NeR chapter 2

General conceptual framework

2 General conceptual framework

2.1 Underlying idea of the NeR

The NeR is primarily focused on the application of emission-abating measures in accordance with Best Available Control Technnology for reducing air pollution. In addition to that, the NeR is aimed at harmonising licensing. This section explains the principles on which the NeR is based.

2.1.1 Prevention, reduction and control of emissions

Emission-abating measures must be focused on the reduction of the total mass flow of emissions (emission load). The use of process-integrated measures to prevent emissions is to be preferred over the use of end-of-pipe techniques due to the structural nature of process-integrated measures.

Fugitive emissions, that is to say, emissions that are not released from a canalised emission source, must be minimised as much as possible through process-integrated or source-oriented facilities and proper control and maintenance. The proper functioning of emission-abating measures must be laid down in the permit requirements.

Process-integrated measures (see also §2.7)
These measures consist of changes in the production process itself. Examples of process-integrated measures are:
- optimisation of the process;
- an alternative process operation;
- use of closed reactors instead of open reactors;
- encasement and source-oriented suctioning.

2.1.2 Best Available Control Technnology

In the selection of emission-abating measures, the NeR bases itself on Best Available Control Technnology. Best Available Control Technnology is composed of facilities and associated emission standards that have proven themselves technically and economically feasible elsewhere. For the definition of this term see Appendix 4.2. The general emission standards in the NeR are based on the potentials of Best Available Control Technnology for reducing emissions. When measures are applied in accordance with Best Available Control Technnology, the treated emissions can meet the NeR standards.

Best Available Control Technnology for reducing emissions is not a static factor. Developments in technology may, just as developments in environmental policy, be a reason for adjusting the standards in the NeR.

In establishing the permit requirements in accordance with the NeR, the reasonableness of the prescribed measures must be checked in conformity with the ALARA principle pursuant to the Environmental Protection Act (*Wet milieubeheer*). How this principle is applied in the context of the NeR is described in the following section.

2.1.3 The ALARA principle

Environmental Protection Act Art. 8.11 stipulates that the ALARA principle must be applied in the issuing of permits (ALARA = As Low As Reasonably Achievable). This also applies to requirements on the ground of the NeR: when establishing requirements on the ground of the NeR, the competent authority must apply the ALARA principle. In practice this usually means that account is taken of the economic restrictions in applying techniques. A comparison must therefore be made with the situation in an average company in the industry in question.
Background information on the ALARA principle in the Environmental Protection Act can be found in the reports of the parliamentary handling of this Act and in various books published on this subject.*

In the NeR the ALARA principle is revealed in the concept of Best Available Control Technnology. The ALARA principle is already incorporated at a general level in the definition of Best Available Control Technnology (sees Appendix 4.2). This means that the application of measures in conformity with the NeR generally involves prescribing Best Available Control Technnology and use of the ALARA principle.
In company-specific cases, the imposing of measures in accordance with the NeR can, however, be contrary to the ALARA principle. This means that the competent authority must always check that the ALARA principle is applied correctly when applying requirements in conformity with the NeR. If according to the competent authority this is not the case, a justifiable departure from the NeR is required.

* *Wegen naar een nieuwe milieuvergunning* (Roads to a new environmental permit), VROM, 1995, pp. 86, 87.

Considerations in applying the ALARA principle
The considerations given below play a role in assessing whether it is reasonable to prescribe emission-abating measures. They are useful in checking measures and emission standards against the ALARA principle and can serve as grounds for refusing a permit or departing from the NeR in a justifiable way.

- Cost effectiveness (costs in relation to the proposed emission abatement, including investments and operational costs).
- Reliability and technical availability, susceptible to malfunction.
- The facility's technical depreciation period.
- Necessary pre- or post-treatment steps in so far as these are not required for other compounds in accordance with the NeR.
- Energy consumption.
- Shift of the environmental issue to other substances and/or environmental compartments.
- Space required, especially in existing situations.
- Significant contribution towards the concentration of substances subject to air quality requirements.
- Alternative requirements in handbooks and workbooks on the ground of target group policy.

2.1.4 Departing from the NeR on the ground of Best Available Control Technology

The premise is that the general emission standards can often be realised with measures in accordance with Best Available Control Technology and that they are therefore in line with the ALARA principle. There are two exceptions to this:

- The effect of the emission-abating technique *falls constantly far above* the standard set by the NeR. In that case the competent authority may, in consultation with the applicant, include justifiable standards in the permit which are stricter than those in the NeR.
- The effect of facilities in accordance with Best Available Control Technology *falls below* the standard set by the NeR. In that case the competent authority and the applicant must examine the possibility of more effective facilities. If this is deemed technically or economically infeasible, the competent authority will depart on duly stated grounds from the general standards. The emissions that can be realised with Best Available Control Technology will then be specified in the permit.

The following two situations require special attention in determining the emission standards in accordance with Best Available Techniques:

- activities that fall under a BAT reference document (BREF);
- ancillary emissions and secondary emissions in the application of emission abatement technologies.

BREFs
For activities that fall under a BREF, the BREF describes the Best Available Technique, and measures must be imposed in conformance with the BREF. For emissions not regulated in the BREF, the guidance note, which is included in the NeR, indicates, to begin with, whether the general standards are applicable. If the general standards are not applicable, the NeR may be departed from on duly stated grounds with reference to the guidance note. If emissions are not regulated in the summary of the BREF or in the guidance note, the general standards are applicable. In those cases, the general approach in the NeR applies, that is to say, on the basis of an assessment of the specific case the competent authority can decide to observe the standards or to depart from them on duly stated grounds. A reason for doing so can, for example, be the occurrence of ancillary emissions or secondary emissions as mentioned in this section. For application of the BREFs see also §2.12.

If a BREF is being prepared for a particular branch of industry and if companies in this branch of industry have to take extra measures in order to satisfy the general standards, the competent authority must take into account a future BREF when drawing up permit requirements. In that case, the competent authority can depart from the general standards.

Ancillary emissions and secondary emissions
A waste gas flow can contain a number of components that can only be controlled with different emission abatement techniques. In that case, for the most important component an emission abatement technique must be used in accordance with Best Available Control Technology and the general standards must be satisfied. For waste gas components that cannot be collected through this measure, here referred to as ancillary emissions, it must be considered whether a second end-of-pipe technique should, in all reasonableness, be used. If this is not the case, the general standards in the NeR may be departed from.

Also in situations in which the use of emission abatement techniques results in new emissions, it must be considered with respect to such secondary emissions whether a second end-of-pipe technique should, in all reasonableness, be used. If this is not the case, the general standards in the NeR may be departed from.

If this occurs when process-integrated measures are applied, according to §2.7 the integral consideration can serve as basis for a departure from the general standards.

Ancillary emissions
A measure can abate the emission of a certain substance but at the same time have a negative effect on the abatement of other emissions. For example, it can be the case that a gas washer is used on the ground of a BREF in order to collect acid gasses. A small emission of chlorine gas (Cl 2) is poorly collected by a washer. The use of an extra end-of-pipe carbon filter would, in that case, be inconvenient (due to moisture) and relatively expensive. If the general standard for Cl 2 cannot be met with the washer, the NeR may be departed from on duly stated grounds.

Secondary emissions
An end-of-pipe technique or process-integrated measure can itself be a source of emissions. NO_x can be released from an incinerator, ammonia from an SCR installation, lye from a lye washer, SO_2 from thermal regeneration of mould sand. Such emissions are usually small and usually remain below the general standards of the NeR. In some cases, however, the general standards are exceeded. In that case, it can be decided to depart from the NeR on the basis of weighing the favourable effects of the emission-abatement technique against the undesirable effects of exceeding the standards.

2.1.5 Cost effectiveness (CE)

In assessing the reasonableness of measures, costs play a major role. However, cost data are often lacking and if they are available there are usually no standards or references against which they can be checked. To improve this, systems have been set up which can clarify this consideration. One of these systems is a method developed on the instructions of the Ministry of Housing, Spatial Planning and the Environment (VROM) and used to determine the cost effectiveness (CE) of an environmental measure. The CE is expressed in the costs of a measure per amount of emission annually, that is to say, the costs in Euros per avoided emission in kilograms. When these costs remain below a certain limit, it is deemed reasonable to apply the measures. You must of course take into account other factors, such as the company's financial resources and the environmental necessity to take measures. You will find more information on that in parts 119, 120 and 126 of the series *Lucht en Energie* (Air and Energy) published by VROM.This method is explained in detail in §2.11 and annex 4.13.

2.2 Relation to other environmental policy

The NeR relates to process emissions and incineration emissions released into the air. The NeR is a guideline for the licensing of installations that are obliged to have a permit on the ground of environmental legislation. The NeR does not apply for air emissions to which a legal regulation directly applies. Nor does the NeR apply when it has been expressly determined in the context of target group policy that the NeR must not or only partly be applied.

2.2.1 Legal instruments

The NeR is used alongside statutory regulations. In cases in which a general administrative order (GAO) does not provide emission standards, or in which it allows the imposing of further standards, the NeR may serve as a reference frame if emission standards are imposed.

Statutory regulations that lay down emission standards for facilities specifically aimed at reducing pollution are the BEES A, BEES B, the BLA and the Regulation governing the incineration of hazardous waste. In 2001 a general administrative order is established regarding the reduction of emissions of volatile organic compounds (VOCs). This is explained in §2.8.
When these regulations apply, the NeR does not apply for the emissions regulated in these decisions. As for components the emission of which is not regulated in the decisions, the NeR-standards may serve as a reference frame for checking the situation and including additional requirements in a permit.

In addition to the above-mentioned regulations, there are also GAOs that impose emission-abating requirements on products or fuels. When these requirements apply, no NeR standards apply for the components regulated in the decisions concerned.
A summary of the statutory regulations that regulate emissions to the air is given in the explanatory note.

Overlap of regulations
In various situations it may happen that a number different regulations apply at the same time. In that case the Decree on emission standards for combustion plants (*Besluit emission-eisen stookinstallaties,* BEES) applies for example, though this Decree does not regulate all aspects of a situation. With respect to emissions not regulated by the BEES, such as those of heavy metals, the NeR may be applied. In such a case, for example when a combustion plant burns a regular fuel containing many heavy metals, the BEES applies to NO_x, SO_2 and particulate matter and the NeR to heavy metals. It is important here that the standards imposed are compatible. For example, a very stringent standard on metals does not go together very well with a flexible standard on particulate matter. That is because the one standard leads to rigorous filtering of particulate matter and the other to less rigorous filters.

Statutory regulations
The NeR does not apply for installations to which a 8.40 GAO applies, because no environmental permit is required for these facilities. Appendix 4.9 contains a list of 8.40 GAOs.

The NeR also does not apply for the emissions from installations or parts of installations which are regulated in the:
- Decree on emission standards for combustion plants, Nuisance Act (*Besluit emissie-eisen stookinstallaties Hinderwet*), Bulletin of Acts, Orders and Decrees (*Staatsblad*) 1992 no. 450 (BEES B, last amended in 1998, Bulletin of Acts, Orders and Decrees 1998 no.168).
- Decree on emission standards for combustion plants, Air Pollution Act (*Besluit, houdende emissie-eisen stookinstallaties Wet inzake de luchtverontreiniging*), Bulletin of Acts, Orders and Decrees (*Staatsblad*) 1992 no. 452 (BEES A, last amended in 1998, Bulletin of Acts, Orders and Decrees 1998 no. 167).
- Decree on emission standards for NO_x nitric acid (*Besluit emissie-eisen NOx saltpeterzuurfabrieken*), Staatsblad 1987 no. 329.
- Decree on emission standards for titanium dioxide installations (Besluit, houdende emissie-eisen voor titaandioxide inrichtingen), Staatsblad 1993 no. 324.
- Decree on air emissions from waste incineration (*Besluit luchtemissies afvalverbranding*), Staatsblad 1993 no. 36.
- Regulation governing the incineration of hazardous waste (*Regeling verbranden gevaarlijke afvalstoffen*), The Netherlands Government Gazette (*Staatscourant*) 1998 no. 79, p. 8.

The NeR does not apply for emissions regulated pursuant to:
- Decree on sulphur-containing fuels (*Besluit zwavelgehalte brandstoffen*), Staatsblad 1974 no. 549, last amended on 8 March 1994, Bulletin of Acts, Orders and Decrees 1994 no. 183.

and
- Asbestos Decree, Environmental Protection (*Asbestbesluit Milieubeheer*), Staatsblad 1993 no. 42, including amendments in Staatsblad 1993 no. 583;
- Decree on substances that damage the ozone layer (*Besluit inzake stoffen die de ozonlaag aantasten*), *Staatsblad* 1992 no. 599, amended on 16 November 1996, Bulletin of Acts, Orders and Decrees 1996 no. 575.

This means that in the context of the NeR no additional requirements have to be imposed if the emissions from parts of installations are regulated in one of the above-mentioned regulations. Finally, account must also be taken of the air quality standards (see §2.2.2).

2.2.2 Checking against air quality standards

In establishing emission standards on the ground of the NeR it must also be checked that these standards are adequate to allow compliance with the statutory air quality standards (see explanatory note). To that end, use will, if necessary, be made of dispersion calculations for air pollution in accordance with the current national dispersion model for air pollution.

Compliance with the NeR standards and use of the ALARA principle are no guarantee for good air quality. If the environmental quality achieved is not acceptable, the competent authority may on the basis of justifiable considerations impose more stringent standards than those in the NeR or include volume-restricting standards in the permit or refuse the permit.

Air quality standards
In applying the NeR, the statutory limit values for the quality of open air must be complied with. These are laid down in the Decree on air quality (*Besluit luchtkwaliteit*) of 11 June 2001, published in Staatsblad 269, 2001. This decree gives limit values for fine particulates, nitrogen oxides, sulphur dioxide, lead, carbon monoxide and benzene. On the basis of European legislation, this decree is supplemented after 2001 with limit values for other substances.

In addition to the statutory limit values and target values, the competent authority must take into account the non-statutory Maximum Permissible Risk Level (MPRL) values and target values for air quality. The air quality values are listed in Appendix 4.3.

2.2.3 Target group policy

Integral Environmental Task Setting (Integrale Milieutaakstelling, IMT)
In the context of implementing the National Environmental Policy (*Nationaal Milieuplan NMP*) an approach has been devised for the industry target group policy. For the industry target group, a declaration of intent with associated Integral Environmental Task Setting has been agreed, a package specifying in a detailed and concrete manner a series of emission reductions that must be achieved in 1995, 2000 and 2010.
With the branches of industry that are responsible for the largest amount of environmental pollution, covenants have been agreed concerning their contribution to the environmental task. A branch of industry usually attempts to achieve this using company environmental plans (*Bedrijfs Milieuplan, BMP*). In a BMP a company describes the activities it has planned and completed and the efforts it is making in the field of the environment.

IMT and air
One of the elements of the IMT concerns emissions to the air. The NeR is one of the implementing tools for reducing those emissions.
Realisation of the IMT by a particular branch of industry may mean that measures for a number of environmental compartments will be required for existing installations simultaneously and on such a scale that on the basis of considerations on cost effectiveness it is not practical to comply with the NeR at that moment. In that case, a term of realisation may be agreed in consultation with the authorities involved.

Target group policy handbooks and workbooks
Several handbooks and workbooks have been prepared for a number of industries as a tool for implementing the industry target group policy. These handbooks and workbooks are based on a integral approach to the environmental issue in the industry in question. In line with existing policy, such as the NeR, these handbooks and workbooks describe the measures and facilities that may serve to identify the emission reductions to be achieved. In some cases, it concerns a more detailed elaboration of the policy premises as specified in the NeR. If the handbooks and workbooks provide different arrangements than the NeR, the competent authority may depart on duly stated grounds from the NeR on that basis.

2.3 System

2.3.1 Source data

In assessing emissions to the air in accordance with the NeR, these emissions must be known. That is to say, the sources, composition, quantities of the emissions and, when the residual emissions exceed the mass flow limit, also the concentration of the emissions must be described in the permit application. The application must be checked for that. On the basis of the information provided, the effect of the end-of-pipe techniques on the emissions must, in principle, be calculable on the basis of a determination of the untreated emissions or the yield of the applied cleaning technique.

Emissions
The emissions are described in the form of a concentration (in mg/m^3) and a load (in kg/hour). The emission concentration is above all linked to the control measures, whether or not applied, and are checked against the general standards.

The emission load is primarily a result of the scope of the activities in combination with emission control and is particularly relevant for its effects on the environment. The load is checked against the mass flow limit.

2.3.2 Emission from a number of sources

The amount of the untreated emission must be determined for the entire installation. To that end, the untreated emission loads from the various sources in the installation must be added up. When it concerns an installation consisting of various components, it may be reasonable to determine the total emission per separate component.

The emissions from an installation added up
The scale of the emission must be determined for the entire installation. However, in industrial companies an installation may consist of separate components which can also operate independently from each other. In such a case, the untreated emission can be determined per separate component.

Storage, transhipment and internal transport
Storage, transhipment and internal transport may be regarded as separate activities if they are clearly and spatially separated from process units and not inextricably bound up with them. The emissions from these separate activities may generally not be handled in the same way as the process emissions and are therefore separately assessed. Internal conveyor belts, day tanks and tanks for additive re-circulation are examples of activities that often are integrally bound up with a process unit Hence, the emissions they release are assessed together with the process emissions.

2.3.3 Classification into classes

The NeR recognises seven substance categories, which are subdivided into classes on the basis of their chemical, physical and toxic properties. The emission standards are dependent on the class into which a substance is classified.

Description	Category	Classes
Compulsory minimisation substances	MVP	ERS,MVP1,MVP2
Substance	S	
Inorganic substances, particulate	sA	sA1, sA2, sA3
Inorganic substances, gaseous or vaporous	gA	gA1, gA2, gA3, gA4
Organic substances, particulate	sO	sO1, sO2, sO3
Organic substances, gaseous or vaporous	gO	gO1, gO2, gO3

Category and class classification of the NeR
The NeR classifies substances into categories according to their chemical composition. Most of these categories are divided into classes, for example, on the basis of their harmfulness and feasible reduction possibilities.

Emission standards are given for the substance classes and categories (see§3.2).
The emission standards and the method used to classify carcinogenic substances, particulate inorganic substances, gaseous or vaporous inorganic substances and organic substances into classes are described in §3.2.

The chemical names of the substances you must take into account are listed in Appendix 4.5. The general emission standards associated with the different categories and classes are mentioned in Chapter 3.

2.3.4 Emission of a number of substances

In determining the emission load, all untreated emission loads of a particular chemical substance or group of substances are added up. The total emission that may occur within a one-hour time period is normative. The way in which the emissions of different substances or a number of sources are added up together is regulated in the cumulation rule.

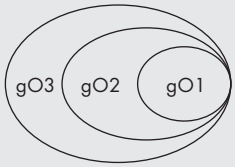
The cumulation rule implies that for simultaneously-occurring emissions of different substances *in the same class* the mass flow is cumulated for all sources within the installation. If the cumulated emission exceeds the mass flow limit of the class concerned, the requirement applies per source to the total concentration of all substances belonging to that class.
The cumulation rule implies that for all simultaneously-occurring emissions of different substances *in separate classes within a single category* the mass flow is cumulated for all sources within the installation. If the cumulated emission exceeds the mass flow limit of a class with a higher number, the requirement for that class applies per source to the total concentration of the substances involved, without prejudice to any requirement applying per class.

Cumulation rule
The application of the cumulation rule for substances of different classes within a category must be seen as clearly distinct from the establishment of the total untreated mass flow per substance from the installation. After this has been determined by adding up the mass flows from all separate sources, the following steps must be taken with respect to substances of C, sA, gO or sO categories in order to establish whether the NeR emission standards may be applied.

Cumulation rule within the class
When the sum of the mass flows of the different substances that are classified in the same class is greater than the mass flow limit, the requirement for that class applies to the total emission concentration of all substances in that class. The requirement applies to all sources in the installation where substances of that class are emitted. That means this requirement applies both in the cases that the concentration of a single substance exceeds the mass flow limit and in the cases that the separate concentrations remain below the mass flow limit but the sum of the concentrations exceeds the mass flow limit.

Cumulation rule within the category
When the total mass flow of a class does not exceed the mass flow limit of that class, then it must be tested if the mass flow of the class (i) together with that of a class with a higher number (j) does exceed the mass flow limit of the higher class (j). If that is the case, the emission standard of the higher class (j) applies to the total of all substances of class (i) and class (j). The same is true for the emission of classes (i) and (j) with respect to class (k). The class with a higher number is defined here as the class with a less stringent emission requirement. In the example below, this is elaborated.

The cumulation rule for emission loads can be illustrated by the following example, where i = gO1, j = gO2 and k = gO3. The total emission load of the substances within class gO1 must be checked against the mass flow limit of gO1. Next, the total emission load of the substances within classes gO1 plus gO2 is checked against the mass flow limit of gO2. Finally, the total emission load of the substances within classes gO1, gO2 and gO3 is checked against the mass flow limit of gO3.



2.3.5 Checking against the mass flow limit

When the total emission from a facility for a certain substance or group of substances is larger than the mass flow limit, the emission is relevant and the NeR applies. Emission abatement facilities should then be implemented in accordance with Best Available Techniques.

For checking against the mass flow limit, the maximum total emission that can occur under normal process conditions in one operating hour must be regarded as normative.

Mass flow limit
The purpose of applying the NeR is to limit the scale or load of emissions to the air. For assessing the relevance of emissions, the NeR gives threshold values per component. These thresholds are called the mass flow limit.

The relevance of the emissions, and hence the level of the mass flow limit, is dependent on the harmfulness of the released substances. That is why harmfulness, together with the technical possibilities for emission abatement, is the basis for the classification into different substance classes.

Fugitive emissions and space ventilation
Because the emission standards are focused on measures at point sources, the load is determined for checking against the mass flow limit for these quantifiable emissions.
Fugitive emissions are assessed separately from that. Fugitive emissions and emissions released via hall ventilation must be restricted as much as possible by means of good housekeeping and preventive measures. Fugitive emissions that cannot be restricted must be discharged as much as possible by means of controlled extraction. The emissions from that extraction, together with the emissions from extraction points of the hall ventilation, are regarded as point sources. These emissions are counted when determining the level of untreated emission.

All in all, it is important to realise that the relative contribution of fugitive emissions will increase the better the emissions from point sources are known and controlled.

Fugitive emissions
Good housekeeping with a view to restricting fugitive emissions consists, for instance, of better maintenance of existing sealing devices. An example of a preventive measure is the use of equipment with fewer sealing devices in the case of new construction or replacement. For a systematic approach to inspection and prevention of leakages, a control programme may be developed.
To that end, use can be made of the fact sheet *Lekverliezen Chemische Industrie* (Chemical Industry Fugitive Losses) (no. 19, KWS2000, December 1994) and the *Handreiking Lekverliezen* (Guideline on Fugitive Losses) (Association of Provincial Authorities [IPO], The Hague, May 1995), which contain a blueprint for such a control programme.
In the past, fugitive losses were determined by means of an estimation method developed by the Dutch Organisation for Applied Scientific Research (TNO). This method gave an indication of the total amount of leakage by multiplying the number of fittings of a particular type by an emission factor.

For several years now the trend has been to calculate fugitive losses by means of measurements. To obtain an indication of the extent of fugitive emission, portable instruments are used directly at the fitting to measure a concentration of hydrocarbons in the air. There are various methods to quantify fugitive loss by means of such a measurement (with a FID or a PID).*

* See 'Tijdschrift Lucht' (Air Magazine) no. 3, August 1999.

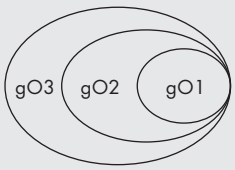
Quantification of the mass flow limit
The load can be determined by measurements, by drawing up mass balances or by using emission factors. In doing so, the highest mass flow that can occur under normal operating conditions within one hour must be determined, because this is the normative emission.
The mass flow for checking must be determined for situations under 'normal' operating conditions.

2.3.6 Imposing of general concentration standards

If the untreated emission exceeds the mass flow limit, the concentration standards for the class concerned will apply. These standards apply for each source separately, before the point where the waste gasses leave the processing unit. The concentration standards should be regarded as an upper limit for the concentration averaged over half an hour. To determine the concentration in the waste gasses, only that air flow is taken into account which is necessary for the process (including the air flow which is necessary for reasons of safety and occupational health standards).

If a source emits a number of substances simultaneously, the cumulation rule within a class and within a category also applies in assessing the emission concentration (see explanatory note), just as in the case of cumulating emission loads.

Example of cumulation rule with respect to concentrations
The total concentration of substances belonging to class gO1 is checked against the concentration standard for gO1. The total concentration of substances belonging to classes gO1 and gO2 is checked against the concentration standard for gO2. Finally, the total concentration of substances belonging to classes gO1, gO2 and gO3 ois checked against the concentration standard for gO3.



Mixing air flows
Air flows which are mixed in order, for example, to dilute or cool them may not count in determining the waste gas concentration. If wastes gasses are combined, the separate waste gas flows must comply with the concentrations standards at the mixing points. Mixing of an air flow with air or inert gasses for obvious technical process reasons (including safety and occupational health) is not covered by this regulation. In situations where large amounts of air are used for cooling or drying, it must be assessed for each situation which flow rate is relevant in calculating the emission concentration.

2.3.7 Compulsory minimisation

Compulsory minimisation applies to all substances that can be released to the air and are classified in the category 'Very High Risk Substances' and compulsory minimisation applies to all substances classified in the category MVP 1 and MVP 2 (see §3.2.1).
For these substances, a constant effort must be made to achieve the lowest possible emission (zero emission).

Executing compulsory minimisation
Compulsory minimisation is executed in five steps (see §3.2.2).
When applying for an environmental permit, the applicant must furnish information that shows which substances may be released. The applicant thus indicates which substances are subject to compulsory minimisation.
On the basis of information concerning the company, the possibilities are then determined for preventing or reducing the emissions of compulsory minimisation substances. In so doing, explicit account must be taken of the preference order of the measures to be taken: 1. *prevention* of emissions and 2. *reduction* of emissions. In the case of prevention of emissions, it is preferable to do so by replacing the compulsory minimisation substance with a less harmful substance.
The step-by-step plan is repeated once every five years.

In situations in which the step-by-step plan is gone through for the first time, the different steps will be worked out in great detail. The purpose of the five-year periodic reassessment is to supplement the existing data on emission abatement with new data.

In taking an inventory of the possibilities to prevent or reduce emissions, all aspects are considered. Both environmental hygiene aspects, economic aspects and feasibility aspects are mapped in order to obtain an optimal assessment. To begin with, this occurs in a qualitative manner, but if necessary a more quantitative elaboration can also be made.

Connection with VROM substances policy
In determining the substances subject to compulsory minimisation, linkage has been sought with the substances policy adopted by the Cabinet (Strategy on Management of Substances, SOMS)[1] and discussed in the lower house of parliament[2]. SOMS provides a method for classifying substances in a concern category. SOMS distinguishes five concern categories: Very High Concern, High Concern, Concern, Low Concern, No Data.
The criteria for classifying a substance in the category Very High Concern are listed in the first progress report 'Implementation of SOMS' (SOMS Uitvoering) (VROM-2002-29), which was adopted on 14 December 2001 by the Council of Ministers. These criteria are comparable to international criteria. The classification is dependent on substance-intrinsic data on environmental and health effects and the availability of this information.

Within the framework of the chemicals policy, the Deputy Ministers of Transport, Public Works and Water Management (V en W) and of Housing, Physical Planning and the Environment (VROM) sent a supplementary list with priority substances to the Lower House of parliament on 2 March 2004. This list lists Very High Concern substances that are given extra attention in the implementation of the environmental policy due to their harmfulness. This list is of importance in, for example, assessing emissions to the air and water.
From the list of priority substances, a selection has been made of the substances subject to the compulsory minimisation of the NeR. These substances are given in the list in §3.2.1.

1) (TK 2000–2001, 27 646, nos. 1 and 2).
2) (TK 2000–2001, 27 646, no. 9; TK 27 646, no. 10).

Standards level
A mass flow limit is also specified for the category of compulsory minimisation substances. The emission standards set for compulsory minimisation substances must be regarded as an absolute upper limit.
A continuous effort must be made to reduce the emissions, which are further defined by means of a compulsory investigation.

The substances for which compulsory minimisation applies are divided into three substance classes. Different emission thresholds are associated with these classes. The division into the first two classes is based on the technical possibilities to limit emissions. For emissions in the form of particulates there are very good filter techniques available that can achieve a very high degree of cleaning. These substances are classified into MVP1. For gaseous emissions, the technical possibilities or developed less far. These substances are classified into MVP2. Very high risk substances are placed in the third class.

2.4 Application of the system in different emission situations

The general concentration standards of the NeR can in principle be achieved by using Best Available Techniques. In some situations the emission trend is such that the general standards cannot be achieved so that they may be departed from on the basis of the ALARA principle (see §2.1.3). In §2.4.1 an emission situation is described in which the general concentration standards do not apply. In the subsections following §2.4.1 it is described which emission situations may be distinguished (§2.4.2) and on which emissions the NeR imposes special regulations (§2.4.3).

2.4.1 Exclusion provision

The following regulations apply to the exclusion provision until 30 October 2007.
If on an annual basis the load of a source is lower than the 1000 multiple of the value of the applicable mass flow limit, the emissions of this source can be excluded in the determination of the normative mass flow for the installation and the facilities level. The general concentration standards do not apply to these sources. The competent authority can, however, limit the emission load in the permit, basing himself on an ALARA consideration. If the exclusion provision is applicable, the further subdivision into emission trend is not relevant.

As from 30 October 2007, the following regulations apply to the exclusion provision.
If on an annual basis the load of a source is lower than the 500 multiple of the value of the applicable mass flow limit, the emissions of this source can be excluded in the determination of the normative mass flow for the installation and the facilities level. The general concentration standards do not apply to these sources. The competent authority can, however, limit the emission load in the permit, basing himself on an ALARA consideration. If the exclusion provision is applicable, the further subdivision into emission trend is not relevant. These regulations apply to existing and new installations.

Thresholds under which the exclusion provision applies

Category	Class	Exclusion provision until 30 October 2007 for emissions less than (kg/year)	Exclusion provision after 30 October 2007 for emissions less than (kg/year)
gA	gA1	2.5	1.25
	gA2	15	7.5
	gA3	150	75
	gA4	2000	1000
	gA5	2000	1000
sA	sA1	0.25	0.125
	sA2	2.5	1.25
	sA3	10	5
gO	gO1	100	50
	gO2	500	250
	gO3	500	250
sO	sO	100	50
S	S	200	100
MVP	ERS	20 mg TEQ/year	20 mg TEQ/year
	MVP1	0.15	0.075
	MVP2	2.5	1.25

2.4.2 Classification according to emission trend

Emissions are first of all classified according to whether they are *regular* or *non-regular*. *Regular emissions* are emissions which are part of the process and occur with a certain regularity (non-incidental).*

Non-regular emissions are incidental emissions that arise due to special circumstances, such as cleaning or accidents. Non-regular emissions are discussed in §2.4.5.

Regular emissions are classified into two types according to their trend over time: *continuous* or *discontinuous emissions*.
Continuous emissions are emissions which are released over a relatively long time period in comparison to the number of operating hours.
Discontinuous emissions are all other emissions.

Continuous or discontinuous emissions
Classification into continuous or discontinuous takes place by comparing the emission period with the number of operating hours. As a result, it may happen that a process with eight-hour emission periods in a company operating round the clock is considered to be a discontinuous process, whereas that same process in a company with day production is held to be a continuous process.

The emission trend of both continuous and discontinuous emissions can be further distinguished into *stable* or *fluctuating emissions* on the basis of the following criteria.

The half-hourly average emission concentrations of *stable* emissions fluctuate round the mean. The variation in the half-hourly average emission concentrations of *fluctuating* emissions is such that they effect the scope and application of any necessary measures.

* Emissions due to customary start and shut down procedures are regarded as regular emissions. If emissions occur only in exceptional cases, they are regarded as non-regular emissions.

Discontinuous fluctuating emissions
In the case of discontinuous fluctuating emissions the periods in which no emissions occur must be disregarded when determining the concentration averaged over half an hour.

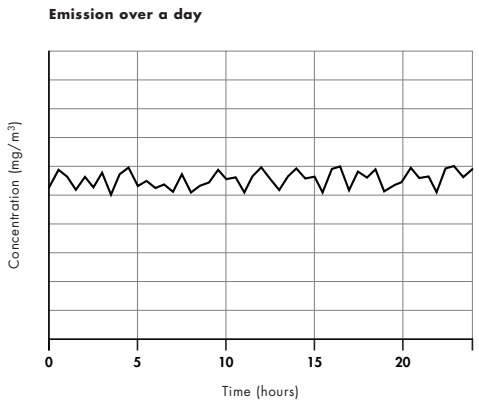
With respect to a number of emission situations, the NeR imposes special regulations: the averaging regulation (see §2.4.3) and the peak emission regulation (see §2.4.4).

Below we give a summary of the various emission situations, the feasibility of the general emission standards using Best Available Techniques in those situations and the special regulations that may apply to them.

Continuous stable emission
Features: the concentration (averaged over half an hour) fluctuates merely within small margins. The emission is more or less continuous over time. The general concentration standards are in principle in accordance with Best Available Techniques for these emissions. This is true both for emissions that are released continuously during day production and for emissions that are released during a longer consecutive period (see Figure 1).

Special regulations that may apply: peak emission regulation.

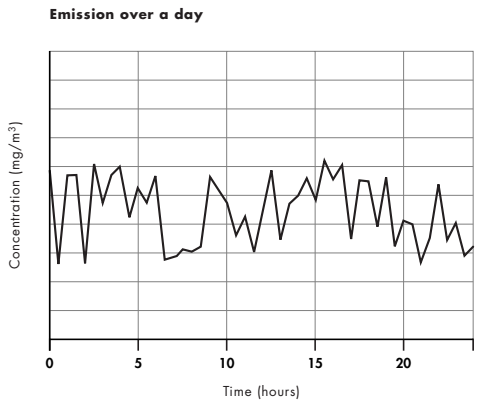
Figure 1 Continuous stable emission



Continuous fluctuating emission
Features: the concentration (averaged over half an hour) and/or the total mass flow of the emission fluctuates considerably. The emission occurs during nearly the whole operating time. The general concentration standards are in principle in accordance with Best Available Techniques for these emissions. This is true both for emissions that are released continuously during day production and for emissions that are released during a longer consecutive period (see Figure 2).

Special regulations that may apply: peak emission regulation, averaging regulation.

Figure 2 Continuous fluctuating emission

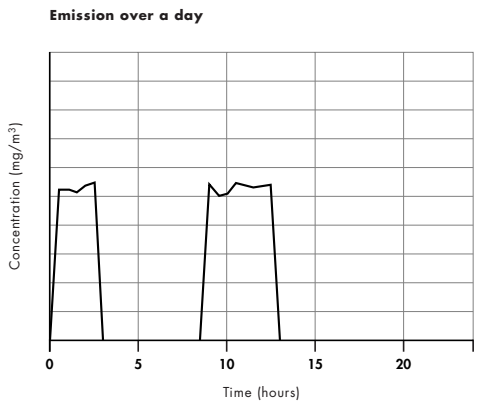


Discontinuous stable emission
Features: the emissions are occasionally released during the operating time(s). The total mass flow or concentration of the emission is more or less stable during a specific period (see Figure 3) in contrast to discontinuous fluctuating emissions. The emission from large welding installations generally meets the features of a discontinuous stable emission.

The concentration standards are not necessarily in accordance with Best Available Techniques or these standards may not reasonably be imposed. Whether the general standards are feasible depends on the process and the (annual) mass flow of the emission, which in turn depend on the duration and level of the emission. This situation requires tailor-made work.

Special regulations that may apply: peak emission regulation.

Figure 3 Discontinuous stable emission

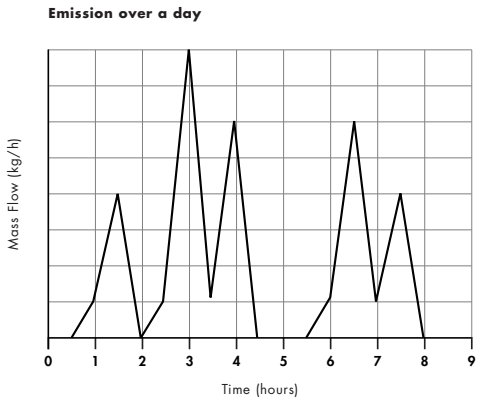


Discontinuous fluctuating emission
Features: the emissions are occasionally released during the operating time(s). The level of the emissions fluctuates strongly. The concentration standards are not necessarily in accordance with Best Available Control Technology or the standards may not reasonably be imposed. Examples of discontinuous fluctuating emissions may be found in the pharmaceutical industry and in smaller production companies that use batch processes.

No clear-cut description can be given of discontinuous emissions for which the general standards are not feasible. This depends on the process and the (annual) mass flow of the emission, which in turn depend on the emission duration, the emission level and the variation in the emission. This situation requires tailor-made work.

Special regulations that may apply: peak emission regulation, averaging regulation.

Figure 4 Discontinuous fluctuating emission



2.4.3 Averaging regulation

The concentration standards apply to the values averaged over half an hour. If emissions vary so strongly over time that the imposing of general standards for half-hourly average concentrations is unrealistic, the emission concentration may be averaged over a longer period. This may be done particularly with respect to discontinuous fluctuating emissions. A longer averaging duration than the emission duration is not allowed. The maximum permissible averaging duration is four hours.
This regulation is solely intended for situations in which it is impossible to apply reasonable measures using the general standards of the NeR. The premise remains the reduction of the total mass flow by imposing of measures in accordance with the ALARA principle.

2.4.4 Peak emission regulation

Peak emissions are defined as incidental high values in the half-hourly average concentrations or in the emission load per hour. Three frequency levels are distinguished:

- If peaks occur regularly (several times a day) in the emission trend, the emission trend may be classified as a fluctuating emission pattern. The emission duration may be averaged to assess the emission level of the regularly occurring peaks (see averaging regulation).

- In the case of peaks that occur occasionally and have an annual emission load of over 100 times the mass flow limit*, tailor-made work is required to assess the emission concentration or the emission load due to the company-specific feature of these peaks. No special regulation applies to these peaks.
- For peaks that occur occasionally and have an annual emission load that is estimated to be lower than 100 times the mass flow limit*, the peak emission regulation applies. When determining the facility level, these peaks may be disregarded. Because of the small annual emission load, it is usually unreasonable to impose the general concentration standards. With respect to these peaks, adjusted concentration levels and a maximum frequency of occurrence may be included in the permits.

In assessing peak emissions, account will be taken of the nature of the sources (substances subject to compulsory minimisation) and any nuisance it creates.

2.4.5 Non-regular emissions

Non-regular emissions are incidental emissions due to special circumstances such as maintenance, cleaning, accidents or start and stop procedures that occur rarely (e.g. for continuous processes). Emissions due to customary start and stop procedures for which the regular emission-abating facilities can be used, are classified as regular emissions.

The possibilities to prevent increased emissions due to non-regular emissions have to be utilised as much as possible. In this connection, punctual switching off of regular waste gas treatment techniques or diversion of the waste gas flow outside these facilities must be avoided if possible.
During these incidental process circumstances, special measures must be taken where possible, especially when:
- the end-of-pipe emission-abating facilities must be decommissioned, for example, when there is a danger of explosion, blockage or corrosion;
- the regular emission control system is not (fully) operative due to an inadequate supply;
- the collection or treatment of the waste gas flow due to the filling or emptying of process tanks in batch processes is not or insufficiently possible.

Waste gas flows that are released during starting or shutting down of a processing unit and not removed via the regular treatment system must if possible be collected and/or returned to the process.

If the process operations require that the regular treatment systems be switched off temporarily or the waste flows diverted around them, the processing units in question must be designed and operated to produce a minimum amount of emission during such a situation.

* Categories S and sO do not have a mass flow limit. For these categories use 100 times the mass flow check value (see §3.7).

If collection and/or returning of the waste gas flows is impossible, the emissions of organic substances must, depending on the composition of the waste gas flow, be treated by means of an adequate treatment technique in accordance with Best Available Techniques.

The emissions of emergency facilities are not covered by the NeR.

2.4.6 Minor sources

If the mass flow limit of a certain substance is exceeded in a company with several point sources, all point sources (including the minor ones) must in principle be controlled within the installation . However, in the context of the NeR it is possible to depart on duly stated grounds from the emission standards in order to avoid having to control at unreasonable costs minor sources which individually may produce a higher emission than the mass flow limit.
In practice, however, the company-specific circumstances and the nature of the sources (substances subject to compulsory minimisation) and any nuisance must always be taken into account.

The following criteria play a role in assessing the need to control minor sources:
- The cost effectiveness of controlling the remaining, untreated emissions from minor sources in relation to the cost effectiveness of (controlled) major sources. For example, it may be decided to limit the control to a cost effectiveness similar to that of the controlled emissions from major sources.
- The amount of the untreated mass flow from minor sources in relation to the amount of residual emissions from major sources already controlled (or to be controlled).

2.5 Translation of NeR standards into permit requirements

In order to assess the emissions to the air, the emissions must be known. That is why the permit application must contain data on the nature of the sources and the composition, quantity and concentration of the emissions. The application must be checked against that. The proper operation of the facilities must be guaranteed through, for instance, emission standards laid down in the permit requirements.

2.5.1 Emission standards

When the NeR applies, the emission standards must be laid down for every distinct source. These standards may be laid down in the form of means specifications or performance specifications.

Framework permit and customised permit
The NeR may also be applied when a flexible permit is granted on the basis of the approach of the framework permit (*vergunning op hoofdzaken, VOH*) or on the basis of a customised permit (*vergunning op maat, VOM*). The NeR is based on the approach and preconditions described in the circular of the Minister of Housing, Spatial Planning and the Environment dated 3 June 1999.
When using the VOM or the VOH, the application of Best Available Techniques remains the premise. The NeR can then serve as a reference in assessing whether Best Available Techniques should be applied.
The NeR system may be used to determine the targets with respect to reducing air emissions from the installation. The NeR emission standards may be included in performance specifications as a concentration standard per source. On the basis of the emission standards, a mass flow standard for the entire installation may be included as a performance specification. In this way, the permit remains clear and easy to enforce.
In a VOM, the manner of including NeR standards depends on the way in which the company in question and the competent authority give shape to the desired flexibility. The above-mentioned circular lists the criteria for this assessment.

2.5.2 Process-integrated measures

There are various ways to lay down process-integrated measures in permit requirements. One of them is to prescribe emission factors that are linked to specific process features, for example, specific dimensions or the production scale. The handling of these product-related emission standards is described in §2.5.3.

2.5.3 Product-related emission standards

The purpose of emission standards must be total mass flow reduction, which always requires an integral consideration. Product-related emission standards and concentration standards are two ways to achieve waste flow reduction. In consultation between the company and the competent authority, it may be decided to use product-related emission standards instead of concentration standards. The application of product-related emission standards must be justified in the preamble.

Reasons for applying product-related emission standards may be:
- the nature of the production process;
- to encourage the reduction of total mass flow.

In order to enforce product-related emission standards, product data may have to be made available. The applicant must be willing and able to supply this information. Concentration standards cannot be translated numerically to product-related standards because product-related standards are process-specific. Process-specific product-related standards may be included in the NeR in special regulations.

2.5.4 Existing and new situations

A new situation exists if an environmental permit is requested for a specific activity for the first time. In an existing situation an activity has been authorised earlier. When an installation is enlarged, the new part is regarded as a new situation.
For existing situations where the standards in the NeR are not yet complied with, the competent authority can use a realisation period. After expiry of this period, the installation must satisfy emission standards in accordance with the general standards of the NeR.

The realisation period must end no later than the following points in time:
- In new situations, the general standards must be satisfied with application of the NeR system from the moment the permit is issued.
- In the case of replacement or drastic adjustment of an existing installation, the general standards with application of the NeR system must be satisfied from the moment of replacement or adjustment.*
- In existing situations, installations that fall under Appendix 1 of European Directive 96/61/EC (IPPC Directive) must satisfy the general standards with application of the NeR system no later than 30 October 2007.
- In existing situations, installations that do not fall under Appendix 1 of European Directive 96/61/EC (IPPC Directive) must satisfy the general standards with application of the NeR system no later than 30 October 2010.

If the general standards in the NeR are adjusted it will be indicated whether a transition period will be needed and which regulation must then be applied.
If the general NeR standards are adjusted it will be indicated whether a transition period will be needed and which regulation must then be applied.

Realisation periods
When determining the realisation period, the competent authority may, for instance, take into account the following:
- the emissions for which a permit had been issued earlier;
- depreciation periods of recently installed actual environmental facilities;
- covenants in the context of target group policy;
- realisation periods stated in approved company environmental plans;
- harmfulness of the emissions and the extent to which the standards are exceeded;
- company economic effects of compliance.

* If an existing installation that is renovated is strongly linked to other operating components there may be restrictions of the emission reduction possibilities. In that case, the competent authority may depart from the general standards on duly stated grounds.

Replacement of installations
If an existing installation is replaced, the competent authority must assess whether the renewed installation is in accordance with Best Available Techniques. Normally speaking, installations which are designed in accordance with can achieve emission levels which comply with the NeR standards for new situations.

When the standards in a permit for an existing installation are broader than the NeR standards, it may be necessary to make the permit more stringent in the event the installation is replaced.

2.5.5 Monitoring of emissions

General
In addition to requirements relating to emissions to the air, the permit must also specify how emissions must be monitored. This chapter gives a method with which to establish the inspection regime that applies to the source. Different forms of monitoring are possible per inspection regime. An inspection method is the manner in which emissions from point sources can be monitored. The competent authority must approve in advance how monitoring is carried out.

Laying down in the permit
The competent authority determines when and how monitoring must be laid down. For example, the normalised inspection method and frequency of monitoring can be laid down in the permit. However, if a company has its own monitoring system (e.g. in the context of an in-house environmental management system) it may be specified in the permit that monitoring will be geared to the in-house monitoring system.

NeR inspection regime
The possible inspection methods and frequencies are determined by the NeR inspection regime that applies to the source in question. This inspection regime is determined according to the nature and the scale (mass flow) of the failure emission from the source in question: the larger and more serious the consequences of failure of the emission-abating facility that is applied to the source, the more stringent the inspection regime. The stringency of the inspection regime determines the stringency of the inspection method and the monitoring frequency.

Possible inspection methods: measuring and ERPs
The following inspection methods are distinguished in the NeR:
a Measuring: separate measurements with effective frequency or continuous measurement.
b ERPs: emission relevant parameters.

sub a) Measuring: for a description of monitoring by means of measurements refer to §3.7.

sub b) ERPs
ERPs are defined as measurable or calculable quantities which are in direct or indirect relationship to the emission to be assessed and which, independently or in combination, provide a sufficiently reliable description of the nature and scale of that emission. In this context, three types of ERPs can be distinguished depending on 'firmness' of the relationship between emission and parameter: category 1, category 2 and category 3 ERPs.

- Category 1 ERPs may replace the doing of measurements and give a reliable quantitative description of an emission.
- Category 2 ERPs give a reliable qualitative description of the composition of a waste gas.
- Category 3 ERPs indicate whether an installation or process operates according to the design features or in the required way and so also gives a good indication of the emission(s).

§3.7 gives examples of ERPs. This list is not exhaustive. In each separate case it will have to be determined how which ERPs can be applied in the permit for purposes of verifying an emission.

In those cases in which use of ERPs provide an equally good description of the actual emission as by means of emission measurement, these inspection methods are to be preferred. In each situation the necessity for and the added value of (continuous) measurement must be weighed against the possibility of (simpler) monitoring on the basis of ERPs.

Inspection programme
Practical experience has shown that it is often difficult to establish a good inspection regime for a new situation in advance. In such a case you can opt for the obligation to set up a monitoring programme. This programme, which a company has to set up within a specific time period after the permit has been issued, must be submitted to the competent authority for approval.
Monitoring can occur in a variety of ways. To begin with, the emissions can be determined by means of a measurement taken in the waste gas; standardised measuring methods for that are listed in Appendix 4.7.
In the case of new installations it is often necessary first to do a measurement in order to establish the relationship between the emission and the ERP. Only in special situations may the emission concentration be established without a measurement, for example, through calculation on the basis of a mass balance and the waste gas flow rate.

2.6 Special regulations for specific processes

In addition to the general standards given in §3.2, the NeR contains special regulations for specific activities. These regulations are listed in §3.3 and §3.4.
The special regulations are first of all intended for process emissions or specific situations in which the general emission standards of the NeR cannot be complied with in a reasonable way using measures in accordance with Best Available Techniques or situations in which the emissions will be considerably lower than these standards.
In addition to this, there are special regulations for specific groups of emissions, namely the emissions of odours and of volatile organic compounds (VOCs).

When special regulations are used the following applies. In principle the general standards apply to a particular source category or emission of a specific substance unless this emission is regulated explicitly otherwise in a special regulation. If the standards on the ground of a special regulation are not applied, the general standards apply to the emissions in question. In those cases in which the special regulations impose less stringent emission standards in relation to the general standards, efforts should be focused on meeting at least the general standards in the future.

In drawing up standards for specific industries or activities, as those in special regulations, account has been taken of the technical and economic resources for the industry or activity in question. The regulations are first of all based on the technical resources for controlling the same type of emission, with overall account taken of the financial-economical restrictions. In this way, the regulations are aimed at a source category as such and do not take into account the specific situation of individual companies.

Within the special regulations, the same stipulations with respect to calculating emission loads and concentrations apply as specified in §2.4 with respect to checking against the general standards .

§3.4 contains the special regulations regarding volatile organic compounds (VOCs). These measures are based on the measures that have been agreed in the context of the KWS2000 hydrocarbon project. This means that use of these regulations may in practice differ to a certain extent from use of the other special regulations. This is explained in more detail in §2.8 and §3.4.

If the NeR advisory group starts a procedure to introduce a new special regulation or to update an existing regulation, the current standards and provisions of the NeR will remain applicable, unless it is decided to apply a transitional regulation for the situations concerned.

Update of emission standards 2002
The next step following the tightening of the general standards in the NeR in year 2002 will be for the NeR advisory group to assess whether new special regulations are necessary for particular activities or installations. Proposals therefor can be presented to the advisory group via InfoMil. In addition, the NeR advisory group will evaluate all special regulations in 2003 and 2004. On that basis it will be determined whether specific regulations need to be adjusted.

2.7 Process-integrated facilities and integral consideration

In this section we consider two frequently occurring situations in which the competent may depart from the general standards. The first situation concerns the application of the general emission standards in the case of a process-integrated facility. The second situation concerns integral weighing up of the effects of environmental measures on other environmental compartments or on energy consumption.

2.7.1 Process-integrated facility

The use of a process-integrated facility is to be preferred over an end-of-pipe technique. Such a facility usually leads to a sustainable reduction of emissions not only for the air compartment but also for other compartments. Furthermore, in many cases this is the most cost effective solution. By a process-integrated facility we mean, for instance, use of a different raw material or a different production process. Examples of this are a switch to water-based paints or use of closed mould techniques in the plastic processing industry. After a process-integrated facility has been installed, an additional technique is often not a cost-effective measure. Demanding it requires a careful balancing of the costs against the extra environmental effect to be achieved.

2.7.2 Which standard is reasonable

If the NeR applies, the concentration in the waste gas flow must meet the general standards. In the case of a process-integrated facility, an emission will often remain with a concentration lower than that specified in the general standards. On the ground of the NeR, no additional standards will then be imposed.

If the concentration in the waste gas flow still exceeds the concentration specified in the general standards after use of a process-integrated facility, an end-of-pipe technique must in principle also be applied. However, if a significant reduction of the environmental burden has been realised, it is not always reasonable to require an extra end-of-pipe technique. This is based on three considerations.

- First, in determining whether an end-of-pipe technique should be requested, the question must be answered whether the extra environmental effect to be achieved outweighs the costs of the end-of-pipe technique.

- Secondly, the relation must be examined between the emission load after use of a process-integrated facility and the emission load after use of an end-of-pipe technique. The outcome of this comparison is included in the integral environmental consideration (also see the following consideration and §2.7.3). If the comparison shows that the emission load after use of a process-integrated technique is lower than after use of an end-of-pipe technique, the competent authority may in any event permit a higher emission concentration than permitted under the general standards of the NeR.

- Thirdly, to a process-integrated facility often environmental benefits are attached, such as the prospect of a sustainable reduction of the environmental burden via the product or the process, or a reduction of the emission to other environmental compartments or a reduction of energy consumption. The effect of the process-integrated facility on the other environmental compartments must also be considered.

2.7.3 Integral consideration with respect to all environmental compartments

In an integral consideration the effects of the technique to be applied on the environmental compartment air are weighed against the effects on the other environmental compartments and energy consumption. If a significant reduction of emissions to another environmental compartment is possible, such a consideration of the environmental effects of a technique to be applied may lead to a temporary or permanent easing of the standards. This consideration can play a role in the case of both an end-of-pipe technique and a process-integrated facility. The result may be that a higher concentration is permitted than under the general standards of the NeR. Even if the residual emission load is higher after application of process-integrated measures than after use of an end-of-pipe technique, an integral consideration may lead to the acceptance of higher concentrations. When it concerns a process-integrated facility, the departure from the general standards will moreover often be permanent.

Furthermore, on technical or financial grounds or on the basis of a priority setting in the company environmental plan agreed with the competent authority it may be decided to prioritise an emission reduction in another environmental compartment. This may lead to the granting of a postponement with respect to compliance with the emission standards of the NeR.

2.7.4 Systematic assessment of process-integrated measures

This step-by-step plan describes the assessment of an application for an environmental permit for process-integrated measures (PI measures) within the framework of the NeR. This step-by-step plan can be a tool in the assessment of process-integrated measures. Here, first of all, it concerns emissions to the air. The aim of the measures is to reduce emissions to the air. In the assessment of the measures, however, other environmental effects are also taken into account in accordance with the integral consideration.

This step-by-step plan applies to situations in which investments have been made in new measures. If in an existing and licensed situation no changes are planned, this step-by-step plan does not apply.
This step-by-step plan does not apply when it concerns process-integrated measures on the ground of other policy or other policy tools than the NeR, for example, measures on the ground of target group policy.

This step-by-step plan only applies to situations in which the scope of the efforts needed to go through the step-by-step plan in its entirety is in reasonable proportion to the scope of the investments. In simple cases, it suffices to use a quality approach or to go through just a few phases. In simple cases, a comparison between possible measures can also be done on the basis of cost effectiveness (NeR §2.11).

Field of application
To go through this step-by-step approach in its entirety, a considerable investigative effort is required. A great deal of information has to be collected, assessed and processed. Many times external experts will have to be called in to do so. Such an effort will only pay off when it involves large investments in measures and essential differences in environmental effects.
When it involves a limited investment or a minor difference in environmental effects between the alternatives, it usually does not pay off to do an extensive investigation. In such a case, the step-by-step plan can, for example, be used as a tool to map a problem, after which the situation is only assessed qualitatively with the aid of limited information. Usually, the most relevant thing to do is to specify several alternative solutions that can be compared. A limited qualitative comparison can then suffice in order to come to an assessment.

Step 1 Checking against the general NeR
The first step consists of checking the emissions to the air against the general standards in the NeR. Two situations are possible:
a The emissions of the PI measures comply with the general standards of the NeR. In that case, further checking is unnecessary and a permit can be issued for the PI measures on the ground of the NeR. This

includes standards in conformance with the general standards of the NeR. This step is followed by step 4.

b The emissions of the PI measures do not comply with the general standards of the NeR. In that case, step 24 is next.

Step 2 Describing alternatives

If the emissions are higher than the NeR standards, an attempt must be made to find alternatives. Research has shown that the use of a number of alternative solutions leads to a better assessment of the situation applied for. It is important that at least one and preferably several alternatives are known. Of these alternatives there must be at least one measure based on customary end-of-pipe techniques that have been applied in comparable situations. In addition, it is preferable that another process-integrated measure is described that leads to lower emissions.

In describing the measures, information must be provided on the consequences of the measures. It concerns the effects on the compartments soil, water, air, waste, energy consumption, safety, noise and odour. In addition, it concerns the consequences for working conditions, compatibility with the production process, effects in the chain (on raw materials, additives, product and waste stage), product quality, etc. Information on costs is also needed.

Step 3 Elaboration of integral consideration

This step consists of the assessment on the basis of an integral consideration. In this step, the environmental effects of PI measures are first checked against boundary conditions to be determined later. Thereafter, the environmental effects are also mutually compared on the basis of an integral consideration system.

Boundary conditions

Boundary conditions can, for example, be specific local environmental standards, standards on the ground of zoning plans, financial limits, etc. The boundary conditions can be a consequence of local policy, e.g. zoning plans, or of national policy, e.g. standards for air quality. Of importance is that the boundary conditions indicate which standards the applicable measures must comply with.

The assessment is divided into the following intermediate steps.

3a Determining the boundary conditions

- Restrictions due to the operational management system
- Statutory limits, policy-based limits
- Local environmental standards (disturbance by noise, odour, safety)
- Choice of the part of the production chain to be considered
- Choice of the supra-local environmental effects to be considered
- Level of Best Available Control Technology

3b Checking the results of step 2 against the boundary conditions

With this check it is determined if the potential measures comply with the boundary conditions in intermediary step a. If it appears that a potential measure cannot comply with the boundary conditions, it must be rejected or adjusted in such a way that it does comply with the boundary conditions.

3c Determining any extra boundary conditions for the integral consideration (IC)

In addition to the above-mentioned boundary conditions, there can still be specific boundary conditions for the integral consideration or special reasons for the choice of particular alternatives. Think, for example, of specific local policy or the possibility to compensate particular effects, for instance, by clustering provisions, such as water or energy.

*3d Choice of a method for generic integral cons*ideration

In this step, a method for integral consideration is chosen. This means that the use of an IC system results in a general consideration in which the specific circumstances have not yet been considered adequately. By going through all the steps in this plan with sufficient attention paid to the specific local aspects and for effects in the chain, the generic IC is supplemented to become an IC for the specific situation.

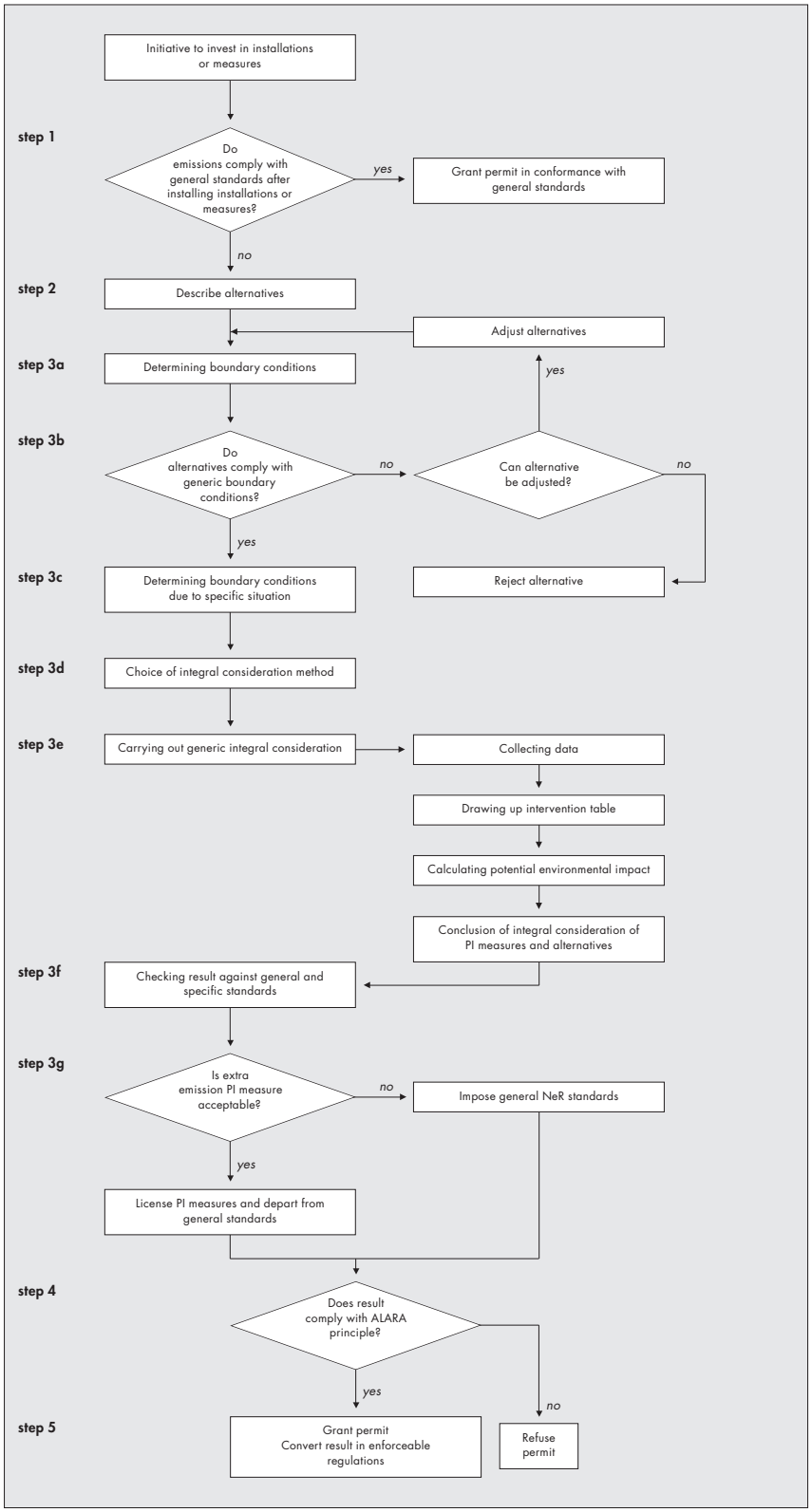
A method must be chosen for carrying out a weighing. There are various methods for carrying out the IC. In general, not one method is deemed to be the most suitable. Each method has its own merits and it depends on the situation, the available data and the aims of the consideration as to which method is the most suitable.

In any event, the following four methods are deemed well suitable in this context:

- the CE shadow price method
- the VNCI method
- the Pré eco indicator 99
- and the CML method

An overview and a detailed description of these methods are given in Appendix 4.16.

Step-by-step plan: integral consideration of process-integrated measures



3e Carrying out the generic IC
The generic IC is carried out in three steps:
1 Collecting data. In this phase, quantitative data are collected on the changes in the production process and on the potential environmental effects. Much information will already be known from the inventory session.
2 Drawing up intervention table. On the basis of the collected data, an intervention table is drawn up, a list with the nature and scope of all interventions associated with the measure.
3 Calculating potential environmental effects.* On the ground of the action of the method selected, the potential environmental effects are calculated and scored. Per alternative this leads to an integral end score for the environmental burden.

*3f Checking the result of the generic IC against the criteria a*nd any boundary conditions
The results of the systematic assessment must, if necessary, still be checked against the boundary conditions of point 3c.
The integral consideration has been carried out on a generic level, that is to say, for a general situation. This general consideration must still be translated into the assessment for the specific situation. This is done by checking against the specific boundary conditions determined in step 3c. The result is an assessment concerning the specific integral consideration.

Conclusion from method
There is no method that leads to a definite generic conclusion. For each specific situation, the generic integral consideration will have to be supplemented with boundary conditions for the specific situation. In other words, the conclusion can in the one situation be different than in the other. The advantage of using a method for the IC is that it will structure the consideration and that the aspects that are of importance in this connection are made visible.

3g Conclusion
In this step, the conclusion is drawn. If it is evident that the extra emissions to the air due to PI measures are not acceptable in comparison with the results of end-of-pipe techniques, the general standards must be imposed with reference to the use of end-of-pipe techniques. If the conclusion is that the extra emissions are acceptable, the standards are formulated on the basis of the PI measures, departing from the general standards on duly stated grounds.

* In the language usage of the methods for integral consideration, the environmental effects referred to here are called 'potential' environmental effects.

Step 4 Checking against ALARA principle
This is a general check of the conclusion of the third step and of the anticipated emission standards against the ALARA principle (NeR §2.1.3). Here any other aspects can play a role which were initially not included in the consideration. One of the aspects is cost effectiveness (NeR §2.11).

Step 5 Drawing up permit regulations
In this step, it is determined in which way the anticipated measures and the anticipated emission levels are included in the permit in an enforceable manner. This must lead to a defining of the quantities that are to be determined for the enforcement of the standard.

2.8 VOC emissions

2.8.1 Environmental impact of VOC emissions

2.8.1.1 Environmental impact
The reduction of emissions of volatile organic compounds (VOCs) is necessary in order to control peaks in the concentration of ozone in the lower atmosphere. Ozone in the living environment results from the breakdown of hydrocarbons in the presence of sunlight and NO_x. In certain weather conditions this leads to a concentration peak. Ozone is a key component of smog. High ozone concentrations may cause damage to crops, for example, and health problems in humans. In addition to the problems with respect to ozone formation in the living environment, high concentrations of volatile organic compounds (such as those that can occur in the workplace) may also have a direct effect on health. Prolonged exposure to high concentrations of these substances may, for instance, damage the nervous system, also called Organic Psycho-syndrome.
In addition to these neuro-toxic properties of VOC, there are also volatile organic compounds with carcinogenic or mutagenic properties.

2.8.1.2 International policy
A reduction of the ozone concentration to a safe level requires a radical reduction of VOC emissions. Ozone formation is an international problem and therefore tackled in an international context. On the ground of the UN-ECE protocol (1991) the European countries are obliged to reduce VOC emissions. With a view to harmonising the VOC emission reduction measures in the Member States, the European Union has drawn up a Directive for VOCs. The implementation of this Directive in the Netherlands forms the legal basis of the requirements imposed on VOC emissions resulting from a number of activities. These requirements are strictly binding. The VOC Directive is clarified in §2.8.2.1.

2.8.1.3 National policy

The national policy in respect of reduction of emissions of volatile organic compounds has for the most part been defined by the KWS2000 project in the period 1988–2000. This project played a key role in the granting of permits. The project, which was set up in consultation with the national government, local authorities and trade and industry, was aimed at halving the amount of VOC emissions resulting from industry, small firms and households. This project is further considered in §2.8.3.

2.8.2 European Directive for VOCs

2.8.2.1 Introduction

The 'Council Directive on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations', no. 1999/13/EC (hereinafter 'the Directive') was adopted on 11 March 1999 by the Council of the European Union and on 29 March 1999 published in the Official Journal of the European Communities. This Directive was incorporated in Dutch legislation on 19th March 2001.

2.8.2.2 The requirements of the Directive

The European Directive for VOCs covers twenty industrial activities, insofar as the annual use of solvents exceeds the thresholds mentioned in the Directive. The following summary lists the activities in question including the threshold values.

Cat.	Activity	Threshold (use of solvents in tonne/year
1	Heatset web offset printing	15
2	Publication rotogravure	25
3	Other types of rotogravure printing, flexography, rotary screen printing, laminate or varnish units	15
3	Rotary screen printing on textile/ cardboard	30
4	Surface cleaning with substances to which one or more of R-sentences R45, R46, R49, R60 and R61 or R40 (halogenated compounds) are assigned	1
5	Other types of surface cleaning	2
6	Vehicle coating (<15 ton) and refinishing	0.5
7	Coil coating	25
8	Other coating processes, including metal, plastic, textile, film and paper coating	5
9	Winding wire coating	5
10	Wood coating	15
11	Chemical cleaning	no threshold
12	Wood impregnation	25
13	Leather coating	10
14	Footwear manufacture	5
15	Wood and plastic lamination	5
16	Adhesive coating	5
17	Manufacture of coating preparations, varnish, ink and adhesives	100
18	Rubber conversion	15
19	Extraction of vegetable oil and animal fat and refinery of vegetable oil	10
20	Manufacture of pharmaceutical products	50

If the amount of solvent used in an activity is higher than the threshold value, the requirements of the Directive apply. These requirements apply from the moment the Directive is incorporated in Dutch national legislation for new situations and from 31 October 2007 for existing situations.
Three types of emission standards may be distinguished: the *emission limit values, the fugitive emission limit values* and the *total emission limit values*. As an alternative to complying with the emission limit values, the Directive offers the option to follow a reduction programme with which emissions are restricted to the same degree as when applying the emission limit values. Installations which, for instance, achieve a sharp reduction in emission due to source-oriented measures but whose residual emission possibly does not comply with the emission concentration requirements of the Directive, may use this option.
The Directive also contains a solvent management plan. With respect to all installations covered by the Directive, the solvent management plan must show that the requirements are being met. §2.8.2.4 further details the solvent management plan.

2.8.2.3 More far-reaching national policy

The Directive imposes requirements on VOC emissions arising from twenty industrial activities. These requirements have been incorporated in Dutch national legislation by means of the 'Solvents Decree conversion of EC VOC DirectiveDecree on volatile organic compounds and solvents' (*Oplosmiddelenbesluit omzetting EG-VOS richtlijnBesluit vluchtige organische stoffen en oplosmiddelen*). These requirements apply to all installations covered by this Decree and where the use of solvents exceeds the threshold value. Apart from one-on-one introduction of the requirements of the Directive in national legislation, each Member State may adopt a more far-reaching national policy. The Netherlands has done so by laying down in the Decree that on the basis of the NeR the competent authorities may set requirements on the emission of volatile organic compounds from an installation. By using the NeR as a tool to establish a more far-reaching national policy, it has also proved possible to maintain the agreements made in the context of KWS2000 to reduce VOC emissions with source-oriented measures after 2000.

2.8.2.4 Solvent management plan

In the European VOC Directive a 'Solvent management plan' is introduced as an important tool for checking that the requirements with respect to VOC emissions are being met. The Directive gives guidelines for conducting a solvent management plan and also offers a method to determine the mass balance. In many cases a well-conducted solvent management plan will demonstrate that the requirements are being met without the need to perform costly emission measurements. In the course of 2001 an information sheet will be published (in Dutch) for the different activities which will deal with the practical side of the

solvent management plan and explain how it can be used to check that the requirements of the Directive are being met.

2.8.3 The KWS2000 hydrocarbon project

2.8.3.1 The project

The KWS2000 hydrocarbon project, which was set up in consultation with the central government, local authorities, industry and consumer organisations, was aimed at reducing VOC emissions from industry, small firms and households. The agreements on measures are laid down in the Control Strategy for the Emissions of Volatile Organic Compounds (February 1989) and the revised version thereof: KWS2000 Strategy 1992–2000. The basic agreement is that the parties implement the measures and support the actions mentioned in the Strategy.

2.8.3.2 The sequel to KWS2000

The KWS2000 hydrocarbon project ends on 31 December 2000. The execution of the KWS2000 policy and the involvement of the various industries have resulted in a sharp reduction of VOC emissions and a decreased use of solvents. To hold on to the achievements of KWS2000 in the VOC reduction policy for after the year 2000, it has been decided, among other things, to include the measures for installation-linked activities in the NeR. In §3.4 these measures are listed and clarified, arranged according to the industries distinguished in KWS2000.

2.8.3.3 The source-oriented reduction strategy of KWS2000

The strategy consisted of a reduction plan and an implementation plan. In the reduction plan it was indicated for which source category the emissions had to be reduced, to what amount they had to be reduced and when it had to be realised. To this end, a series of measures were given per source category. Appendix 4.11 gives a summary of these source categories.
As well as these measures, a forecast was given of the effect of the implementation of the measures on VOC emissions in the year 2000. In the National Environmental Policy Plan 3 (*NMP3*) a reduction target was included of 50% in 2000 as compared to 1981. The purpose of KWS2000 was, however, the implementation of measures. In the implementation plan it was indicated by means of which policy instruments the measures had to be implemented and who was responsible for this.

An approach at the national level was chosen instead of at the local or regional level because for an effective reduction of ozone formation international alignment was required. Aspects such as the competitive position of the various industries, product-oriented measures and the desired balance between all source categories also made it necessary to give the strategy a national character. Another aim of the project was the creation of broad support by involving all implementing parties in the formulation and implementation of the policy. This approach was also the basis of the target group approach. A source-oriented approach was used in the reduction plan, which meant that, where possible, product-oriented or process-integrated measures were formulated. Only in those cases in which this type of measure was not regarded as feasible it was decided to use end-of-pipe techniques. The underlying thought was that long term oriented source measures would ultimately be more desirable than short term oriented concentration standards (they would lead to the choice of end-of-pipe techniques).

2.8.3.4 Scope of action

The measures are aimed at the reduction of volatile organic compounds (VOC). In the context of the NeR, VOCs are defined as all organic compounds that have a vapour pressure of 10 Pascal or more at a temperature of 293.15 K or that have a similar volatility under those circumstances, unless mentioned otherwise in the specific measures (see §3.4). This definition is in agreement with the one given in the European VOC Directive.
In this context, methane is not classified as an organic compound.

With respect to each separate source category, measures were agreed. These measures apply in principle to all companies that perform the activity in question, regardless of scale. This approach essentially differs from the general system of the NeR, in which standards only begin to apply at the moment a particular lower limit is exceeded. The fact that measures are identical for both 'large' and 'small' companies entails that the competent authorities must continually ask themselves whether an individual company can reasonably implement a certain measure. In §2.8.4, which describes the approach used in granting permits, this is considered in more detail.

2.8.3.5 Types of measures

For the purpose of controlling VOC emissions, the KWS2000 programme mentions a wide range of measures, varying from good housekeeping to process-integrated and product-oriented measures These measures apply to activities inside installations as well as outside installations. The VOC regulations of the NeR (§3.4) only include measures that relate to activities inside installations. These measures can in turn be subdivided into measures on installation level and on industry level (company categories), with a distinction made into certain, uncertain and conditional measures. The implementation of the KWS2000 programme was aimed at converting uncertain and conditional measures into certain measures, after which those measures could be carried out. The VOC regulations only include the certain measures and the conditional measures the conditions of which can be detailed at the local level.

Measures on installation level
Some of the *certain measures* on installation level can be applied immediately; others require a further technical description. For many measures such a description is available in the form of publications such as fact sheets. In that case, this is indicated in §3.4 (also see §2.8.4.2).

Conditional measures can only be applied when they meet a number of conditions. If these conditions can be detailed on the local level, these measures and the associated conditions are also specified in §3.4 (also see §2.8.4.3).
In addition to certain and conditional measures, *uncertain measures* were also included in the KWS2000 Control Strategy. These are measures that may not be implemented before a further feasibility inquiry has taken place. These measures are not included in the NeR, but they are not ignored by the Ministry of Housing, Spatial Planning and the Environment (VROM). The moment a further inquiry shows that these measures can be taken, they will be included in the NeR.

Measures on industry level
Product-oriented VOC measures contribute significantly to the reduction of VOC emissions released during use of VOC-containing products, such as paints, varnishes and cleaning and degreasing agents. The common feature of these measures is to replace or change conventional rich-VOC products by or into free-VOC or low-VOC products. That always means changing the production process and influencing product quality, which often gave rise to many questions or bottlenecks. During the implementation of the KWS2000 programme many feasibility and demonstration projects were carried out to answer or solve these questions or bottlenecks. In this way, the conditions were created to promote the application of certain product-oriented measures in industries (see also §2.8.4.4).

When certain measure have been formulated on industry level, the industry target must be reached through the joint effort of companies. This does not, however, mean that each individual company must contribute (in equal measure) to the industry target. This depends on the resources a company has to apply the measures that form the basis of the industry targets. In many cases a further inquiry will be needed at an individual company to determine whether those measures are feasible. In other words, certain measures on industry level may be conditional measures on installation level. In §3.4 the measures formulated on industry level are translated into a situation existing at individual companies. §2.8.4 further clarifies the method used to issue permits.

2.8.4 Approach with respect to authorisation

2.8.4.1 Introduction
The VOC measures, which are mostly source-oriented, are laid down on industry level but carried out by individual companies. Implementation on company level must be set down in the environmental permit. This section explains how the measures can be translated into requirements for an individual company. This process consists of the following steps:
- in consultation with the company, establishing which measures may be adopted immediately and laid down in the permit;
- the possibility of carrying out the other measures must be investigated; §2.8.4.8 clarifies the method of compulsory investigation.

2.8.4.2 Approach with respect to certain measures on installation level
In nearly all cases, certain measures may immediately be included in the permit. However, it is possible that in a specific situation the prescription of a measure may cause huge problems to a company. If so, the competent authority must determine whether such a measure may reasonably be imposed. §2.2 explains under which conditions the standards may be departed from on duly stated grounds. If so, the emission limit values of the European Directive for VOCs (see §2.8.2.2) must, however, be used as an upper limit.

2.8.4.3 Approach with respect to conditional measures on installation level
Conditional measures are measures that may only be included when certain conditions are met. §3.4 lists these conditions for the various conditional measures. During the preliminary consultation concerning the permit application it will have to be examined whether the conditions are met. If so, the measure may immediately be included in the permit. If this is not (yet) the case, a further investigation will have to be made. §2.8.4.8 clarifies the method of compulsory investigation.

2.8.4.4 Approach with respect to measures on industry level
When a specific measure has been formulated as an industry target, the competent must consult with the company in question to determine whether it can contribute to the industry target or whether it opts on duly stated grounds for other VOC-abating measures. The industry arrangements are primarily for those industries where the desired source-oriented approach is achieved by switching to VOC-low products (such as paints and cleaning agents). Practice has shown that the implementation of certain product-oriented measures on industry level in individual companies is not so easy due to company-specific features. This has to do with the large differences between the varnishes or the products to be cleaned, the role of clients and the requirements set on product quality. Low-VOC products which could be applied in one company

appear to produce problems in other companies in the same industry. This means that it is not always possible to translate certain product-oriented measures immediately to the level of individual companies. In most cases, conditions or technical uncertainties must be taken into account on the level of an individual company. In consultation with the company in question, the competent authority must determine to what extent it is possible to impose source-oriented measures; specifically this means that the company will have to indicate whether a switch to low-VOC products is feasible. To furnish that information, the company often will have to perform an investigation into possible measures. This investigation may vary from making arrangements with clients concerning the acceptance of products with VOC-low varnishes to the development of new or modified products with low-VOC varnishes by producers / suppliers.

In the previous section we explained what the relation is between compulsory investigation and granting of permits. Ultimately the effort of individual companies must result in the achievement of a proposed emission decrease by means of the arrangements made with industry.

Reduction percentage
It is often wrongly believed that companies are obliged to reduce their emissions with a certain percentage. A company can, for instance, claim that it complies with 'KWS2000' if it has reduced its emissions with 50% as compared to 1981. This need not be the case, however. A company has met its requirements when it has implemented the relevant strategy measures. The reduction achieved is derived from that.

2.8.4.5 Approach with respect to alternative measures

A company may wish to apply a different measure than the one laid down in §3.4. This is permissible, providing the alternative measure results in a similar emission decrease as the measure agreed. The company must first furnish the grounds on which it has departed from the agreed measure and show that the alternative measure generates a similar VOC reduction.

2.8.4.6 Relation between VOC measures and general standards of §3.2

The VOC reduction measures of §3.4 apply before the general emission standards of §3.2. This means that the permit requirements for installations for which measures have been formulated will be based on §3.4 and that the concentration standards derived from §3.2.5 no longer have to be used. This prevents the source-oriented approach being hindered by instructions containing concentration requirements.

The following exceptions apply:

a in the case of emissions of volatile organic compounds which are subject to compulsory minimisation in accordance with §3.2, it must always be determined, apart from the measures of §3.4, whether additional measures are possible in accordance with Best Available Techniques;
b when the measures of §3.4 are not sufficient to solve problems in relation to statutory air quality standards or odour nuisance, more far-reaching measures may be required. §2.2 indicates how this can be worked out in the permit;
c when measures are included in §3.4 in the form of end-of-pipe techniques, the selected techniques must comply with Best Available Techniques; §3.2 lists the general emission standards for end-of-pipe techniques.

2.8.4.7 Existing and new companies

When in the context of the preliminary consultation concerning a permit application by an existing company, the VOC-abating measures to be applied are brought up for discussion, it is essential to look at the measures which the company applied or did not apply in the past. The main aim is to achieve an emission decrease preferably by applying source-oriented measures.
New companies must at least comply with the measures that apply to existing companies.

2.8.4.8 Approach with respect to compulsory investigation

Before source-oriented measures may be prescribed it is necessary to establish if the measure in question can be applied in the situation for which a permit is required. In the preliminary meeting the competent authority may require that the permit application should also describe the possibility to implement that measure, as well as indicate how and within which period the measure will be applied. If a company is unable to provide insight into the application of source-oriented measures in the permit application, the requirement to conduct an investigation may be included in the permit. The results of this must be laid down in an action plan. This plan must describe the current VOC emission, the relevant processes and the resources to limit the VOC emission. It must also indicate what kind of obstacles there are to applying the measures and whether and how these obstacles can be removed. Finally, it is important that the periods are indicated in which this will be realised.
An action plan must be updated annually until the moment all measures have been introduced. The action plan forms the basis of the permit requirements. If the action plan is part of the permit application, the requirements may be formulated in accordance with it. If the action plan is drawn up after the permit has been issued, it may constitute a reason to update the permit.

2.8.4.9 Approach with respect to choice of requirements

Since a large part of the policy in respect of VOC emission reduction is formulated as a measure, the measure is often included in the permit as a means specification. However, the Environmental Protection Act (*Wet milieubeheer*) expresses a preference for performance specifications, in which it is the installation owner's responsibility to apply such measures to ensure that the specified targets are met. Such an approach is also possible within the VOC policy, partly because in the European VOC Directive a large number of standards are formulated in the form of product-related emission standards. In §2.7 it is explained how performance specifications and product-related emission standards must be handled.

2.8.4.10 Integral consideration

The existing VOC policy expresses a distinct preference for the reduction of VOC emissions by means of source-oriented measures. End-of-pipe and/or process-integrated techniques come up for consideration when it is impossible to apply source-oriented measures. In itself this is a logical sequence because in most cases source-oriented measures produce the best environmental and economical results as well as technical results. Practice has shown, however, that in specific company situations end-of-pipe techniques are comparable to if not better than source-oriented measures in terms of environmental health and costs. Due to these factors an integral consideration is required, in which working conditions may not be ignored. The outcome of this consideration might be that end-of-pipe and/or process-integrated techniques are comparable to or even better than source-oriented measures in terms of environmental health and/or costs. In those specific cases the preference for source-oriented measures may be departed from in favour of other types of measures. However, the grounds for doing so must be furnished by the company in question.

2.9 Odour

2.9.1 General approach

With respect to the drawing up of permit requirements for controlling odour nuisance, the NeR approach is based on a letter from the Minister of Pubic Health, Spatial Planning and the Environment dated 30 June 1995. In this letter the minister set out the new lines of the odour policy. The core of this policy is that the competent authority establishes which level of odour nuisance is still acceptable in a certain situation and that measures for controlling odour nuisance must be determined in accordance with the ALARA principle.

The NeR provides a nuisance classification system for determining the acceptable nuisance level (see §3.6). With this system an odour nuisance situation can be assessed. Use of the nuisance classification system leads to a specific weighing up for an individual situation or to application of a special regulation.

The amount of odour in the external atmosphere is given as a concentration expressed in odour units per cubic metre of air. No general relation has been determined to exist between the odour concentration (ou_E/m^3) and the odour nuisance arising in the living environment as a result of different odours. That is why generally applicable standards for the emission of odour components cannot be drawn up.

> ***Geureenheden* or odour units (ge and ou_E)**
> In laboratories, odour concentrations are measured in European odour units in accordance with NVN2820: odour units or ou_E/m^3. In daily practice in the Netherlands, odour concentrations are expressed in a different quantity, namely *geureenheden*, ge/m^3. There is a fixed relationship between these two quantities: 1 ou_E/m^3 = 2 ge/m^3. In this English edition of the Netherlands Emission Guidelines (NeR), ou_E are used where the Dutch NeR mostly uses ge.

Odour usually involves a combination of organic compounds in (very) low concentrations. The required amount of control is particularly dependent on the nuisance level. Odour perception depends on a diversity of factors which may involve substance, location and person. The most important factors are exposure period, exposure frequency, intensity and odour perception.

2.9.2 Establishing an acceptable nuisance level

In a specific situation, the competent authority establishes the acceptable nuisance level at the site of objects that must be protected from odour nuisance. In general these objects are part of the living environment. Apart from houses, the objects may be other locations where people stay for a longer period of time and where exposure to odour may form a nuisance, such as hospitals, old people's homes, nursing homes and recreation areas.

Although odour-sensitive objects must, in principle, be protected from odour nuisance, differences in the level of protection may be used. For a company premises, for instance, a higher acceptable nuisance level may be used than for a residential cluster. In such a situation it is important that the anticipated reduction of nuisance be weighed against the reasonableness of the measure to be implemented.

Using the nuisance classification system, the competent authority determines the nuisance level. In this connection, the nuisance classification system offers a number of investigation methods. Other methods besides those given in the nuisance classification system may also be used.

After determining the objects to be protected, the competent authority establishes the odour emission arising from the applied process. In doing this the odour emission from the applied process is weighed against the degree of resulting residual nuisance. The starting point for the assessment is the process in accordance with Best Available Techniques without odour control techniques. On this basis the possibilities are assessed to eliminate the nuisance or reduce it as much as possible. Companies must indicate themselves which emission-abating measures are possible and what effect they may have.

The competent authority assesses the matter in accordance with the ALARA principle on the basis of the odour control measures proposed by the company and the information obtained by means of the systematic approach concerning maximum permissible nuisance. If the measures in accordance with Best Available Techniques for the process in question are insufficient to prevent impermissible nuisance, more far-reaching odour control techniques will be required.

The level thus established is the acceptable nuisance level. It is essential to recognise that technical failures and incidents may be a major cause of odour nuisance. Insofar as such process anomalies can be anticipated, nuisance control must also be focused on preventing such incidents as much as possible.

2.9.3 Permit requirements

The result of the assessment is laid down in permit requirements and the grounds for it are stated in the preamble. This is done in the form of means specifications with associated specifications concerning the functioning of the means to be implemented or as an emission (performance) requirement with a maximum odour load to be realised (in (ou_E/hour) or in other emission figures).
Odour concentration immission values laid down in the permit requirements cannot be checked directly by means of immission measurements. Enforcement of the requirements must therefore be based on control of the scale of the odour emission and the proper operation of facilities.

2.9.4 Action plan

The measures taken against odour problems in existing situations may be based on an action plan. This plan, to be drawn up by the applicant, describes the odour sources and the scale of the necessary emission decrease. On this basis the competent authority may set a compliance deadline.

2.9.5 Special regulations

For industries for which standard measures are known, it is not necessary to go through a comprehensive procedure to determine the acceptable nuisance level with respect to the objects to be protected. This applies to industries for which special regulations have been drawn up. Emission-abating measures have been included in these special regulations and, in cases in which the relation between nuisance and concentration is known, the nuisance levels as well. On this basis the competent authority may determine the maximum odour concentration levels and decide on possible measures.

2.10 Particulates and fine particulates

Airborne particulates are distinguished into fine particulates and coarse particulates. Fine particulates are defined as fixed suspended particles with an aerodynamic diameter of 10 micron maximum. This is also referred to as the PM10 fraction, which stands for 'Particulate Matter smaller than 10 micron'. A part of the fine particulates, the fraction measuring less than 2.5 micron (PM2.5), develops primarily through reactions from gaseous components SO_2 and NO_x. This is also called secondary aerosol. Fine particulates especially are relevant to public health because when breathed in by human beings they may be deposited in the lungs.
In the NeR the emission abatement of fine particulates is regulated by the general standards for particulates. Fabric filters are still regarded as Best Available Technology for controlling the emission of fine particulates.
The control of NO_x and SO_2 emissions reduces the formation of secondary aerosol and is therefore part of the measures for reducing the concentration of fine airborne particulate matter.

Coarse particulates are defined as fix suspended particles that cannot be breathed in. The effects of coarse particulates consist mostly of nuisance due to the deposit of particulates in the living environment. Measures against the spread of coarse particulates are given in §3.8.

> No mass flow limit has as yet been set for particulates. The concentration standards for particulates are dependent, among other things, on the hourly mass flow: at an hourly mass flow of below 0.5 kg the standards are less stringent than for higher hourly mass flows.

To establish the emission of particulates, a definition is used which is derived from the European draft standard *prEN 13284-1,* version 1999.

PrEN 13284-1
This European preliminary standard for measuring dust or particulates gives the following definition:
'dust: particles of any shape, structure or density dispersed in the gas phase at the sampling point conditions. According to the described method, all the compounds which may be collected by filtration under specified conditions after representative sampling of the gas to be analysed, and which remain upstream of the filter and on the filter after drying under specified conditions are considered to be dust (or particulate matter)'.

2.11 Cost effectiveness of environmental measures

2.11.1 Introduction

The cost of implementing an environmental measure is a significant factor in the dialogue between competent authorities and industry. The competent authorities apply the 'ALARA principle, As Low as Reasonably Achievable' (according to Dutch law: the greatest possible environmental protection at acceptable cost) whereas industry seeks to minimise its costs. In addition to the absolute cost, the acceptability of the cost may be a sticking point, i.e. is the effort required from a company acceptable given the effort required elsewhere in the industry or in a comparable sector? The cost effectiveness of a proposed measure can help solve such problems.

Discussion of the acceptability of an environmental measure's cost has been dogged by the differing calculation methods used by the various parties. The Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM) therefore published a 'cost effectiveness methodology' (1) in 1995 to set a standard for the calculation of the cost effectiveness of end-of-pipe environmental measures.

The Ministry also published two reports on the building blocks for an indicative 'reference value' (2,3). On the basis of measures already implemented in the Netherlands and in combination with the methodology, such a value can be used to determine the acceptability of end-of-pipe techniques for VOC, particulates (suspended particulate matter), NO_x and SO_2 emissions. From the information collected, the Ministry has defined 'indicative reference values' for these four substances (the term 'indicative reference value' is explained further in §2.11.3).

In principle, the methodology is also applicable where measures are integrated into a process. It should be noted, though, that both the methodology and the indicative reference values (with the exception of that for VOC) still require extensive testing for such measures.

In 1999, InfoMil surveyed the competent authorities on their use of the cost effectiveness methodology and the indicative reference values (4). National and local government and the business community had agreed that the methodology and the indicative reference values would be implemented only if they were applied correctly. The survey concluded that users found the methodology a useful tool in the discussion of cost. The indicative reference values were also used to estimate the reasonableness of the cost and to take decisions accordingly. The examples given show that the indicative reference values allow an objective discussion of what is reasonable and this has led to both the rejection of certain and the adoption of other measures. The survey results prompted the inclusion of the methodology and the indicative reference values in the Dutch Emission Guidelines (NeR).

The cost effectiveness methodology and the indicative reference values are tools for use in the licensing process and caution should be exercised when interpreting their results. The instrument is just one of the many factors that play a role in the decision-making process.

2.11.2 Principles of the methodology

This section sets out the principles of the methodology. A full description of the methodology, necessary for its actual use in practice, is contained in annex 4.13.

The methodology standardises the way in which the cost of an environmental measure is calculated at company level, irrespective of the internal costs figures applied by the company itself. Its value lies in the ability to compare the calculated cost effectiveness with the indicative reference values (see section §2.11.3) and to evaluate the measures themselves.

The key aspects of the standardised calculation method are the assumed depreciation period for equipment and structures, the depreciation method and the interest paid on capital invested. The method also provides some clarity regarding the definition of costs, revenues and environmental impact. The methodology is summarised in table 1.

Table 1 Principles of the cost effectiveness methodology*

Cost effectiveness =	Annual cost (in Euro) / Annual reduction in emission (in kg) = (Euro per kg emission reduction)
Annual cost	• Annual capital costs (interest + depreciation) • Annual operating costs • Minus revenues and savings
Annual reduction in emission	• Annual unabated emission • Minus annual remaining emission
Accounting method for cost calculation	• Depreciation period: – Equipment, etc.: 10 years – Structures and buildings: 25 years • Depreciation method: annuity • Interest rate: 10% per annum

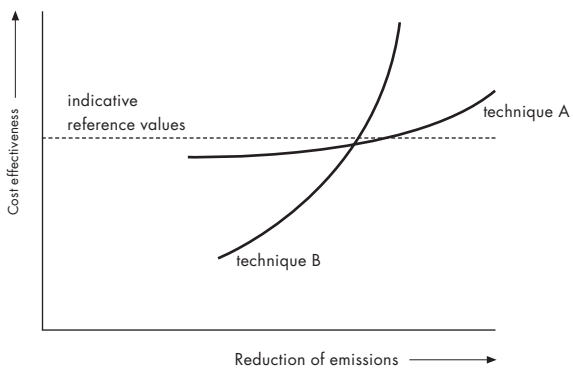
* See annex 4.13 for a complete description of the methodology and definitions of terms

2.11.3 The indicative reference values

The methodology has been used to determine a cost effectiveness range based on a sample of reduction measures realised in the Netherlands for the components VOC, particulates, NO_x and SO_2. The range clearly shows which levels of cost effectiveness were acceptable at the time. For policy purposes, the question is what the limits are of acceptability and thus reasonableness and where they might be exceeded. Against this background, only the highest values of the sampled cost effectiveness range are relevant. The 'indicative reference values' are based on these highest values. They are arrived at by excluding measures that were implemented for highly specific purposes (in which case the values concerned are not taken into consideration).

This approach indicates which measures are more cost effective than the indicative reference values and are therefore acceptable and in theory also reasonable and, conversely, which measures are less cost effective than the indicative reference values and are therefore not acceptable and in theory not reasonable. The phrase 'in theory' is used deliberately. The fact that in practice also measures have been implemented with a more favourable cost effectiveness than the indicative reference value shows that compliance with the ALARA principle is not exclusively met if a measure's cost effectiveness is just at the limit of the indicative reference value. In certain circumstances the point at which further investment to reduce emissions would have little added value may actually be at a cost effectiveness below the indicative reference value (the law of diminishing returns). This is illustrated in the figure below.

Figure 1 Illustration of the effect of and diminishing returns for two different situations



If various techniques are available to reduce the emission of a particular substance, the cost-effectiveness of each option can be plotted against its environmental impact (the total reduction in emissions). In the example, the curve for technique A is relatively flat and a significantly better environmental impact can be realised at relatively low additional cost. This technique should therefore be chosen at the level of the indicative reference value. If the curve is relatively steep (technique B) it should at least be questioned (and established) whether the additional environmental benefit counterbalances the relatively sharp increase in cost. Fundamentally the total cost effectiveness (i.e. total cost divided by total environmental impact) of each option must always be assessed against the indicative reference value. However in case of a steep curve the justification may also be questioned of the marginal cost effectiveness (i.e. the additional cost divided by the additional environmental impact), in part in view of other environmental problems that also require attention and therefore generate costs.
Section 2.11.4 shows how these questions can be answered.

Finally, it should be borne in mind that cost effectiveness is just one of the criteria to determine whether a measure is or is not reasonable or feasible. A measure might be categorised as acceptable and reasonable on the grounds of its cost effectiveness but might not be implemented because, for example, other measures are given greater priority, the specific branch of industry does not have the financial resources or the measure is significantly more onerous than the environmental measures implemented in other industries for the same substances. This is why the reference value is 'indicative'; it provides an indication of what is reasonable and what is not reasonable; it cannot be used in all circumstances as a hard and fast cut-off point; latitude – both upward and downward – should be permissible if there is good cause.

In principle the methodology can also be used in case of process-integrated measures. It is unlikely to be used in practice for such measures, however, since it has not yet been adequately tested. Furthermore, there is no frame of reference and, where measures are integrated into a process, the alternative processes or products often differ so widely that it is impossible to make a meaningful comparison of the alternatives. The latter is particularly relevant for the reduction of emissions of volatile organic compounds.

In summary, competent authorities should use the indicative reference values when setting the licensing requirements, as an indication of the upper limit of what is reasonable under the ALARA principle. This means that values lower than the indicative reference value may be agreed in accordance with the ALARA principle. A decision on the reasonableness of the licensing requirements may also be based on many other factors, examples of which are given in section §2.11.4.

If required to achieve national or international environmental targets or if necessitated by an adjustment for inflation, the (national) government will take the initiative to revise the indicative reference values.

The reference values for the components VOC, particulates, NO_x and SO_2 are shown in table 2, followed by an explanation of how the figures were arrived at.

Table 2 Indicative reference values for VOC, particulates, NO_x and SO_2

Component	Indicative reference value *(Euro per kg emission reduction)**	*(NLG per kg emission reduction)*
VOC	4.6	10
Particulates	2.3	5
NO_x**	4.6	10
SO_2	2.3	5

* The conversion of Dutch guilders to Euros is based on a slightly (10%) deviating exchange rate since it is considered important to show the indicative character of the reference values by using plain figures

** Although the value of 4.6 euro/kg meets the values found in studies for NO_x emission trading, this value may not be used as a reference in the system of NO_x emission trading.

VOC

The indicative reference value for VOC has been set at € 4.6 per kg of reduced emission. The cost effectiveness of the 33 end-of-pipe measures studied varied from € 0.36 to € 12.6 per kg. If exceptional cases are excluded, such as those in which the emission of chlorinated hydrocarbons is reduced, the most unfavourable cost effectiveness of the remaining 27 cases is approximately € 4.9 per kg. VOC is the only component considered in the study in respect of which calculations were also made for process-integrated measures. Of the 19 process-integrated measures, the cost effectiveness ranges from –€ 9 to € 11.2 per kg of reduced emission. Of the 11 cases remaining after the exclusion of the exceptional cases, the most unfavourable measure had a cost effectiveness of € 1.3 per kg and eight measures had a positive cost effectiveness (up to –€ 0.9 per kg).

Particulates

The indicative reference value for particulates has been set at € 2.3 per kg of reduced emission. The cost effectiveness of the 18 measures studied varied from 0.0 to nearly € 36 per kg. If exceptional cases are excluded, for example measures to reduce the emission of particulates containing lead, the most unfavourable cost effectiveness of the remaining 13 cases is about € 2.25 per kg. Significantly less favourable values were found for specific components, rising from € 13 to nearly € 36 per kg. No reference value has been set for specific components.

NO_x

The indicative reference value for NOx has been set at € 4.6 per kg of reduced emission. The cost effectiveness of the measures studied varied from € 0.2 to € 4.5 per kg. There were no exceptional cases. Recent studies (25, 26) carried out for the proposed NO_x emission trading suggest marginal costs in the same order of magnitude as the indicative reference value, which can be taken as confirmation of this reference value.

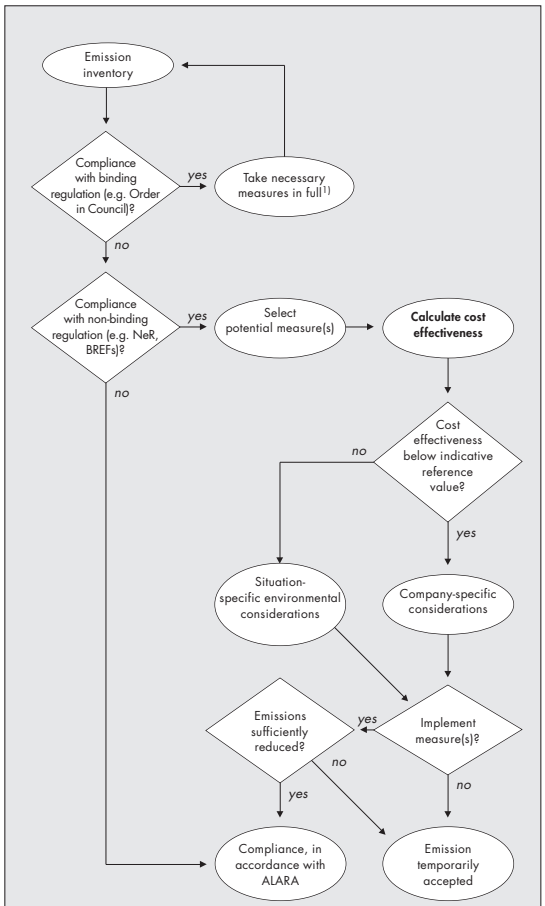
SO_2

The indicative reference value for SO_2 has been set at € 2.5 per kg of reduced emission. The cost effectiveness of the 11 measures studied varied from € 0.3 to € 4.5 per kg. There was one exceptional case. The cost effectiveness of the remaining 10 measures for the reduction of SO_2 was more favourable than € 1.3 per kg. A figure of € 2.5 per kg has been set as the indicative reference value.

2.11.4 Cost effectiveness and licensing

Both competent authorities and applicants can use the cost effectiveness instrument to apply the ALARA principle. It can facilitate their decisions but it is only one of the factors in the decision-making process. The instrument's position in the licensing process is shown in figure 2.

Figure 2 Position of the cost effectiveness instrument in the licensing process



[1)] In the case of NO_x emissions the use of the system for NO_x emission trading (still in preparation) by installations or companies will be considered equal to this.

The first step in the licensing process is to study whether the emissions satisfy all legal requirements. If so, the licensing authority must subsequently apply the available guidelines on the state of the art, such as the NeR, the guidelines of the Co-ordinating Committee for the Implementation of the Pollution of Surface Waters Act (CUWVO), the recently introduced European BAT reference documents and other relevant information on environmental measures and feasible

emission levels. On the basis of this information the competent authority will determine whether the emission situation justifies the consideration of measures.

If there is any doubt about the reasonableness and related financial feasibility of a measure, its cost effectiveness can be calculated using a draft design based on rough cost estimates.
The draft design must generate all information necessary to determine cost effectiveness. It should incorporate measures that comply with the BAT guidelines on state of the art. The draft design should be provided by the company itself and assessed by the competent authority. Cost effectiveness may be calculated by either the company or the licensing authority.

The calculated cost effectiveness can be compared with the indicative reference value(s) to provide an insight into the acceptability of the measure or measures concerned.
The methodology and the frame of reference have not yet been tested for process-integrated measures. Furthermore it may not be possible to choose between two comparable alternatives.
Application of the methodology and the indicative reference value in such cases may lead to impracticable results.

It is stated in the notes to the indicative reference values (§2.11.3) that the law of diminishing returns is applicable if the environmental benefit of a particular technique is significantly less than the relative increase in costs. This is determined in part by the marginal cost effectiveness (the increase in costs divided by the increased environmental benefit).

In an *existing installation* where existing environmental measures are improved or renewed, it is necessary to evaluate both the total cost effectiveness (with regard to the indicative reference values) and the marginal cost effectiveness. The marginal cost effectiveness should be judged against separate reference values, consisting of a lower and an upper limit. The lower limit is set at 1.5 times the indicative reference value while the upper limit is set at a level 4 times the indicative reference value.
Below the lower limit, the improvement or renewal qualifies as reasonable, above the upper limit as unreasonable. If the marginal cost effectiveness lies between these two limits, the improvement or renewal may be postponed.

In a *new installation* the only criterion should be total cost effectiveness. However if there are significant differences in the cost of alternative techniques but less significant differences in their environmental impacts, marginal cost effectiveness could also be calculated in order to judge the differences between the techniques. Since the situation is new, only the limit of 4 times the indicative reference value can be applied to judge the reasonableness of the marginal cost effectiveness.
This additional calculation of marginal cost effectiveness may be used both to compare patently different techniques and to optimise a given technique. In the latter case, optimisation should not be targeted at determining only the minimum level of protection. That would be contrary to the ALARA principle required by the legislator: the greatest possible environmental protection at acceptable cost.

In addition to cost effectiveness, other factors play a role in deciding whether a measure should be implemented or not. Examples of these company and situation-specific factors are:

- The actual cost in practice. Company-specific costs may differ from the costs calculated using the methodology, for example if a subsidy is received or if utilities are purchased at a reduced price.
- The financial strength of the sector. A given environmental measure will be more readily implemented if a sector is financially strong and has a good market position. The position of an individual company is then of secondary importance.
- The company-specific emission or immission situation, which in certain cases may be a reason to introduce a measure even if its cost effectiveness is unfavourable. This may be the case, for example, if environmental quality objectives are breached or if certain toxic or environmentally harmful components are emitted (such as benzene in VOC or toxic heavy metals in particulates).
- The prioritisation of another environmental measure, for example for another environmental compartment, may be a reason to postpone implementation of the measure studied.
- Significant negative other environmental impacts (such as extremely high energy consumption, cross-media transfer of the problem, etc).

The comparison of cost effectiveness with the indicative reference values should therefore be interpreted with caution and should be considered as only one of the factors that play a role in the final decisionmaking.

2.12 Application of BAT reference documents

2.12.1 Introduction

BAT Reference Documents (BREFS) are the result of an exchange of information on Best Available Techniques (BAT) for a series of industrial activities. This information exchange is organised by the European Commission and arises from the European IPPC Directive (Council Directive 96/61/EC concerning integrated pollution prevention and control).

This section deals with the implementation of the BREFS in the Netherlands and its consequences for licensing. The backgrounds are also described.

2.12.2 Object of IPPC Directive

The object of the IPPC Directive is to achieve an integrated approach in order to prevent and control industrial pollution. The final goal of this integrated approach is a high level of protection of the environment as a whole. To achieve this level, improvement of the control and operation of industrial processes is necessary.

Central in this approach is the general principle formulated in Article 3 of the IPPC Directive.

> **From Article 3 IPPC Directive**
> Operators should take all appropriate preventative measures against pollution, in particular through the application of best available techniques enabling them to improve their environmental performance.

This principle not only focuses on the operation of installations, but also on the way the installations are designed, built, maintained and decommissioned.

To bring this principle into practice, the IPPC Directive imposes a number of requirements on IPPC activities:

- There must be a permit for the specific industrial activities to which the Directive refers.
- The permit has an integral character and guarantees a high level of protection of the environment as a whole.
- Emission limit values or prescribed techniques in the permit are based on Best Available Techniques (BAT) or a combination of these techniques. Emissions from prescribed techniques correspond to the emission levels in accordance with BAT.

The IPPC Directive has no direct effect on the installations to which they refer and must be implemented through national legislation. In the Netherlands, according the Ministry of Housing, Spatial Planning and the Environment (VROM), the standards of the IPPC Directive have for the most part been complied with through the Environmental Protection Act (*Wet milieubeheer*, Wm) and the Surface Water Pollution Act (*Wet verontreiniging oppervlaktewateren*, Wvo). Specific legislation to convert the Directive has been limited to several minor amendments of the Installations and Permits Decree, Environmental Protection Act (*Inrichtingen- en vergunningenbesluit Wet milieubeheer*, IVB), the Executionary Decree on Pollution of National Waters (*Uitvoeringsbesluit verontreiniging rijkswateren*) and, for regional waters, of various regulations of provinces and district water boards. The Ministry of VROM started a project in 2002 aimed at amending the Wm itself in order to achieve a better anchoring of IPPC in national legislation. An important element of that is scrapping of the ALARA principle and adoption of BAT (Best Available Techniques).

From 31 October 1999, the IPPC Directive applies to new and substantially changed installations (see explanatory note) and, from 31 October 2007, also to existing installations. This means that, from that date, permit application, permit procedure and content of the permit must satisfy the standards of the IPPC Directive. The competent authority determines which standards for a specific installation must correspond with BAT. As a result of a BREF becoming available, the competent authority will ascertain if the standards are at an adequate BAT level or if they must be renewed / tightened. See also the text below concerning bringing the permits for existing installations into technical substantive compliance by no later than 31 October 2007. In setting new, tightened standards, a transitional or implementation period can, if necessary, be granted on the ground of technical and economic considerations, at the end of which those standards must be complied with. The point in time when a company must actually comply with those standards may be later than 31 October 2007, depending on the time of publication of the BREF, the time it takes to update the permit and the implementation period granted to the company.

In principle, a permit procedure suffices on the basis of Wm and Wvo, subject to the mutual adjustment on the standards. The ALARA (BAT) consideration must be based on the most recent and generally acceptable insights into Best Available Control Technology. This, in any event, includes the relevant available BREFS (BAT Reference Documents). The final period at which the Wm permit for an existing installation that is not changed substantially before 31 October 2007 (see explanatory note) must be in technical substantive compliance with the IPPC Directive (BAT) and the BREFS (if available) is 31 October 2007. In view of that, the competent authority will, before 31 October 2007, check the permits of existing installations that are not substantially changed and, if necessary, adjust them to IPPC and BREFS.

Existing installation: an installation that is operational on 31 October 1999, or an installation for which a permit has been issued or for which, in the opinion of the competent authority, a complete permit application has been submitted, on the condition that the installation is made operational no later than 31 October 2000 (Art. 2, paragraph 4 IPPC).

Substantial change: a change in the operation that, according to the competent authority, can have negative and significant consequences for humans or the environment (Art. 2, paragraph 10 IPPC).

2.12.3 Status of the BREFs

In BAT Reference Documents (BREFS), the results are presented of an exchange of information among the Member States of the European Union, EFTA countries (N, IS, CH, LI), EU candidate countries, non-governmental environmental organisations (NGOs) and the branches of industry involved concerning the best available techniques and the developments in this area. The legal foundation for publication of the BREFS by the European Union is Article 16, paragraph 2 of the IPPC Directive. In addition, Article 2, paragraph II and Appendix IV, point 12, of the directive prescribe that the competent authorities must take the BREFS into account when determining the best available techniques. As a result, the BREFS have a comparable status as the NeR and the CIW (Commission for Integral Water Management) recommendations.

Definition of 'best available techniques'

The term 'best available techniques' is defined in Article 2, paragraph 11 of the directive as:

The most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions.

- 'techniques': both the technologies used and the way in which the installation is designed, built, maintained, operated and decommissioned;
- 'available': developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator;
- 'best': the most effective in achieving a high general level of protection of the environment as a whole.

2.12.4 Best Available Techniques (BAT) versus ALARA and Best Available Control Technology (Wm framework)

For application in Dutch practice, the relationship between the concept of best available techniques (BAT) and the concepts of ALARA and Best Available Control Technology is of importance.

Both in the case of BAT in the IPPC Directive and in the case of ALARA in the Wm, the largest possible protection of the environment is required, in so far as in all reasonableness that can be demanded. The reasonableness relates in particular to the economic feasibility of environmental measures, but also other local aspects must be taken into consideration. The Administrative Jurisdiction Division (Afdeling bestuursrechtspraak) of the Council of State (Raad van State) has determined through jurisprudence that the assessment freedom of the competent authority in defining ALARA finds its limitations in what arises from the 'most recent and generally acceptable environmental hygienic insights'. These insights are laid down as Best Available Control Technology in circulars, guidelines (e.g. the NeR) and reports (e.g. CIW recommendations), in which the reasonableness check has been performed on branch of industry level.

In short, the conclusions concerning the best available techniques in the BREFS are generally well comparable to the concept of Best Available Control Technology used in the issuance of permits.

2.12.5 Best Available Techniques (BAT) versus BBT and BUT (Wvo framework)

To prevent the pollution of surface water in the Netherlands, tackling emissions is the first matter of importance. Depending on the nature and harmfulness of the substances (and independent of the environmental quality standards to be achieved), application of the best implementable techniques (best uitvoerbare technieken, BUT) and best existing techniques (best bestaande technieken, BBT) is used within the framework of Wvo. For example, to tackle emissions of so-called black-list substances, BBT is used, whereas for most of the other substances a compliance effort applies in accordance with BUT. For merely a limited number of relatively harmless substances occurring naturally in surface water, the water quality approach is used. Examples of these are chloride and sulphate.

The definition of BAT has a reasonableness criterion, which entails that the necessity to reduce emissions increases to the extent the environmental harmfulness of the substances increases. The definitions of BUT and BBT are, in fact, elaborations of such a reasonableness criterion. That is why it can be concluded that the concept of BAT comprises the concepts of BUT and BBT. More information on the emission policy and the concepts of BBT and BUT can be found in the CIW manual WVO permit issuance.

2.12.6 Object of the BREFs

The BREFs provide reference materials which the competent authority must take into consideration when determining the permit conditions. These documents give relevant information concerning the best available techniques and are therefore valuable tools for improving the environmental performance.

2.12.7 Implementation of the BREFs in the Netherlands

The official BREF is actually only the summary (Executive Summary) of a BREF document. This official version of 10 to 20 pages is translated into all the languages of the EU Member States and published by the European Commission. The full version is only available in English and is not officially published. It is therefore regarded as the clarification of the BREF and has the associated status.

Each BREF is accompanied by a short enforcement note. This is meant to inform the competent authority about the application of the BREFs. The BREF is then included in the NeR, together with the enforcement note, and, if applicable, in the relevant CIW recommendation, along with simultaneous change or cancellation of the current regulations in the NeR / CIW recommendation for the sector in question.

If the NeR or the CIW recommendation sets additional or other standards than the BREF, the enforcement note will indicate how these should be used. Also if the language usage in the BREF creates confusion, for example, due to a poor translation, the enforcement note will indicate what precisely is meant by particular texts or terms.

In §2.12.2 it is described from which date the IPPC Directive applies to new, substantially changed installations and existing installations. These periods do not expressly apply for use of the BREFs in the issuance of permits. Because the BREFs reflect the current Best Available Control Technology, the BREFs must, in the Netherlands, already be used for existing installations as well in the ALARA consideration on the basis of the Environmental Protection Act.

2.12.8 Application of the BREFs in the issuance of the permit

In the issuance of permits, the ALARA consideration and Best Available Control Technology play a central role. There can be different sources of Best Available Control Technology for a particular sector. For the sectors in question, the BREFs are a relevant source of information on Best Available Control Technology. When drawing up the permit, the competent authority must use the information in the BREFs in order to be able to make a good ALARA consideration. For those sectors for which no BREFs are available, the competent authority must make the ALARA consideration on the basis of other information.

The BREFs contain descriptions of techniques with mention of the environmental performance (numerical values) that can be expected from applying the techniques. Although the numerical values do not have the formal status of emission limit values, they can be used as an indication thereof. For, the IPPC Directive determines that preferably not the techniques (= resource regulation) must be laid down in the permits, but the environmental performance that can be achieved through application of those techniques (goal regulation).

In determining BAT, the guidance note and the general requirements of the NeR must, in addition to the BREF, be consulted. If in all reasonableness, in accordance with the most recently adopted general insights as set down in the general requirements of the NeR, a further BAT can be prescribed than the one ensuing from the BREF, this must be done.

If permit regulations are not based on the best available techniques (BAT), in the preamble of the permit it must be indicated with reasons stated in which way a high level of protection of the environment as a whole is guaranteed.

The Dutch government has decided in the implementation of the IPPC Directive not to make a distinction between installations that fall under the directive and other installation to which the Wm applies. This means that the BREFs must also be included as an information source in the ALARA consideration for installations that do not fall under the IPPC Directive due to their production capacity. In doing so, attention is required for the question to what extent the conclusions in the BREF are applicable to such an economy of scale, since the BREFs are not focused on these installations.

Abbreviations

ALARA:	As Low as Reasonably Possible
BAT:	Best Available Techniques
BREF:	BAT Reference Document
BBT:	best existing technique
BUT:	best implementable technique
CIW:	Commissie Integraal Waterbeheer (Commission for Integral Water Management)
IPPC:	Integrated Pollution Prevention and Control
IVB:	Inrichtingen- en vergunningenbesluit Wet milieubeheer (Installations and Permits Decree, Environmental Protection Act
Wm:	Wet milieubeheer (Environmental Protection Act)
Wvo:	Wet verontreiniging oppervlaktewateren (Surface Water Pollution Act)