* BImSchG, *zweiter Teil, zweiter Abschnitt)*.

BImSchG Regulation 4 concerns facilities requiring permits *('Verordnung über genehmigungsbedürftige Anlagen')*. It mainly consists of a long list of (more than 500) types of facilities and indicates for each type of facility whether a 'G' or 'V' permit is required, as well as whether requirements from the IED apply.

Figure 4 provides an impression of the way in which Regulation 4 indicates permit requirements (page 7 of 32).

[9] G: *Genehmigungsverfahren gemäß § 10 BImSchG;* permit procedure according to § 10 BImSchG (with public participation)
[10] V: *Vereinfachtes Verfahren gemäß § 19 BImSchG;* Simplified procedure according to § 19 BImSchG (without public participation)

Figure 4. An impression of the structure of BImSchG Regulation 4 (page 7 of 32)

Next to these fixed categories, there are some borderline cases. This is the case when federal laws are absent or not applicable. These cases must be regulated at national – *'Länder'* – level. Examples of such cases are:

- 'small emission control': for example, community events (fireworks, local festivals)
- 'new' emission sources, like wind turbines lower than 50 meters
- 'new' types of facilities not mentioned in BImSchG regulation nr. 4. Real examples of the latter are: bio-processors, a company that burns plastic for recycling purposes, or a company that prepares batteries for re-use.[11]

There are different ways how the authorities deal with such borderline cases. In case the company requires a permit (in accordance with BImSchG regulation nr. 4) an impact report *('Gutachtung')* can be required. In case the company itself orders a consultancy firm to analyse its potential environmental impact, this report can be used to assess the facility's potential emissions. One can also look for process steps in the company's production process that are covered by BImSchG regulation nr. 4. Finally, when a company and its processes are not described in regulation nr. 4, there is little to be done (except applying building regulations).

2.4.3 Categories of substances

As was described before, Ta Luft describes on the one hand requirements for establishing *'protection of the environment'* (including immission limits), and on the other hand requirements for establishing '*precaution against harming the environment'* (including emission limits that can be met with state-of-the-art technology). Chapters 4 and 5 of TA Luft contain descriptions of these requirements for several categories of substances.

Chapter 4 of TA Luft gives overviews of substances for which immission limits are prescribed in order to protect the environment. They are firstly categorized according to the reasons or purposes of the requirements, and secondly to their respective levels of hazard

[11] For old batteries and plastic that fall into the 'waste'-category, article 8.11 of BImSchG regulation nr. 4 applies.

or nuisance. The reasons or purposes of the requirements (and the substances that listed) are:

- Protection of human health (e.g. benzene and lead)
- Protection against considerable nuisance or disadvantages due to dust precipitation (dust deposition)
- Protection against considerable disadvantages, in particular protection of vegetation and ecosystems (sulphur dioxide, nitrogen oxide, fluor hydrogen; ammonia)
- Protection against harmful environmental effects through pollutant deposition (e.g. arsenic, lead, cadmium)

Figure 5 presents an example of an excerpt of substances with immission values to protect human health.

Chapter 5 of TA Luft gives overviews of substances for which emission limits are prescribed in order to establish precaution against harming the environment. They are firstly categorized according to their physical or chemical characteristics or the types of their hazards, and secondly to their respective levels of hazard or nuisance. Their categories are:

- Dust, including particulates (no classes)
- Dusty inorganic substances (3 limitative classes, plus CMRs*[12] in class III)
- Dusty emissions during handling, storage or processing of solid substances (no classes)
- Gaseous inorganic substances (4 limitative classes)
- Organic substances (2 limitative classes) (plus CMR, PBT, OEL < 25 mg/m3 or strongly odorous in class I)
- Gaseous emissions during processing, conveying, transfer or storage of liquid organic substances (no classes)
- CMR*[12] and PBT substances: emissions must be limited as much as possible ('Emissionsminimierungsgebot'; see next paragraph).
  - Carcinogenic substances in 3 non-limitative classes
  - Carcinogenic fibres in 3 types
  - Mutagenic, reprotoxic and PBT (no classes)
- Highly odorous substances (no classes)
- Soil-polluting substances (no classes: Pb, Cd, Ni, Hg) (like in IED; based on emission values, not of soil quality values (e.g. 'baseline report')).

Figure 5. Example of substances with immission values; 'to protect human health'

Figure 6. Example of gaseous inorganic substances with emission values

[12] CMR* refers to substances that are carcinogenic, mutagenic or reprotoxic according to CLP, and/or according to TRGS 905, annex of 67/548/EEG and GefStoffV, or as assessed by recognized scientific bodies.

Figure 6 presents an example of an excerpt of gaseous inorganic substances with emission values.

2.4.4 Limits to emissions

Similar to the emission limits for discharges to water, TA Luft emission limit values are fixed general emission limits, independent of the air into which the emission takes place. However, in cases of emissions above a certain level, immission values must be considered as well. These 'certain levels' are described in TA Luft as 'trivial mass flows' *('Bagatellmassenstromen')*. With point emissions below these values (and diffuse emission below 10% of these values) there is no requirement to calculate immission values.

For cases in which emissions are above these 'trivial mass flows', TA Luft describes how to measure/determine pre- and additional load. If the immission resulting from preload and additional load is below the limit value (on year basis, and with converting calculations also on daily and hourly basis) the facility is compliant. If the sum of preload and additional load leads to exceedance of the immission limit, additional technical measures are required (prescribed in a quasi-annex to the permit). In the extreme case that an immission limit proves not to be attainable, a permit can be revoked. According to § 20 BImSchG, the operation is to be prohibited in whole or in part in the case of an immediate risk to human health or an immediate significant threat to the environment. In practice, however, this hardly ever occurs.

For 'other' air polluting substances (= substances without limit value), TA Luft prescribes that examinations whether harmful environmental effects are caused, must be carried out if there are sufficient indications for this (and describes procedure). In practice, this happens mostly in case of complaints.

As was described in the previous paragraph, for CMR*[12] and PBT substances, emissions must be limited as much as possible. This is the co-called *'Emissionsminimierungsgebot'*. In practice, this 'Emission minimisation command' is implemented by including a limit value in the permit, together with an *'Überprüfungspflicht'* ('review duty'). In general, this is not continuously inspected or supervised by the authorities. Also, the substitution principle applies. However, there usually is a strong(er) substitution pressure from occupational health protection *('Arbeitsschutz')*.

Pending permit applications are published on the internet site of the *Umweltportal NRW*.[13] At present, they only concern permits where the regional government *('Bezirksregierung')* is the competent authority. In time this will be extended. At the website of the regional government of Köln permit documents can be found for those cases in which public participation was part of the approval process.[14]

[13] See: https://www.umweltportal.nrw.de/genehmigungsverfahren
[14] See: https://www.bezreg-koeln.nrw.de/brk_internet/verfahren/index.html

2.4.5 Monitoring of emissions and of air quality

Where the monitoring of air quality is concerned, BImSchG prescribes that the authorities are to monitor the quality of the air on a regular basis. The governments of the *Länder* can decide by regulation on the geographical areas that are to be monitored. Monitoring data are made publicly available on the internet.[15]

A good overview of the monitoring of emissions that is to be done by or on behalf of emitting facilities is provided in the report 'Air Pollution Prevention – manual on emission monitoring' (UBA-FB 00 10 90; 2008), published by The Umweltbundesamt (UBA). It describes the legal grounds and requirements for discontinuous and continuous monitoring, measurement methods and available means. Legal grounds are BImSchG and EU law (most of all IPPC), and concern both companies with and without permit requirements.

- *Discontinuous monitoring* is to be done for acceptance, compliance tests, controlling measurements, in case of complaints, for approval application, for self-monitoring, for an emission declaration and more.
- *Continuous monitoring* is to be done at the request of the appropriate authorities (e.g. when exceeding a certain mass flow; or in case of biological waste treatment), or following EU requirements (for incineration activities and VOC-emissions).

2.4.6 Priorities and issues

One issue in NRW (and Germany) with emission control, is the slow and lacking adaptation of TA Luft. TA Luft must be dynamic, in order to adapt to changing technical and emission standards. For example: EU BATs must be included within 4 years after their conclusion. Also changing limits for formaldehyde and ammonia must be included. However, in practice adaptation of TA Luft is a slow process (preparation of the newest version is already 5 years underway).[16]

In the meantime, BAT conclusions and changing limits are included in German legislation through administrative provisions *('Verwaltungsvorschriften')*,[17] or included in BImSchG regulations 13 and 17.

2.5 Environmental inspections in NRW

2.5.1 Legal basis and organisation

Environmental inspections in NRW take place within the framework of German and EU (IED) legislation. They are done through a company's self-inspection, by designated experts and by the authorities. Authorities are inspectorates from municipalities and regions *('kommunalen und staatlichen Umweltbehörden')*, with the support (and under supervision) of the Environmental Ministry of NRW (in accordance with German Constitutional Law; *Grundgesetz*, art. 30, 74, 83).

[15] See: https://www.lanuv.nrw.de/umwelt/luft/immissionen/; https://www.lanuv.nrw.de/umwelt/luft/immissionen/aktuelle-luftqualitaet/; https://www.lanuv.nrw.de/umwelt/luft/emissionen/emissionskataster-luft/
[16] See: https://www.bmu.de/gesetz/entwurf-zur-neufassung-der-ersten-allgemeinen-verwaltungsvorschrift-zum-bundes-immissionsschutzgeset/
[17] For example, the BAT conclusions for refineries are codified in this *Verwaltungsvorschrift:* http://www.verwaltungsvorschriften-im-internet.de/bsvwvbund_19122017_IGI25012151SB.htm

Inspections are planned in Inspection plans and programmes *('Umweltüberwachungsplan und -programme')* on regional *('Bezirk')* level. Results from (individual) inspection visits are made public on the internet *('Umweltinspektionsberichte')*.

Sanctions are applied in two stages:
- Administrative: financial (immediate sanction of smaller infractions by inspectorate)
- Criminal: prosecution, in case of more serious infractions

2.5.2 Inspection strategy

Since 2011 in NRW there is 'risk-based planning of cross-media environmental inspections.' This is a system in which the authorities, with the assistance of the NRW Environment Ministry, systematically implement regular reviews of all relevant facilities as legally required, based on the environmental relevance or hazard potential of these facilities. 'Cross media' means looking at waste, air and water immissions, soil, and at on-site inspections looking at e.g. air and water emissions, wastewater, waste or noise.

The relevance of facilities is established on the basis of NRW-wide criteria:
- *facility-related factors:* type, size, substance inventory and permissible emissions in normal operation;
- *location of facility:* distance to sensitive uses, pre-pollution of the environment);
- *previous experiences* with the facility's operator.

On this basis inspection intervals are established, ranging from one to several years (IED requires every three years). As already mentioned, these planned inspections are described in Inspection plans and programmes.

2.5.3 Inspection activities and outcomes

In NRW, on 31-12-2017 there were:
- 14.796 facilities requiring permits
- 5.140 elements of facilities, process steps and side-facilities requiring permits *(AVN: 'Anlagenteile, Verfahrensschritte und Nebeneinrichtungen ')*
- In total: 19.936 facilities and AVN; of which 3.432 resort under IED

For the division of these facilities over the different sectors (cf. Decree 4 of BImSchG), see table 1.

Table 1. Number of facilities requiring permits per sector

Sector	No. of facilities
Waste	5.939
Energy	5.814
Food	1.754
Storage	1.753
Steel, iron	1.187
Stone, earth	1.083
Chemicals	900
Surface treatment	432

Sector	No. of facilities
Wood	44
Other	1.033

The number of permits granted in NRW varies between 600 and 1.000 per year.
In 2017 there were:

- 523 'light' permits (without public consultation), of which:
  - 127 new permits
  - 396 modification permits
- 55 'regular' permits (with public consultation), of which:
  - 22 new permits
  - 33 modification permits

In 2017 the environmental inspectorates conducted 1.749 cross-media inspections in NRW.

3. Control of industrial discharges and emissions in Flanders (BE)

3.1 Main features

Main features of the control of industrial discharges and emissions in Flanders (BE) are:

- European legislation is an important driver.
- The VLAREM legislation provides one integrated basis for control of industrial discharges to water and emissions to air, requiring permits for facilities and activities with a certain level of impact on the environment.
- Recently a new Decree is implemented (on the '*Omgevingsvergunning')*, leading to the integration of environmental and urban planning permits
- Three classes of permits are distinguished for facilities with different levels of potential environmental impact. VLAREM provides a detailed classification scheme for facilities and the applicable types of permits and other requirements
- The 'Co-ordinated Decree on Integral Water Policy' forbids the discharge of wastewater without a permit. This is implemented through VLAREM, which regulates:
  - Environmental Quality Standards (EQS) and Classification Criteria (*'Indelings-criteria';* IC) for 170 substances, as well as sectoral (BAT) requirements;
  - Permit requirements for facilities with discharges above IC level, aiming at:
    - Less pollution by EU-WFD hazardous substances and none by priority hazardous substances
    - No direct or indirect increase in pollution (emission limits are set including consideration of the nature and quality of the receiving water)
- VLAREM regulates industrial emissions to air by means of:
  - Permit requirements and lists of EQS and emission limit values for approx. 160 substances, as well as sectoral (BAT) requirements
  - Emission limits in permits, based on generic emission limit values and obligations for extra reduction measures in case this is required by the established impact on the environment (by means of a 'significance framework').
- Water and air quality are monitored by the authorities ('Vlaamse Milieumaatschappij'). There are several requirements for companies to monitor emissions to water air in case certain threshold emission values are exceeded. All monitoring data are made public.
- Environmental inspections are carried out by the Inspectorate of the Flanders government. Not all individual inspection reports are made public yet.

3.2 General background and legal framework

3.2.1 General background of the way in which industrial discharges and emissions are controlled in Flanders

In Belgium, up to 1980 environmental legislation was a 'national' (or Federal) issue. Because of the regionalisation movement, however, from 1980 onwards the three regions – Flanders, the Walloon region, Brussels – are competent for matters related to the territory, including the environment. So, control of industrial discharges and emissions in the

Flanders region is based on Flemish (and EU) legislation that has been more or less 'newly' developed since the 80's.

By the end of the 90's Flanders (as one of several EU Member States) was condemned by the European authorities for infringement of EU law, because it had not introduced a Reduction Programme, nor an accompanying set of Environmental Quality Standards (as was required by directive 76/464/EG). Since then, the Flanders regulator has been active to follow-up and implement European legislation, which has thus become a main driver of the Flemish way of controlling industrial discharges and emissions.

3.2.2 A common legal basis for the control of industrial discharges and emissions in Flanders?

The basis for control of industrial discharges and emissions in Flanders is the VLAREM legislation. This legislation is the executive elaboration of the Flanders Environmental Permit Decree.[18] It provides a unifying body for controlling all environmental effects of facilities and activities, mostly by means of environmental permits.

The VLAREM legislation basically consists of three parts: VLAREM I (with general provisions for environmental permits); VLAREM II (with specific environmental conditions for categories of facilities) and VLAREM III (with sectoral and technique-specific requirements; frequently adapted to the state of the technology).

For most industrial activities (incl. discharges to water and emissions to air) a permit is required. VLAREM distinguishes between 3 classes of permits, ranging from class 1 (facilities with the heaviest environmental impact) to class 3 (facilities with the least environmental impact).

Annex 1 to VLAREM II defines for specific types and characteristics of facilities:
- Permit classes
- Remarks
- Requirements for a certain type of environmental coordinator
- Whether audits are or can be required
- Whether an annual report is or can be required
- Whether specific soil protection requirements apply (VLAREBO)

Annex 1 consists of 63 headings referring to specific industrial sectors or activities. Each one of these headings is divided into sub-headings and sub-sub-headings, resulting in an extensive table of classified sectors and activities with a length of 235 pages. As an example, figure 7 presents one of these pages, with heading 46, concerning laundries.

[18] Decree of 28 June 1985 concerning the environmental permit. Belgisch Staatsblad, 17 September 1985. Frequently adapted.

Figure 7. Example of classification of facilities in Annex 1 to VLAREM II: Laundries

Recently a new decree has come into force: *'het Omgevingsvergunningdecreet'* (Decree on the Integrated Environmental Permit (25 April 2014). This decree is implemented by means of the 'Omgevingsvergunningbesluit' (27 November 2015), which has replaced VLAREM I. Amongst other things, this leads to the integration of environmental and urban planning permits. So far, this has not substantially affected the way in which industrial discharges and emissions in Flanders are controlled.

3.3 Control of industrial discharges to water in Flanders

3.3.1 Legal basis

The prime legal basis for control of industrial discharges in water is the 'co-ordinated decree of 15 June 2018 regarding integral water policy', which states in article 3.2.1.*"It is prohibited to throw or deposit objects or substances into the waters (…), to discharge contaminated or polluting liquids or to introduce gases, with the exception of the following cases: (1) The discharge of wastewater for which a permit has been granted (…) in accordance with the provisions of the Decree of 25 April 2014 on the environmental permit and its implementing decrees."*

Part 2 of VLAREM II contains provisions regarding environmental quality standards and relevant policy tasks. Chapter 2.3 specifically deals with surface water and relates to the objectives of the WFD. Part 4 of VLAREM II contains environmental conditions for classified facilities. Chapter 4.2 concerns the control of surface water pollution. Together,

with the decree mentioned above, these sections lay down the legal basis for the control of industrial discharges to water.

Chapter 2.3 defines types of wastewater (and cooling water) discharges. It also defines Environmental Quality Standards (EQSs) and classification criteria *('indelingscriteria'; IC*). The IC is the concentration above which discharge water is considered as 'industrial wastewater with hazardous substances.' Facilities can only discharge wastewater with concentrations above IC with a permit that explicitly allows them to do so.

Industrial discharges of hazardous substances to water are taken care of and regulated in the environmental permit of that installation.
The limit value that ends up in the permit is the result of a dynamic process that starts from the environmental quality standard that applies to the substance.
For priority substances these EQSs arise from the WFD (2000/60/EG) and the directives 2008/105/EG and 2013/39/EG; for the other substances, EQSs have been calculated by experts (from international literature) and put in legislation.
All these EQSs can be found in Annex 2.3.1 (Art. 3 §1 to 4) of VLAREM II.

Emission limit values in a permit are based on the EQSs but also take into account the use of best available techniques, remediation at source and the goals of progressive reduction or phasing out of emissions as laid down in the WFD. In general, dilution is avoided as much as possible.
Next to the permitting of emission limit values, there's also a possibility to limit the use of some substances, either in the permit or in general.
These guiding principles are elaborated and included in Art. 2.3.6.1 of VLAREM II.
For the moment Flanders is further elaborating the application of the Wezerprinciple as well.

Added to these basic principles are further provisions (following EU legislation) on mixing zones, on limit values based on the Directive on Industrial Emissions (2010/75/EG) including BAT, BREF and BAT-GEN, most of which have their place in VLAREM III. On top of that there are also Flemish BAT studies and according limit values, which are included in VLAREM III.

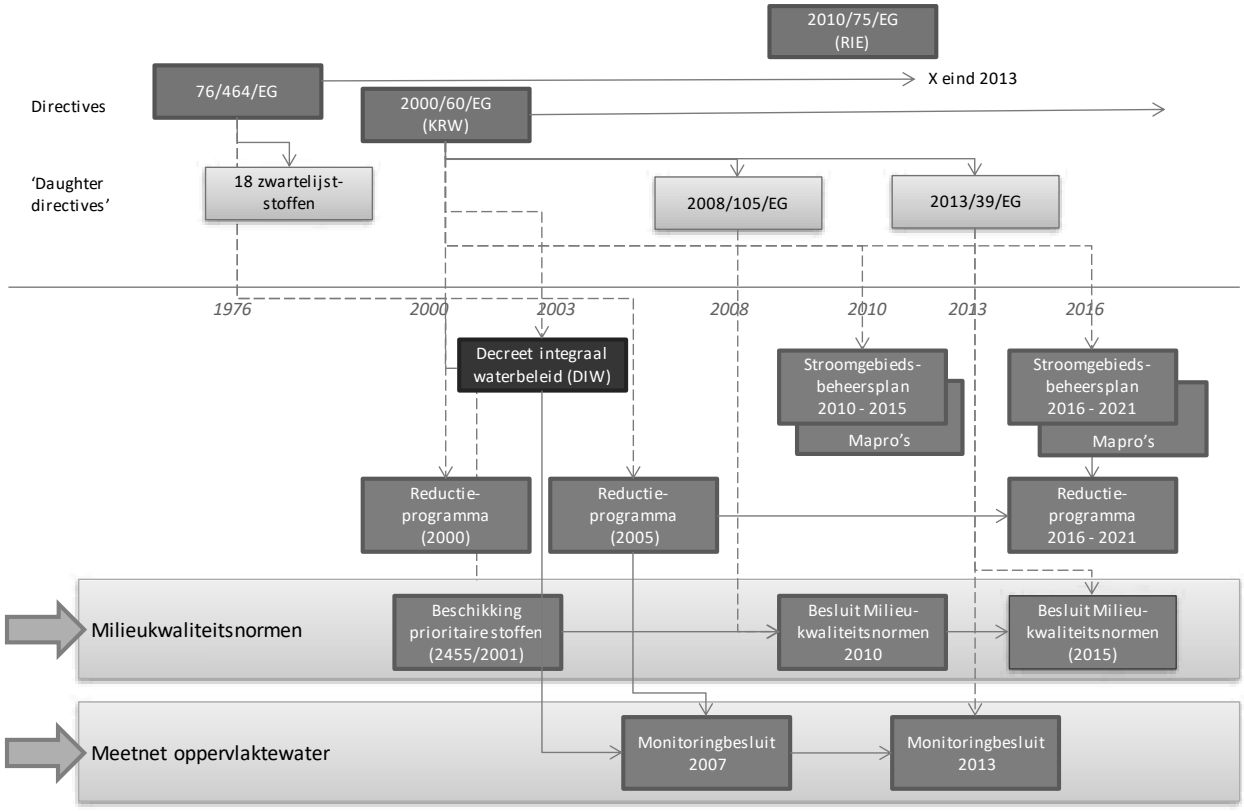
3.3.2 Classes of permits and facilities

As was described in paragraph 3.2.2, VLAREM distinguishes between 3 classes of permits, ranging from class 1 (facilities with the heaviest environmental impact) to class 3 (facilities with the least environmental impact). Annex 1 to VLAREM II provides the classification for specific types and characteristics of facilities. Next to that, certain sectors and types of facilities are regulated by IPPC and BAT requirements (based on the IED directive and Flanders BAT studies).
No other classification of permits and facilities exists with specific respect to industrial discharges to water.

3.3.3 Categories of substances

VLAREM II contains monitoring requirements and environmental quality standards for several substances with regard to surface water. These requirements and standards are mainly based on decrees and measures to implement EU legislation. Figure 8 gives a schematic overview of the way in which EU legislation on control of industrial discharges to water is implemented in Flanders' legislation by means of programmes and decrees.

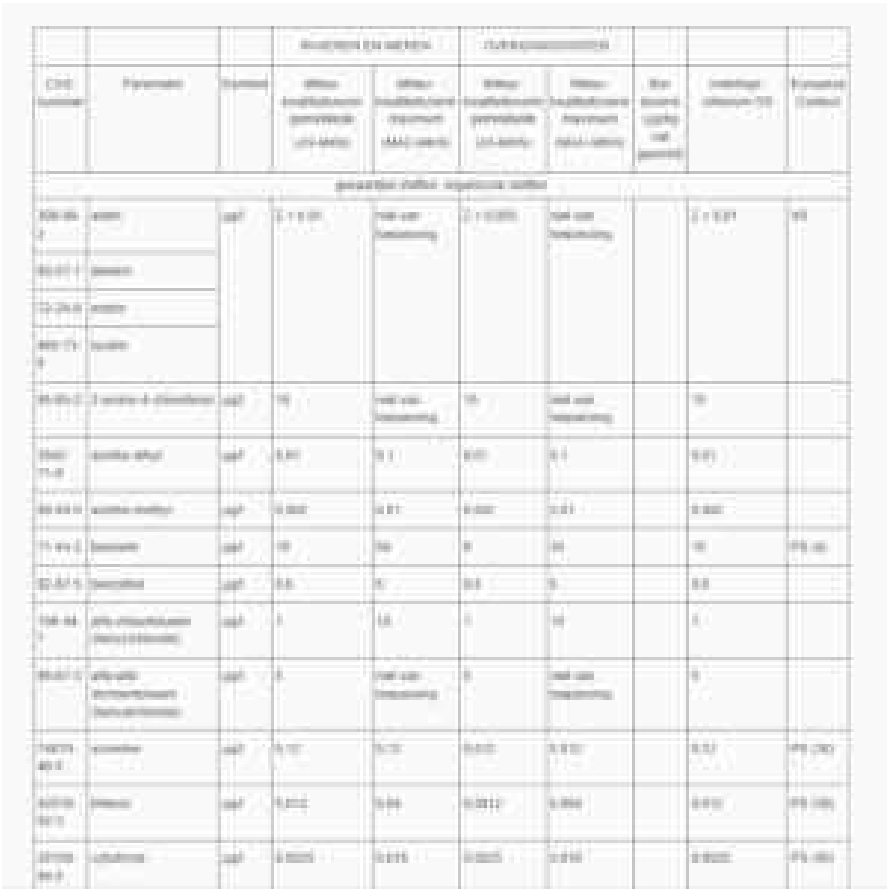
Figure 8: Implementation of EU legislation on control of industrial discharges to water in Flanders' legislation



The substances for which classification criteria *('Indelingscriteria'; IC)* are established, are listed in Annex 2.3.1. of Vlarem II. This annex contains EQS and IC for industrial wastewater discharges with hazardous substances.

Figure 9 (next page) presents an excerpt of the list of in total 170 substances. This is the combined list of European and specific pollutants under the WFD. As can be seen, for each substance annual average and maximum EQSs for rivers and lakes and for transitional waters are given, as well as a biotanorm for specific substances. Next, for each substance an IC is given (which in most cases equals the EQS – except for some metals). The last column of the table describes the European context, i.e. whether a substance is a priority substance (PS), a priority hazardous substance (PGS) or a polluting substance which was included in Directive 2008/105/EG because it was subject to pre-WFD European legislation (VS).

Figure 9. Excerpt from annex 2.3.1. of VLAREM II; substances with IC



Next to the substances on this list, VLAREM II Part 5 *(sectoral environmental requirements for classified facilities)* contains 63 chapters regarding specific economic sectors. Some of these subchapters include specific water discharge limit values for relevant substances (idem 5bis).

VLAREM III part 3 contains 11 chapters with sectoral requirements for IED facilities, also including water discharge limits for specific relevant substances.

3.3.4 Limits to discharges

The limits that are applied to discharges, depend on the types of substances that are discharged. Generally speaking:

- For **non-hazardous substances (without IC)**: general rules apply.
- **Hazardous substances with IC** are permitted on individual basis with an emission limit in case they are discharged in quantities or concentrations above IC (or above reporting limit).
- For substances that are classified as **most-hazardous substances (with IC)**, prevention or phasing out is the principle.

– **Hazardous substances without IC** are permitted on individual basis with an emission limit (provided they are detectable), based on PNEC: predicted no-effect concentration.

The emission limits for hazardous substances with ICs are either based on calculations with the actual flow rates, or on calculations with a flat-rate 10 percent dilution factor. The latter method now appears to be untenable in the light of the 'Wezer judgement' (Wezer arrest of the European Court of Justice of 1 July 2015) and is therefore being revised.[19]

Next to these general limits, specific emission limits may be applied that are prescribed in sectoral provisions in VLAREM II parts 5 and 5bis and in VLAREM III part 3.

Some consideration is also given to the relative contribution of industry to the actual water quality. If the upstream water quality is already poor due to emissions from non-industrial sources, it is considered to be too harsh to place all limitations on industrial discharges.

Although facilities are only allowed to discharge hazardous-substances-without-IC (below PNEC) if they are included in the permit, it is not always clear how authorities can know that these substances are being discharged. According to VLAREM, companies must include in their permit-application substances that are *typical ('kenmerkend')* for their discharges, which is not the same as *all* substances. Authorities expect that operators will, at the least, assess their discharges for the possible presence of the (170) substances with IC. On top of that, the environmental inspectorate monitors a list of substances that is in the 'water analysis compendium' (the WAC, annex 4.2.5.2 of VLAREM II). This list contains more than 170 substances; if these substances are discharged and are or can be detected, they must also be included in the permit (application).

So, information about the substances that are discharged is acquired in the following way. Substances with an IC must be included in the permit (application) when discharged above IC. Substances that are discharged above reporting limit (from the WAC) must be included in the permit (application) with an emission limit value (either individual or with a group limit value (e.g. for PFTs)). For other substances that are not included in either of these two lists (IC or WAC) but that are typical for a company's wastewater, emission limit values are included in the permit (application) when discharged above PNEC. This PNEC is derived by the 'Vlaamse Milieumaatschappij' (VMM) based on REACH data, on publicly available information or on information from international colleague institutes. The VMM has only limited capacity to generate these parameters itself.

In general, permit information is made public by local authorities. There is however no overview of this at national level.

3.3.5 Monitoring of discharges and of water quality

Monitoring of water quality is prescribed by the monitoring decrees of 2007 and 2013 and is carried out by the VMM.

[19] Mogelijk heeft dit ook te maken met de verwarring rondom voetnoot **Fout! Bladwijzer niet gedefinieerd.**.

An example of a water monitoring synthesis report is *'Waterverontreiniging in Vlaanderen in 2017'* (Water Pollution in Flanders in 2017').[20]

Article 4.2.5.3.1 of VLAREM II states that above certain discharge limits, the operator of an establishment must measure at least once per calendar year a given number of specified physical and chemical parameters of the discharge. Also, the E-PRTR regulation obliges companies to monitor certain discharges.

All monitoring data, public and private, are made public. They can all be found on the internet, using the search term *'geoloket waterkwaliteit'*.[21]

3.3.6 Priorities and issues

There are priority concerns about pharmaceuticals and about microplastics in water. Illustrative for the concerns about pharmaceuticals is the fact that out of the 200 pharmaceutical products that have been permitted, for only 14 ecotoxicological properties are established (for diclofenac, which is a specific source of concerns, at least a PNEC has been derived). The VVM is presently consulting with the Federal Agency for Medicines and Health Products (FAMHP) and with OVAM, the Flanders Public Waste Agency, and is co-operating with the EU Strategy on Pharmaceuticals in the Environment.

A specific activity that has taken place in Flanders is the screening of water bodies for new substances. These screening activities have so far not led to big surprises.

More general concerns are:

- One overall issue of concern is the fact that industrial facilities are rather strictly regulated, even though in many cases their relative contribution to water pollution is limited. As industrial discharges are more and more controlled, other, more diffuse sources are becoming relatively more important. The strict regulation of industrial facilities is to a certain extent inherent to the present form and shape of the Water Framework Directive. Other sources of pollution are less strictly regulated, like for instance inland shipping. In Flanders it is felt that with the framework of the WFD it is hard to strike a just balance between the control of point vis-à-vis diffuse sources.
- Also, in connection to the former point, there is the issue that atmospheric deposition (e.g. of mercury or PAHs)[22] has a serious effect on water quality. The Water Framework Directive demands that measures are taken to counter these effects, but this only leads to stricter regulation of point sources. As such, the strictness of the Directive leads to practical problems, according to the Flemish interviewees.

3.4 Control of industrial emissions to air in Flanders

3.4.1 Legal basis

Just as was the case for water, VLAREM II part 2 contains environmental quality standards and monitoring and reporting requirements for air. The provisions in VLAREM II

[20] https://www.vmm.be/publicaties/jaarverslag-water-2017-syntheserapport (including references to underlying monitoring reports
[21] See: http://geoloket.vmm.be/Geoviews/
[22] So-called Long-Range Atmospheric Transport or LRAT

concerning the control of industrial emissions are mainly based on decrees and measures to implement EU legislation.

- Article 2.5. on Environmental Quality Standards (EQSs) and relevant policy tasks sets EQS for air and dust (that are listed in annex 2.5). The 'Vlaamse Milieumaatschappij; VMM' is to monitor and report the effective environmental quality in terms of these EQSs.
  Several of these requirements implement the Air quality directive (EG/2008/50).
- Articles 2.8 (on BAT) and 2.15 (on industrial emissions) *implement the IPPC (1996/61/EC) and IED directives (2010/75/EU).*
- Article 2.8A on the register of polluting substances *implements E-PRTR (EG/166/2006)*
- Article 2.10 on SOx, NOx, VOS, NH3 en PM2,5 *implements the National Emission Ceilings directive (2016/2284/EU)*

Part 4 of VLAREM II contains environmental conditions for classified facilities. Chapter 4.4 concerns the control of air pollution. Together with the provision in part 2 mentioned above, these sections lay down the legal basis for the control of industrial emission to air in Flanders.

3.4.2 Classes of permits and facilities

As was described in paragraph 3.2.2, VLAREM distinguishes between 3 classes of permits, ranging from class 1 (facilities with the heaviest environmental impact) to class 3 (facilities with the least environmental impact). Annex 1 to VLAREM II provides the classification for specific types and characteristics of facilities. Next to that, certain sectors and types of facilities are regulated by IPPC and BAT requirements (based on the IED directive and Flanders BAT studies).
No other classification of permits and facilities exists with specific respect to industrial emissions to air.

3.4.3 Categories of substances

The annexes to VLAREM contain EQS for air and dust (listed in annex 2.5) and emission limit values (listed in annex 4.4.2).

EQSs for air are given for cadmium, chlorine, hydrogen chloride, monovinyl chloride, hydrogen fluoride and asbestos. EQS for dust deposition are given for precipitated non-hazardous dust, lead, cadmium and thalium. The interviewed experts remark that also WHO guidance values and EU standards are taken into account.

As to industrial emissions to air, article 4.4.3.1 states that the limit values apply that are listed in annex 4.4.2 to VLAREM II. Annex 4.4.2 ('general emission limit values for air') contains lists of emission limit values for:

- dust,
- substances,
- organic substances,
- gaseous inorganic substances,
- dusty inorganic substances
- and fibrous substances,

that apply when the mass flow of the emission exceeds a certain given limit.

Figure 10 presents an excerpt of the list of in total 160 substances and substance groups. As can be seen, for each substance or substance group an emission limit value is given, as well as the measuring method that must be applied to establish the emission level.

Figure 10. Excerpt from annex 4.4.2. of VLAREM II; substances with limit values for emission to air

VLAREM II - bijlagen
Bijlagen

Bijlage 4.4.2. Algemene emissiegrenswaarden voor lucht

PARAMETER	CAS-nummer	EMISSIE-GRENSWAARDE	MEETMETHODE
1° totaal stof, bij een massastroom van:			
a) ≤ 200 g/h		150 mg/Nm³	LUC/I/001
b) > 200 g/h		20 mg/Nm³ (*)	
(*) Van de voormelde emissiegrenswaarde van 20 mg/Nm³ voor de parameter "totaal stof" kan conform artikel 1.2.2.1 van VLAREM II worden afgeweken. De individueel afwijkende emissiegrenswaarde mag in dit geval echter maximaal 50 mg/Nm³ bedragen.			
2° de volgende gasvormige anorganische stoffen, bij een massastroom per stof van 10 g/h of meer:			
- arseenwaterstof	7784-42-1	1 mg/Nm³	
- chloorcyaan	506-77-4	1 mg/Nm³	
- fosgeen	75-44-5	1 mg/Nm³	
- fosforwaterstof	7803-51-2	1 mg/Nm³	
3° de volgende gasvormige anorganische stoffen, bij een massastroom per stof van 30 g/h of meer:			
- broom en zijn gasvormige verbindingen, uitgedrukt als broomwaterstof		5 mg/Nm³	
- chloorgas	7782-50-5	5 mg/Nm³	LUC/III/002
- cyaanwaterstof	74-90-8	5 mg/Nm³	LUC/III/009
- fluor en zijn gasvormige verbindingen, uitgedrukt als waterstoffluoride		5 mg/Nm³	LUC/III/006
- zwavelwaterstof	7783-06-4	5 mg/Nm³	
4° de volgende gasvormige anorganische stoffen, bij een massastroom per stof van 300 g/h of meer:			
- gasvormige chloorverbindingen (met uitzondering van chloorcyaande en chloorgas), uitgedrukt als waterstofchloride		30 mg/Nm³	LUC/III/001
5° de volgende gasvormige anorganische stoffen, bij een massastroom per stof van 5 kg/h of meer:			
- koolstofmonoxide (afkomstig van productieinstallaties niet volledige oxidatieve			

It is added (article 4.4.3.1 § 2.) that substances that are not included in the list of organic substances, are included in the group of which the substances most closely approximate those substances in terms of their environmental impact (which implies, in fact, that also organic substances that are not specifically mentioned can have emission limit values). Special attention is to be given to the persistence and bioaccumulation, toxicity, reaction products and odor intensity. This can be regulated in the environmental permit for the operation of the classified establishment or activity.

On top of these provisions, VLAREM II Chapter 5 *(sectoral environmental requirements for classified facilities)* contains 62 subchapters, most of which contain specific sectoral requirements, sometimes including specific air emission limit values (idem 5bis). (N.b.: subchapter 5.20 concerns 'industrial facilities that may cause air pollution').

VLAREM III part 3 contains 11 chapters with sectoral requirements for IPPC facilities including air emission limit values.

3.4.4 Limits to emissions

Article 4.4.3.1 and 4.4.3.2 state that for the actual limits to emission that are to be included in permits, the listed emission values apply. However, these emission values can be tightened with an eye to the impact on immissions and the applicable EQS for air.

For the assessment of the environmental effect of emissions the so-called *'significantiekader'* ('significance framework') is applied. This framework is part of the *'Richtlijnenboek Lucht'* ('Guidance book Air') that has been drafted by experts from Antea Group and VITO to serve as a manual for Environmental Impact Assessment purposes. Based on the 'significance framework' it is established whether emissions have a limited or substantial effect on the environment. If so, impact reducing measures (*'milderende maatregelen'*) can be required.

Figure 11: The 'significance framework' (Source: 'Richtlijnenboek Lucht)

Figure 11 shows the 'significance framework' as it is included in the Guidance book air.

It is up to companies themselves to include emissions (as well as possible impact calculations) in their permit request. Also, in Integral Environmental Annual Reports annual loads of polluting substances must be reported (obligatory in case these loads exceed a certain threshold value). Permit requests for specific types of (IPPC) companies and companies located in areas of attention *('Aandachtsgebieden;* defined in environmental monitoring reports) are being looked at extra closely.

In its environmental permit application, a company can request to deviate from general or sectoral VLAREM conditions. For example, based on an approved motivation a company may be released from VLAREM measurement obligations. On the other hand, sometimes special conditions can be set in permits on top of VLAREM conditions.

3.4.5 Monitoring of emissions and of air quality

By parliamentary decree the task of monitoring of air quality and (some) emissions is laid down with the *Vlaamse Milieumaatschappij* (VMM). An example of an air monitoring report is '*Jaarrapport lucht - Emissies 2000-2016 en luchtkwaliteit in 2017 in Vlaanderen'*.[23]

VLAREM II art. 4.4.4 prescribes

- The parameters SOx, NOx and total dust are measured at least monthly at the operator's expense if the mass flow of the substance in question exceeds a certain limit.
- In addition, the environmental license may impose on the operation of the classified establishment or activity that the operator has measurements carried out at his expense:
  - of emissions from other relevant parameters;
  - of immissions of certain substances in the vicinity of the establishment;
  - of the deposition of certain substances on the soil in the vicinity of the establishment.

All monitoring data, public and private, are made public. They can all be found on the internet, using the search term 'geoloket luchtkwaliteit'.[24]

3.4.6 Priorities and issues

In 2016 a VITO report was published[25] with the results of a study on the feasibility of an update of the emission limit values for air. This update was deemed necessary as the limit values in VLAREM were still based on the German TA Luft of 1986, whereas the TA Luft itself had been updated in 2002 (se also the previous chapter of this report). The study concludes that a direct update following the German example does not seem feasible. Two alternative development paths are proposed: one which aims at sectoral evaluations for specific sectors and parameters following a BAT approach; and another in which emission guidelines are introduced, that are checked for relevance and feasibility during the permit process (in this context reference is made to Dutch and German permit processes).

There is no specific information yet on which further steps have been taken in this process.

3.5 Environmental inspections in Flanders

3.5.1 Legal basis and organisation

Inspections are carried out by the inspectorate ('Milieuinspectie') of the Flanders' government.

Inspections have their legal basis in the Environmental Enforcement Decree (Title XVI in the Decree on General Provisions on Environmental Policy (DABM)). This decree is further implemented by the Environmental Enforcement Decree.

[23] https://www.vmm.be/publicaties/jaarrapport-lucht-emissies-2000-2016-en-luchtkwaliteit-in-2017-in-vlaanderen
[24] See: http://www.vmm.be/data/luchtkwaliteit-in-je-eigen-omgeving
[25] Van der Aa, S. et al. (2016); *Haalbaarheidsstudie actualisatie algemeen emissiegrenswaarden lucht*. VITO, Mol.

3.5.2 Inspection strategy

No specific information yet.

3.5.3 Inspection activities and outcomes

The report on environmental inspection 2017[26] contains facts and figures about 2017, including:

- In Flanders there are 11.300 class 1 and 54.700 class 2 facilities; 810 industrial IPPC facilities; and 290 Seveso facilities.
- Most complaints concerned Class 1 facilities (2900 complaints about 570 facilities), mostly about odour (66%). Of all complaints, 10% concerned air and 10% concerned water discharges.
- In total 10.700 inspections were carried out, aimed at 4.000 facilities.
- The inspectorate took approx. 1.500 discharge water samples at 700 facilities; at 85 facilities one or more infractions were observed.
- The inspectorate carried out 180 air measurements.

Not all inspection data (e.g. on company level) are made public yet.

[26] See: https://www.vlaanderen.be/publicaties/milieuhandhavingsrapport-2017-afdeling-handhaving

4. Control of industrial discharges and emissions in the Netherlands

4.1 Main features

Main features of the control of industrial discharges and emissions in the Netherlands are:

Legal basis and policy

- Partly integrated and partly separate legal bases for control of industrial discharges to water and for control of industrial emissions to air
- The basis for control of industrial discharges to water and emissions to air lie in the Activities Decree, containing regulations from:
  - The Environmental Protection Act and Dutch General Provisions Act ('Wabo'); requiring permits for industrial activities, including emissions to air and indirect discharges to water through sewage systems (industrial or municipal);
  - The Water Act; requiring permits for discharging directly to surface water. The act combines previous acts of surface water and wastewater among others and implements European water regulations.
- The Activity Decree describes environmental rules for facilities and about hundred activities. Depending on the type of facility a permit is required and/or general rules apply for an activity.
- The competent authority decides about the permit, this can be either national, province or at the municipal level.
- Permits require a public consultation phase and will become public once finalized.
- The Dutch government takes priority action in minimizing the release of the so-called National substances of concern ('ZZS'). These substances meet the hazard criteria as defined by REACH article 57.

Measures and emission standards

- For emissions to air or discharges to water the limit values of substances are determined by the hazardous nature of the substance. More strict standards apply when a substance is more hazardous (most stringent for ZZS).
- Best Available techniques (BAT) apply, in line with the IED and Dutch law. Extra measures can be required if environmental quality standards are exceeded.

Monitoring and inspection

- There are several legal requirements for companies to monitor emissions to air. Besides, water quality is monitored rather intensively by authorities, also for production of drinking water.
- Environmental inspections take place according to risk-based planning.
- Summaries of inspection reports are made public.

4.2 General background and legal framework

4.2.1 General background of the way in which industrial discharges and emissions are controlled in the Netherlands

The Netherlands is a densely populated country with several industrial zones. The geographical location along the North Sea and in the delta of major European rivers

resulted in the development of harbours and large industrial zones, such as the Rotterdam harbour. Environmental regulations were developed over the past decades. At present, discharges and emissions are controlled by multiple regulations and authorities. The general idea is that emissions and discharges are prohibited, unless they comply with general rules or are specifically included in a permit.

In 2021 a new Environment and Planning Act will be implemented *('de Omgevingswet')*, replacing 26 current environmental and spatial planning acts. The focus in this new act shifts towards an integrated regional vision and plan *('Omgevingsvisie en -plan')*, enabling local solutions and approaches to environmental management. For several domains the responsibility is further decentralised by shifting authority to lower (local) authorities. In section 4.2.2.6 this is explained further.

4.2.2 A common legal basis for the control of industrial discharges and emissions in the Netherlands?

4.2.2.1 The common legal basis

There are three important acts providing the framework for environmental management, including regulating industrial discharges and emissions; (1) the overarching Environmental Protection Act, (2) the Water Act and (3) the General Provisions Act. Specific elements of the Acts are set out in Decrees and Ministerial Regulations. For industrial activities, as discharges and emissions, the Activities Decree is the most important. See figure 12 on the next page for an overview.

(1) The most important environmental legislation in the Netherlands is the **Environmental Protection Act** *('Wet milieubeheer' or Wm)*. This Act provides the framework and legal instruments for environmental protection. An important feature in this act is 'duty of care' *('zorgplicht')*, meaning that any environmental damage has to be prevented and/or minimised as much as possible. The Act establishes that permits must be obtained before certain activities may be performed and that general rules may substitute permits. It defines environmental quality standards for several compartments, either in the Act itself or in related legislation, thereby also implementing European legislation, such as the Water Framework Directive and the Industrial Emissions Directive.

(2) **The Water Act** *('Waterwet')* contains the most important regulations for the use and management of water, see also section 4.3.1. However, the Water Act may never undermine the Wm or the environmental quality standards set under the Wm. Companies may be required a Water permit for activities influencing the quantity or quality of water.

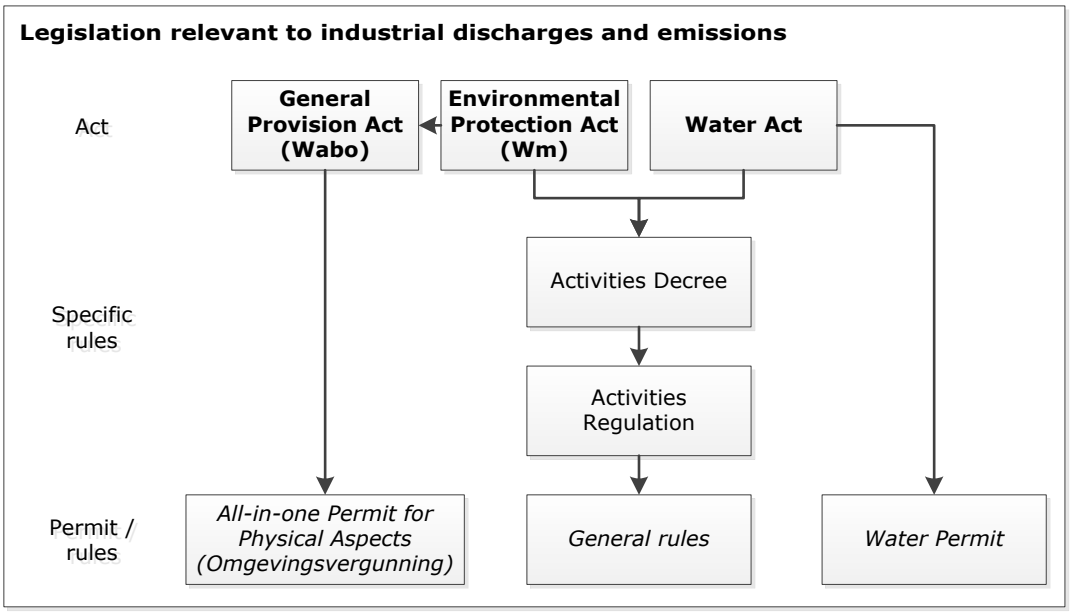
(3) The **Dutch General Provisions Act** *('Wet algemene bepalingen omgevingsrecht'* or *Wabo)* lays down the specific rules for granting an All-in-one Permit for Physical Aspects *('Omgevingsvergunnning')*. The Wabo prescribes the procedure how to apply to the relevant competent authority for permits for activities that impact the physical environment.

The Activities Decree *('Activiteitenbesluit')* and the associated regulation (the Activities Regulation; *'Activiteitenregeling')* specify legal aspect of both the Wm and Water Act. The

decree provides rules for about 100 (industrial) activities executed by facilities, for several environmental aspects, such as air, water, soil, waste, and safety. Some of the aspects are an implementation of EU legislation. In the Activities Regulation the requirements of the Decree are further elaborated, for example by prescribing the techniques to be used or the ways to measure emissions.

Companies with an *Omgevingsvergunning* (as regulated by the Wabo) should also comply with the general rules set by the Activities Decree, but specific rules set in a permit can overrule the Activities Decree. Besides the *Omgevingsvergunning* a company may also need a Water permit, for discharge of (waste) water into surface water.

Figure 12. Overview of current environmental legislation concerning industrial emissions and discharges



4.2.2.2 Facility types and permits

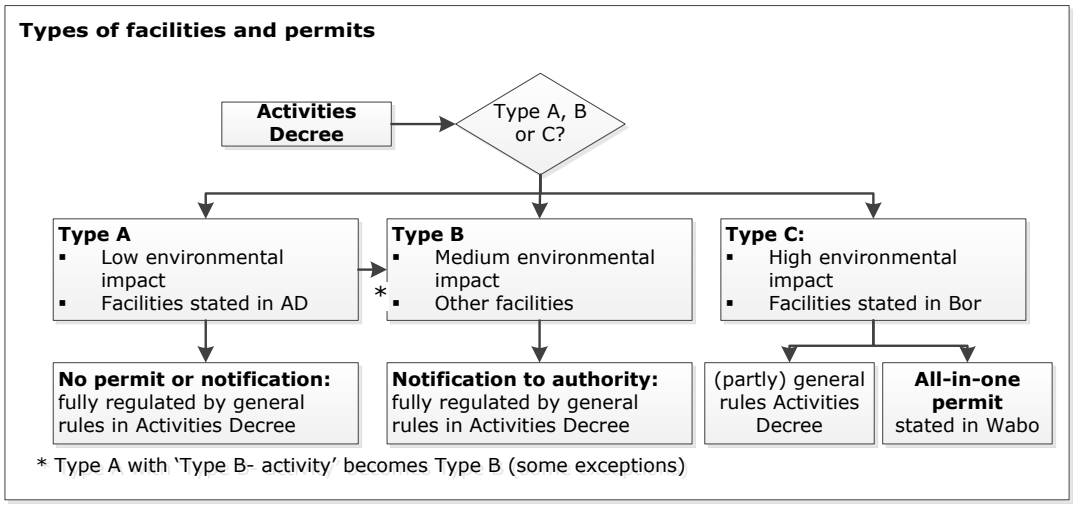
In the Activities Decree a distinction is made between three types of facilities, depending on their environmental impact (see figure 13, next page):

- Type A: facilities that perform less environmentally harmful activities, such as offices and schools. Type A companies are not required to have a permit or to submit a notification but should comply with the general rules set in the Activities Decree. A defined list of Type A activities is included in the Activities Decree.
- Type B: facilities that are not listed as Type A company nor as Type C, for example car companies, metalworking companies and marinas. Type B companies are required to submit a notification to the competent authority in the case of a start-up or a change and should comply with the general rules set in the Activities Decree.
- Type C: facilities that perform environmentally harmful activities. Type C companies require an All-in-one Permit for Physical Aspects for the environmental aspects, as regulated by the Wabo. The *'Bor' ('Besluit omgevingsrecht'*; Decree on Environmental Law) lists which facilities are designated as Type C and include all IPPC-installations

and IED class-4 facilities (chemical industry). Type C facilities should comply with some of the general rules set in the Activities Decree, but rules set in the All-in-one Permit can overrule the Activities Decree.

In a tool called the Activities Decree Internet Module (AIM) a company can submit a notification to the competent authority. The AIM gives information on the type of facility, the applicable general rules, whether a permit is required and the competent authority.

Figure 13. Overview facility types



4.2.2.3 Competent authorities and execution offices

The competent authority for a company is a governmental body, which ensures compliance with general rules and permit rules, may grant a permit and may prepare rules that deviate from the general rules. The 'Bor' indicates which government body is the competent authority for companies. For complex industrial companies (such as IPPC companies) the province is the competent authority. The municipality is the competent authority for most other companies with less impact on the environment.

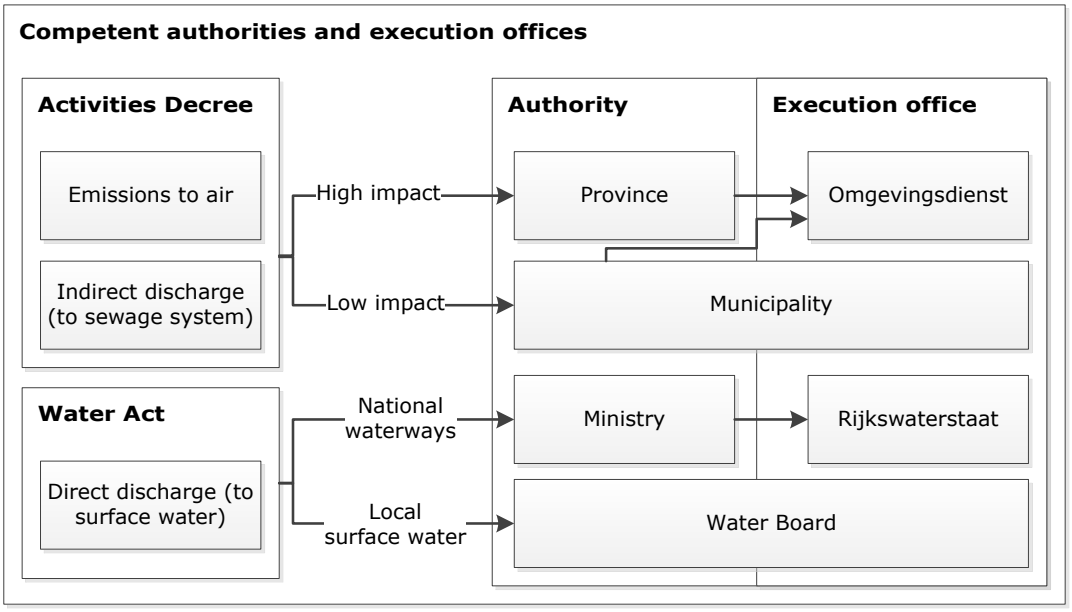
Execution of the environmental tasks of provinces and some municipalities is carried out by regional implementation or execution offices *('Regionale uitvoeringsdienst,* often referred to as *'Omgevingsdienst').* In recent years the management of certain high-risk companies moved to six specialised *'Omgevingsdiensten'*. These companies have large quantities of dangerous substances and fall under the European Seveso II Directive, which in the Netherlands is implemented in the *'Besluit Risico's Zware Ongevallen'* (BRZO). The so-called BRZO-*Omgevingsdiensten* also control the discharges and emissions of these BRZO-companies.

For specific water related activities, the regional Water Board or the Minister of Infrastructure and Water Management (I&W) can be the competent authority. The so-called Water Boards *('waterschappen')* are specialised, independent regional authorities for water issues and among the oldest forms of local government in the Netherlands, as some of them were founded in the 13th century. The Water Boards manage water barriers,

waterways, water levels, water quality, and sewage treatment in their regions. The territories of these Water Boards are based on water catchments and do mostly not correspond with municipality or province boundaries. The national executive agency of the ministry *('Rijkswaterstaat')* is involved in the management of water quality and quantity in the national waterways, as the Meuse and Rhine. Besides the Water Boards and *Rijkswaterstaat*, the regional executive agencies *('Omgevingsdienst')* are also involved in water quality issues.

In the special case of mining activities, the Ministry of Economic affairs and Climate is the competent authority. The Dutch State Supervision of Mines carries out the inspection tasks.

Figure 14. Overview competent authorities and execution offices



4.2.2.4 Emissions and discharge of ZZS

Special attention is given to the National substances of concern *(Zeer Zorgwekkende Stoffen, ZZS),* as defined by the Activity Decree. ZZS meet the hazard criteria set in Article 57 of REACH. ZZS are, however, not limited to those substances formally identified as SVHC (Substances of Very High Concern) under REACH. Other substances meeting the criteria on other authoritative lists (CLH, POP, WFD, OSPAR) are also identified as ZZS. To support the competent authorities, the RIVM composed a list of ZZS.[27] It should be noted, however, that this list is not limiting as companies have the responsibility to correctly classify substances of concern (in line with REACH). Self-classified ZZS will also be treated as ZZS in permits by the competent authorities.

ZZS are prone to the strictest emission and discharge regulations and an obligation to minimise the emissions and discharges as far as possible, in order to achieve environmental concentrations at which risks for men and environment are expected to be negligible. To

[27] https://rvszoeksysteem.rivm.nl/ZZSlijst/Index

comply with the minimisation obligation, companies have to report on their research and activities concerning substitution or reduction every 5 years. In this report an assessment of costs, environmental impacts and achievability is integrated. For this report a guidance is available.[28] Together with their competent authority a plan is made which measures have to be implemented.

The ZZS-regulations are included in the Activities Decree. The general rules, such as the minimisation obligation and emissions to air apply to type C facilities. Type A and B facilities are not considered to have relevant ZZS emissions. However, when emissions are expected the competent authority can prescribe 'customised rules' *('maatwerk')*. For discharges of ZZS to water the regulations from the Activities Decree do not apply but are set in a Best Available Techniques document (GAM, see 4.3.3.). The ZZS minimisation obligation has to be prescribed in the permit.

Since 2018 an additional list of potential ZZS (pZZS) is made available by the RIVM. These substances are currently under research by member states in the European REACH regulation. This means that there is a concern that these substances may meet the SVHC criteria; however, this is not yet established. To enable authorities to be proactive, this list was established and can be used to invoke duty of care, based on the principle of the 'zorgplicht'.

4.2.2.5 Monitoring of discharges and emissions

Facilities can be required to report their discharges to water and/or emissions to air in the European PRTR (Pollutant Release Transfer Register). This registry also includes energy use, waste streams and emissions to air and soil. Registry is required for certain substances or substance groups above thresholds for certain facilities, including IPPC-installations. In the implementation of the E-PRTR regulations the Netherlands added some extra substances, originating from previous national regulations.

Based on the data from measurements, emission registrations (mainly e-PRTR) and estimates, the water and air quality is modelled on different geographical scales for both the public and policymakers and is made publicly available.[29]

4.2.2.6 New environmental legislation in 2021

As was already mentioned in 4.2.1, new Act on environment and spatial planning will become effective in 2021. The Environment and Planning Act (*'Omgevingswet'*) replaces a large number of current laws and regulations. Most of the current regulations concerning industrial activities are included in the new Act. The regulations regarding permits are incorporated into the Environmental Quality Decree ('*Besluit kwaliteit leefomgeving'* (Bkl). General rules on environmental harmful activities which are currently included in the Activities Decree, will be included into the new Environmental Activities Decree ('*Besluit activiteiten leefomgeving'* (Bal)). This Decree contains general requirements for ZZS, with regard to the identification, the obligation for the minimalisation of the use (phasing-out) and the emissions and discharges to air, water and soil.

[28] https://www.infomil.nl/onderwerpen/lucht-water/zeer-zorgwekkende/vermijdings/stappenplan/
[29] www.emmissieregistratie.nl

A major change is that for IPPC-installations, the minimalisation requirements for use and emissions apply regardless of the defined BAT/BREF's (see the note at the end of 4.4.4 for the current situation).

4.3 Control of industrial discharges to water in the Netherlands

4.3.1 Legal basis

As stated above, water issues are regulated through the Water Act and the Wm. The Water Act was implemented in 2009 and combines eight former water regulations, including regulations on surface water, ground water and water safety. This integrated act simplifies the implementation of the European (water) legislation. The Act refers to water quality values from the Environmental Protection Act (Wm), thereby referring to the Water Framework Directive and the Groundwater Directive. In addition to the Water Act, every Water Board has its own set of rules and regulations. These are stated, among others, in the Water authority by-laws ('*Keur*').

The WFD is implemented in national legislation under the Environmental Protection Act (Wm), the *'Besluit kwaliteitseisen en monitoring water'* and the associated '*Regeling monitoring kaderrichtlijn water*'. The former contains the quality standards for the European priority (hazardous) substances in surface water, European and national standards for groundwater and for surface water intended for drinking water abstraction. The latter includes the national surface water quality standards for specific pollutants. Besides the water quality standards derived in the context of the WFD, the Netherlands have set quality standards for numerous other compounds, which are not included in WFD legislation but are used for water quality management in general. All officially set standards are available via the RIVM-website.[30]

Discharges to water are controlled based on the activity from which the discharges originate and the water it discharges to. The Activities Decree regulates industrial discharges (see paragraph 4.2.2.1), for non-industrial discharges other 'Discharge Decrees' under the Water Act are in place, for example the Act on household discharges ('*Besluit lozing afvalwater huishoudens'*).

4.3.2 Classes of permits and facilities

Both the Activities Decree and Water Act (or by-laws) give general rules for certain discharge activities. For these activities no permit is necessary, but they might require a notification to the competent authority.

Depending on the type of facility and its discharge activities either an All-in-one Permit for Physical Aspects ('Omgevingsvergunning') or a Water permit is required. Generally, for companies with discharges directly into surface water a Water Permit is required (granted by Water Board or Rijkswaterstaat) and for indirect discharges an All-in-one Permit is required. The water board or Rijkswaterstaat can advise on the discharge section of the All-in-one permits, but the permits are granted by the 'Omgevingsdienst'.

[30] https://rvs.rivm.nl/

4.3.3 Categories of substances

For the companies that do not require a permit there are discharge levels for relevant substances for their activities stated in the general rules. When other substances or ZZS are discharged 'customised rules' ('*maatwerk*') may be set and companies are responsible to comply with the Duty of care (*'zorgplicht'*).

The specific focus on ZZS was already introduced in section 4.2.2.3 and is a main issue in the permitting practice. For activities that require a permit (either defined by the Wabo or Water acts) substances are categorised based on their aquatic hazard (*'waterbezwaarlijkheid'*), meaning; 'the degree to which a substance is likely to have adverse effects on the aquatic environment'. A method called General Assessment Methodology (GAM, '*Algemene Beoordelingsmethodiek', ABM* in Dutch) is used to classify substances and mixtures into different categories (Z, A, B or C). The classification is based on intrinsic properties of substances, such as toxicity and (bio)degradability. Category Z includes the ZZS. At present, special attention is paid to substances that are relevant for drinking water quality. Triggered by incidents with a.o. pyrazole and PFAS, there is political and research interest in persistent, mobile and toxic compounds (PMT).

Both the company intending to discharge, and the competent authorities use the GAM. The company is responsible for the data used as input for the GAM assessment. The competent authority uses the GAM for issuing discharge permits, drafting customised discharge regulations and enforcement based on the duty of care.

4.3.4 Limits to discharges

The categories from the GAM serve as a guideline for the measures needed to reduce the discharge of a substance or mixture, called the decontamination effort (*'saneringsinspanning'*). The highest effort is required for category Z, the lowest for C. The decontamination effort is two-fold; tackling pollution at the source (substitution and process modification) and purification of the wastewater flow (minimisation of the residual discharge). The decontamination effort can be used to determine which technologies can be qualified as Best Available Techniques (BAT). Application of BAT is paramount. After the required decontamination effort is determined, immisions of residual discharges are assessed using the discharge test (*'immissietoets' = immission test*).

The discharge test is used to determine the effect of the residual discharge on water quality. The test calculates the contribution to the concentration of a substance in the surface water at different points downstream in a mixing zone approach. The size of the mixing zone depends on the size of the water body and its flow rate. The concentration in the vicinity of the discharge point should not exceed the limit value for acute effects, while the chronic limit values should be met at the edge of the mixing zone. In addition, the increase in concentration as a result of the discharge should not lead to significant decrease in water quality. Preferably, officially set acute and chronic quality standards are used (see also 4.3.1). If these are absent, standards can be derived using the European guidance under the European Water Framework Directive or with a simplified procedure based on that method. The discharge test is thus not limited to WFD-relevant substances.

When an intake point for drinking water production is downstream, special attention should be paid to protection of drinking water quality and specific limit values for drinking water may be derived. Other protected areas, such as Natura-2000 areas, swimming water or shellfish areas should be considered as well. In all situations, preload resulting from diffuse sources or activities upstream is taken into account.

When, after measures taken, residual discharges still do not comply with the limit values in the discharge test, additional measures are issued. For ZZS even the obligation to minimise the discharges still applies when residual discharges do comply with the discharge test and immission standards. To determine which measures can be reasonably required, a tool for the cost efficiency has been developed[31].

4.3.5 Monitoring of discharges and of water quality

In Water permits or All-in-one Permits specific monitoring requirements can be issued, but only if the usefulness can be substantiated.

Several institutions monitor the water quality in the Netherlands at numerous locations. In the national waterways and at the borders of the main rivers entering the Netherlands, the Rhine and Meuse, *Rijkswaterstaat* continuously monitors the biological and chemical quality. If pollution is observed, *Rijkswaterstaat* immediately informs the water boards, drinking water companies and sister organisations in Belgium and Germany. The water boards monitor regional waterways. They participate in a coordinated monitoring program for pesticides, but also have their own monitoring projects based on pollution sources in their region. In the water bodies designated by the Water Framework Directive, a special monitoring programme is executed to be able to report to Europe. The surface water at drinking water intake points is very intensely monitored by drinking water production companies.

4.3.6 Priorities and issues

In recent years attention is given to the ZZS-policy in water quality management. Besides this, there is a focus on Emerging substances in surface water, enhanced by the fact that these substances may influence the drinking water production. The research focusses on:

- pharmaceutical substances and residues
- biocides
- industrial substances, such as PFAS and fire retardants
- micro plastics and nanomaterials
- persistent, mobile and toxic compounds (PMT)

4.4 Control of industrial emissions to air in the Netherlands

4.4.1 Legal basis

As described above, the Activities Decree and 'Wabo' regulate the industrial emissions to air, including the Industrial Emissions Directive regulation.

[31] In Dutch: https://www.helpdeskwater.nl/publish/pages/155877/kosteneffectiviteit_van_maatregelen_ter_beperking_van_wateremissies-iw_format-definitief_6_november_.pdf

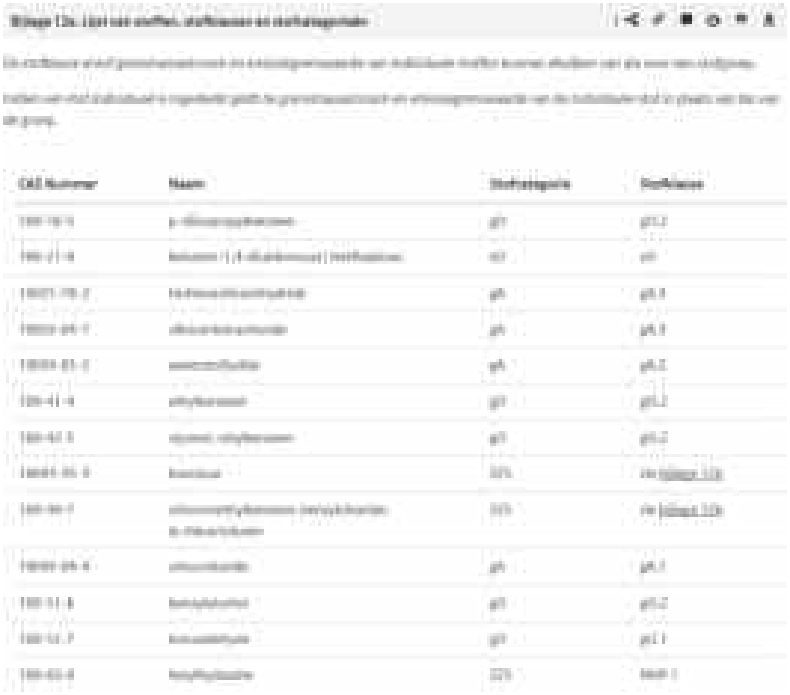
4.4.2 Classes of permits and facilities

General rules concerning emission include regulation of VOS, NOx, Sox and PM emissions. In the permit for type C-facilities all emissions are regulated, with special attention to ZZS. For type B and type A facilities the general rules in the Activities Decree apply. For these facilities the regulation of ZZS is not directly applicable, but the use of BAT for emission reduction is compulsory for type B facilities.

4.4.3 Categories of substances

Substances are categorised into substance-classes to determine the emission limits. The classification is determined by the intrinsic properties of a substance, such as organic of inorganic. For ZZS a specific class is available.

Figure 15. Example of substances and their substance classes (annex 12 Activities Regulation)

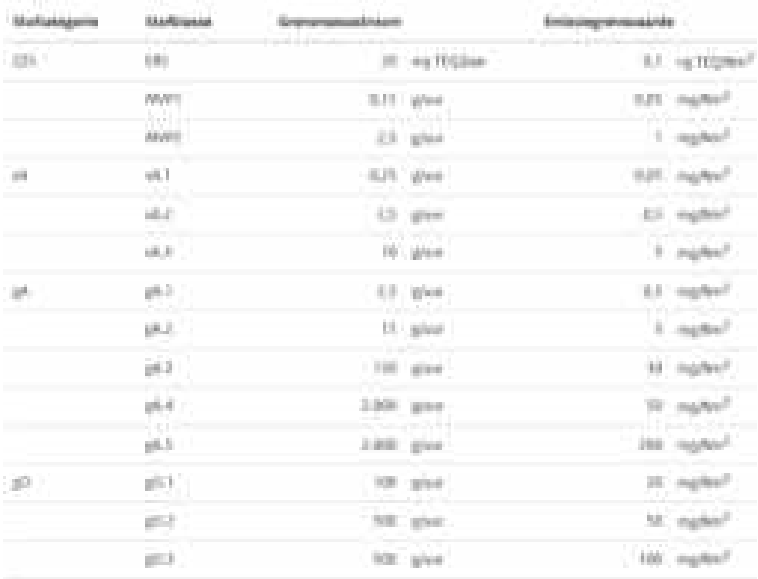


4.4.4 Limits to emissions

Within the Activity Decree the regulation of emissions of substances is tiered. First, the emission load (g/hour) is tested against the defined Mass Flow Limits (*'grensmassastroom'* or GMS). The mass flow limit is set per substance class. For calculation of the emission load the emissions of all point sources at a facility in the same class are summed. The mass flow limit guarantees that at living areas the maximum permissible concentrations (MPC) are not exceeded. When the emission load stays below the mass flow limit, no further steps are necessary. If the emission load exceeds the mass flow limit, the emissions concentrations have to comply with the emission limits (*'emissiegrenswaarde*' or EGW). This limit must be met per emission source per substance class (summated) and is based on technically

achievable emission concentrations. The mass flow limits and emission limits are shown in Figure 16.

Figure 16. Mass flow limits and emission limits per substance class (Activities Decree)



In the second tier, a more complex assessment, called the immission test, is performed where air concentrations are modelled in the surrounding environment that are assessed against substance specific risk limits (Maximum Permissible Concentrations for air). The MPC is a health-based risk limit, representing a safe concentration for inhalation upon lifetime exposure. When the MPC is exceeded an emission can in principle not be permitted, but the authorities can apply a case-specific motivation. It is also possible to apply stricter limits in case-specific assessment, if there is specific concern.

For ZZS an obligation to minimise the emissions always applies, also when the concentration does not exceed the MPC. Although there is a legal requirement to minimise emissions towards zero-emissions, in practice often the Negligble Risk level (‘*Verwaarloosbaar Risiconiveau’,* VR) is considered as the lowest adequate minimisation level.

Note that when a facility is an IPPC-installation and there are Best Available Techniques defined, the Activity Decree is overruled. This means that emission levels set by the BREFs apply. For ZZS, the BREF’s should contain specific emission limits, otherwise, the relevant requirements for emissions of ZZS of the Activity Decree have to be complied with.

4.4.5 Monitoring of emissions and of air quality

When the emission limit applies to an emission, there is a monitoring obligation as described in the Activities Decree. The competent authority checks these measurements based on a control regime, resulting from the measure and substance class. For certain

legally recognised emission reduction measures, the monitoring obligation is lifted. Facilities can also be required to report their emissions in the European PRTR.

The Netherlands monitors the air quality based on European guidelines. The monitoring focusses on the most important substances regarding air quality, such as particulate matter and nitrogen dioxide. No special requirements arise from permits for industrial chemicals, but specific obligations can be included in the permit.

4.4.6 Priorities and issues

As for water, policymakers focus on ZZS, concerning industrial emissions. Recently there has been more emphasis on the deposition of (industrial) substances originating from air emissions. This is mainly caused by a case concerning PFAS, in which these substances are detected in most areas.

4.5 Environmental inspections in the Netherlands

4.5.1 Legal basis and organisation

The corresponding competent authorities or their executive agencies generally carry out environmental inspections. The ministry of I&W has its own inspection agency, the Human Environment and Transport Inspectorate (*'Inspectie Leefomgeving en Transport', ILT*), which focusses on the high-risk companies. The ILT works together with the local authorities and can advise on draft permits issued by Wabo competent authorities. ILT can also signal gaps or issues in the policies or execution practice and inform the ministry.

To combine and share information an IT-tool called 'Inspectionview' is created, in which inspectors can enter their findings.

4.5.2 Inspection strategy

The inspection strategy is based on the type of facility and whether a facility has complied in previous inspections. Inspectorates develop strategies based on environmental and safety goals and prioritization based on sector, geography and supply chain analysis. Inspections can be without warning or be announced beforehand, so a company can be asked to provide documents for review. Inspections are both on administration and physical. Environmental inspections mainly take place at type C facilities, but also type A and B facilities may be inspected on compliance with the general rules.

After inspection the results are shared with the company. When an infraction of the rules or of a permit is found, several steps can be taken, depending on the severity of the offence. For infractions with low environmental damage, the company gets a stated period to get into compliance. If this is not done, or if there is medium environmental damage, an administrative penalty (*'last onder dwangsom')* is imposed until the company complies. In situations with acute environmental damage administrative order (*'bestuursdwang'*) can be used to stop production or close a plant.

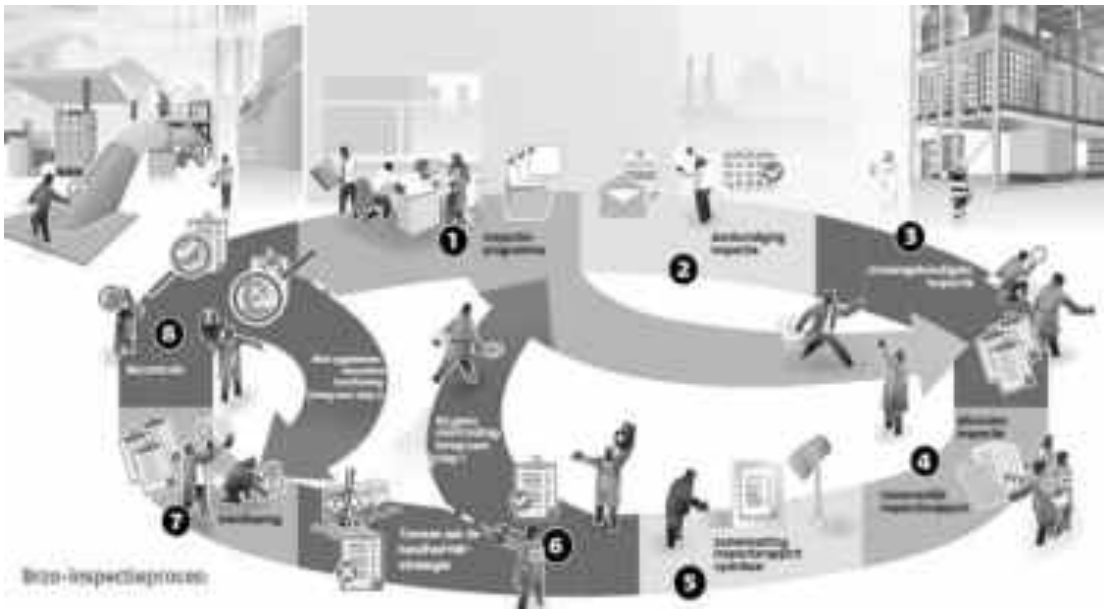
4.5.3 Inspection activities and outcomes

The inspection process generally consists of six to eight steps:

1. Inspection program
2. Announcement of the inspection (not always applicable)
3. Inspection; if possible, collectively with several authorities, including Omgevingsdiensten, Water Boards or Rijkswaterstaat and Health and Safety Inspections
4. Collective inspection report
5. Publicly available summary of report
6. Compliance check
7. Enforcement (if necessary)
8. Follow-up inspection

Figure 17 presents a schematic representation of this inspection process.

Figure 17. Inspection process in the Netherlands



5. Comparative overview

5.1 Introduction

Based on what's described in the previous chapters and in annex A, this chapter provides an overview of the ways in which discharges to water and emissions to air are controlled in the respective countries and regions (Nordrhein-Westfalen (DE), Flanders (BE), the Walloon region (BE) and the Netherlands). Overall similarities and differences are highlighted, without the pretension, however, of presenting a systematic comparison. Since on certain aspects of the way in which industrial discharges and emissions are controlled in the Walloon region, information is missing and/or has not been checked by national experts, this information is presented with a certain clause (see footnote (*), page 58 and further) or is not included.

The overview focuses on characteristics that are on the one hand basic to the different systems, and on the other hand of specific interest to Dutch policy makers: the legal frameworks, the classification of facilities and substances, the limits to emissions, monitoring requirements, inspection practices, publicly available information and issues and priorities.

In order to facilitate tracing back the information that is presented in the overview tables to the original descriptions in the different chapters, references to the source paragraphs are included in the titles of these tables. For example: The overview table of 'overall frameworks' (table 2) refers to paragraph X.2, since paragraphs 2.2, 3.2, 4.2 and A.2 contain descriptions of these frameworks for NRW, FL, NL and WA.

5.2 Comparative overview: legal frameworks

In all regions and countries under study, direct regulations and permit systems are the main instruments for controlling industrial discharges and emissions. Direct financial instruments appear to be less used, although some examples have been found.[32] Besides, the constraint of cost-effectiveness of required measures also introduces a financial consideration in all regulatory frameworks.

There are, however, significant differences in the overall legal frameworks in the different regions and countries. In Flanders (FL) and even more so in the Walloon region (WA), there are integrated legal frameworks for the control of industrial emissions. In Nordrhein-Westfalen (NRW) there are separate frameworks for the control of discharges to water and of emissions to air (leading to requirements of an *'Erlaubnis'* for discharges to water and a *'Genehmigung'* for emissions to air. In the Netherlands (NL) there is a (rather complicated) mixed system, with partly integrated ('all-in-one permit') and partly separate legal frameworks ('Water permit'), also resulting in a rather fragmented landscape of competent authorities.

[32] One example is the sewage financing system in NRW. Here, the discharger pays for discharging. The price depends on the quantity and quality of the wastewater. Another, indirect example of the use of financial instruments, is to be found in the Walloon region, where a company's request for financial aid by the government appears to be reason for a visitation by the environmental inspectorate.

Also, countries and regions differ in the main drivers and backgrounds of their control frameworks. Both in NRW and NL specific paths of economic development (industry, harbours) along with demographic and geographical conditions gave rise to early forms of pollution control and water management systems. In FL and WA, following the regionalisation in the 80's, the regional authorities had to develop more or less new control systems, with EU legislation as strong drivers.

Table 2. comparative overview – overall frameworks (see paragraphs X.2)

	NRW	**FL**	**WA** (*)	**NL**
Legal frameworks (X.2.2)	Separate legal bases for control of discharges (WHG, AbwV, OGewV) and emissions (BImSchG and TA Luft)	One integrating framework (VLAREM), with separate chapters and annexes for water and air	One integrated permit system (Permit Decree) for all types of emissions	Mixed system, partly integrated (Activities Decree, Wabo) and partly separate legal bases (Water Act)
Relevant backgrounds and drivers (X.2.1)	High population density and early industrialisation give rise to early pollution control systems and build-up of expertise	Pollution control is competence of regional authorities since regionalisation (80's). EU legislation is important driver		High population density, industrialisation and location in water delta give rise to early water management and pollution control systems, also because of the dependence on surface water for drinking water production

5.3 Comparative overview: control of industrial discharges to water

5.3.1 Categories of facilities

In all countries and regions, facilities are categorized in order to tailor permit requirements to the potential impact of these facilities. In some countries or regions these categories are linked to classes of permits. For example, in FL and WA a detailed categorization of sectors and activities is directly linked to a limited number of types of permits and types of requirements that apply. In the Netherlands, permits are granted based on activities, not on sectors (110 activities are distinguished, not all water-related). Depending on their activities, some companies do not require a permit but must comply with general rules; whereas others resort to different classes and require an All-in-one permit, and possibly also a Water permit.
In NRW 57 sectors are distinguished, where for each sector rather detailed specific requirements are prescribed.

In short, all countries/regions use a differentiated approach. FL and WA most of all differentiate to (hundreds and hundreds of) facilities; NRW most of all differentiates in terms of tailor-made requirements and measures (for 57 sectors).

(*) Please note that on certain aspects of the way in which industrial discharges and emissions are controlled in the Walloon region, information is missing and/or has not been checked by national experts.

Table 3. comparative overview – categories of permits and facilities (water) (see paragraphs X.2.2, X.3.1 and X.3.2)

	NRW	FL	WA (*)	NL
Segmentation of sectors and activities	AbwV distinguishes 57 branches or sectors	VLAREM distinguishes 63 types of sectors or activities, with sub- and sub-subdivisions	The Permit Decree distinguishes 2600 sectors or activities (including sub- and sub-subdivisions)	The Activities Decree distinguishes 110 activities (not all water-related, mainly regulated through general rules)
Categories of facilities and permits (X.3.2)	No classes of permits for water are distinguished	Three classes, from class 1 (heaviest impact) to class 3 (least impact)	Three classes, from class 1 (heaviest impact) to class 3 (least impact)	Three classes for Activities Decree, from A (least impact) to C (heaviest impact); Separate: category that requires Water Permit

5.3.2 Categories of substances

In most of the countries and regions, overviews and categories of substances are provided in order to tailor permit requirements to the potential impact of these facilities. Lists of substances also help operators to check on their emissions. The appearance of these lists differs. In FL an annex to VLAREM lists 170 substances comprising the European and national WFD-substances. In NL about 70 specific substances are regulated under the WFD but permitting of discharges to water is not limited to these compounds. NRW lists are tailor-made for 57 different sectors. In WA no overall lists are provided; regulated substances are included in transversal, sectoral and integral conditions (and sometimes in complementary or particular conditions).

In FL and WA, the substances on the lists are most of all prescribed by the EU. NRW has a longer history of prescribing limit values and EQSs for substances that have been proved to be relevant. Gradually, these lists of substances overlap with or are also covered by EU Directives. NL has its own method to categorise relevant substances, in which it also includes (potential) PBT and CMR substances (ZZS).

Both the FL and NL systems have a systematic openness to include non-legally listed substances of concern. In FL these substances are categorised as 'hazardous substances without IC'. In NL any compound should be assessed for its aquatic hazard, with special attention being paid to ZZS and substances that are relevant for drinking water due to their persistence and mobility. For the latter, a health-based risk limit should be taken into account for permitting.

Table 4. comparative overview – categories of substances (water) (see paragraphs X.3.3)

	NRW	FL	WA (*)	NL
Lists or categories of substances with *EQSs / immission limits*	Lists with EQSs for ecological (67) and chemical (46) status.	List of 170 substances with EQS and IC ('Indelingscriteria')	No; EQS are included in transversal, sectoral and integral conditions.	List of circa 300 substances with EQSs.

	NRW	**FL**	**WA (*)**	**NL**
Lists or categories of substances with *emission limits*	Lists of emission limit values for substances with relevance for (57) different sectors	Some sectoral requirements contain emission limits for specific substances	No; emission limits are included in transversal, sectoral and integral conditions.	For activities regulated by general rules lists of substances and emission limits are given. Besides, for other substances the aquatic hazard according to GAM determines the category and the decontamination effort.
More substances listed than prescribed in EU Directives?	Yes (for substances with emission limit values); all substances with EQS are gradually (also) prescribed by EU.	No	No	Yes (based on GAM, and all ZZS)
Substances of concern?	No specific category	Yes; hazardous substances without IC are permitted on individual basis based on PNEC	No specific category	Yes, ZZS and drinking water relevant substances (PMT)

5.3.3 Limits to industrial discharges

In the different countries and regions, limits to industrial discharges are largely set in a similar manner. Permits contain emission limits, that can be tightened in case immission standards or EQS are (expected to be) exceeded. In all cases, BAT must be applied. Both BAT and the WFD obligation to phase out emissions of priority hazardous substances and to minimise risks of priority substances, are drivers for minimisation and substitution in all countries and regions. Only in NL an additional driver is installed, which is the so-called ZZS policy, requiring operators to minimise as much as possible the emission of ZZS (if possible, by substitution).

Table 5. comparative overview – limits to industrial emissions (water) (see paragraphs X.3.4)

	NRW	**FL**	**WA (*)**	**NL**
Emission, immission	Emission limits to water can be tightened in case the load exceeds immission standards or EQS			
BAT	BAT is starting point of permit requirements			
Minimisation and substitution	Through BAT and WFD requirements	Through BAT and WFD requirements	Through BAT and WFD requirements	Through BAT and WFD requirements, and through minimisation requirement for ZZS

5.3.4 Monitoring requirements

Monitoring requirements can concern discharges, water quality and water in sewers. As to discharges, companies in all countries and regions are subject to the E-PRTR obligations. In NL, the list of substances that must be reported by these companies is slightly extended. In DE, FL and NL, also other monitoring requirements can be included in permits. In NRW, a traditional role of authorities to (also) monitor discharges is gradually shifted to the dischargers.

In all countries and regions, surface water quality is monitored by, or on behalf of the authorities. Only in NRW there is a tendency to oblige dischargers to monitor water quality upstream and downstream, in order to be able to establish additional load and causality.

Only in NRW a self-monitoring obligation for public owners of sewer systems is reported. (A similar system for private owners is still pending).

Table 6. comparative overview – monitoring requirements (water) (see paragraphs X.3.5)

	NRW	FL	WA (*)	NL
Monitoring of discharges	– By (or on behalf of and paid for) companies (increasingly) (incl. E-PRTR obligations) – By (or on behalf of) authorities	– (Above certain discharge limits) by (or on behalf of and paid for) companies (incl. E-PRTR obligations)	– E-PRTR obligations	– By companies (permit obligations, plus E-PRTR obligations, incl. extra substances)
Monitoring of surface water quality	– By (or on behalf of) authorities (LANUV) – More and more by (or on behalf of and paid for) companies	– By authorities (VVM)	– By authorities (ISSeP)	– By authorities (RWS, Water boards)
Monitoring of sewers	– Self-monitoring by public/private owners of sewer systems	–	–	–

5.4 Comparative overview: control of industrial emissions to air

5.4.1 Categories of facilities

In most countries and regions, the same categorisation of facilities is used for the control of emission to air as for the control of discharges to water (including links to classes of permits). Only in NRW a separate, quite detailed classification is used (through BImSchG Regulation 4) to classify sectors and activities, and to determine whether they need a G (regular), V (light) permit or no permit at all, and whether IED requirements apply. In NL, for control of emission to air only the three categories of facilities apply (A, B, C), since, different than for discharges to water, for emissions to air no separate permit is required.

Table 7. comparative overview – categories of permits and facilities (air) (see paragraphs X.2.2, X.4.1 and X.4.2)

	NRW	FL	WA (*)	NL
Segmentation of sectors and activities	BImSchG Regulation 4 distinguishes more than 500 types of facilities	VLAREM distinguishes 63 types of sectors or activities, with sub- and sub-subdivisions	The Permit Decree distinguishes 2600 sectors or activities (including sub- and sub-subdivisions)	The Activities Decree distinguishes 110 activities (not all air-related, mainly regulated through general rules)

	NRW	FL	WA (*)	NL
Categories of facilities and permits (X.4.2)	Two classes (G or V) or no permit required	Three classes, from class 1 (heaviest impact) to class 3 (least impact)	Three classes, from class 1 (heaviest impact) to class 3 (least impact)	Three classes for Activities Decree, from A (least impact) to C (heaviest impact)

5.4.2 Categories of substances

Just like for water, also for air most countries and regions provide overviews and categories of substances. In NRW the TA Luft prescribes immission limits for 5 categories of substances in order to protect from harming the environment. Also, it prescribes emission limits for 9 categories of substances in different classes of hazard or nuisance in order to establish precaution against harming the environment. In FL and NL, the German TA Luft has been used as a model, that was later adapted to national needs. Thus, in FL an annex to VLAREM II lists EQS for air and dust for 6 substances and emission limit values for 160 substances in 6 groups. In NL emission limits for sets of substances are given for activities prone to the general rules. Activities that (also) emit other substances require permits. There is a list of 22 MPCs (Maximum Permissible Concentrations) for air in the Activity Decree and circa 260 MPCs that are not included in legislation but that are officially set by the ministry. The latter MPCs have been derived in the context of permitting. Their number is continuously growing.

Again, In FL and WA the substances on the lists are most of all prescribed by the EU. The German TA Luft has a longer history and has in fact been model to many of the approaches in other countries. In NL all compounds must be assessed for their hazardousness, with special attention being paid to ZZS.

The NRW, FL and NL systems for air have a systematic openness to include non-listed substances of concern. In NRW all CMRs are included, including those that have been assessed as such by recognized scientific bodies. In FL special attention is paid to PBT and odorous substances. In NL all compounds must be assessed, with special attention being paid to ZZS.

Table 8. comparative overview – categories of substances (air) (see paragraphs X.4.3)

	NRW	FL	WA (*)	NL
Lists or categories of substances with *EQSs / immission limits*	Lists of immission limits for 5 categories of substances (in TA Luft)	Lists of EQS (immission) for air and dust for 6 substances (Annex to VLAREM II).	No; EQS (immission) are included in transversal, sectoral and integral conditions.	Legal immission limits for 22 compounds. Moreover, there are additional officially set limits for 260 components (and increasing)
Lists or categories of substances with *emission limits*	Lists of emission limits for 9 categories of substances in different classes of hazard or nuisance (in TA Luft)	Lists of emission limit values for 160 substances in 6 groups (Annex to VLAREM II).	No; emission limits are included in transversal, sectoral and integral conditions.	Mass flow limits and emission limits are given per substance class

	NRW	FL	WA (*)	NL
More substances listed than prescribed in EU Directives?	Yes	No	No	Yes
Substances of concern?	Yes, CMRs (substances are considered CMR when legally classified or recognized by scientific bodies as such)	Yes, special attention is to be given to PBT and odorous substances (which can be regulated in the environmental permit)	No specific category	Yes, ZZS

5.4.3 Limits to industrial emissions

In the different countries and regions, limits to industrial emissions are largely set in a similar manner. Permits contain emission limits, that can be tightened in case immission limits or EQS are (expected to be) exceeded. In all cases, BAT and IED requirements must be applied, which are also drivers for minimisation and substitution. In NRW and NL an additional driver is installed, i.e. a minimisation obligation for CMRs (NRW) or ZZS (NL) (if possible, by substitution).

Table 9. comparative overview – limits to industrial emissions (air) (see paragraphs X.4.4)

	NRW	FL	WA (*)	NL
Emission, immission	Emission limits to air can be tightened in case the load exceeds immission limits or EQS			
BAT	BAT is starting point of permit requirements			
Minimisation and substitution	Through BAT and IED requirements, and through minimisation requirement for CMR	Through BAT and IED requirements	Through BAT and IED requirements	Through BAT and IED requirements, and through minimisation requirement for ZZS

5.4.4 Monitoring requirements

Monitoring requirements can concern emissions to air and air quality. As to emissions to air, companies in all countries and regions are subject to the E-PRTR obligations. In NRW there are several grounds for companies to be obliged by permit to carry out discontinuous or continuous monitoring of their emissions (including a specific German obligation to issue an emission report). In FL, permits can contain obligations to monitor emissions too. In NL, there is a legal monitoring obligation for emissions to which an emission limit applies.

In all countries and regions, air quality is monitored by, or on behalf of the authorities. In FL, permits can also contain obligations to monitor immissions and depositions in the vicinity of the facility.

Table 10. comparative overview – monitoring requirements (air) (see paragraphs X.4.5)

	NRW	FL	WA (*)	NL
Monitoring of emissions	– Discontinuous and/or continuous monitoring by companies (incl. E-PRTR obligations)	– by (or on behalf of and paid for) companies (incl. E-PRTR obligations)	– E-PRTR obligations	– By companies (permit obligations, plus E-PRTR obligations)
Monitoring of air quality	– By (or on behalf of) authorities	– By authorities (VVM)	– By authorities (ISSeP)	– By authorities

5.5 Comparative overview: environmental inspection

A distinct difference between the organisation of the inspectorates in the different countries and regions, is the quite differentiated, multi-layer structure in NL and NRW vis-à-vis the concentration in one department in FL and WA. This may also be an explanatory factor for the presence of explicit strategies in NRW and NL for an integrated (cross media in NRW, collective in NL) and focused (risk-based) approach of inspection activities.

Table 11. comparative overview – environmental inspections (see paragraphs X.5)

	NRW	FL	WA (*)	NL
Organisation (X.5.1)	Multi-layer inspectorate (local, regional, national)	One inspectorate ('Milieuinspectie')	One inspectorate ('Departement de la Police et des Contrôles')	Multi-layer inspectorate (local, regional, fluvial, national)
Strategy (X.5.2)	Cross-media environmental inspections, risk-based planning	-	-	Risk-based planning. If possible, collective inspections by several authorities (incl. OD's, Water Boards and I-SZW)

5.6 Comparative overview: public information

In all countries and regions environmental information is made public (as required by the Aarhus convention). The way in which, and the extent to which this is done, differs somewhat. NRW appears to be the most open with its information, by making results of all individual inspection visits public and by a tendency to do the same with permit data. The other countries and regions (only) make permit information publicly available in the context of public consultations. Also, all countries publish annual inspection reports with general overviews. NL also publishes summary reports of individual inspections.

Table 12. comparative overview – public information (see paragraphs X.3.4, X.3.5, X.4.4, X.4.5 and X.5.3)

	NRW	FL	WA (*)	NL
Permit information (X.3.4 and X.4.4)	More and more, permit requests are made public during permitting process (in any case on regional level and in case of (legally required) public participation)	Permit information is made public by local authorities	Public consultation is conducted for class 1 and class 2 projects; information on the permit is available on request	During the permitting process, a public consultation is held. All information, except business secrets, is made publicly available.

	NRW	FL	WA (*)	NL
Monitoring data (X.3.5 and X.4.5)	All data publicly available on the internet	All data publicly available on the internet	Overviews available on the internet	Water and air quality data are measured, reported, modelled and made publicly available
Inspection outcomes (X.5.3)	Annual inspection plans and programmes and reports are published. Also, results from (individual) inspection visits are made public on the internet.	Annual inspection reports are published. Not all inspection data are made public yet.	Annual inspection reports and programmes are published. Not all inspection data are made public.	Annual inspection plans and programmes and reports are published. Summaries of (individual) inspection reports are made publicly available

5.7 Comparative overview: issues and priorities

All interviewees in the different countries and regions have been asked about their (new) priorities and the issues they are – or have problems with – dealing with around control of industrial discharge and emissions. The answers make clear that almost all authorities face challenges from (sometimes the same) specific types of compounds in surface waters, like pharmaceuticals and microplastics (it is not exactly clear whether this is the same for compounds in the air).

The authorities are facing different types of issues, ranging from difficulties with striking the right balance between the control of point and diffuse sources (FL) to knowledge and communication gaps between different controlling agencies (NL). In both NRW and FL, updating regulation to new technical and emission standards appears to be a somewhat problematic issue.

Table 13. comparative overview – issues and priorities (See paragraphs X.3.6 and X.4.6)

	NRW	**FL**	**WA** (*)	**NL**
Priorities water (X.3.6)	– Pyrazole – Perfluoro compounds – Pharmaceuticals – Legionella	– Pharmaceuticals – Microplastics	–	– ZZS Emerging substances in surface water (and their risks for drinking water), especially: – Pharmaceutical substances and residues – Plant protection products and biocides – Industrial substan-ces, such as PFAS and fire retardants – Microplastics and nanomaterials – Persistent, mobile (and toxic) compounds, such as pyrazole and melamine
Issues water (X.3.6)	Slow progress in updating annexes of AbwV to new technical and emission standards (e.g. BAT conclusions)	Strict regulation of industry vis-à-vis other, diffuse sources (because of WFD approach) Issue of atmospheric deposition (leading to practical problems, also because of WFD)	-	– Knowledge and communication gap between water authorities (direct discharges) and 'Omgevingsdiensten' (indirect discharges)
Priorities air (X.4.6)	–	–	–	– ZZS – Precipitation of (industrial) substances originating from emissions (caused by PFAS case)
Issues air (X.4.6)	Slow progress in updating TA Luft to new technical and emission standards (e.g. BAT conclusions) (meanwhile, included in *'Verwaltungsvorschrif-ten'*)	Discussions about necessary update of VLAREM requirements, following updates of TA Luft; outcome of discussions not yet clear.	BAT and BREF-revision: need for inclusion of additional pollutants in some sectors, lack of guidelines for 'disproportionately higher costs compared to the environmental benefits.'	-

5.8 An agenda for exchange of information and experiences?

One of the objectives for carrying out this study, is to facilitate improved understanding and exchange between the authorities in the different countries and regions. Such exchange could be useful, either to learn from one another's experiences and solutions, or to reflect on shared issues or challenges.

During the interviews, several topics were mentioned that would merit exchange between the colleagues in the different countries and regions. They are presented here, to serve as a longlist of optional points on an agenda for future exchange.

Longlist of optional agenda points:

General control issues

- How to prioritise? (substances, compounds, activities, facilities)
- Are there experiences and ideas for a systemic approach? (compounds in the air that lead (through deposition) to water and soil pollution; compounds in surface water that end up in groundwater or drinking water).
- How to make a 'duty of care' operational?
- How to establish 'reasonable costs' of additional technical measures to prevent possible exceeding of EQS?
- How, and to what extent, make companies responsible for monitoring?

Control issues air:

- How to assess deposition of substances?

Control issues water:

- How to deal with preload caused by diffuse sources or point sources upstream? (Can each facility complete standards, is it a company's bad luck if it's last in line?)
- How to deal with atmospheric depositions within the WFD framework? (e.g. with mercury pollution)
- What can be learned from screening of water bodies for new substances (the Flanders example?)

Communication

- How to make permitting, monitoring and inspection information public? (With what organisation between different CAs, how to make the information searchable and findable, in which formats, which information to disclose and to protect?)

Organisation

- How to organise contacts and exchange between different Competent Authorities?
- How to speed up permitting procedures without loss of content and quality? (The NRW example?). How to make sure that shorter permit periods do not place competent authorities (CAs) in a disadvantageous position? How to prevent that pre-consultation results in 'capture'? (the situation in which CAs are no longer able to take an independent position vis-à-vis facilities)

Annex A: Control of industrial discharges and emissions in the Walloon region (BE)

Due to a lack of underpinning and inside information, it has been decided to include this chapter on the control of industrial discharges and emissions in the Walloon region as an annex to this report.

A.1 Main features

Main features of the control of industrial discharges and emissions in the Walloon region (BE) are:

- The Decree on Environmental Permits provides one integrated basis for control of industrial discharges to water and emissions to air, requiring permits for facilities and activities with a certain level of impact on the environment.
- Three classes of permits are distinguished for facilities with different levels of potential environmental impact. The Decree provides a detailed classification scheme for facilities and the applicable types of permits and other requirements
- There are different types of conditions for different classes of facilities in different sectors:
  - *General conditions*, that apply to all facilities
  - *Sectoral* (class 1 and 2) and *integral conditions* (class 3), that apply to all facilities in a given class, sector or region (including conditions from EU Directives)
  - *Special* (classes 1 and 2) or *additional conditions* (class 3), specific to the facility in question
- All different types of conditions are set in specific *'Arrêté's'* (128 in total)
- The Decree on Environmental Permits requires that the competent authority sets emission limit values for facilities and installations, to ensure that emissions, under normal operating conditions, do not exceed the levels associated with BAT. In doing so, the authority must take immission guide values into account.
- Emissions and water and air quality are monitored by the authorities (various laboratories and Institut Scientifique de Service Public (ISSeP) and made public.
- Environmental inspections are carried out by the Département de la Police et des Contrôles (DPC).

A.2 General background and legal framework

A.2.1 General background of the way in which industrial discharges and emissions are controlled in the Walloon region

Just as in Flanders, since 1980 onwards the Walloon authorities are competent for matters related to the Walloon territory, including the environment. So, control of industrial discharges and emissions in the Walloon region is based on Walloon (and EU) legislation.

A.2.2. A common legal basis for the control of industrial discharges and emissions in the Walloon region?

A.2.2.1 Types of permits and facilities

Of the three countries resp. four regions under study, the Walloon framework for the control of industrial discharges and emissions is the most unified and rests on the most extensive common legal basis. This basis is the Decree on Environmental Permits (11 mars 1999 - Décret relatif au permis d'environnement). It provides a unifying body for controlling all environmental effects of facilities and activities, mostly by means of environmental permits. These permits are either issued by municipalities or by a *'"Fonctionnaire Technique" (FT) de la Wallonie'*.

In the decree 3 classes of permits are distinguished: class 1 (facilities with heavy environmental impact), class 2 (medium impact) and declaration class 3 (low impact).
A specific *Arrêté*[33] defines for specific types and characteristics of facilities:
- Permit classes
- Requirement of Environmental Impact Assessment
- Risks for soil
- Relevant organs to be consulted
  (e.g.:
  - AWAC *('Agence Wallonne de l'Air & du Climate';* 'Walloon Air and Climate Agency'*)* for air and climate
  - DESO and DESU for underground and surface water
  - DNF for nature and forest
  - DPS for protection of soil)
- Calculation factors for location (communal, rural, or industrial area)

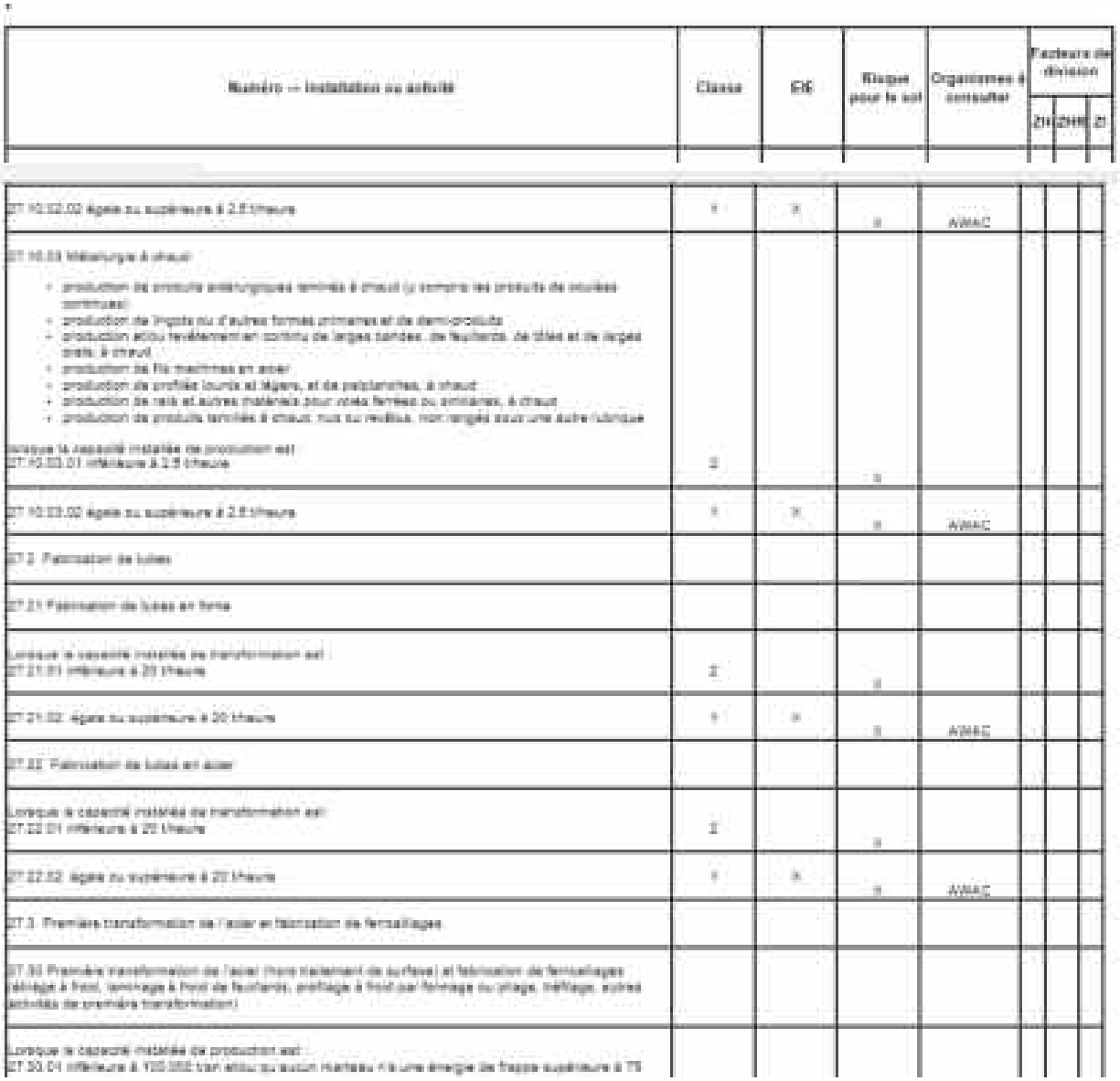
Annex 1 of this decree contains a list of types of facilities and activities with their classifications on these aspects. The list consists of more than 2600 entries related to sectors, subsectors, sub-subsectors and scales of activities and facilities. Figure 18 on the next page provides an impression of this list and contains an excerpt that concerns part of the high-temperature metallurgical industry.

A.2.2.2 Types of conditions

There are different types of conditions for the different types of facilities (classes 1, 2 or 3):
- **General conditions** *(conditions générales)* that apply to all facilities and activities
- **Sectoral** *(conditions sectorielles)* (classes 1 and 2) or **integral** *(conditions intégrales)* (class 3) conditions that apply for facilities and activities in a specific economic sector or territory with specific risks
- **Special conditions** *(conditions particulières)* (classes 1 and 2) or additional conditions *(conditions complémentaries)* (class 3), that are specific to the establishment in question. They complement the general and sectoral / integral conditions and cannot be less severe than these.
-

[33] 4 juillet 2002 - *Arrêté du Gouvernement Wallon arrêtant la liste des projects soumis à étude d'incidences, des installations et activités classées ou des installations ou des activités présenttant un risque pour le sol.*

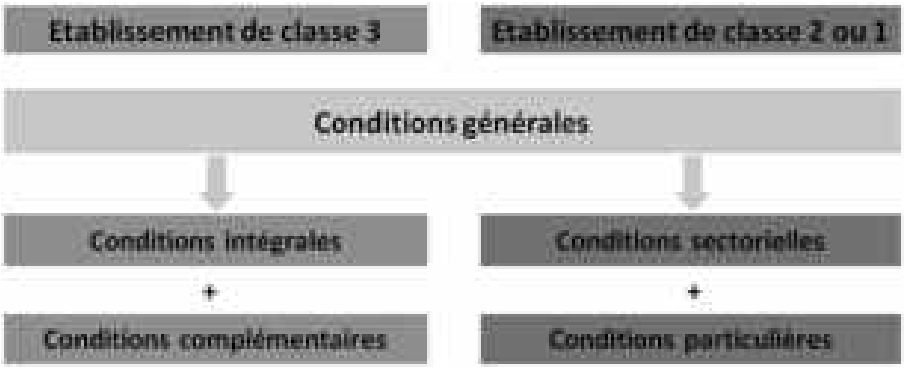
Figure 18. Example of classification of facilities in Annex 1: High temperature metallurgy



Numéro — Installation ou activité	Classe	EIE	Risque pour le sol	Organismes à consulter	Facteurs de division		
					Zn	Zn++	Zi
27 10 02 02 égale ou supérieure à 2,5 t/heure	1	X	X	AIWAC			
27 10 03 Métallurgie à chaud : • production de produits sidérurgiques terminés à chaud (y compris les produits de moulées connexes) • production de lingots ou d'autres formes primaires et de demi-produits • production et/ou revêtement en continu de larges bandes, de feuillards, de tôles et de larges plats, à chaud • production de fils machines en acier • production de profilés lourds et légers, et de palplanches, à chaud • production de rails et autres matériels pour voies ferrées ou similaires, à chaud • production de produits terminés à chaud, nus ou revêtus, non rangés sous une autre rubrique Lorsque la capacité installée de production est 27 10 03 01 inférieure à 2,5 t/heure	2		X				
27 10 03 02 égale ou supérieure à 2,5 t/heure	1	X	X	AIWAC			
27 2 Fabrication de tubes							
27 21 Fabrication de tubes en fonte							
Lorsque la capacité installée de transformation est 27 21 01 inférieure à 20 t/heure	2		X				
27 21 02 égale ou supérieure à 20 t/heure	1	X	X	AIWAC			
27 22 Fabrication de tubes en acier							
Lorsque la capacité installée de transformation est 27 22 01 inférieure à 20 t/heure	2		X				
27 22 02 égale ou supérieure à 20 t/heure	1	X	X	AIWAC			
27 3 Premières transformation de l'acier et fabrication de ferrosilliages							
27 30 Première transformation de l'acier (hors traitement de surface) et fabrication de ferrosilliages (étirage à froid, laminage à froid de feuillards, profilage à froid par formage ou pliage, tréfilage, autres activités de première transformation)							
Lorsque la capacité installée de production est 27 30 01 inférieure à 100 000 t/an et/ou au moyen d'un marteau ou une énergie de frappe supérieure à 75							

General, sectoral and integral conditions are fixed by decree. They are directly applicable to the facilities and activities they target. In contrast to special or additional conditions, they do not have to be attached to the permit. Figure 19 provides a schematic overview of the types of conditions for the different classes of facilities.

Figure 19. General, sectoral and integral conditions for different classes of facilities



The general conditions that concern all facilities and activities, are elaborated in two arrêtés.[34]

On top of that, there are:

1) **Transversal conditions (sectorial or integral)**, that concern specific types and classes of facilities. These conditions are related to:
   - The SEVESO Directive (Arrêté du Gouvernement wallon du 19 avril 2007 déterminant etc. etc.)
   - The IPPC/IED Directive (Arrêté du Gouvernement wallon du 16 janvier 2014 déterminant les conditions sectorielles relatives à certaines activités générant des conséquences importantes pour l'environnement et modifiant diverses dispositions en ce qui concerne notamment les émissions industrielles)
   - Reduction of greenhouse gas emissions (Arrêté du Gouvernement wallon du 13 décembre 2012 déterminant etc. etc.)
   - Periodical notification of environmental data (in relation to the EPER, later E-PRTR directive) (Arrêté du Gouvernement wallon du 13 décembre 2007 relatif à l'obligation de notification périodique de données environnementales [… etc. etc.])
2) **Sectorial conditions**
   - 71 Arrêté's concerning specific sectors
3) **Integral conditions**
   - 38 Arrêté's concerning specific activities (or SME sectors)
4) **Sectoral and integral conditions**
   - 15 Arrêté's concerning specific (SME) sectors/activities

The resulting, somewhat complex system of facility classification, sectoral specifications and different types of conditions, is made accessible by the Walloon authorities by means of a website with a dedicated search machine that allows to search on company characteristics: http://environnement.wallonie.be/cgi/dgrne/aerw/pe/index_rubri.htm.

[34] They are: 'Arrêté du Gouvernement wallon du 4 juillet 2002, fixant les conditions générales d'exploitation des établissements visés par le décret du 11 mars 1999 relatif au permis d'environnement'; and: 'Arrêté du Gouvernement wallon du 4 juillet 2002, 'relatif à la procedure et à diverses mesures d'exécution du decret du 11 mars etc.'

A.2.2.3 Control of industrial discharges and emissions

The decree on environmental permits of 11 March 1999 contains several general requirements that concern both industrial emissions to water and to air. It requires that the competent authority sets general, sectoral and integral conditions. In doing so, the authority must take immission guide values into account. It also requires the government to set emission limit values for facilities and installations, to ensure that emissions, under normal operating conditions, do not exceed the levels associated with BAT.

The same decree requires that the permit request:
– describes nature, quantities and significant effects of the foreseeable emissions; and
– describes techniques planned to prevent or, if not possible, to reduce these emissions.

A.2.2.4 Environmental monitoring

Monitoring of industrial emissions to and quality of water and air, is carried out by various laboratories including l'Institut scientifique de service public (ISSeP), which is the reference laboratory. Environmental data can be found on the website 'État de l'environnement Wallon'.[35] On this website, also information can be found on the monitoring budgets for the different environmental compartments. Figure 20 presents a graph of these budgets.

Figure 20. Walloon monitoring budgets for different aspects and compartments

[35] http://etat.environnement.wallonie.be/home.html

A.3 Control of industrial discharges to water in the Walloon region

A.3.1 Legal basis

Given the extensive common framework for control of industrial discharges and emissions, there is only limited additional regulations specifically aiming at the control of industrial discharges.

The Order on general conditions for the operation of facilities (4 July 2002) contains some definitions related to water quality and pollution and describes a number of grounds for exceptions.

A.3.2 Classes of permits and facilities

All classification of permits and facilities is part of the overall legal framework. There is no specific classification of facilities and permits with regards to industrial discharges to water.

A.3.3 Categories of substances

Emission and immissions values for specific substances are included in transversal, sectoral and integral conditions and possibly also in complementary and particular conditions. No overarching categories of substances are distinguished.

A.3.4 Limits to discharges

As part of the overall control framework, the competent authority sets limit values for discharges to water to ensure that emissions, under normal operating conditions, do not exceed the levels associated with BAT. In doing so, the authority must take immission guide values into account.

A.3.5 Monitoring of discharges and of water quality

Discharges and water quality are monitored as part of the overall environmental monitoring, as described in paragraph 4.2.2.4.

A.3.6 Priorities and issues

No specific information yet.

A.4 Control of industrial emissions to air in the Walloon region

A.4.1 Legal basis

Given the extensive common framework for control of industrial discharges and emissions, there is only limited additional regulations specifically aiming at the control of industrial emissions to air.

The Order on general conditions for the operation of facilities (4 July 2002) defines point emission (émission atmosphérique canalisée), diffuse emission, odor levels. It refers to a specific order for 'limit and alert values for air quality'.[36]

The Order also requires that, if for one or more pollutants short-term air quality objectives are (likely to be) exceeded, the operator of an installation whose mass flow rates of (precursors of) these pollutants are higher than those specifically defined for this purpose under sectoral conditions, shall take all necessary measures to limit these emissions until the end of the alert.

On top of that, the Arrêté du Gouvernement wallon relatif à la lutte contre la pollution atmosphérique en provenance des installations industrielles (09-12-1993) provides the general framework for setting site-specific emission limit values.

A.4.2 Classes of permits and facilities

All classification of permits and facilities is part of the overall legal framework. There is no specific classification of facilities and permits with regards to industrial emissions to air.

A.4.3 Categories of substances

Emission and immissions values for specific substances are included in transversal, sectoral and integral conditions and possibly also in complementary and particular conditions. No overarching categories of substances are distinguished.

A.4.4 Limits to emissions

As part of the overall control framework, the competent authority sets limit values for emissions to air to ensure that emissions, under normal operating conditions, do not exceed the levels associated with BAT. In doing so, the authority must take immission guide values into account.

A.4.5 Monitoring of emissions and of air quality

Emissions and air quality are monitored as part of the overall environmental monitoring, as described in paragraph 4.2.2.4.

A.4.6 Priorities and issues

Issues that are mentioned by the consulted expert are: "BAT and BREF-revision: need for inclusion of additional pollutants in some sectors, lack of guidelines for 'disproportionately higher costs compared to the environmental benefits.'"

[36] L'Arrêté du Gouvernement Wallon du 23 juin 2000 relatif à l'évaluation et à la gestion de la qualité de l'air ambiant; i.e. the transposition of Directives 2008/50/CE (on ambient air quality and cleaner air for Europe) and 2004/107/CE (relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air).

A.5 Environmental inspections in the Walloon region

A.5.1 Legal basis and organisation

In the Walloon region, inspections and enforcement take place on the legal basis of the Order of 5 June 2008: *Décret relatif à la recherche, la constatation, la poursuite et la répression des infractions et les mesures de réparation en matière d'environnement*.

Inspections are carried out by the Département de la police et des contrôles (DPC). These inspections consist of:
- (routine) inspections;
- enforcement activities (policing); and
- anti-poaching activities.

A.5.2 Inspection strategy

No specific information yet.

A.5.3 Inspection activities and outcomes

DPC publishes annual reports, that can be found on the environmental portal of the Walloon region (most recent: 2006). These annual reports include an inspection programme for the following year.

On the website 'État de l'environnement Wallon' that was mentioned before, overview information can be found on inspection activities and outcomes.

Figure 21 (next page) presents a graph that shows the amount of different types of inspections that have been carried out in recent years. Relevant for the topic of industrial discharges and emissions are the inspections of 'complaints and follow-ups' (lowest bar, orange), 'companies soliciting for regional aid' (second lowest bar, purple), 'IPPC/IED companies' (third lowest bar, dark rose) and 'other (waste issues, Seveso)' (upper bar, yellow).

Figure 21. DPC inspections

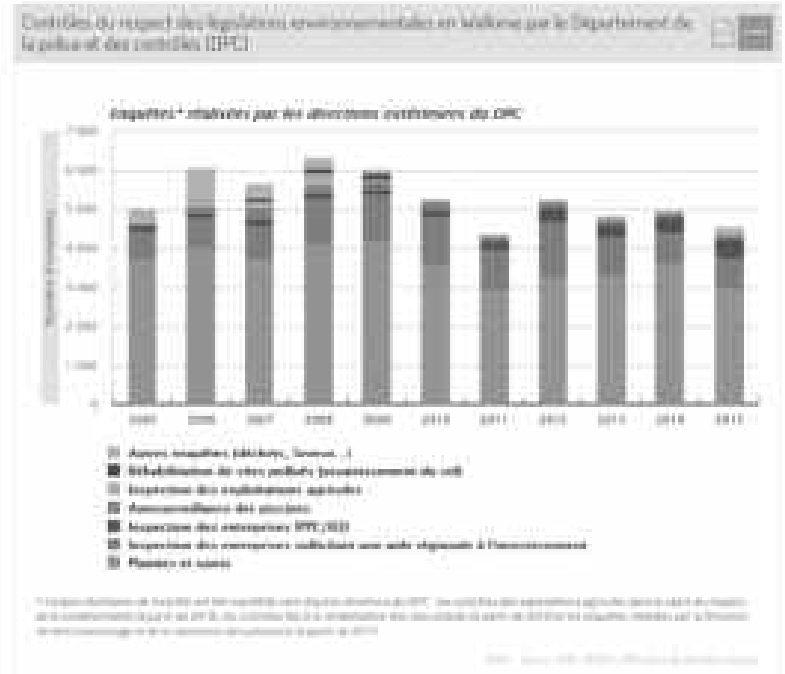


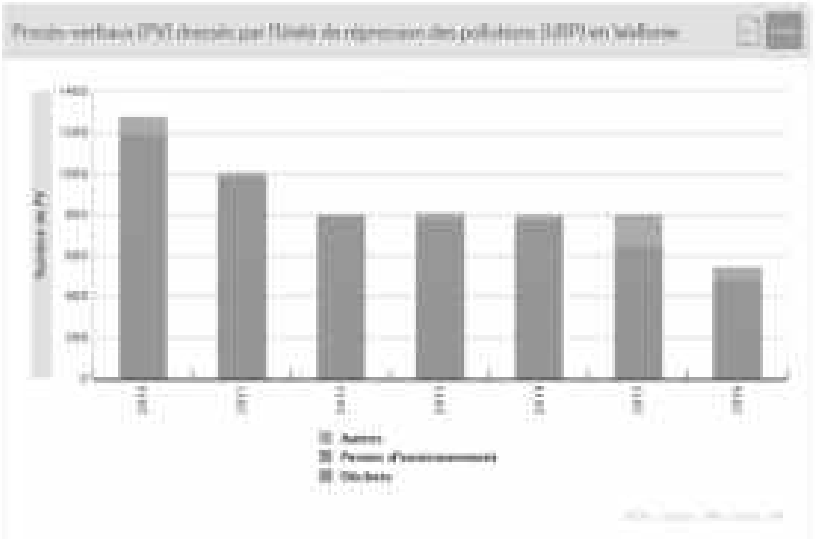
Figure 22 presents the constraining measures that have been taken by DPC following these inspections. The red upper bar concerns the number of *'Procès-verbal'* or minutes (in case of serious infractions). The middle light-brown bar concerns the number of *'Avertissements'* or warnings (for minor infractions). The lower, dark-brown bar concerns the number of *'Injunctions'* or orders for repair or improvement.

Figure 22. Constraining measures by DPC

Finally, figure 23 presents the subjects of the minutes i.e. the perpetrators of serious infractions. The lower grey bar concerns waste issues, the middle green bar permit issues

and the upper yellow bar other issues. It can be seen that, other than the number of waste issues, the number of permit issues remains more or less constant.

Figure 23. Subjects of the minutes



Annex B: references NRW

B.1 (Links to) literature, documents, relevant links and websites

Literature
- Umweltbundesamt (2008): *'Air Pollution Prevention – manual on emission monitoring'* (UBA-FB 00 10 90)
- Umweltbundesamt (2018): Dialog mit Expertinnen und Experten zum EU-Rechtsakt für Umweltinspektionen – Austausch über mögliche Veränderungen im Vollzug des EU-Umweltrechts' (UBA Texte 21/2018

Documents
Documents water:
- Wasserhaushaltsgesetz
- Verordnung über Anforderungen an das Einleiten von Abwasser in Gewässer
- Oberflächengewässerverordnung
- Verordnung zur Selbstüberwachung von Abwasseranlagen

Documents air:
- BundesImmissionsschutzgesetz (BImSchG)
- Verordnungen zum BImSchG
- Vierte Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über genehmigungsbedürftige Anlagen - 4. BImSchV)
- TA Luft
- New version of TA Luft draft
- Draft for transposing MCP Directive into German law (Regulation 44)
- Verwaltungsvorschrift BAT conclusions Raffinieren von Mineralöl und Gas
- Pending permits Bezirksregierungen
- Permits Bezirksregierung Köln

Monitoring:
- Überwachungsplan der Bezirksregierung Köln
- https://www.lanuv.nrw.de/umwelt/luft/immissionen/
- https://www.lanuv.nrw.de/umwelt/luft/immissionen/aktuelle-luftqualitaet/
- https://www.lanuv.nrw.de/umwelt/luft/emissionen/emissionskataster-luft/

Relevant websites
- Website of the NRW Environmental inspection (including links to all environmental inspection results)
- Website of LANUV

B.2 List of consulted experts

Hr. Wulf Böckenhaupt	Bezirksregierung Köln
Dr. Horst Büther	Bezirksregierung Köln
Dr. Michael Rottschäfer	Bezirksregierung Köln

Dr. Friederike Vietoris	Ministerium für Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes Nordrhein-Westfalen
Frau Kyra Weyres	Bezirksregierung Köln

Annex C: references Flanders

C.1 (Links to) literature, documents, relevant links and websites

Literature

– Van der Aa, S. et al. (2016); Haalbaarheidsstudie actualisatie algemeen emissiegrenswaarden lucht. VITO, Mol.

Documents

Documents generic:

– Decree of 28 June 1985 concerning the environmental permit. Belgisch Staatsblad, 17 September 1985
– Omgevingsvergunningdecreet, 25 April 2014
– Omgevingsvergunningsbesluit, 27 November 2017
– VLAREM II
– VLAREM II Bijlagen
– VLAREM III
– Milieuhandhavingsrapport 2017. Afdeling Handhaving

Documents water:

– Achtergronddocument bij Stroomgebiedbeheerplan 2016-2021; 'Reductieprogramma 2016-2021' - Vergunningenbeleid Gevaarlijke stoffen

Documents air:

– Richtlijnenboek Lucht (Antea Groep en VITO, geactualiseerde versie, 2012)

Monitoring:

– Jaarverslag Water 2017 - syntheserapport
– Jaarrapport lucht - Emissies 2000-2016 en luchtkwaliteit in 2017 in Vlaanderen

Relevant websites:

– http://geoloket.vmm.be/Geoviews/
– http://www.vmm.be/data/luchtkwaliteit-in-je-eigen-omgeving

C.2 List of consulted experts

Julie Ameloot	Vlaamse Milieumaatschappij
Koen Toté	Vlaamse Milieumaatschappij
Jeroen Vanhooren	Vlaamse Milieumaatschappij
Sofie van Volsem	Vlaamse Milieumaatschappij

Annex D: references Walloon region

D.1 (Links to) literature, documents, relevant links and websites

Documents

Documents generic

- Decree on Environmental Permits (11 mars 1999 - Décret relatif au permis d'environnement)
- 4 juillet 2002 - Arrêté du Gouvernement Wallon arrêtant la liste des projects soumis à étude d'incidences, des installations et activités classées ou des installations ou des activités présenttant un risque pour le sol.
  - Annex 1 of this Arrêté
- Arrêté du Gouvernement wallon du 4 juillet 2002, fixant les conditions générales d'exploitation des établissements visés par le décret du 11 mars 1999 relatif au permis d'environnement
- Arrêté du Gouvernement wallon du 4 juillet 2002, 'relatif à la procedure et à diverses mesures d'exécution du decret du 11 mars etc.
- Décret relatif à la recherche, la constatation, la poursuite et la répression des infractions et les mesures de réparation en matière d'environnement (5 June 2008)

Documents air:

- L'Arrêté du Gouvernement Wallon du 23 juin 2000 relatif à l'évaluation et à la gestion de la qualité de l'air ambiant
- Arrêté du Gouvernement wallon relatif à la lutte contre la pollution atmosphérique en provenance des installations industrielles (09-12-1993)
- 30 AOUT 2018. - Arrêté du Gouvernement wallon déterminant les conditions sectorielles relatives aux installations de combustion moyennes et modifiant diverses dispositions environnementales

Monitoring:

- http://geoportail.wallonie.be/home.html

Relevant websites:

- Walloon portal on environmental legislation and permits
- Dedicated search machine that allows to search all Walloon environmental permit legislation on the basis of sector and company characteristics
- Webpages about the implementation of the IED
- Website 'État de l'environnement Wallon'
- AWAC website on air and climate policies
- Annual inspection reports
- Information about environmental inspections

D.2 List of consulted experts

André Guns	Agence Wallonne de l'Air et du Climat (AWAC)

Annex E: references the Netherlands

E.1 (Links to) literature, documents, relevant links and websites

Documents generic:
- Environmental Protection Act - Wm
- Dutch General Provisions Act - Wabo
- Activities Decree
- Decree on Environmental Law - Bor

Documents water:
- Water Act
- General Assessment Methodology - GAM
- Discharge test

Documents air:
- Toxicological evaluation of mass flow limits for air emissions of substances of very high concern
- Immission test

ZZS:
- Flyer ZZS-policy

Relevant websites
General:
- Activities Decree Internet Module (AIM)
- InfoMil (knowledge center for environmental legislation and policy)
- Environment and Planning Act
- RIVM substances and standards database

ZZS:
- InfoMil ZZS
- RIVM ZZS information
- RIVM ZZS database
- InfoMil – ZZS emission and discharge reduction guideline

Water:
- Helpdesk Water
- InfoMil Water
- General Assessment Methodology
- Discharge test

Air:
- InfoMil Air

Monitoring and inspection:
- Emissieregistratie (water and air quality models)
- Environment and Transport Inspectorate – ILT

E.2 List of consulted experts

Lise de Boer MSc.	RIVM – author of the Dutch reference chapter
Dr. Nicole Janssen	RIVM
Dr. Els Smit	RIVM

Annex F: List of abbreviations

ABM	Algemene Beoordelingsmethodiek
AbwV	Abwasser Verordnung
AVN	Anlagenteile, Verfahrensschritte und Nebeneinrichtungen
AWAC	Agence Wallonne de l'Air & du Climate'Bal
Bal	Besluit activiteiten leefomgeving
BAT	Best Available Technology
BE	België
BImSchG	Bundesimmissionsschutzgesetz
Bkl	Besluit kwaliteit leefomgeving
Bor	Besluit Omgevingsrecht
BREF	BAT reference documents
BRZO	Besluit Risico's Zware OnBRZOgevallen
Cd	Cadmium
CLP	European regulation on Classification, Labelling and Packaging
CMR	Carcinogenic, mutagenic, reprotoxic
DABM	Decree on General Provisions on Environmental Policy
DE	Deutschland
DIN	Deutsches Institut für Normung
DPC	Département de la Police et des Contrôles
EGW	Emissiegrenswaarde
E-PRTR	European Pollutant Release Transfer Register
EQS	Environmental Quality Standard
EU	European Union
EU MCP directive	European Medium Combustion Plant directive
FAMHP	Federal Agency for Medicines and Health Products
FL	Flanders
GAM	General Assessment Method
GMS	Grensmassastroom
Hg	Mercury
IC	Indelingscriterium
IED	Industrial Emissions Directive
IenW	Infrastructuur en Waterstaat
ILT	Inspectie Leefomgeving en Transport
IPPC	Integrated Pollution Prevention and Control
ISO	International Organisation for Standardisation

ISSeP	l'Institut Scientifique de Service Public
LANUV	Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein-Westfalen
MPC	Maximum Permissible Concentration
Ni	Nickel
NL	Nederland
NRW	Nordrhein-Westfalen
OEL	Occupational Exposure Limit
OGewV	Oberflachengewässer-Verordnung'
OVAM	Openbare Vlaamse Afvalmaatschappij
PAHs	Polycyclic Aromatic Hydrocarbons
PBT	Persistent, bio-accumulative, toxic
PFAS	Perfluoroctaansulfonzuur
PGS	Prioritair Gevaarlijke Stof
PMT	Persistent, Mobile and Toxic
PNEC	Predicted No-effect Concentration
pZZS	Potentiële Zeer Zorgwekkende Stoffen
REACH	European regulation on Registration, Evaluation and Assessment of Chemicals
RIVM	Rijksinstituut voor Volksgezondheid en Milieu
SVHC	Substances of Very High Concern
TA Luft	Technische Anleitung zur Reinhaltung der Luft
TüV	Technischer Überwachungsverein
UBA	Umweltbundesamt
URL	Uniform Resource Locator
VITO	Vlaamse onafhankelijke onderzoeksorganisatie
VLAREBO	Vlaams Reglement rond bodemsanering en bodembescherming
VLAREM	Vlaams Reglement betreffende de Milieuvergunning
VMM	Vlaamse Milieu Maatschappij
VOC	Volatile Organic Compounds
WA	Walloon region
Wabo	Wet algemene bepalingen omgevingsrecht
WFD	Water Framework Directive
WHG	Wasserhaushaltgesetz
WHO	World Health Organisation
Wm	Wet Milieubeheer
ZZS	Zeer Zorgwekkende Stoffen