Annual report 2001

AQUAFIN NV

Mission statement

Supported by its technological, operational and territorial knowledge, Aquafin wants to make a significant contribution to an integral and sustainable water policy for the Flemish Region and other clients. In so doing, sustainable and efficient business practice forms the reference framework for Aquafin in which it strives continuously towards a balance between improving the environment, the economic result and working considerately with all employees.

Contents

Board of Directors of Aquafin

Behind: Geert Maes, Wilfried Van den Heuvel, James Anthony Hill and Jhony van Steen. In front: Francine Swiggers, Ivo Van Vaerenbergh and Luc Bossyns. Not on the photo: Willy Breesch, Brian Duckworth and Loïc De Cannière.

Board of Directors of Aquafin NV

Chairman	Ivo Van Vaerenbergh
Managing Director	Luc Bossyns
Directors	Lode Beckers (until 18 May 2001)
	Willy Breesch (as from 18 May 2001)
	Brian Duckworth
	Loïc De Cannière
	James Anthony Hill
	Geert Maes
	Francine Swiggers
	Wilfried Van den Heuvel
	Frank Van Sevencoten (until 18 May 2001)
	Jhony Van Steen (as from 18 May 2001)

Aquafin Management

Managing Director	Luc Bossyns
General Services Manager	Marc Dedecker (as from 1 September 2001)
Operations Manager	Marc De Maeseneer
Engineering Manager	Marc Goossens
Planning Manager	Boudewijn Van De Steene

Audit Committee

Chairman	Ivo Van Vaerenbergh
	Brian Duckworth
	Geert Maes

Human Resources Committee

Chairman	Ivo Van Vaerenbergh
	James Anthony Hill
	Wilfried Van den Heuvel

The Permanent Representative of the Flemish Region

Bruno Beels

Reviseurs d' Entreprises

Ernst & Young Bedrijfsrevisoren B.C.V. represented by Rosita Van Maele

Foreword

2001 was a turbulent year in thinking about water policy. Many changes in water policy have taken place and will continue to do so. Aquafin is preparing for a new way of working and will change its form of organisation. In the spirit of the European *Water* framework directive the river basins will become the control units. This renovation phase was given the name *Aquafin 2020*. Aquafin is making the change from pipe layer and water treater into one integrated water company. In doing this we want to retain the high quality of our employees and our work.

In 11 years' time we have delivered 1,172 clean-up projects, financed for a total of EUR 1.23 billion. There were building sites everywhere in Flanders. Scores of sewage outlets were cleaned up, new wastewater treatment plants were built and older ones were renovated. The balance sheet is positive: operation of the treatment plants continues to progress, as does the most important item, the quality of our Flemish streams and rivers. This improved water quality must lead to ecological recovery of our watercourses, which is necessary for revival of the fish populations.

In October 2001 the Flemish Parliament voted on a resolution about renegotiating the contract between the Flemish Region and Aquafin NV. Much emphasis was laid here on an ecological result commitment. Naturally this demands unambiguous agreements about responsibilities and tasks. Quite a number of study assignments are associated with preparing the renegotiation. Aquafin made an impression with the study concerning *zoning* that it conducted at the request of the Flemish Minister for the Environment. Aquafin drew up a methodology that calculates the best treatment scenario based on population density for areas where water treatment is still not provided. Three options are open here: large-scale or small-scale collective treatment, or individual treatment. These draft zoning plans leave space for the Region and the municipalities to add their own touches.

Aquafin wants to maximise the value of its territorial knowledge, operational experience and views on sustainable water management for the Flemish Region, the municipalities and other clients. Its knowledge of treatment processes and technologies opens the door for collaboration with the industrial and drinking water sector. Aquafin changed its articles of association so that it can develop commercial activities and so that it could acquire the shares in Aquaplus NV. This Aquafin subsidiary focuses primarily on industry and the public administrations in potential EU-countries.

In the autumn of 2001 the VAT authorities disputed the VAT assessment rate of 6 % that Aquafin has charged on its invoices to the Flemish Region since 1993 in accordance with agreements made earlier. The company has instituted the necessary proceedings to fight application of a VAT rate of 21 % as well as all further past claims from the VAT authorities. Steps are also being taken to bring about a favourable VAT arrangement for the future. The Flemish Ministers for the Environment and Finance are supporting Aquafin in this.

In the middle of this 'thinking conversion' further professional work is underway within the company. There is huge involvement and effort. The board is especially grateful to the staff for this enthusiasm. Aquafin is ready for a change of course.

Luc Bossyns — *Managing Director*

Ivo Van Vaerenbergh — *Chairman*

Report of the Board of Directors on the financial year 2001

Investments

In 2001 Aquafin delivered 112 investment and renovation projects to the Flemish Region with a value of almost EUR 160 million. These deliveries include 15 new wastewater treatment plants (7 small-scale treatment plants and 8 large-scale treatment plants), 3 renovations and 8 storage and settling basins. 50 pumping stations and 160 km of pipes have also been taken into use.

From the set up of Aquafin until the end of 2001, a total of 1,211 sanitation projects were delivered to the Flemish Region for a total value of EUR 1,291.5 million. 119 of these projects were wastewater treatment plants (85 new plants, 2 pilote installations and 32 renovation projects). The renovation projects were mostly adjustments and modernizations of the infrastructure that was transferred to Aquafin.

The table shows the 1999-2003 investment projects and the 1994-2003 renovation projects at 31 December 2001.

	Number	Value in 000 EUR
Delivered		
– new plants	1,172 (87 WWTPs)	1,234,513.4
– renovations	39 (32 WWTPs)	56,965.4
Awarded or contracted		
– new plants	250 (19 WWTPs)	356,882.9
– renovations	39 (38 WWTPs)	160,403.5
Planned		
– new plants	619 (67 WWTPs)	805,126.5
– renovations	24 (23 WWTPs)	71,593.2
Total	2,143	2,685,484.9

Operations

At the end of 2001 Aquafin was responsible for the operation of 191 wastewater treatment plants (WWTPs) delivered to the Flemish Region, 692 pumping stations and 3,449 km of pipes. Of those respectively 85 WWTPs, 472 pumping stations and 2,149 km of pipes have been built by Aquafin since its set up in 1990. The remaining infrastructure was entrusted to Aquafin on 1 Januari 1994.

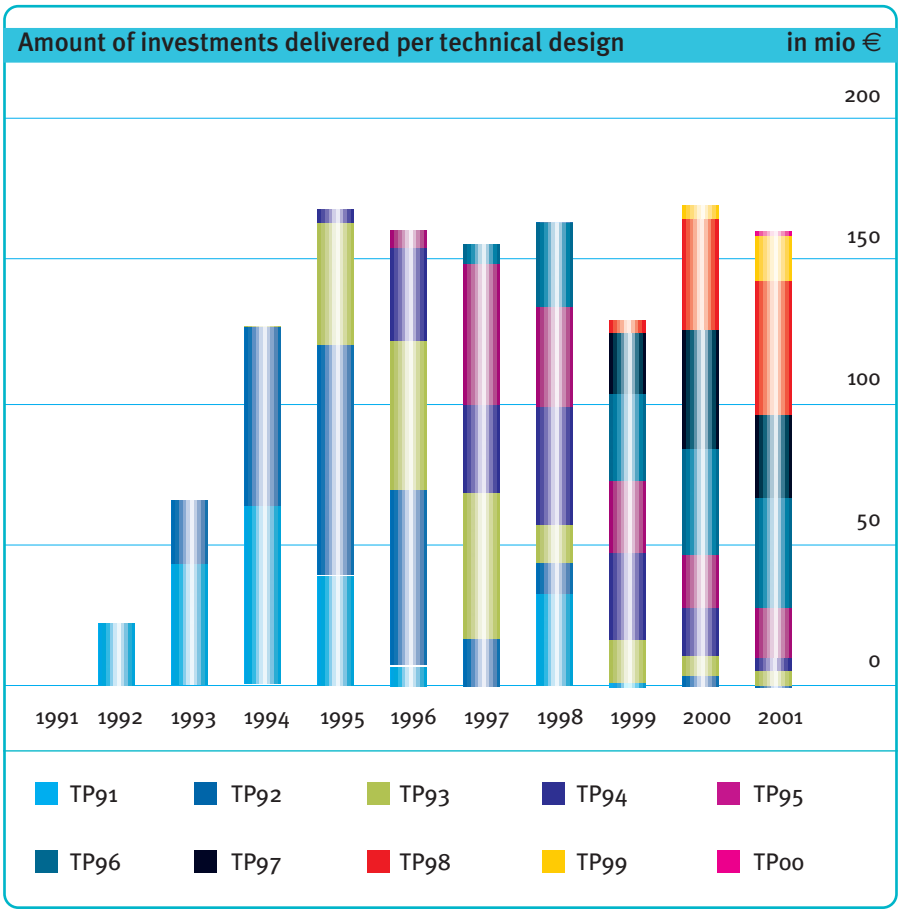
The total design capacity of the treatments plants is a 5.8 million people-equivalent (PE). If we make allowance for the adaptations to enable nutrient removal at a number of older plants, the capacity was a 4.8 million people-equivalent in 2001.

A wastewater pollution load of a 3,006,920 PE was biologically treated, which means a capacity utilization of 62.9 % with nutrient removal.

2001 was once again an extremely wet year, resulting in very high pumping costs for rainwater in the sewer system. Here the frog plan is of great value, which encourages the municipalities to deconnect inlets of clean water from the sewer system. 16 % of the operation budget is absorbed by electricity invoices.

In 2001 as much as 57 % of the operations budget was put on the market through the law on public contracts. The sludge disposal costs, amounting to 34 % of the total operations budget, make up the largest part. As from 2002 half of the electricity budget will be bought in the liberalized market.

Also in 2001 Aquafin's efforts were very much focused on nutrient removal in



large plants, as imposed by the Flemish and European environmental legislation. The favourable values for nitrogen removal are a result of numerous process optimizations and investments.

Today 53 % of all sewage in Flanders is being treated. The sewerage level is much higher, though many houses are not connected to the municipal sewer system in their streets. But there is good news. The quality of our waterways and the fish stock are improving gradually. Quality improvements are spectacular in those areas where Aquafin has realised sanitation projects. The measurements were carried out by the Flemish Environment Agency, scientific institutions and by order of provincial fisheries commissions.

Aquafin has 692 staff (642.5 FTE) and 137 staff made available by the Flemish Environment Agency. Over 60 % is employed in the Operations Directorate.

Management agreement

After its decision of 30 June 2000 not to tacitly renew the management agreement with Aquafin on 1 January 2001, the Flemish Government invited the company to renegotiate the present agreement. On 24 October 2001 a parliamentary resolution was adopted that stipulates that the renegotiations between the Flemish Region and Aquafin must start no later than 1 September 2002. One of the basic assumptions is a performance-related fee, in which the relevant responsibilities are assigned to Aquafin.

At the invitation of the Flemish Government, Aquafin has carried out a number of assignments aimed at producing documents for the authorities; these should lay the legislative foundations for the new integral water policy. The master plan methodology describes how all the investments in wastewater treatment that have yet to be planned can be decided, their cost price, and the best priotarisation in which they must be performed to ensure an optimum ecological and financial return. For areas and dwellings where there is still no wastewater treatment determined, Aquafin developed an arithmetic model to define new treatment zones. Completed with territory information and after approval of the Flemish Minister for the Environment these zoning plans should offer clarity and legal certainty to both citizens and municipalities.

Research & Development

In 2001 Aquafin joined a European research network numbering 70 partners in 26 countries. Aquafin participated in the preparation of 7 proposals for the 'EU 5th framework research programme'. The research proposals deal with the reuse of sewage, the integral management of the sewer-treatment-river chain, the operational management of the waste-water-drinking water infrastructure and the environmental and socio-economic impact of sludge processing and disposal.

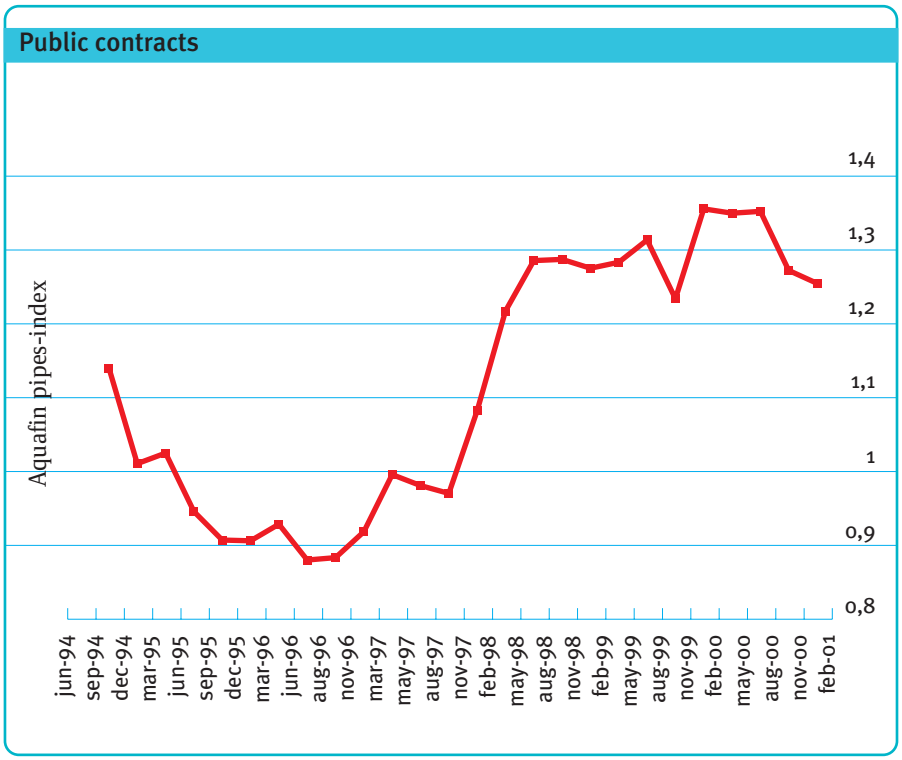
In the research projects the theme of sustainable water management is never far away. In 2001 various projects were launched to investigate the possible applications of membrane systems. In the Waregem region, for example, the effluent from the sewage treatment plant in Waregem can be upgraded through a combination of microfiltration and reverse osmosis to form water of a higher quality which is suitable for replacing the threatened water-table. In 2001 work also began on the first full-scale membrane installation in Wulpen, which is also a 'first' for Europe. Aquafin NV and the Intergemeentelijk Waterbedrijf Veurne-Ambacht (IWVA) are collaborating on sustainable drinking-water production in the coastal region.
Another use of membrane technology has led to a patent application. Together with

Severn Trent Water and Prof. dr. W. Verstraete of the University of Ghent, Aquafin has designed a new treatment technology for the radical removal of COD from wastewater. The BIOMAC technology (biological membrane activated carbon) involves the concentration of COD on active charcoal, which is then broken down by specialized bacteria in a membrane bioreactor.

Small-scale wastewater treatment is increasingly important for the remediation of the more remote areas of Flanders. In collaboration with various universities, Aquafin has optimised the choice of technology for small-scale water treatment systems in terms of cost price and integratability. The matrix combines treatment in reedbeds with technical systems. The Zemst-Kesterbeek and Zevergem-De Pinte reedbeds are evidence that progress has already been made. With its knowledge and experience Aquafin can assist the municipalities and industry in their striving towards the integrated and sustainable treatment of local and diffuse pollution.

Aquafin is also at the cutting edge of measurement and control technology. Within the framework of a European research project, its R&D department is working on the development of a non-contact sensor for the measurement of the pollution load in wastewater using laser technology. Tests with a prototype at the treatment plant in Boom produced promising results. The use of measurement and control technology to create a better effluent also leads to energy savings. This has been shown by the on-line control of iron chloride and carbon source at the treatment plant in Lommel.

Risk analysis has been on the agenda in the framework of Aquafin's numerous renovation projects. R&D has developed a probabilistic calculatory method that can quantify the causal relationship between the level of uncertainty and the risk-determining factors. The procedure has been used for the renovation of 2 treatment plants (Hove and Zwalm). It facilitates the decision-making process and ensures that investments are no higher than are actually necessary. For the plant in Hove the risk analysis procedure produced a saving of EUR 1 million.



Price rate of Aquafin's public contracts. The line is drawn up per quarter based on the different costs an average Aquafin project represents (sewering as well as road works). Index 1 is the point of reference.

VAT dossier

During the financial year a dispute arose with the VAT authorities regarding the rate that has to be charged on the invoices that Aquafin has submitted to the Flemish Region for the execution of its wastewater treatment tasks. In 1991 the VAT authorities formally approved the use of the reduced rate of 6 %. After the VAT legislation was amended in 1993, external advice was sought and, in the light of that advice, no new approval was requested. Provisions could still be found within the amended legislation to justify applying the reduced rate. This standpoint was also confirmed by the fact that no comments were ever made either when the VAT returns were submitted or during the various subsequent audits. In November 2001 however, following an extensive audit, the VAT authorities decided that, in future, a rate of 21 % would be applicable. Aquafin must also pay the difference of 15 % between the two rates, plus interest and penalties, from September 1996. This latter standpoint was communicated to Aquafin by means of a final demand dated 9 January 2002.

Aquafin feels that it is entitled to the reduced rate and also argues that the VAT authorities have not respected the principles of sound administration. Aquafin has therefore lodged an objection to this decision.

The above action is being launched in consultation with the Flemish Region. In

the management agreement with the Flemish Region there is a provision that taxation forms a reasonable cost element. As a result any additional demand can ultimately be charged on to the Flemish Region. In order to safeguard its interests Aquafin has therefore summoned the Flemish Region as an intervener in third-party proceedings.

This standpoint was confirmed by the decision of the Flemish Government of 26 April 2002 to sign an agreement with Aquafin. In the agreement is stated explicitly that all the possible consequences of the above-mentioned dispute can be charged on to the Flemish Region when Aquafin handles the matter with due care.

For the above reasons the Board thinks that the dispute with the VAT authorities cannot have any financial consequences for the company. The Board deplores the fact that this matter was bandied about in the media before it was formally made known to the company and that, as a result, the good name of the company has been besmirched.

Comments on the balance sheet

As usual the balance sheet total has once again increased. At the end of the financial year the balance sheet total was EUR 1,679 million, which is EUR 382 million higher then the previous financial year. This growth is almost entirely due to the net growth in the investments in the wastewater treatment infrastructure. These installations will remain the property of Aquafin NV until the management agreement with the Flemish Region ends.
As was the case last year there was a high level of construction activity. This found expression in a further increase in works in progress to EUR 291 million.

On 28 November 2001 Aquafin bought the shares in Aquaplus for EUR 1.7 million. This majority holding is entered under *Financial fixed assets*.
The missions which were carried outside the framework of the Agreement and which have still not been completed are shown under the heading *Orders in progress*. Globally considered, this heading remained at the same level as in the previous year.

During the year trade receivables decreased but remain at a high level: EUR 23.5 million at the end of 2001. In 2001, deliveries of investment projects were heavily concentrated in the last two months of the year, as was also the case in previous years. The sales invoices relating to these had not yet fallen due for payment at the end of 2001.

Under *Sundry receivables* is included a credit against OVAM relating to the dispute over environmental levies for the sludge incineration plant in Bruges. On 7 september 2001 Aquafin was awarded a favourable judgement and OVAM/the Flemish Region was ordered to repay the additional assessments collected earlier. Of the balance of EUR 3.6 million outstanding at the end of 2001 the largest part has already been repaid by OVAM. Under the same heading the claim on the Flemish Government is included which relates to the extra VAT-claim (6 % – 21 % problem) amounting to EUR 220 million.

If the General Meeting accepts the proposed profit distribution the legal reserve will be raised by EUR 0.581 million. The available reserve remains unchanged.

In execution of the management agreement with the Flemish Region the investments will be repaid over 15 years. This reimbursement tempo is faster than that for the depreciations: this will create a positive balance which, after the reimbursements have been made, will be used to further finance the depreciations. This positive balance will – with the approval of the Accounting Standards Committee – be recorded in a special liabilities account entitled 'Reimbursement from the Flemish Region'. The amount of EUR 232 million relates to all projects that had been delivered by the end of the financial year.

The provision for risks and charges was reduced by EUR 0.9 million. At the one hand it has been used for the final settlement of the 1998 and 1999 financial years with the Flemish Region. On the other hand necessary adjustments were made taking into account the most recent data. One may notice that the number of legal disputes has strongly decreased, especially those involving owners of land bordering on works. The provision for risks and charges relates to legal disputes, disputes relating to the management agreement and the processing of the sludge that is buffered at the plants.

Long-term financing is based on the 'affectation agreement'. This stipulates that the balance of the long-term loans must be less than the claims that Aquafin NV has on the Flemish Region. These claims consist of the still unpaid portion of the already delivered investment projects. In this context Aquafin has taken up EUR 150 million in long-term loans, EUR 75 million of them with the European Investment Bank and EUR 75 million with commercial banks. Taking into account the reimbursements of previously contracted loans the balance of the long-term bank loans amounted to EUR 779 million, 67 million of which has to be reimbursed within the year.

The increase in works in progress has had an impact on the short-term loans, which have risen by EUR 4.5 million to EUR

207.5 million. The amount of the short-term loans (EUR 108.5 million) is, however, still well below the currently permitted credit lines, which amount to EUR 328 million.
In 2001 the programme for the issue of commercial papers that was begun the previous year was boosted to EUR 250 million; of this figure EUR 99 million has actually been taken up.

Under the heading *Liabilities relating to taxes* the extra VAT debt (6 % – 21 % problem) amounting to EUR 220 million has been entered.

Comments on the profit & loss account

In the management agreement with the Flemish Region it is stipulated that reimbursement is based on the charging on of all reasonable costs plus an allowance for the shareholders based on their investment of capital. It follows from this that the costs and revenues are largely a mirror image of one another. The increase in costs and, in particular, in the costs of trade goods, raw and auxiliary materials, salaries, social charges and pensions are in line with the growth in the infrastructure which Aquafin operates.
The ongoing growth in assets explains the continuous growth in depreciations.
The movement shown on value depreciation and provisions relates partly to the settlement of the 1998 and 1999 financial years and partly to the decreases in value and provisions contested by the Flemish Region during the recently closed financial year.
Due to the increase in short- and long-term financing (+EUR 95 million) and the substantially increased interest rates, the cost of debts grew by EUR 4.9 million.

After adjusting for provisions, decreases in value and costs and revenues not charged on to the Flemish Region, the profit before tax is EUR 20.99 million. The increase of EUR 3.68 million compared to last year is due to the rise of interest rates on linear loans over the past two years. This interest rate does, after all, largely determine the indemnity that is paid for the contribution of the capital by the shareholders.

Proposal to the General Meeting

Taking into account the profit after tax for the financial year of EUR 11,588,726.05 and a transferred profit of EUR 16,573.91, the profit available for distribution is EUR 11,605,299.96.

On the basis of a maximum payout of 95 % the following profit distribution is proposed to the General Meeting:
addition to the statutory reserve:
EUR 581,000.00
dividends:
EUR 11,020,280.24
transferred profit:
EUR 4,019.72
If the General Meeting approves the proposed profit distribution then the following gross dividend will be paid out on 1 June 2002:
– EUR 27.49 for the shares fully paid up on 25 April 1990
– EUR 13.75 for the shares not fully paid up.

Mandates

Mr B. Duckworth's appointment as a director was confirmed by the General Meeting of 18 May 2001. This mandate will end after the General Meeting called to review the accounts for the 2002 financial year.

Mr L. Beckers and Mr F. Van Sevencoten resigned their seats. The Board of Directors thanks Mr L. Beckers and Mr F. Van Sevencoten for their dedication of many years to the company and for services rendered and wishes them the very best for the future. To replace them the Board appointed Mr W. Breesch and Mr J. Van Steen as directors at the General Meeting of 18 May 2001. These mandates will end after the General Meeting called to review the accounts for the 2003 financial year.

The external auditor's mandate ends after the General Meeting called to review the accounts for the 2001 financial year.
The Board of Directors proposes to the General Meeting to extend the mandate of Ms R. Van Maele, partner of Ernst & Young, Bedrijfrevisoren C.V., Mautstraat 54, 9000 Gent, with 3 years. The mandate will end after the General Meeting called to review the accounts for the 2004 financial year.

During the past financial year, our external auditor and the companies with which she has collaborated in a professional capacity, have carried out missions amounting to EUR 19,821.59 within the scope of the control tasks foreseen in the 'affectation agreement' for long-term credit.

Working in harmony with the environment

Production and use of sustainable energy

Main focus on energy recycling

Better chance of recycling with better sludge quality

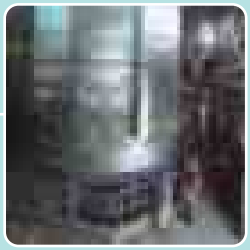
Controlling the discharge of PCBs and waste oil

Creating flower meadows and ponds

Producing sustainable energy from renewable sources is a noble objective, which Aquafin also wants to make its contribution towards.
Generating wind energy is not directly our core skill, but where we have the space available, we are happy to have wind turbines installed.
The main focus of processing sludge is to recycle energy. There is an ever-increasing amount of sludge being digested. The biogas generated creates heat, which can be used for sludge digestion and buildings. But the majority of the biogas produced is used thermally for drying sludge.
In 2001 activated sludge and the biogas produced from it were recognised as renewable energy sources. In early 2002 Aquafin was one of the first companies in Flanders to achieve recognition as a producer of green power. It produces 'green' electricity using biogas generators, for which power certificates can be traded. There are some other recycling and disposal opportunities which can be developed further, but this is dependent on the quality of our sludge.
For this reason, we have signed better agreements with companies involved in removing septic tank waste. We have also taken a critical look at our use of additives.

Production and use of sustainable energy

Aquafin is considering where wind turbines could be installed at its wastewater treatment plants and pumping stations. In return for giving the right to install these turbines it will receive an allocation of free power. Aquafin receives tradable green power certificates for the electricity produced from the biogas generated from its sludge digestion.

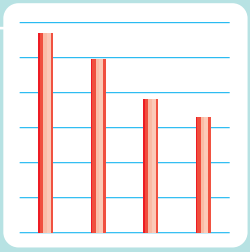


Main focus on energy recycling

In 2001 two new sludge dryers were built. The dryer built in Bruges operates using recycled heat from the sludge incinerator. The dryer installed at Houthalen will operate using steam generated from the waste incinerator at an intermunicipal utility company. Electricity is generated or heat recycled from the incineration of dried or dewatered activated sludge.

Better chance of recycling with better sludge quality

If our sludge had a lower content of heavy metals, there would be more opportunities for using it as a sealant layer for waste dump sites or as a lime fertiliser. Aquafin is examining whether a modified use of polyelectrolytes in sludge processing and better agreements with firms involved in removing septic tank waste can bring about improvements.



Controlling the discharge of PCBs and waste oil

All transformers containing PCBs are being replaced. The removal plan has been approved by the Minister for the Environment. Waste containing PCBs is removed in strict accordance with the law. The waste oil/lubricant balance has been positive for the second year running. Every last drop of waste oil is identified and reported to OVAM (public waste material company for Flanders).

Creating flower meadows and ponds

As part of the construction of some new wastewater treatment plants and the renovation of others in 2001 ponds were created and flower meadows planted. This will help add to these WWTPs' ecological value.

Production and use of sustainable energy

Middelkerke wind turbine.

Wind turbines at WWTPs and pumping stations

In 2000 Aquafin carried out, at the request of Minister for the Environment, Vera Dua, an inventory of all the possible locations for installing wind turbines at our pumping station and WWTP sites. During that same year the first 660 kW turbine was installed in Middelkerke on the site of the Boterdijk pumping station.

The investments and running costs involved are borne fully by the operating company. In exchange for giving the right to install the turbines on its site, Aquafin is receiving an allocation of free power from the turbines.

Installation of following turbines is planned:

Ostend WWTP: 2 x 1650 kW turbines (WVEM/Electrawinds)
This is an ongoing project involving 8 wind turbines being installed along the Ghent-Ostend railway line.

Ertvelde WWTP: 1 x 2000 kW turbine
This project is part of a larger project involving 50 wind turbines in the Ghent canal area.

Boterdijk pumping station, Middelkerke: 2 x 660 kW turbines
Extension to the 660 kW turbine.

Heist WWTP: ongoing project along the Leopold canal
An application for town planning approval for this project is under consideration.

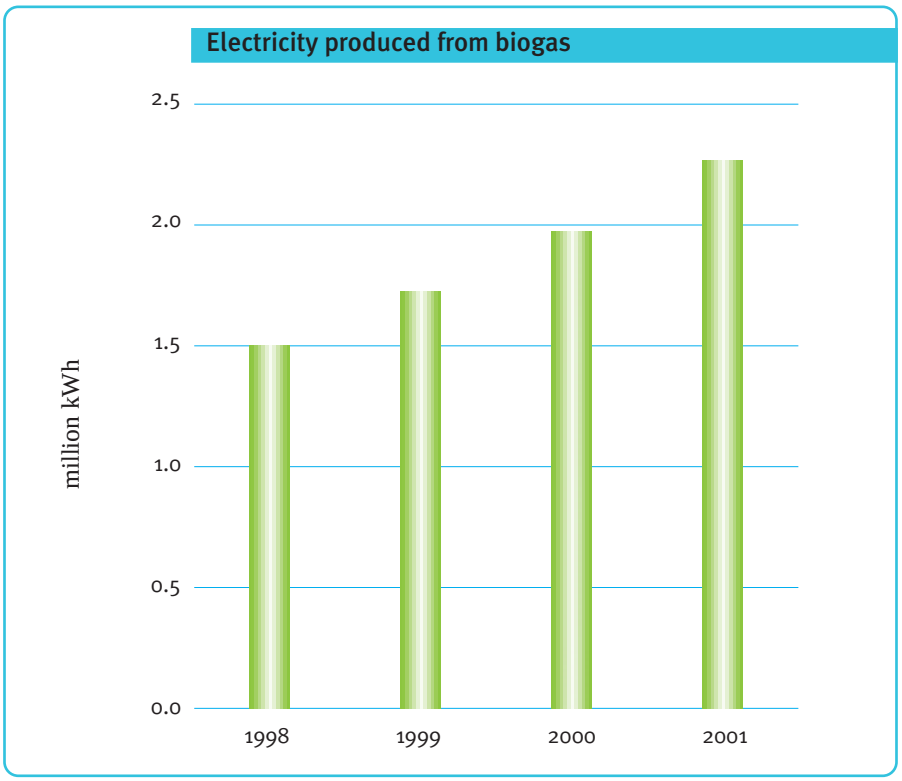
South Antwerp WWTP:
The feasibility of this project is being examined by IVEG (interc. utility company).

Green power certificates for production of electricity from burning biogas

When activated sludge is digested the organic material is decomposed and converted into biogas. This reduces the volume of sludge requiring further processing. The biogas produced can be of beneficial use at the treatment plant itself. For instance, the draft implementation plan for sludge put forward by OVAM provides for the expansion of the sludge digestion capacity as a preliminary processing stage.

In 2001 1.1 million m^3 of biogas were used in biogas generators. Aquafin's biogas generators located at Zwalm, Zele, Sint-Truiden, Hasselt, Genk, Dendermonde and Leuven produced 2.26 million kWh of green electricity. This output of electricity generated from biogas amounts to the annual consumption of 646 households.

In June 2001 the biogas generator at the Leuven treatment plant was recommissioned after a 10-year break. The biogas generator at the Zwalm WWTP, which halted operation in 2000 due to problems with sludge digestion, has also been brought back into operation. The biogas generator at Dendermonde was replaced by a new one. The gas generator at the Hasselt WWTP produced less electricity in 2001 than in 2000 due to the various problems it had. The graph illustrates the development of electricity production using biogas during the last few years.



The majority of biogas output is, however, not converted into electricity, but is used thermally. In 2001 the amount used this way was 2.4 million m^3 or 56,331 gigajoules. Its most important application is for the sludge dryer at Deurne, where 57 % of the energy required by the dryer was supplied in 2001 by biogas. Biogas is also used for heating the sludge digestion process and as the source for central heating in the site's actual buildings.

The fact that the government of Flanders passed a decision on 28 September 2001 recognising activated sludge and the biogas produced from it as a renewable energy source has been warmly welcomed. This means that electricity produced using biogas can be certified. These certificates can then be traded with power suppliers. At the moment their value is estimated at 74.37 euro per unit of 1000 kWh of green power. In order to generate a market for these green power certificates, power suppliers are set a particular target supply of green power. Power suppliers who fail to achieve their target will be fined. Aquafin was recognised in early 2002 as a producer of green power and has been included on the first official list produced by VREG, the Flemish regulatory body for the electricity and gas market (www.vreg.be).

Main focus on recycling energy

Sludge dryer in Houthalen.
Sludge silos in the foreground.

Sludge dryer in Bruges.

Drying sludge using recycled heat; burning sludge to recycle energy

Drying sludge using recycled heat
Drying dewatered sludge produces a material containing about 90 % of dry material in it. Using primary energy sources is avoided as much as possible. In Deurne digestion gas is used to power the dryer. In 2001 two new dryers were brought into service at Bruges and Houthalen. Another two dryers are planned at Ghent and Leuven.

The dryer at Houthalen came into operation in October 2001. Its drying operation is intended to be powered by the heat generated from the steam produced by the incinerator for domestic waste at the regional environmental conservation centre. The sludge dryer has been built, but the steam has not yet been provided. To begin with, primary energy resources are being used (fuel oil). Aquafin has temporarily leased a steam generator for this.

In 2001 12,350 tonnes of dry sludge material were dried by Aquafin using the dryers at Houthalen and Deurne, and around 12,800 tonnes of dry material were dried by Envisan.

The mixing installation on top of the sludge dryer in Bruges.

Burning sludge to recycle energy

Sludge is used as fuel in power stations and cement ovens. This is known as co-incineration. Dried sludge has the same energy content as brown coal. Co-incineration of sludge is possible both with dewatered and dried sludge.

Dewatered or dried sludge is also burned as a form of recycling energy in waste incinerators and sludge incinerators.

In 2001 38,188 tonnes of dry sludge material were co-incinerated in brown coal stations in Germany (dewatered sludge) and in cement works in Wallonia (dried sludge). 25,062 tonnes of dry sludge material was burned as a form of recycling energy by the waste management company Indaver and at the sludge incinerator in Bruges.

Autothermal process in Bruges

Until just recently coals were used to power the incinerator for wastewater treatment sludge at Bruges, in order to be able to burn the dewatered sludge at a sufficiently high temperature. In December 2001 the new dryer came into operation. This new dryer in Bruges is designed for autothermal incineration. By drying an amount of the dewatered sludge beforehand the use of normal coal to power the dryer can be discontinued. By ensuring in this manner that less water is getting into the oven more sludge can be burned (20,000 tonnes of dry material per year instead of 14,000 tonnes).

As for the dryer, it is powered completely by the heat from the flue gases. The energy recycling process takes place near the three oil heat exchangers. The oil heat exchangers heat up the thermal oil, which will provide the heat to be used in the sludge dryer.

Better chance of recycling with better sludge quality

Sludge quality

The table below indicates the average quality of the sludge used at Aquafin. The figures represent the arithmetic mean of the concentrations set for the dry material.

From an overall perspective the average values change little. But since 1999 the chemical removal of phosphates has been generally carried out by adding ferric iron chloride. This means that the concentrations of phosphorus and iron have increased in sludge, while the concentrations in most other substances have decreased.

Beneficial application of sludge at waste dump sites

Dewatered sludge can be used to beneficial effect to form a sealant layer for waste dump sites. The aim of a sealant layer is to prevent water seeping into the dump. Hydrostab is an alternative to the sealant materials traditionally used, such as a sand and bentonite mixture. The Hydrostab process involves waste materials being used instead of natural soil materials. The waste materials comprise a gravel fraction (e.g. sieve sand, contaminated earth), a filler fraction (e.g. fly ash) and a sludge fraction (e.g. wastewater treatment sludge). Water glass is then combined with these waste materials to produce Hydrostab. In the Netherlands the use of Hydrostab is recognised as being an effective application of waste materials. In 2001 around 11,600 tonnes of dry sludge material was disposed of for use as a sealant layer at the Razob waste dump site in the Netherlands, with around another 11,400 tonnes of dry sludge still dumped as usual. Dumping is however at the very bottom rung on the Lansink Ladder, which specifies the order of priority for treating waste materials set out by the Dutch government. In theory, this method of disposal is only used in emergency cases.

Before the Hydrostab process can be considered the sludge must have a dry material content of at least 28 %, with an average of 30 %. The mineral oil content cannot amount to more than 6,000 mg/kg of dry material. This last value is exceeded with some sludges. We worked out how we could manage to process more sludge by modifying the use of polyelectrolytes (PE). Polyelectrolytes are the most commonly used chemical substances for mechanically thickening and dewatering treatment sludge. They improve the sludge/water separation.

Liquid polyelectrolytes are the most practical to use. They are made up of, however, an oil fraction of mineral origin, which is detrimental to the possibility of recycling. In 2001 Aquafin looked into whether polyelectrolytes in powder form could be used for dewatering using centrifuges. There was a distinction made between the results from using undigested sludge (Liedekerke WWTP) and digested sludge (Hasselt WWTP). The sludge at both wastewater treatment plants is dewatered using

Trend indicating the average sludge quality

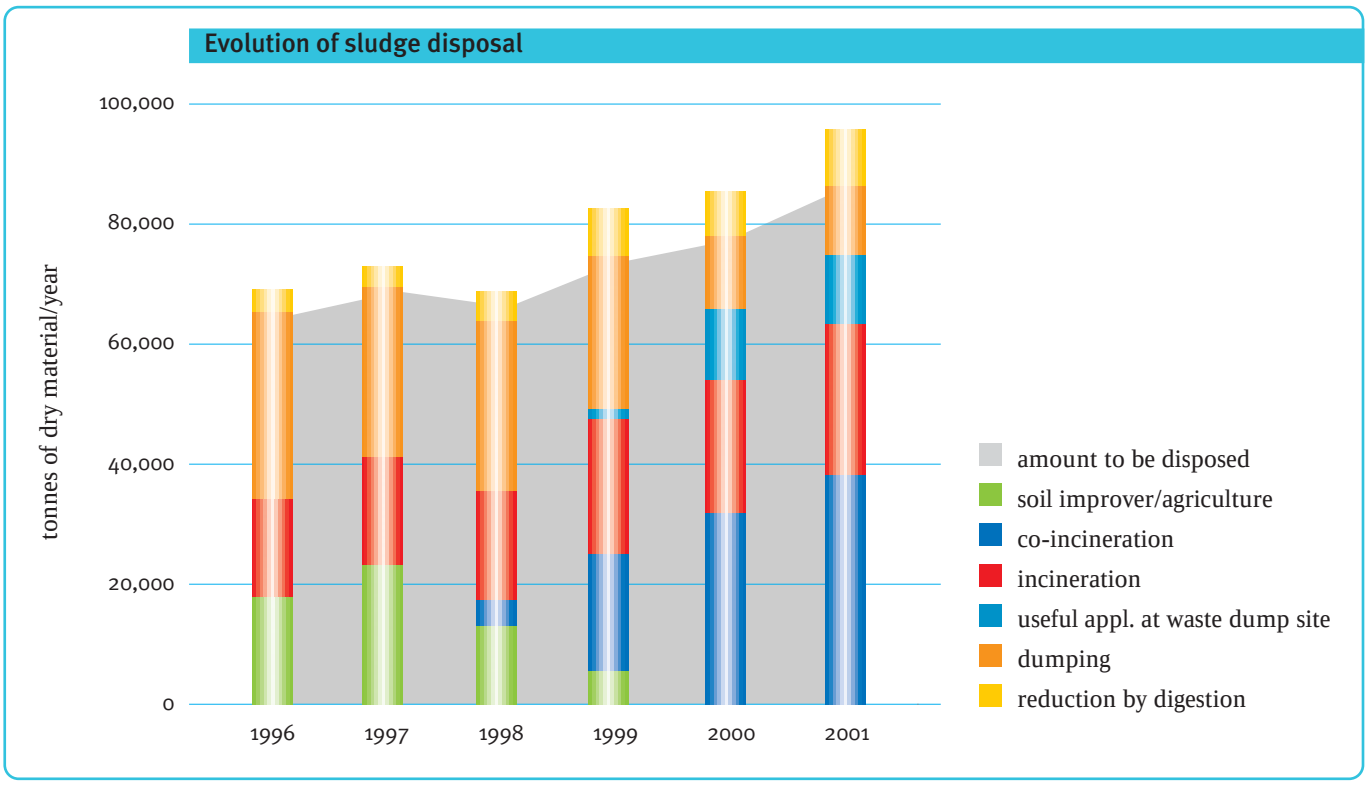
	1997	1998	1999	2000	2001
Organic material (%)	52.8	50.5	48.9	49.7	49.9
Organic and ammoniac nitrogen (% N)	7.22	3.82	3.51	3.50	3.63
Phosphorus (% P_2O_5)	3.9	3.9	4.2	4.6	4.4
Iron (% Fe)	2.5	2.9	5.7	4.5	4.2
Zinc (mg Zn/kg dry material)	1,229	1,228	1,236	1,174	1,222
Copper (mg Cu/kg dry material)	359	359	315	310	277
Lead (mg Pb/kg dry material)	190	187	204	177	172
Chromium (mg Cr/kg dry material)	94	82	76	77	75
Nickel (mg Ni/kg dry material)	75	49	46	45	43
Cadmium (mg Cd/kg dry material)	2.9	2.4	3.2	3.8	3.6
Mercury (mg Hg/kg dry material)	2.3	1.3	1.4	1.6	1.4

Sludge thickening table at Menen WWTP.

	Undigested sludge		Digested sludge	
	Liquid PE	Powder PE	Liquid PE	Powder PE
Dewatered DS material (%)	39.6	39.0	32.5	32.2
PE consumption (kg product/tonne dry material)	16.3	8.9	15.0	7.3
Separation rate achieved (%)	99.4	99.1	99.5	99.6
Mineral oil content (mg/kg dry material)	3,880	2,350	8,750	6,650

centrifuges. The table shows the results for both plants.
Using less PE in powder form we achieved a comparable separation rate result for the dry material, as when using liquid PE. The sludge water in both cases has the same dry material content. It is also clear that a better quality of sludge is achieved with considerably less mineral oil. In fact, a better rate was achieved in Deurne for PE in powder form, and again considerably less product was required: 6 kg product PE/tonne dry material, as opposed to 16 kg product PE/tonne dry material. Making this switch also seemed to be positive from a sludge drying process standpoint.

The issue was also examined in 2001 as to whether mechanical thickening could be achieved with reduced PE use. The solution in this case was to purchase better equipment through a separate tendering process. At the Menen WWTP, where the first thickening tables acquired using this tender process have been installed, an average dry material content of 9 % has been achieved, instead of 6 %, while the amount of PE consumed was on average 3 kg product PE/tonne dry material, as opposed to 5 kg product PE/tonne dry material using other thickening tables.



Beneficial application of sludge as lime fertiliser

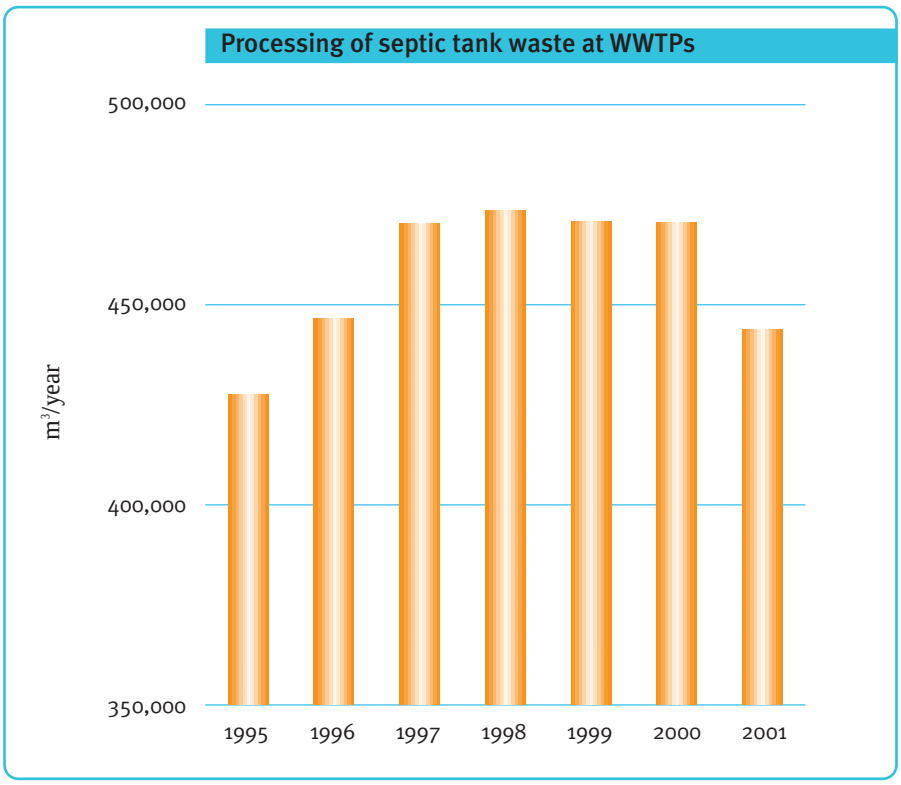
Aquafin would also like to dispose of a share of its sludge as fertiliser or soil improver. Not in the form of untreated liquid sludge, as was spread on agricultural land in the past, and which is now banned, but as lime fertiliser. This is a stable, hygienic end product, which is produced as a result of composting a combination of alkaline material and dewatered sludge.

But there are only a few wastewater treatment plants which can produce sludge of sufficient quality suitable for use as a base product in this secondary material. The main problems are caused by zinc, copper and nickel. The reasons for this include the use of zinc and copper guttering and galvanised water-pipes. OVAM's draft sludge implementation plan is proposing a set of product standards on this, which also cover guttering and pipes. Not to mention the fact that less contaminated septic tank waste could also ensure that there were fewer heavy metals in our sludge.

Tighter regulation on discharging septic tank waste

Every year removal firms deliver around 40,000 loads of septic tank waste to Aquafin's wastewater treatment plants for processing. This is material which has been cleared from the septic tanks connected to households and company sanitary facilities. VLAREM stipulates that septic tank waste is treated in a public wastewater treatment plant. Aquafin has signed agreements with a large number of removal firms, where the terms specified include the quantities of septic tank waste and the discharge facilities.

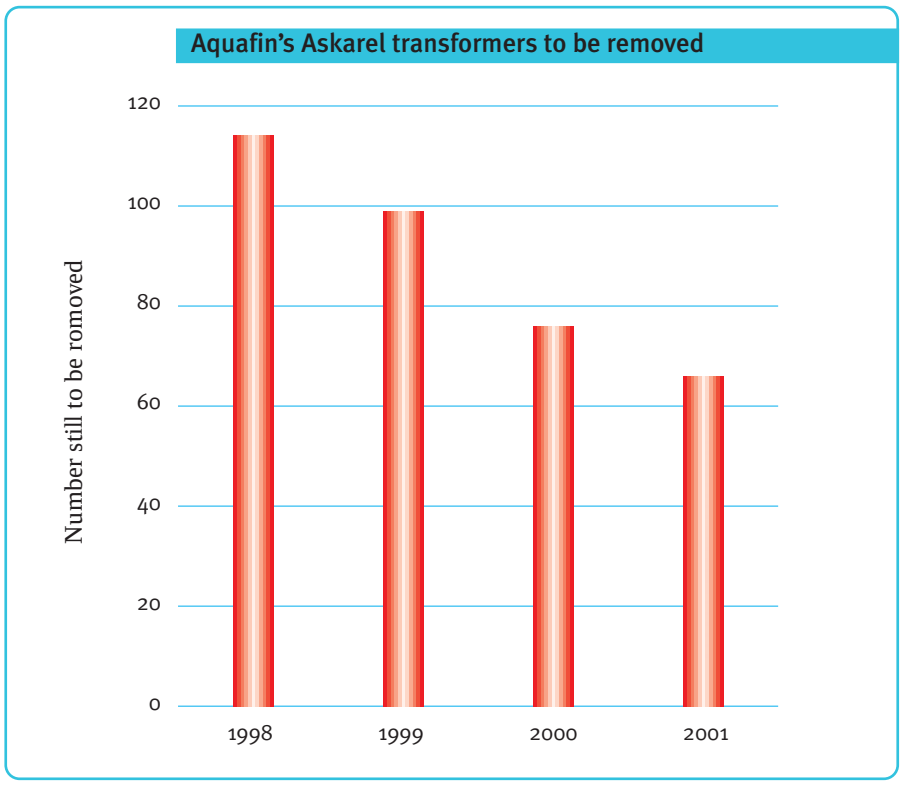
The graph on page 23 indicates the quantities of discharged septic tank waste supplied.



In order to prevent the activated sludge from becoming contaminated it is important that septic tank waste only contains the sludge cleared from septic tanks containing household wastewater. One of the objectives of OVAM's draft sludge implementation plan is then also to draft and monitor balanced regulations on collecting and processing septic tank waste.

With this in mind, in 2001 Aquafin and a number of removal companies signed additional agreements with the aim of guaranteeing the origin of the septic tank waste. These firms will provide removal certificates, which offer the user or owner of the material from the cleared septic tank the guarantee that the septic tank waste will be discharged and treated as provided for under environmental legislation. The user or owner, for his part, signs the certificate, thereby declaring that the material removed originates only from a septic tank intended for household wastewater.

Controlling the discharge of PCBs and waste oil



No PCB oil discharged into the environment

In the past PCBs (polychlorinated biphenyls) were added to transformer oil because of their fire-resistant properties. This gave rise to Askarel transformers. These have now been banned from being made. But Askarel transformers, which are still in good condition, can continue to be used until the end of 2005, subject to compliance with specific terms, or if a removal plan has been approved, until the end of 2010. Aquafin submitted a removal plan, which was approved by the Environment Minister on 18 July 2001. According to this, by 31 December 2006 at the latest all transformers containing PCBs at wastewater treatment plants and pumping stations need to be replaced. Although we would, in fact, hope to have this job done by the end of 2005. By the end of 2001, 48 of the 114 Askarel transformers to be removed had already been removed and replaced by air-cooled transformers. This is equivalent to 24,315 kVA of power and an amount of EUR 764,663. In each case the removal and destruction are carried out by approved collecting and processing firms. The details of these removals appear annually in the OVAM report. For instance, in 2001 about 26 tonnes of waste material contaminated by PCBs were discharged in a controlled manner. In this way, Aquafin is ensuring that no PCBs can affect our environment or food supply chain.

No environmental contamination from waste oil either

Waste oil is also discharged in a controlled manner, in accordance with legal regulations. Our waste oil is taken away by an approved collecting company and delivered to an approved processing company. In 2001 as well, the status with regard to waste oil was completely balanced. What is even better is that the balance is positive as a result of reducing the rise in the use of lubricants. In 2001 47 m^3 of waste oil was discharged, while only 44 m^3 of lubricants were purchased.

Creating flower meadows and ponds

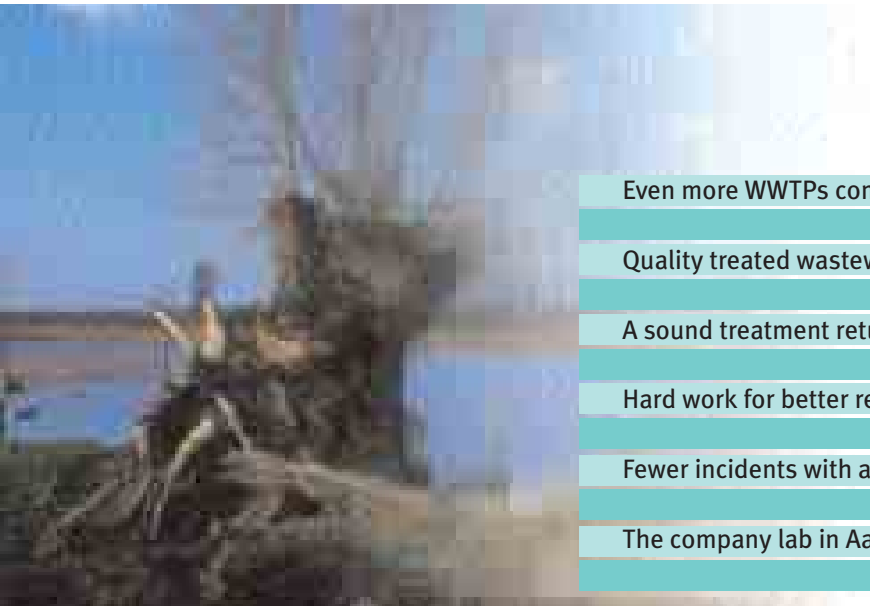
Flower meadows at the Ieper WWTP.

There is already a green belt being established around wastewater treatment plants aimed at integrating them better into the landscape and limiting any nuisance. This involves using the greenery in the area in order to provide the best possible chance for local fauna and flora to thrive.

Where there is enough space, conventional lawns are already being replaced more and more by ponds, reedbeds and flower meadows. They enhance the look of the treatment plants and provide added ecological value. Flower meadows have already been planted at WWTPs in Ieper, Houthalen, Geel, Geraardsbergen, Liedekerke, Rotselaar, Kortemark and Eksel. There are also plans to plant flower meadows at WWTPs in Destelbergen, Halen, Menen, Temse and Heimolen Sint-Niklaas.

There have been ponds already created at WWTPs in Aalst, Halen and Geraardsbergen, with another one planned for the WWTP at Knokke.

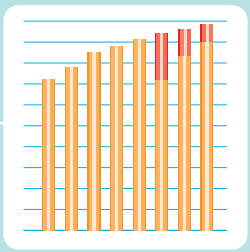
Wastewater treatment plant results



Effluent standards have been hardened in the course of the years. Aquafin has still succeeded in getting more wastewater treatment plants to comply with all standards each year: the percentage has risen from 70 % in 1994 to 90 % in 2001. Increasingly more of the larger WWTPs comply with compulsory nitrogen removal. In 2001 a further 15 WWTPs which had been taken over complied with the standard for nitrogen thanks to renovation, emergency solutions or improved process handling.

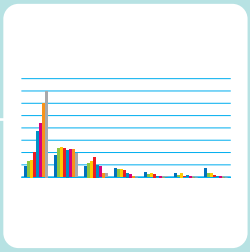
Likewise the quality of the treated wastewater is becoming better. The concentrations of polluting substances in the effluent discharged have roughly halved over five years. We are therefore making less of a demand on the self-purifying capacities of the receiving watercourses. The waste volume fed in was somewhat less than last year due to the excessive rainfall and the disconnection of industry. Despite the expansion of the treatment capacity and the load pumped up, the treatment return and the waste volume removed fell slightly, with the exception of nitrogen.

The number of incidents with an ecological impact at WWTPs fell because of process monitoring, standardisation and computerisation.



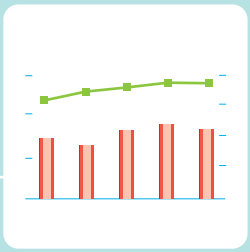
Even more WWTPs comply with all effluent standards

90 % of our WWTPs comply with all standards imposed. The number of larger treatment plants that still remove insufficient nitrogen has fallen by 15 due to all kinds of measures.



Quality treated wastewater increasing

The effluents discharged to the surface water are becoming purer each year: the average pollutant concentration will also be reduced this year. There is therefore a progressive reduction in the demand on the self-purifying capacities of our streams and rivers.

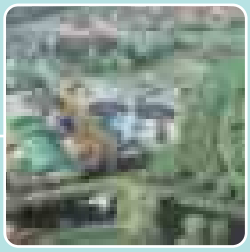


A sound treatment return

2001 was an especially wet year. A more limited waste volume was fed in because of this. The treatment return and waste volume removed could be maintained by pumping up more sewage and treating this biologically.

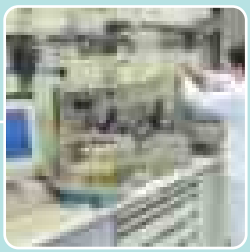
Hard work for better results: two examples

Better effluent is not a gift. It has to be worked hard for and considered inventively. We illustrate that using the initiatives that were taken at two larger WWTPs, those at Turnhout and Harelbeke.



Fewer incidents with an ecological impact

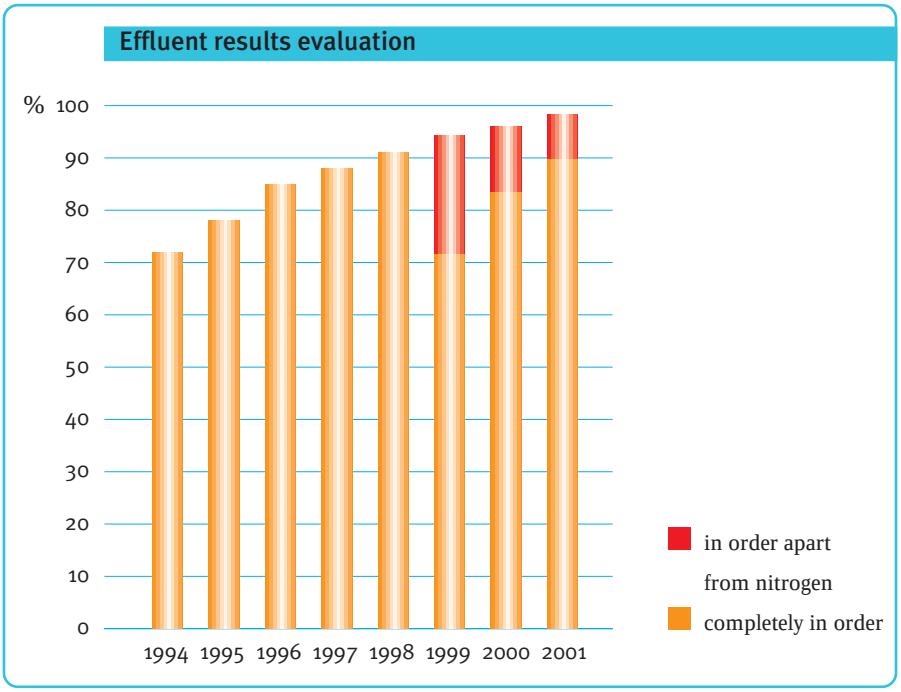
The number of incidents at our WWTPs has reduced greatly since 1997. In 2001 a few more incidents were noted than in 2000, but there were fewer with a serious ecological impact.



The company lab in Aalst monitors the process

The company laboratory has specialised in microscopic investigation of active sludge and supports the business operation of the WWTPs. The effluent quality is becoming more constant due to standardisation of the measurement equipment and computerisation.

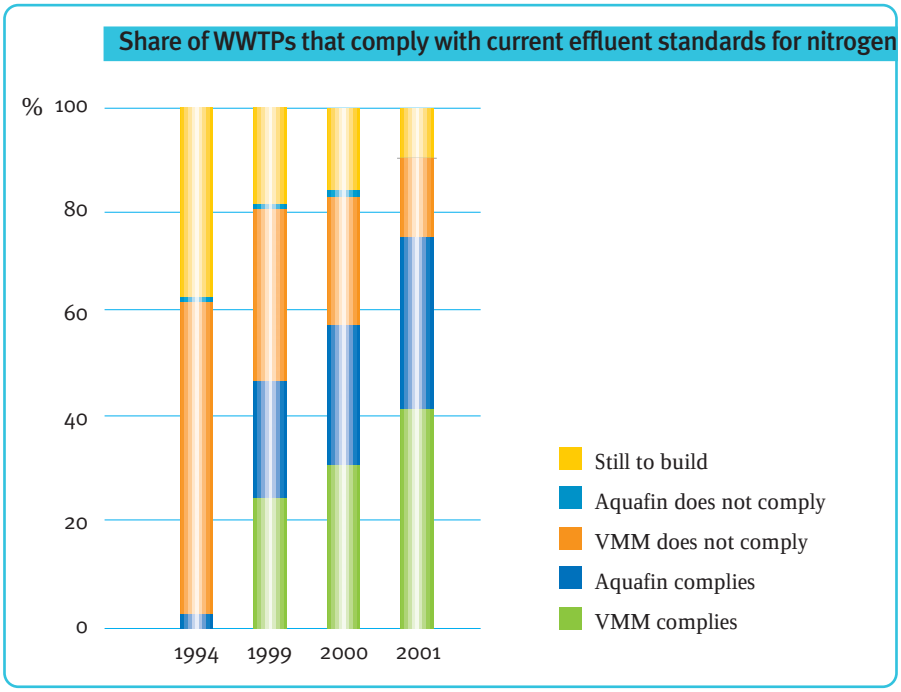
Even more WWTPs comply with all effluent standards



The effluent results from 185 WWTPs were evaluated in comparison to the standards. 166 WWTPs or 90 % of all WWTPs complied with all emission limit values imposed. All WWTPs of more than 10,000 PE built by Aquafin achieve the nitrogen standard. WWTP Deinze just failed to comply for phosphorus. 18 of the WWTPs taken over from the Flemish Environment Agency did not comply fully for nitrogen removal and 2 of them had problems with an additional parameter (phosphorus for Aartselaar WWTP and suspended solids for Hasselt WWTP).

Six new WWTPs larger than 10,000 PE were also commissioned in 2001: they likewise complied with the nitrogen standard.

15 existing WWTPs comply with the nitrogen effluent standard for the first time. This result was achieved as a consequence of renovation work carried out, changed process handling or applying emergency measures.

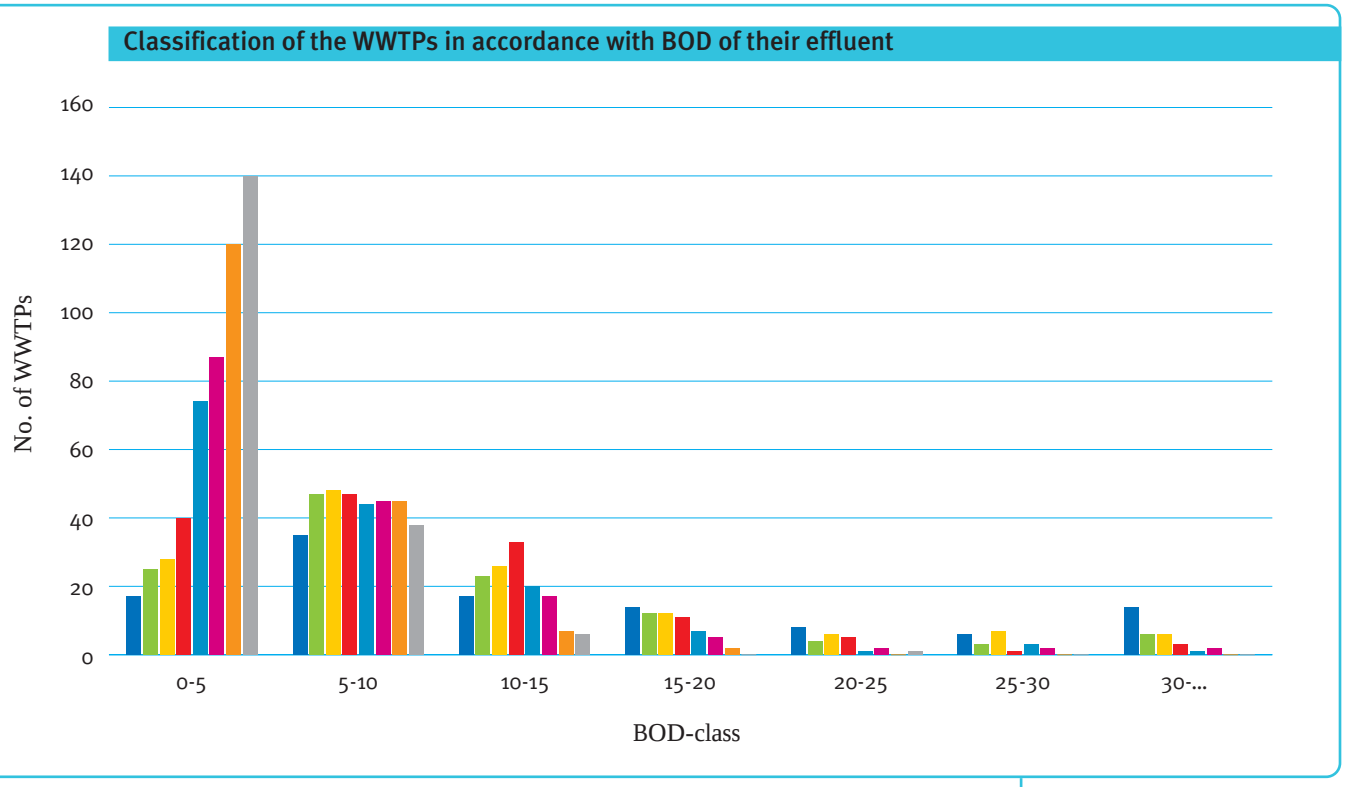


In 1994 when Aquafin took over operation of all existing WWTPs from the Flemish Environment Agency no legal nitrogen standard had been imposed. A WWTP still has to be built in 10 % of the Flemish agglomerations.

15 SUCCESSFUL EFFORTS IN 2001 TO COMPLY WITH THE NITROGEN STANDARDS

Schoten	Renovated
Turnhout	Renovated
Oudenaarde	Emergency solution: administration of active carbon and intermittent aeration
Duffel	Emergency solution: post-switched de-nitrification filter (Biofor type)
Schilde	Emergency solution: conversion of a sludge oxidation basin into an additional aeration tank/
	de-nitrification basin and administration of a carbon source
Hoogstraten	Emergency solution: conversion of an intermediate clarifier into a de-nitrification basin and administration of a carbon source
Kalmthout	Emergency solution: conversion of an intermediate clarifier into a de-nitrification basin and administration of a carbon source
Overpelt	Administration of a carbon source
Koersel	Emergency solution: conversion of a stabilisation tank into an additional aeration tank/
	de-nitrification basin and on-line nitrate measurement for improved administration of the carbon source
Bree	Adjustment of process control and implementation of re-circulation
Hove	Emergency solution: conversion of sludge oxidation basin into a de-nitrification basin
Edegem	Emergency solution: conversion of sludge oxidation basin into a de-nitrification basin
Genk	Emergency solution: separate treatment of nitrogen-rich sludge water
Lichtaart	Emergency solution: additional installation of a post-switched de-nitrification filter (Biofor type)
Sint-Truiden	Emergency solution: buffering of nitrogen-rich sludge water

Quality treated wastewater increasing



For 96 % of the WWTPs in 2001 the average biological oxygen demand (BOD) of the effluent was below 10 mg/l. In 1994 this percentage was only 47 %. This BOD indicates how much oxygen per litre is required for biological break-down of the residual waste volume discharged by the WWTPs. This parameter improves every year.

The average effluent concentrations of the WWTPs are represented in the table below. With the exception of BOD, the average values for 2001 are lower than in 2000 and have improved greatly since 1997.

in mg/l	1997	1998	1999	2000	2001
BOD	13.8	7.4	6.8	4.4	5.0
COD	76.8	58.6	56.3	50.4	46.3
Suspended solids	21.8	17.2	21.6	12.2	11.5
Total nitrogen	21.7	16.3	16.8	14.8	11.9
Total phosphorus	2.8	2.0	1.9	1.8	1.0

A SOUND TREATMENT RETURN

89 % of the pumped up load was treated completely biologically. The remaining 11% was discharged via the rainwater route after mechanical and physical pre-treatment.

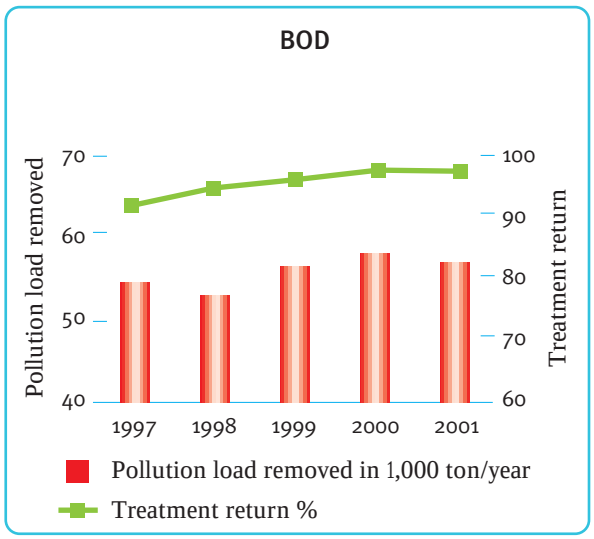
	1996	1997	1998	1999	2000	2001
Load pumped up (million m³/year)	360	418	594	591	659	731
Biologically treated load (million m³/year)	339	386	523	537	598	652

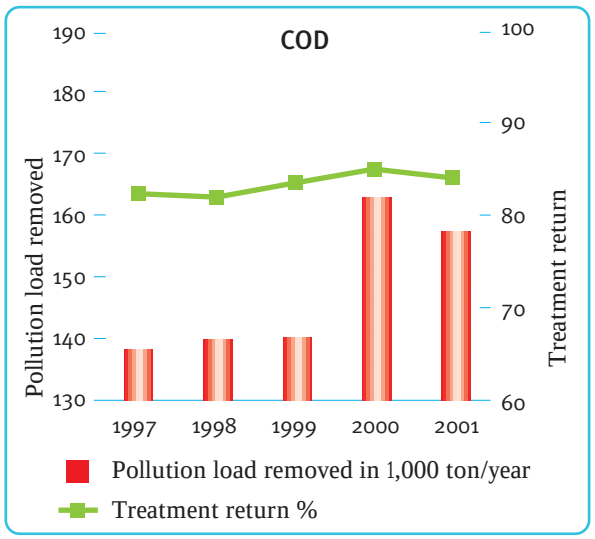
In the attached graphs the waste volume removed from all WWTPs is presented together. For each measured parameter (BOD, COD, suspended solids, total nitrogen and total phosphorus) the difference is indicated between the biologically treated waste volume and that which is discharged after biological treatment. Likewise an indication is given of the treatment return for each parameter measured. The treatment return is equal to the waste volume removed during biological treatment divided by the biologically treated waste volume.

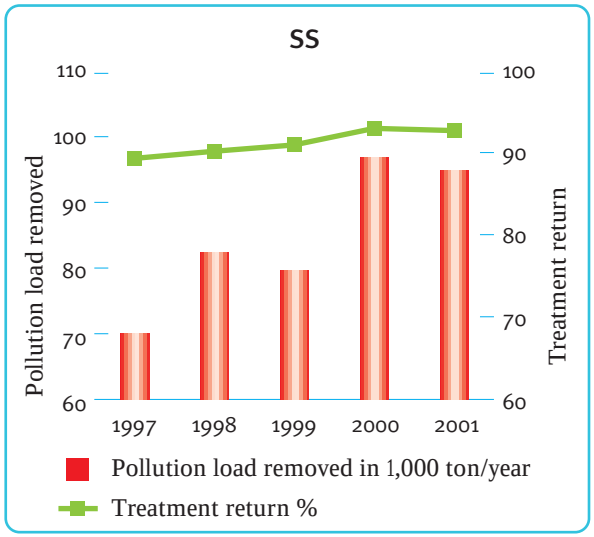
Taken overall, somewhat less waste volume than in 2000 was removed in 2001, but this was certainly more than in previous years. The returns also fell slightly. There is still an increase in the treatment return and the waste volume removed for nitrogen.

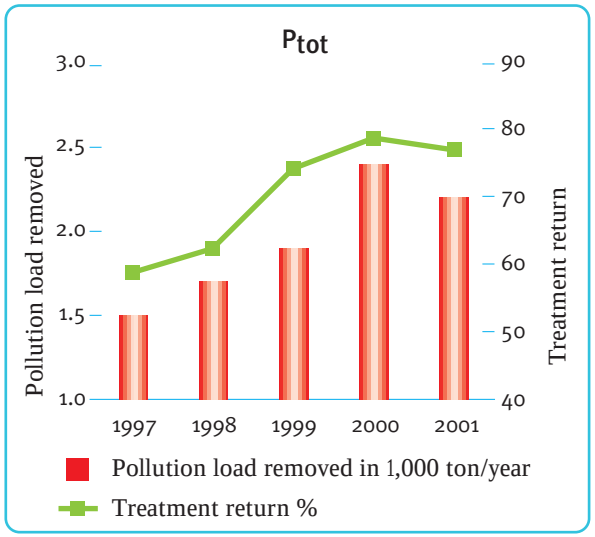
Despite the considerable expansion of the treatment capacity through new construction and the increase in the number of WWTPs where the entire pumped up volume is treated biologically, the incoming waste volume fell. The somewhat lower return and waste volume removed figures can be explained mainly by dilution of the effluent. For this reason less waste volume arrived at our WWTPs in 2001 despite the fact that 72 million m³ more sewage was pumped up. 2001 was the wettest year since the founding of the Met. office in 1833. The gradual disconnection of industry boosted dilution.

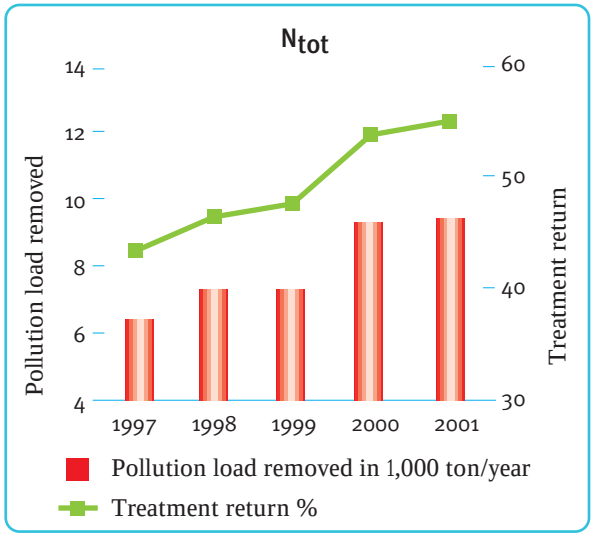
Pollution load removed and treatment returns











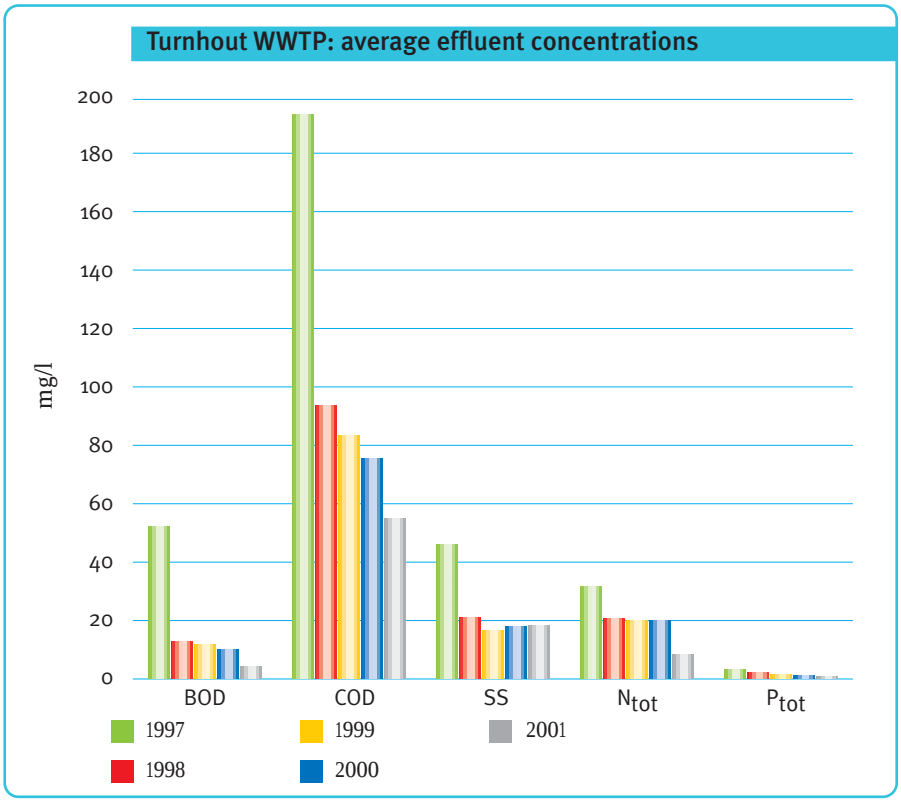
Hard work for better results

Turnhout WWTP aeration basin. The nitrogen standard was achieved for the first time following the renovation in 2001.

Better effluents are not achieved by coincidence; they must be worked hard for and possible clean-up measures must be pursued creatively. We show what all of this means using two examples: Turnhout WWTP and Harelbeke WWTP.

Turnhout WWTP, step by step to better effluent

The WWTP in Turnhout was built in 1957 and expanded in 1993. The capacity amounted to 45,000 PE following the expansion. The effluent standards were much less strict than now: BOD: 30 mg/l, COD: 150 mg/l, SS: 60 mg/l, no standards for N and P. The installation consisted of a heavily loaded trickling filter, three lightly loaded trickling filters and one secondary clarifier.



1997: addition of chemicals
In 1997 the installation was heavily overloaded biologically and hydraulically. 60 % of the incoming wastewater originated in industry, coming from the food industry and printing businesses among others. Although efforts had already been made in that year to improve the effluent results by adding chemicals among other things, standards were exceeded regularly.

1998: additional aeration in the sludge digestion tank
In 1998 the out-of-use sludge digestion tank was converted into an aeration basin with bubble aeration. The effluent standards were complied with that year.

1999: chemical phosphorus removal
Stricter standards applied from 1999 onwards: BOD: 25 mg/l, COD: 125 mg/l, SS: 35 mg/l, Ntot:15 mg/l (annual average), Ptot: 2 mg/l (annual average). A move was made to chemical phosphorus removal. The stricter effluent standards were achieved with the exception of nitrogen.

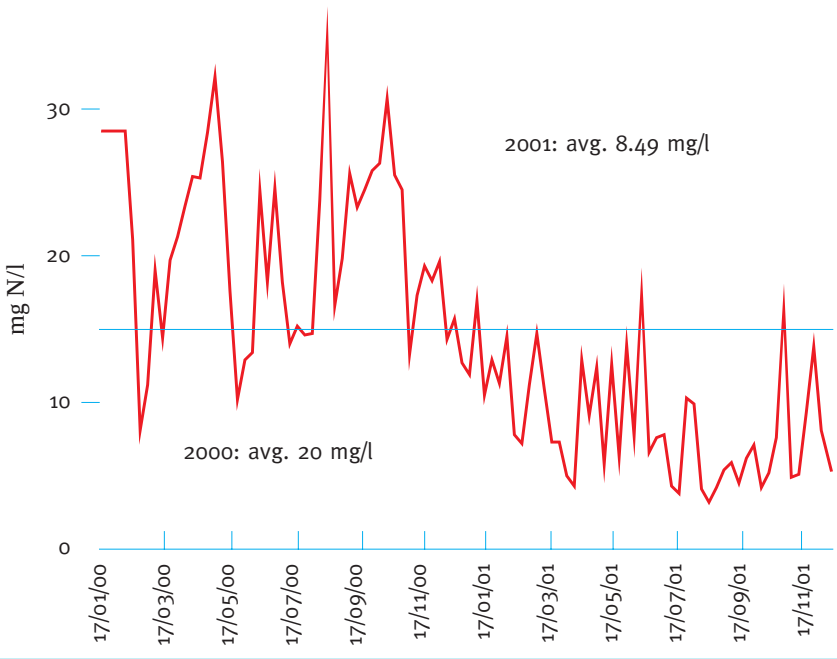
2000: nitrogen removal
In 2000 the WWTP was expanded to 83,000 PE and was converted for nitrogen removal. The works started in November 1999. Phase one was commissioned in December 2000: two aeration basins (with bubble aeration) and three secondary clarifiers. The nitrogen standard was achieved for the first time in 2001: the nitrogen concentration dropped from 20 mg/l in 2000 to 8.5 mg/l in 2001 (see graph below).

2001: jacked up load increased
In 2001 the influent pumps and mechanical treatment were completely renewed. With this, the load increased from 1,410 m^3/h (940 m^3/h biological) to 3,100 m^3/h (1,550 m^3/h biological).

Odour and noise nuisance attacked
In the past Turnhout had a nasty reputation for odour nuisance. Aquafin took initiatives to solve this problem: a study of the odour emission and immission by the RUG (1994), covering and air treatment of the influent pump pit and the gravity sludge thickeners (1995), a complaints inventory with a green telephone line (1995), forced ventilation of the trickling filters (1996) and aeration in the sludge digestion tank to lighten the load on the trickling filters (1998).

In order to minimise odour and noise nuisance at the modernised installation a cover, suction and treatment of the suctioned air were located beside the following components: the influent pit, the influent pump, the influent drain, the sand trap, the selector tank, the intermediate booster pump and certain parts of the sludge processing. In addition the effluent drains of the secondary clarifiers were covered to prevent noise nuisance.

Turnhout WWTP: N_{tot} effluent concentrations

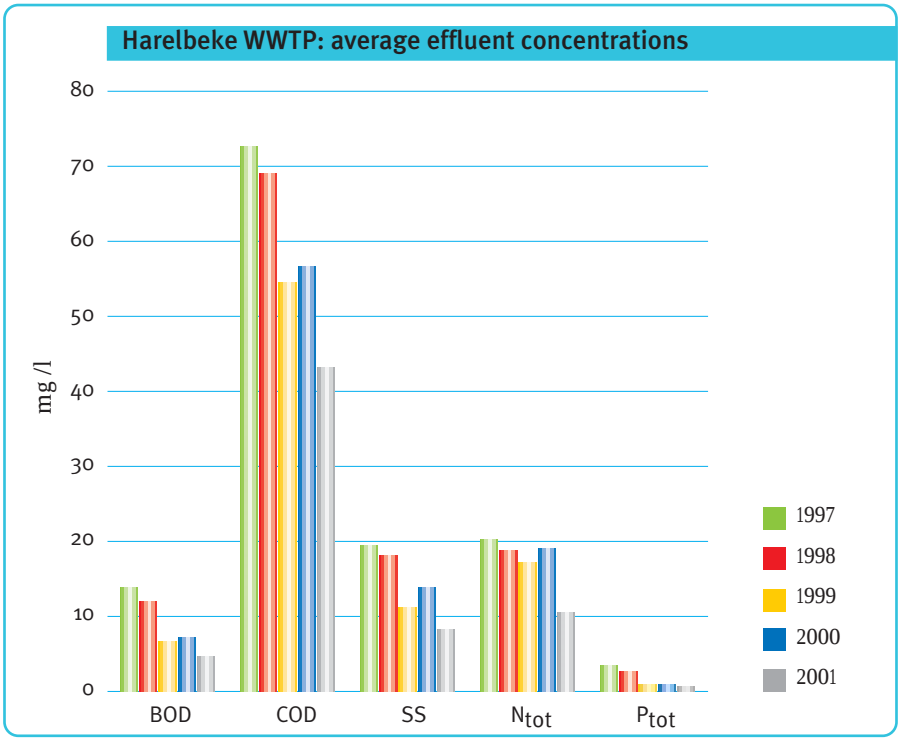


Harelbeke WWTP: working on better effluent, even if the nitrogen standard cannot be reached with certainty without renovation

The Harelbeke WWTP was commissioned in 1986 with a design capacity of 150,000 PE. The effluent standards amounted to: BOD: 25 mg/l, COD: 125 mg/l and SS: 35 mg/l. The results for these parameters have been excellent in recent years and have continued to improve.

Since 1999 standards also apply for nitrogen and phosphorus: Ntot: 10 mg/l (annual average), Ptot: 1 mg/l (average). An expansion of the WWTP is required to continue to comply with the nitrogen standard; the works for this will start in 2002. In anticipation, Aquafin is attempting to reach the nitrogen standard or approach it as closely as possible with all kinds of emergency solutions.

Harelbeke WWTP.



Better nitrogen removal with extra aeration and mixers

In order to obtain nitrification, the first step in nitrogen removal, under all circumstances, the sludge load may be no higher than 0.10. At Harelbeke WWTP this currently amounts to 0.10 to 0.15 kg BOD/kg MLSS.d. In order to obtain de-nitrification, the second step in nitrogen removal, aerated phases (nitrification) must be interchanged with non-aerated phases (de-nitrification).

In 2001 a third blower was added and the ceramic aeration dishes were replaced with membrane dishes with a higher return to increase the aeration capacity. Fourteen mixers were installed to enable the sludge to be held in suspension during non-aerated phases. The average effluent concentration for total nitrogen halved following these

last modifications: from 19 mg/l in 2000 to 10.5 mg/l in 2001.

On-line nitrate and ammonium measurement for even better N-removal

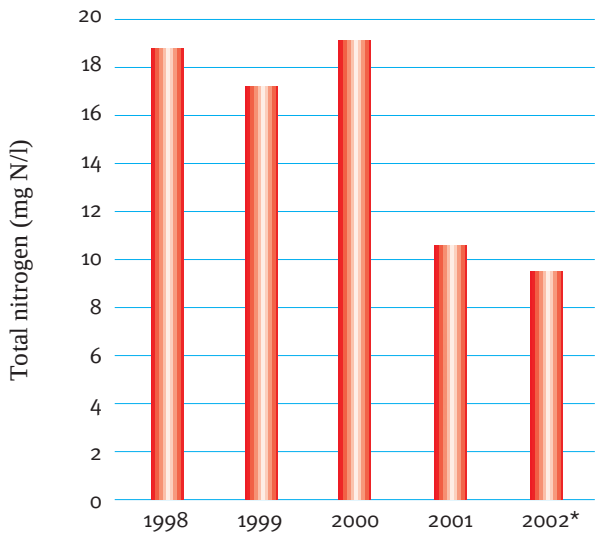
The control consisted of fixed, set periods with and without aeration. Harelbeke WWTP is so highly loaded that in this way any variation in the influent load can cause large fluctuations in nitrate and ammonium contents in the effluent. On-line measurement devices were installed to obtain the optimum relationship between the aerated and non-aerated phases. These devices measure the concentrations of ammonium and nitrates in the aeration basin. The duration of the aerated and non-aerated phases has been regulated on the basis of these measurements since the beginning of 2002.

On-line phosphate measurement results in less chemicals consumption

In May 1999 a start was made with administration of iron chloride in the aeration basin to remove phosphates. This resulted in a drastic drop in the phosphorus content in the treated wastewater.

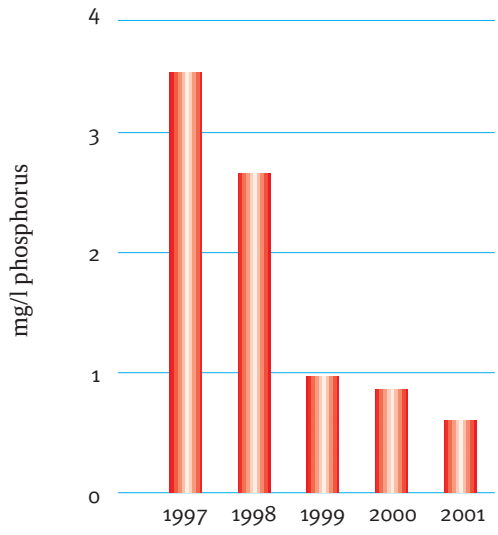
Administration was regulated using small administration pumps that could be set manually. Adjustment took place following speed-testing on phosphate. Even with this the large fluctuations in the supply of phosphorus could not be absorbed. This meant that chemicals were over-administered regularly to ensure continued compliance with the N standard.

Average nitrogen concentration in the effluent of Harelbeke



* Forecasts based on the first results in 2002

Average phosphorus concentration in the effluent of Harelbeke

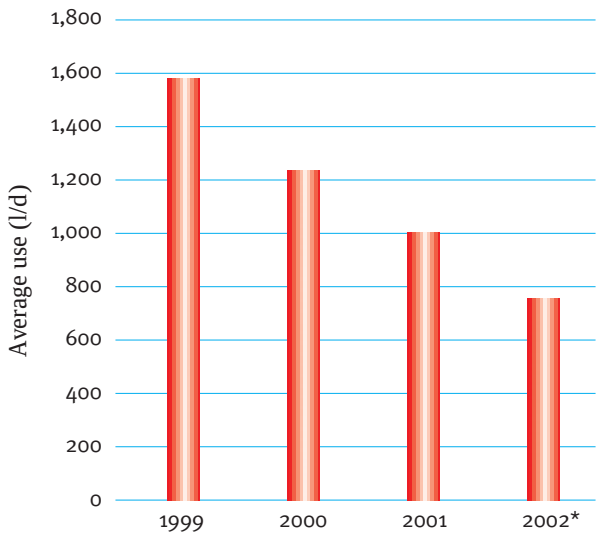


In the course of 2001 on-line phosphate measurement was installed in the aeration basin. This improved manual regulation. Beginning in 2002 the signal from the on-line measurement will be used for direct control of the administration pumps. This computerisation has led to a further drop in chemical consumption.

Expansion of Harelbeke WWTP still necessary

The aeration volume at Harelbeke WWTP will be expanded (nitrogen removal), there will be additional secondary clarifiers, the primarily clarifiers will be converted into anaerobe tanks (biological phosphorus removal) and there will be sludge digestion with recovery of biogas. The biologically treatable load will increase from 4,400 m³/h (3.2 Q14) to 8,300 m³/h (6 Q14), so that no further overflows will take place via the storm tanks. According to current plans these works will start in the second half of 2002.

Use of chemicals at Harelbeke WWTP



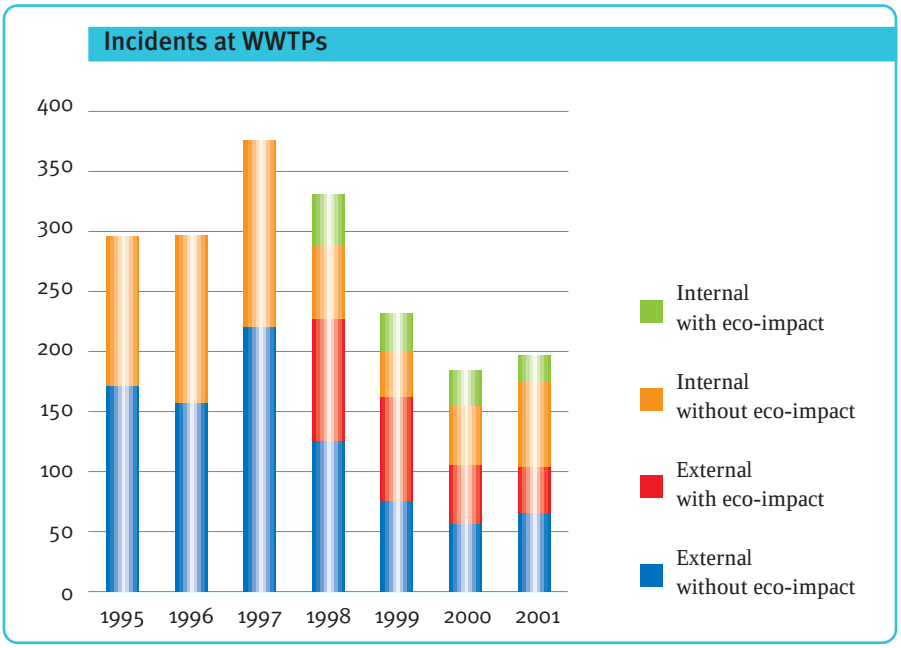
* Forecast based on first results from 2002

Fewer incidents with an ecological impact

Stekene WWTP.

A special point of attention in the operation of the water treatment infrastructure is following up situations with a negative impact on the environment. For instance, this can happen as a result of abnormally working overflows or the failure of pumps or aerators with a poor treatment result as the consequence. These situations are referred to as 'incidents' and are reported to the government.

Since 1998 there has been a systematic recording of whether the incident had an ecological impact. When these incidents occur the WWTP's standards are exceeded temporarily or a serious disruption has taken place because of non-treated wastewater. External (straight) dischargers on the sewage system cause increasingly less serious damage to the operation of our installations. Although somewhat more incidents occurred in 2001 than in 2000, the number of incidents with an ecological impact was somewhat lower. In 2001, 22 incidents with a ecological impact were caused by internal defects; this was 8 fewer than in 2000.



The company lab in Aalst monitors the treatment process

Computerised COD determination.

Aquafin's company laboratory in Aalst, certified in accordance with NBN EN 45001, supports and optimises the daily process handling of the WWTPs. To do this, analyses of wastewater and sludge, microscopic investigation of active sludge and other microbiological investigation are conducted. Via this route the cause of acute process problems is sought. These are caused largely by external discharges, but also by the formation of light sludge and the associated chance of sludge flush-out. In 2001 the company lab conducted 37,115 analyses. The company lab also manages Aquafin's measurement and analysis equipment, a patrimony of approximately EUR 2.9 million that is central to monitoring and computerising the treatment process.

An oxygen meter measures the heartbeat of a WWTP

An oxygen meter measures the concentration of dissolved oxygen in the aeration basin. It is measuring the heartbeat of the water treatment installation. Based on the oxygen concentration more or less air is introduced into the basin to allow the bacteria in the active sludge to breathe. Purification stops with too little oxygen, resulting in poor effluent. Too much oxygen drives up the energy bill. Both are therefore detrimental to the environment.

An oxygen meter must therefore be reliable and quickly replaceable if a fault occurs. In the past quite a bit went wrong here. The company lab investigated a large number of oxygen meters for their usability in WWTPs. The type of equipment and interface were standardised. Maintenance and replacement take place under our own control. When an oxygen meter fails it can be replaced with another within several hours.
An oxygen meter currently costs Aquafin EUR 1,250, quite a bit less than previously.
In collaboration with the Computerisation department intelligent, permanent monitoring of the oxygen measurement is now being developed so that failure will be detected. This is above all important at unmanned WWTPs.

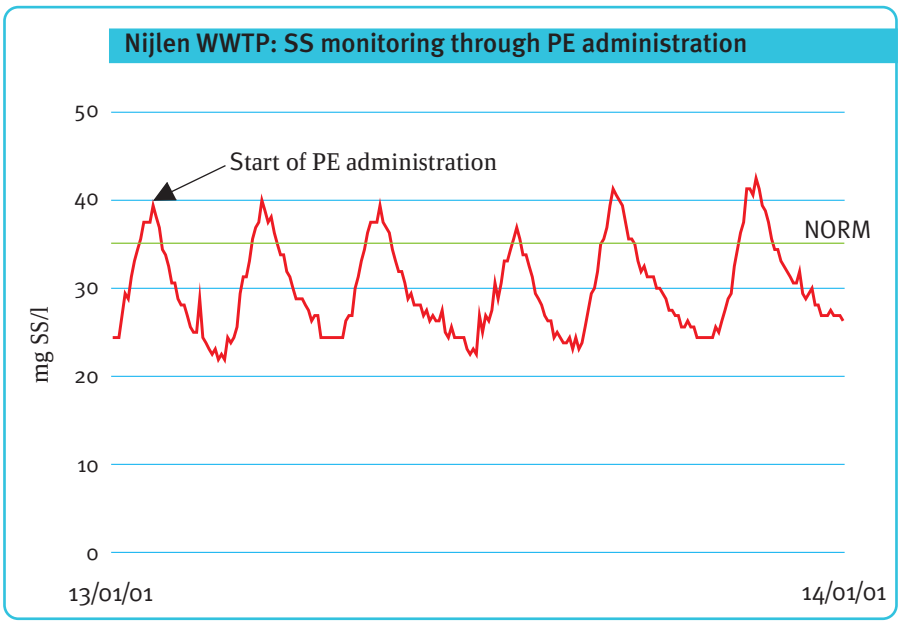
An oxygen meter measures the concentration of dissolved oxygen in the aeration basin.

Oxygen Meter Interface.

A turbidimeter provides permanent effluent monitoring

A turbidimeter measures the turbidity of a liquid. In the case of a WWTP's effluent it provides a measurement for the volume of suspended solids. Sludge flush-out can be observed immediately with this. Sludge flush-out is the most common problem at water treatment installations. In the same way as was used for the oxygen meter Aquafin has standardised the turbidimeter and created an interface. At the end of 2001, 44 WWTPs were provided with such a turbidimeter; all WWTPs will have these at their disposal within 5 years.

Several technical staff from WWTPs have developed a control for the administration of polyelectrolyte, a flaking substance, based on the turbidity measurement. This addition is important to WWTPs with an increased chance of sludge flush-out. No more chemicals than necessary are added due to computerisation, which also benefits the environment.



Ring tests assure quality analyses

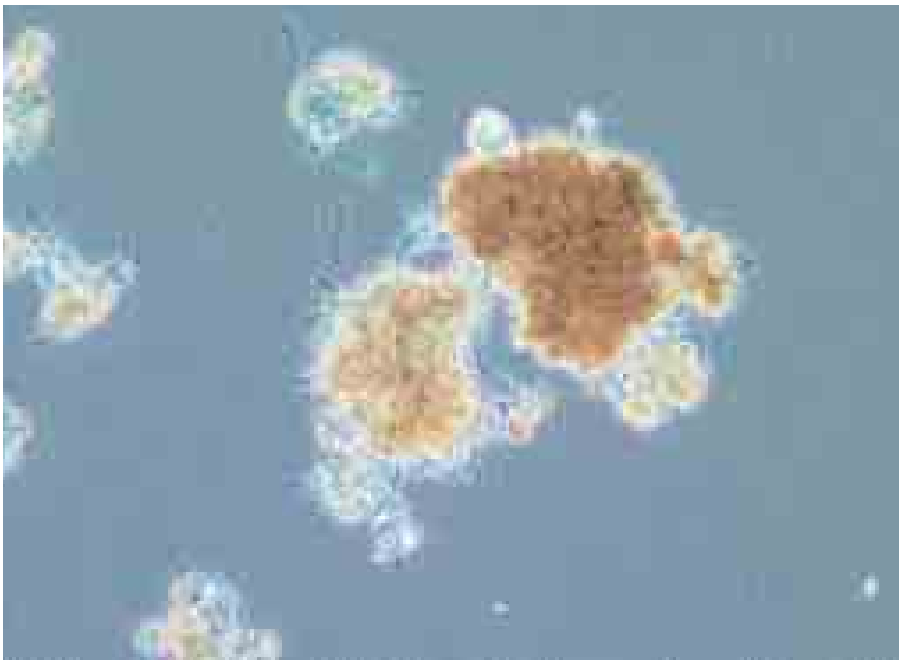
Daily analyses are carried out on the active sludge and effluent to follow up the treatment process. The analyses that can be carried out using simple resources happen at the WWTP itself. The lab provides the technical employee with the material and training to be able to conduct these analyses correctly.

Since correct analyses can depend on small details, annual ring tests are organised for a number of analysis parameters. Different ranges of samples are created and sent for analysis to between 50 and 100 technical employees.

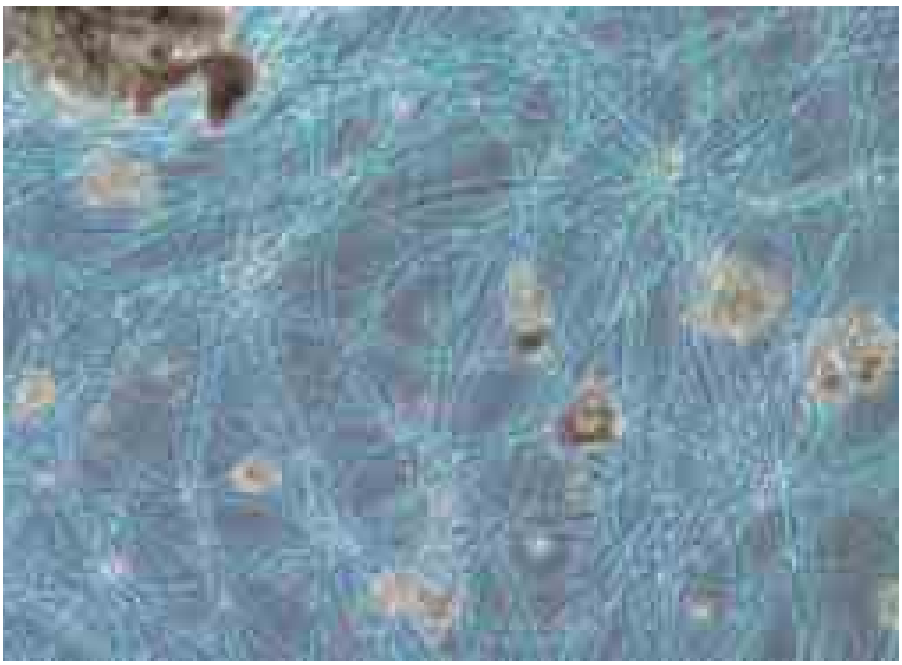
Microscopy of water treatment sludge with a quality label

Activated sludge consists of a collection of bacteria and other microscopically small animals such as single celled organisms, rotifers and roundworms. Together they are responsible for water treatment, but they must be removed from the water via sedimentation before it can be discharged. The composition of the activated sludge determines the return from the treatment as well as the ability to produce sediment. Microscopic investigation of the sludge can bring to light problems with water treatment and sedimentation. A proper flake structure points to sludge that will produce good sediment. The presence of an excessive number of thread shaped bacteria hampers flake formation and therefore also sedimentation.

Aquafin has developed a methodology for microscopic investigation of the water treatment sludge. The company lab achieved an accreditation for this in 1999. The expertise is used to support technical staff where there are acute problems with the treatment process. The company lab has drawn up a manual for microscopic investigation of active sludge. This will go on sale in 2002.



Compact, rounded-off, robust flakes with few thread formers (100x PH1).

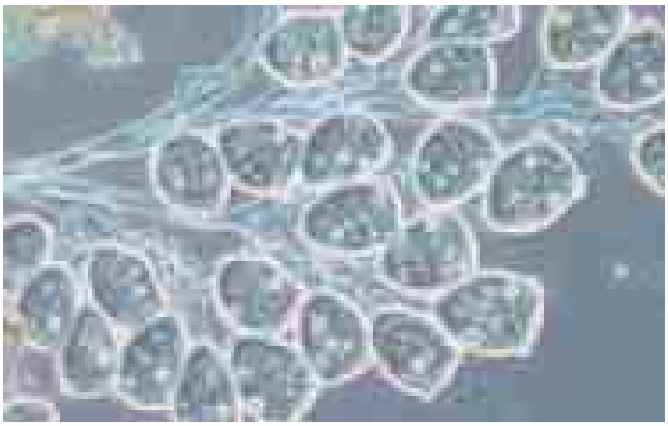


Dominance by thread formers (100x PH1).'

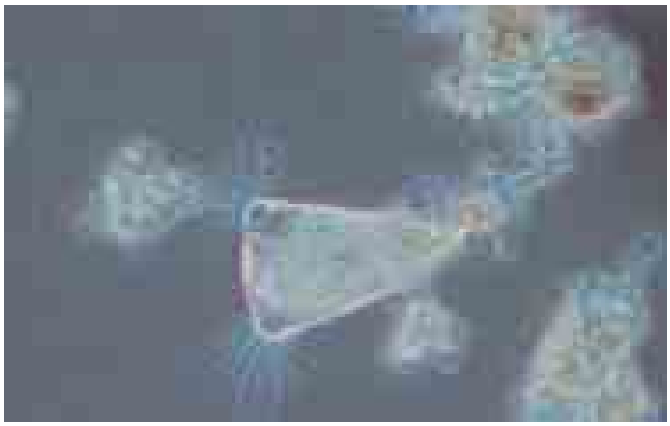
Healthy activated sludge

Healthy activated sludge has a sound flake structure, frequent active protozoa (and metazoa) and a sound flake formers/thread formers balance.
The diversity of the micro-organisms depends on many variables and is different for each treatment process.
An optimum balance between flake formers/thread formers is important for sludge settlement.

Paramecium spp. (200XPH1).



Carchesium spp. (100X PH1).



Tokophrya spp. (200X PH1).

Vorticella spp. (100X PH1).

Rotifer (200X PH1).

2001: wettest year since the Ukkel meteorological office opened in 1833!

Twice as much sewage can be treated biologically

Frog plans keep pure water out of sewer system

Greener boundary provisions beside overflows

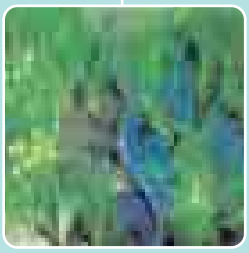
Construction of a separate sewage system in a housing estate

When all homes are connected to a sewage network with a treatment plant, no untreated domestic wastewater ends up in streams in dry weather. When it rains this claim holds true for completely separate systems. In semi-separated and mixed systems more rain means more dilution of the wastewater, fuller sewers, more sewage overflowing to streams and rivers and therefore a more limited feed of pollution load into our wastewater treatment plants.

Wastewater was extremely diluted in 2001. It has never rained so much since Belgium gained independence. Scientists are warning of climate change. The rain will also continue in the future. Complaining will not help. In 2001 Aquafin undertook campaigns to investigate and solve overflow problems.

Twice as much sewage can be treated biologically

Because of the wastewater dilution in 2001 we had to pump up more sewage to get the same waste volume in the wastewater treatment plants (WWTPs). An additional number of WWTPs were upgraded to allow them to treat a larger volume of wastewater biologically.

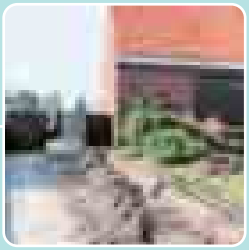


Greener boundary provisions beside overflows

Several overflows were provided with retention basins or buffer ditches to limit the negative impact of spilled water. One overflow on stagnant fishing water was safeguarded with a treatment system incorporating floating vegetation elements. The treatment returns from this system were followed up.

Frog plans keep pure water out of sewer system

Frogs and toads are not at home in the sewer system. The frog plan attacks the cause of the problem. One of the ways of doing this in mixed sewers is to brick up inlets from streams and canals to the sewer system and to restore the natural drainage. Aquafin drew up ‘frog plans’ for a number of communities.



Construction of a separate sewage system in a housing estate

A trial project to construct a completely separate sewage system in a rural housing estate is running in Geel. Separation of wastewater and rainwater is also being implemented on private land – house by house. Thanks to this trial project we are acquiring a better insight into the methodology to follow and the feasibility of such projects.

2001 wettest year

Twice as much sewage can be treated biologically

At Dilsen WWTP the storm tank was converted into a secondary clarifier. This way, more pollution load can be treated biologically.

In accordance with the 'Power lines for an integrated sewage policy in Flanders' each Aquafin treatment plant was designed up until recently so that when it rained, half of the maximum load pumped up was treated completely biologically. The other half underwent primary treatment (grid and sand removal) and was stored in a storm tank. When this tank was full it overflowed to a stream or river. Once the rain was over, the contents of the tank were let off to the WWTP and were treated biologically. The problem was that the water flowed over from the storm tank into the stream made quite a contribution to the total waste output from a WWTP. Following measurements at 6 WWTPs Aquafin arrived at the following percentages of waste emission via the overflow of the storm tank in comparison to the total annual emission from the WWTP: BOD: 35 %, COD: 21 %, SS: 31 %, Ntot: 15 %, Ptot: 15 %. Even in the absence of other standards for overflow water it is still clear that the overflow water from a storm tank cannot satisfy the effluent standards of a WWTP.

In order to reduce this source of water pollution Aquafin decided to aerate the entire pumped up load of its WWTPs and to treat it biologically. The storm tanks took on a new function as secondary clarifiers. In 2001 another 10 WWTPs were converted in this way. 54 WWTPs are now being operated in this way. In 2001 they all complied with the effluent standards for biological treatment. In wet years this measure must certainly ensure that significantly more waste volume will be treated biologically. Protection for the receiving water course will therefore be better: in the case of heavy rain the average daily waste volume removed will after all be doubled.

Greener boundary provisions beside overflows

Bornem overflow, May 2001.

Every sewage system without completely separate drainage between rainwater and wastewater has at least one overflow, from which a mixture of rainwater and wastewater runs when it rains heavily. In 2001 Aquafin took a number of initiatives to reduce the negative impact on watercourses.

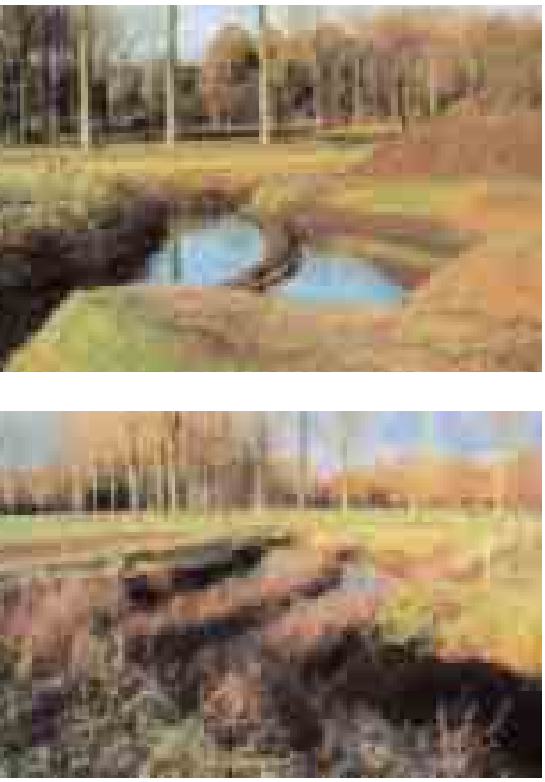
Treatment of overflow water using floating vegetation elements in Bornem

The Beerdonkstraat overflow in Bornem has been sited on a canal that flows into the Oude Schelde. This fishing water forms the green heart of a castle domain. In order to buffer and treat the spilled water Aquafin built a retention basin containing floating vegetation elements. The synthetic elements, provided with drifting trunks, are planted with a rich diversity of marsh and bank plants (including yellow iris, bulrush, marsh marigold and varieties of sedge).
The existing micro-organisms nest on the plant roots and in so doing treat the water. Sedimentary and suspended solids from the water settle themselves on the bottom.

Realisation of this project costs approximately EUR 131,000. The system was started up at the end of May 2001. It is evident from measurements during four spillings that the concentration peaks of polluted substances are flattened out and that significant separation of suspended solids occurs (see graphs). What used to be dead overflow water has come to life because of this. Large numbers of water fleas were observed (up to 6,800 of these water filters per litre).

Buffer ditches and a retention basin as boundary provisions for overflows

Buffer ditches were constructed to combat the detrimental effects of spillings in Overijse, Oostkamp and Leuven. An open retention basin was constructed in Balen. A buffer ditch is a cut out in the bank at the place where the overflow water is discharged to the watercourse.

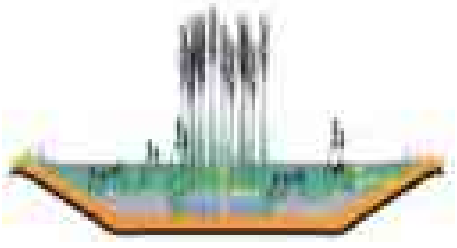


Evolution of the Oostkamp buffer ditch: November 2000 and November 2001.

At the level of the bank the buffer ditch is separated from the watercourse via coconut rolls containing reed plants or rubble. It serves primarily as a sedimentation zone. Twenty-one similar projects are stacked up. Green boundary provisions are being proposed as a softening measure in an Environmental Effects Rapport or are being constructed at the request of the watercourse manager or the manager of the AMINAL Nature Department.

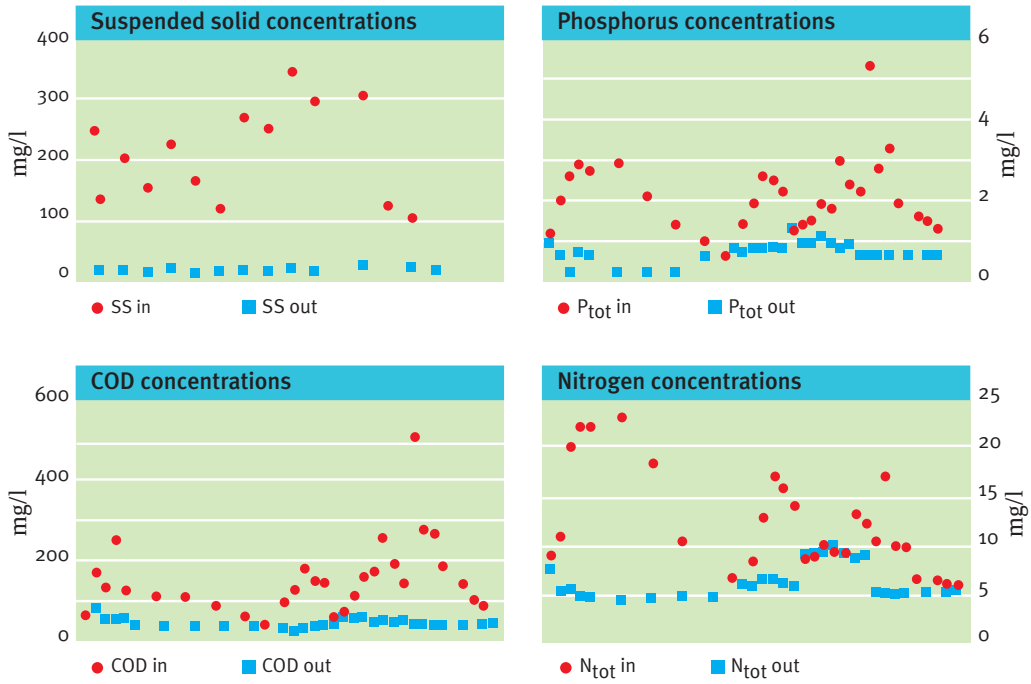
Green retention basins at WWTPs

A retention basin has to limit the overflow frequency from mixed sewers close to a WWTP. Aquafin developed a more appropriate alternative from a landscape viewpoint for small-scale treatment plants. Instead of a concrete structure we conceived a green overflow water store, the 'marsh ditch with moorland edges' (see drawing). The treated wastewater from the small-scale wastewater treatment plant (SWWTP) flows through a canal, planted with reeds and other marsh plants. When the overflow comes into operation, the water flows into the channels situated alongside, where it can settle. After the downpour the buffered volume is fed back to the SWWTP for further treatment. This concept will be realised by way of a trial at the SWWTPs in Kortessem (150 inhabitants) and Dikkelvenne (1,000 inhabitants).



Marsh ditch with moorland edges concept.

Treatment results of the Bornem overflow with floating vegetation elements



Frog plans keep pure water out of sewer system

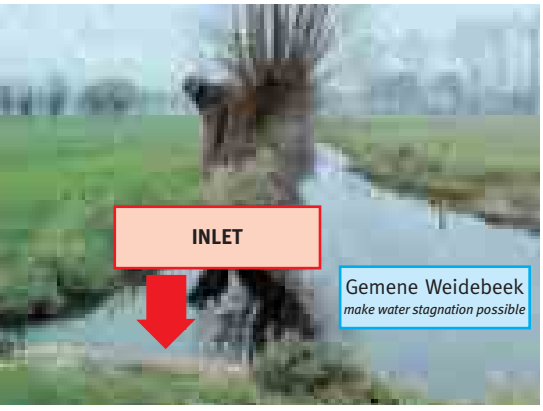
The amphibians washed up in the plants and pumping stations are set out in their natural biotope as much as possible.

Where frogs, salamanders and toads wash ashore at treatment plants or pumping stations there are generally streams or canals connected to the sewer system. In numerous places Aquafin has made an inventory of all inlets, the places where canals flow into the sewer system.

The research results for Zedelgem were presented to the press in 2001. The frog plan for Jabbeke and Damme has been completed and the results have been discussed with the municipalities. Preparatory work has taken place for Oedelem (Beernem) and Oostkamp. Discussions were conducted with the City of Brugge concerning the disconnection works in Assebroek, Male and Sint-Kruis. In the first place a frog plan is a working document for the municipality in which a list of problems in the sewer network is presented. A large number of disconnection actions can be carried out within MIP-projects (municipal investment programme). The municipality can realise other disconnections that demand less financial resources at its own expense in the short term. Aquafin is also taking its responsibility and among other things it has ensured that the one-way valves on several overflows close better. Each year Aquafin follows up the action list and discusses the most important bottlenecks with the municipality.

Frog plans keep pure water out of sewer system

An inlet to the Millebeek in Zekegem was bricked up.



On the initiative of the City of Bruges the Gemene Weidebeek in Assebroek will be disconnected from the sewer system. The basin will be restored to its original state.

Several concrete actions resulting from the frog plans in the Brugge treatment zone:

Municipal measures

- The track canal from Snellegemstraat in Zedelgem has been converted into a 'sedimentation canal'.
- Before long a canal will be laid through the nature area of Assebroekse Meersen, beside the Green district, to disconnect a rural area of 30 hectares from the sewer system (initiative: City of Brugge, in dialogue with the Polder Sint-Trudoledeke).
- Closing off an inlet to the collector in Assebroek (Brugge) and connecting this via an opening under the Moerkerksesteenweg to a polder watercourse. The rainwater from a new estate will also be connected to this canal.
- Disconnecting the Gemene Weide brook from the sewer system in the heart of Assebroek and restoration of the original drainage to the Zuidervaartje.

Measures from Aquafin

- Creation of the contracting dossier for the disconnection of a canal and drainage inlet from the collector at the Fonteinbeek in Oostkamp.

Aquafin's proposals are not restricted to disconnection on its own, but also offer added value in the areas of cultural or natural history and landscape. Some examples.

Pumped-off and drainage water

In 2001 Aquafin conducted a campaign to inform contractors and municipalities better about regulations in the area of pumped-off water. VLAREM makes it obligatory to submit to the municipal authorities a report or a permit application for pumped-off water. Aquafin did this in 2001 for 46 construction dossiers for pipeline projects and for all of its construction sites at the WWTPs. Few construction managers and contractors however consider the way in which they discharge the ground water that is pumped off. It is also not known generally that a written permission from Aquafin is required for discharging pumped-off water to the sewer from 10 m^3/hour upwards. Moreover a discharge of pumped-off water to the sewer may only be done if no affordable technical possibility exists to infiltrate it or to discharge it to a canal or other surface water. The same regulation exists for discharging drainage water, but here too we notice that few private individuals and farmers are aware of this. Nevertheless compliance with these VLAREM provisions is of great importance: all too often the discharged pumped-off water and drainage water dilutes the wastewater to the degree where spillings occur even in dry weather.

The 'harvest' of one day on the Brugge WWTP.

Revaluing the medieval town centre canals in Damme

The proposal consists of revaluing the medieval town centre canals as veins for rainwater discharge. This can be realised via two limited remediation projects and the connection of the wastewater to the trunk sewer in Kerkstraat. The canals are currently arched. When the wastewater no longer flows in there they can be opened once again where possible, for example the section at the edge of the town ramparts. Added value for the cultural and natural historic patrimony of Damme.

Connecting two nature areas in Sijsele

An old railway track bed in Sijsele connects two nature areas to each other, these being Rijkevelde (Sint-Kruis direction) and the lush countryside landscape close to the clinic (Maldegem/Donk direction). Residues from the railway canals currently drain off into the sewer system. The proposed disconnection not only prevents non-polluted water ending up in the sewer system and the wastewater treatment plant; it also gives the opportunity to provide new plots in the neighbourhood with a separate sewer system. The two nature areas will also be connected with a water element, enabling migration of water-bound species.

The construction of a frog pool in Zedelgem

In Zedelgem Aquafin proposed disconnecting railway channels from the sewer system and allowing them to drain into an infiltration zone. This operates like a "wadi" in desert areas. In the winter the wadi is filled with water that slowly infiltrates the soil and therefore supplements the water table. The wadi can spill into a drainage canal. In summer it will generally be dry. Houtland Regional Landscape will lay out this infiltration zone further as a frog pool. This work was included in the design plans for converting the old railway bank into a pathway. Implementation of all this is expected within one year.

2001 wettest year

Construction of a separate sewer system in a housing estate

In the trial project in Geel the full separation between rainwater and wastewater discharge is extended to inside the connected homes.

160 families enter the trial project in Geel

Completely separate sewage systems are currently being constructed in new estates. The full separation between rainwater and wastewater discharge is extended to inside the connected homes. Where existing homes are involved the construction of a fully separated sewer system is only of use if every connected home implements the full separation of wastewater and rainwater on private land. Not a real problem according to some, but an insurmountable one to others. Who is right?

In Mosselgoren, Borgeleien and Venkelstraat in Geel an interesting trial project is running in the area of separate collection of wastewater from existing homes. The wastewater will be treated in a reedbed that still has to be constructed. All rainwater will be kept out of the sewer system. The rainwater from the streets is already drained via track canals. A separate solution is devised for each home for the drainage of both wastewater and rainwater. To the degree possible, the rainwater must stay where it falls.

In this way direct peak discharges to the watercourse are reduced, which also decreases the chance of superfluous water.

Through this pilot project we are acquiring better insight into the costs and feasibility of complete disconnection of rainwater from the wastewater discharge system at the point of existing homes and we hope to arrive at a systematic approach.

Commissioned by the Flemish Environment Agency (FEA), consultant engineers conducted the 'Feasibility study into disconnecting rainwater on private land', the results of which were made known at the Vlario-day 2002. This involved a theoretical study in which the anticipated cost was determined for a number of cases and with clearly demarcated marginal conditions.
The actual investment and study cost will be determined by the project in Mosselgoren, although naturally for the given local situation only. For example in Mosselgoren this involves an open development and in the existing situation there are (partly piped-in) canals available over as good as the entire area. The project can be split into three parts.

The full separation of wastewater and rainwater in 160 homes

In this part involvement and consultation are central. In February/March 2001 a general agreement memorandum was drawn up by a committee that unites residents, authorities and technical partners. This contains all necessary information concerning the project and answers all questions from the residents.

An information meeting took place at the end of March. The town of Geel was the driving force here: it informed the citizens and convinced them where there were doubts. Almost all residents have signed the agreement memorandum, through which they stated their agreement with the principle of disconnection.

The town of Geel appointed an architect to work out a suitable solution for each home. He was able to start in April 2001. In close dialogue with the residents he checked how the drainage of each home happened in the existing situation and what modifications were required to allow this to fit within the total trial project. The best and least expensive solution, acceptable to all parties, was sought for each situation. Possibilities are: infiltration of rainwater into the soil, drainage to a canal, rainwater pits used for toilet flushing, washing machine, watering gardens, topping up ponds and washing cars.

In the meantime the plans are ready for almost all homes. At the end of April the order was given to a contractor and the works effectively started in June. Meanwhile separation has been carried out in roughly half of the homes.

The Flemish Region is paying the costs: the project provides implementation of an action plan from the MINA-plan. The AMINAL Water Department is the construction manager for works on private land; the Flemish Environment Agency is jointly following up the project. Both managements will use accumulated knowledge of affairs for the review of the 'Code of Good Practice for constructing 2 DWF-systems.' Aquafin is the technical partner and supports and coordinates the three parts. Aquafin also supplies a permanent site supervisor.

Construction of the public sewer system

The preliminary design is drawn up in accordance with the current 'Code of Good Practice for 2 DWF-systems'.
The existing canals will be retained and re-profiled where necessary. The town of Geel is construction manager here.
The project comes into consideration for subsidies within the RIO-decree. Aquafin is responsible for technical guidance.
According to current timing these works will be contracted out in 2002.

Construction of the reedbed

A reedbed with sludge composting (Pure-concept) is provided as treatment system. Aquafin is construction manager here. The works will probably start at the beginning of 2003.

Implementation of the investment programmes

New construction and renovation of WWTPs in 2001

WWTPs of more than 10,000 PE

WWTPs between 2,000 and 10,000 PE

WWTPs of less than 2,000 PE

Collecting wastewater

The European directive on Urban Wastewater commits Flanders to collect and treat its domestic wastewater. For agglomerations of more than 10,000 PE, phosphorus and nitrogen must also be removed from the wastewater; biological water treatment suffices for agglomerations between 2,000 and 10,000 PE. Smaller agglomerations must be provided with adequate water treatment. The timing imposed for the clean-up operation is not feasible. Some deadlines have already been exceeded: our starting position was too weak and the lost ground in respect of our neighbouring countries was too great.

But the necessary clean-up works are in full progress or are planned. New water treatment installations were also delivered in 2001 and older ones were renovated. The total Flemish water treatment capacity rose by 211,000 PE. The expansion of the trunk sewer network progressed. Significant works are also stacked up for the coming year.

In the area of small-scale wastewater treatment Aquafin proposed a new small-scale wastewater treatment plant (SWWTP) matrix with green accents and combinations of treatment techniques.

New construction and renovation of WWTPs in 2001

In 2001 Aquafin built 15 new installations with a combined design capacity of almost 217,000 PE; 6 of these are small-scale installations. 4 wastewater treatment plants were renovated thoroughly.

WWTPs of more than 10,000 PE

According to Europe 114 agglomerations must comply with nutrient removal. 84 agglomerations already have a wastewater treatment plant that operates properly. In 17 agglomerations the existing installation must be renovated. In 13 agglomerations a new WWTP must be built: construction has been delayed in 6 locations.

WWTPs between 2,000 and 10,000 PE

According to Europe 84 agglomerations must have a wastewater treatment plant that treats the wastewater biologically. 56 of these already comply. 28 new WWTPs are still to be built: construction is planned, but in a large number of cases has been delayed.

WWTPs of less than 2,000 PE

The number of small-scale wastewater treatment plants to be built still has to be investigated. Aquafin proposed a new greener SWWTP matrix. The municipalities' initiative right to construct SWWTPs was recently increased from 500 PE to 2,000 PE.

Collecting wastewater

Of the 1,876 trunk sewer works that were approved in an investment programme Aquafin has already carried out 1,089. 166 are in execution. A number of large works are still in prospect.

New construction and renovation of WWTPs in 2001

In September Flemish Minister for the Environment Vera Dua paid a visit to a.o. Merelbeke WWTP.

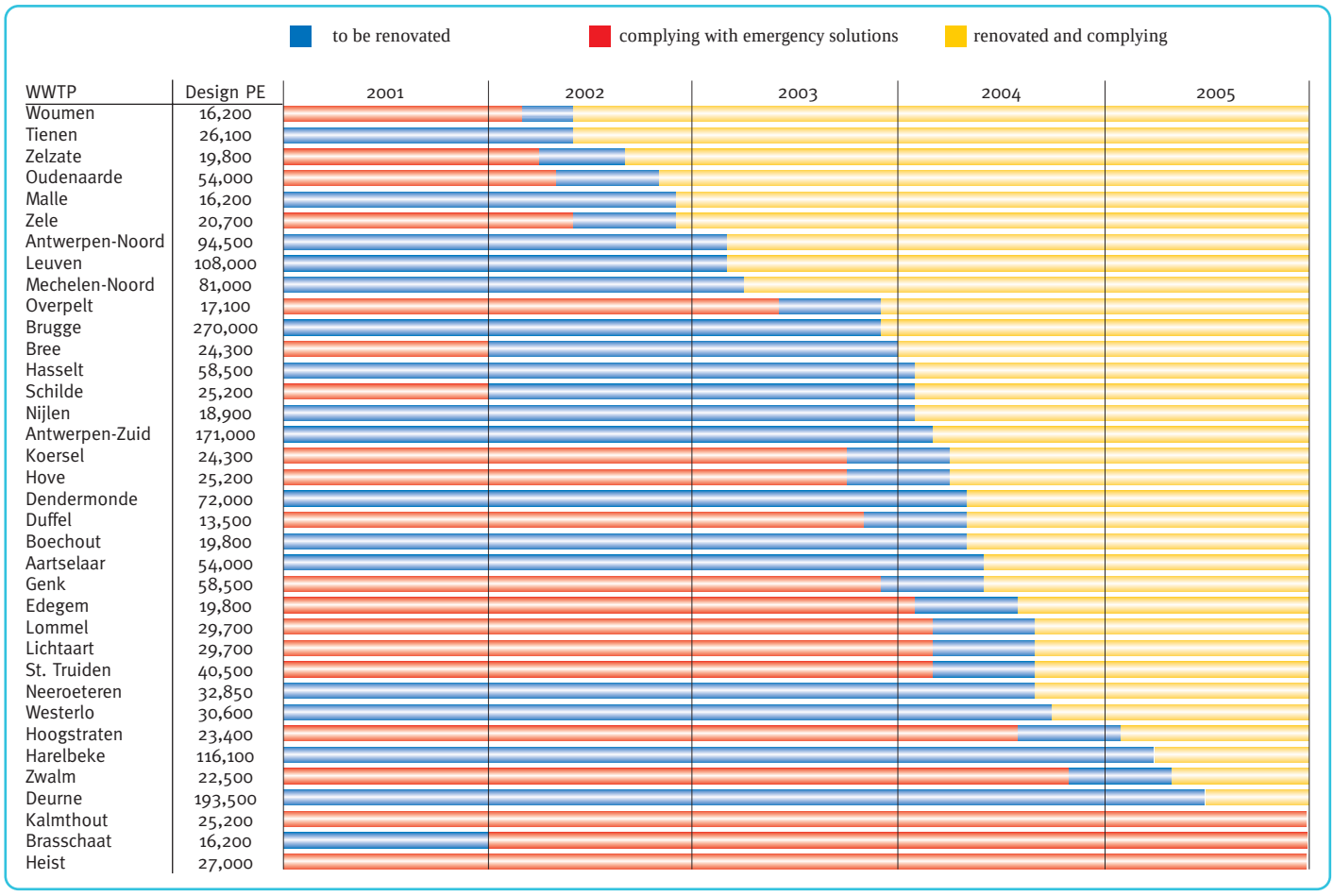
In 2001 the renovation of Brugge WWTP was started. The plant is being adapted to comply with the nitrogen standards. The works will end in November 2003.

New WWTPs 2001	Capacity in PE	New SWWTPs 2001	Capacity in PE
Halen	26,000		
Ronse	30,000	De Pinte – Zevergem	750
Destelbergen	66,000	Ieper – Hollebeke	400
Deinze	25,500	Zemst – Larebeek	470
Bierbeek	16,500	Zemst – Kesterbeek	350
Londerzeel	10,500	Sint-Niklaas – Heimolen	270
Wichelen	6,500	Bierbeek – Kleinbeek	210
Zichen	8,500		
Temse	25,000		

WWTP renovation in 2001	Old capacity (PE)	New capacity (PE)
Ninove	25,000	35,000
Sinaai	2,500	6,000
Schoten	35,000	29,000
Borgloon-Tivoli	3,500	2,000

At the end of 2001 Aquafin had 191 delivered wastewater treatment plants in operation. Of these, 15 new installations were delivered to the Flemish Region in the course of 2001. They have a combined design capacity of 216,950 PE. The WWTPs in Merelbeke (16,000 PE) and Menen (66,000 PE) are already treating wastewater, but have not yet been delivered to the Flemish Region. In addition 4 installations were renovated. Schoten WWTP was completey dismantled and replaced by an activated sludge system. Turnhout WWTP was renovated but has not yet been delivered to the Flemish Region.

WWTPs OF MORE THAN 10,000 PE



WWTP	Design PE
Woumen	16,200
Tienen	26,100
Zelzate	19,800
Oudenaarde	54,000
Malle	16,200
Zele	20,700
Antwerpen-Noord	94,500
Leuven	108,000
Mechelen-Noord	81,000
Overpelt	17,100
Brugge	270,000
Bree	24,300
Hasselt	58,500
Schilde	25,200
Nijlen	18,900
Antwerpen-Zuid	171,000
Koersel	24,300
Hove	25,200
Dendermonde	72,000
Duffel	13,500
Boechout	19,800
Aartselaar	54,000
Genk	58,500
Edegem	19,800
Lommel	29,700
Lichtaart	29,700
St. Truiden	40,500
Neeroeteren	32,850
Westerlo	30,600
Hoogstraten	23,400
Harelbeke	116,100
Zwalm	22,500
Deurne	193,500
Kalmthout	25,200
Brasschaat	16,200
Heist	27,000

Timing of the renovation projects for WWTPs of more than 10,000 PE.

The Flemish Environment Agency (FEA) defined 114 agglomerations of more than 10,000 PE in the Flemish Region. According to the European Urban Wastewater Directive these agglomerations must be provided with biological water treatment with nutrient removal by 31 December 1998 if they are situated in 'vulnerable areas'. Nutrient removal means radical removal of nitrogen and phosphorus. On 1 August 1995 all of Flanders was designated as a 'vulnerable area'. Since then Aquafin has been running a race against time to convert the WWTPs that were taken over.

Renovations

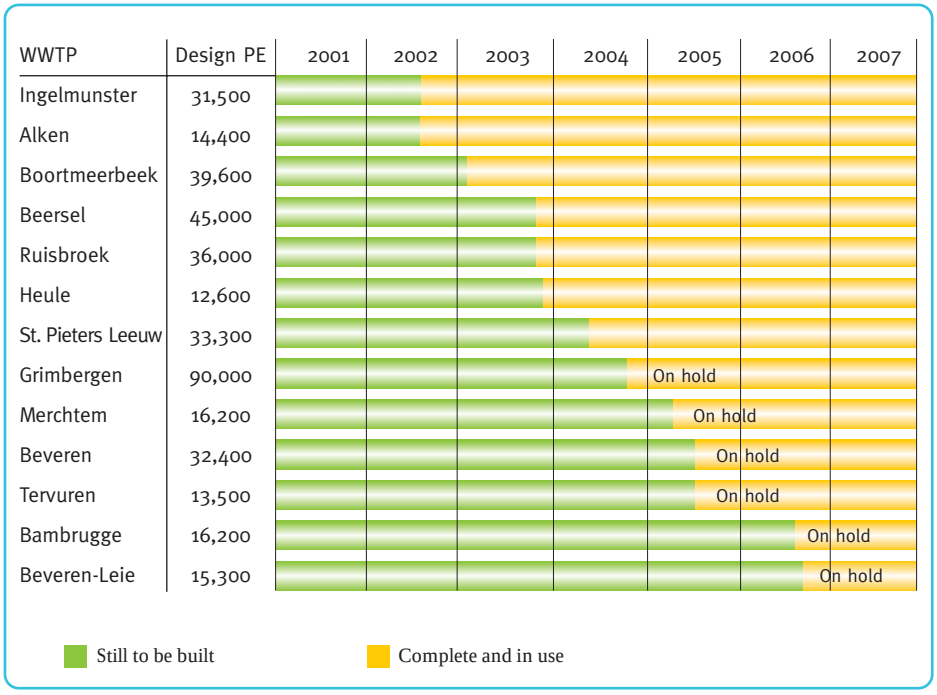
In 1998-1999 iron chloride tanks were installed to enable realisation of the standards for total removal of phosphorus using chemicals – a relatively simple action that was implemented quickly everywhere. The conversion works for nitrogen removal are generally much more extensive; projects for this were provided for in the renovation investment programme. Because of the new construction and renovation of WWTPs, 84 of the 114 agglomerations of more than 10,000 PE now fully comply with the requirements imposed for nitrogen and phosphorus.

17 installations that did not comply in 2001 will comply by May 2005 at the latest: 7 renovation projects are underway, 3 are in the process of contracting out and 6 are in the design phase. An emergency solution is being worked out for 1 installation. Renovation is still needed for a number of WWTPs that comply thanks to an emergency solution.

Destelbergen WWTP.

New construction

An approved Technical Plan exists for all 13 treatment plants in agglomerations of more than 10,000 PE that are still to be built. 4 installations are under construction, 2 are contracted out and 1 is in the design phase. But construction of 6 installations has been delayed due to problems with environmental planning, obtaining urban architectural or environmental permits, or problems with acquiring land.



WWTPs between 2,000 and 10,000 PE

Zichen WWTP.

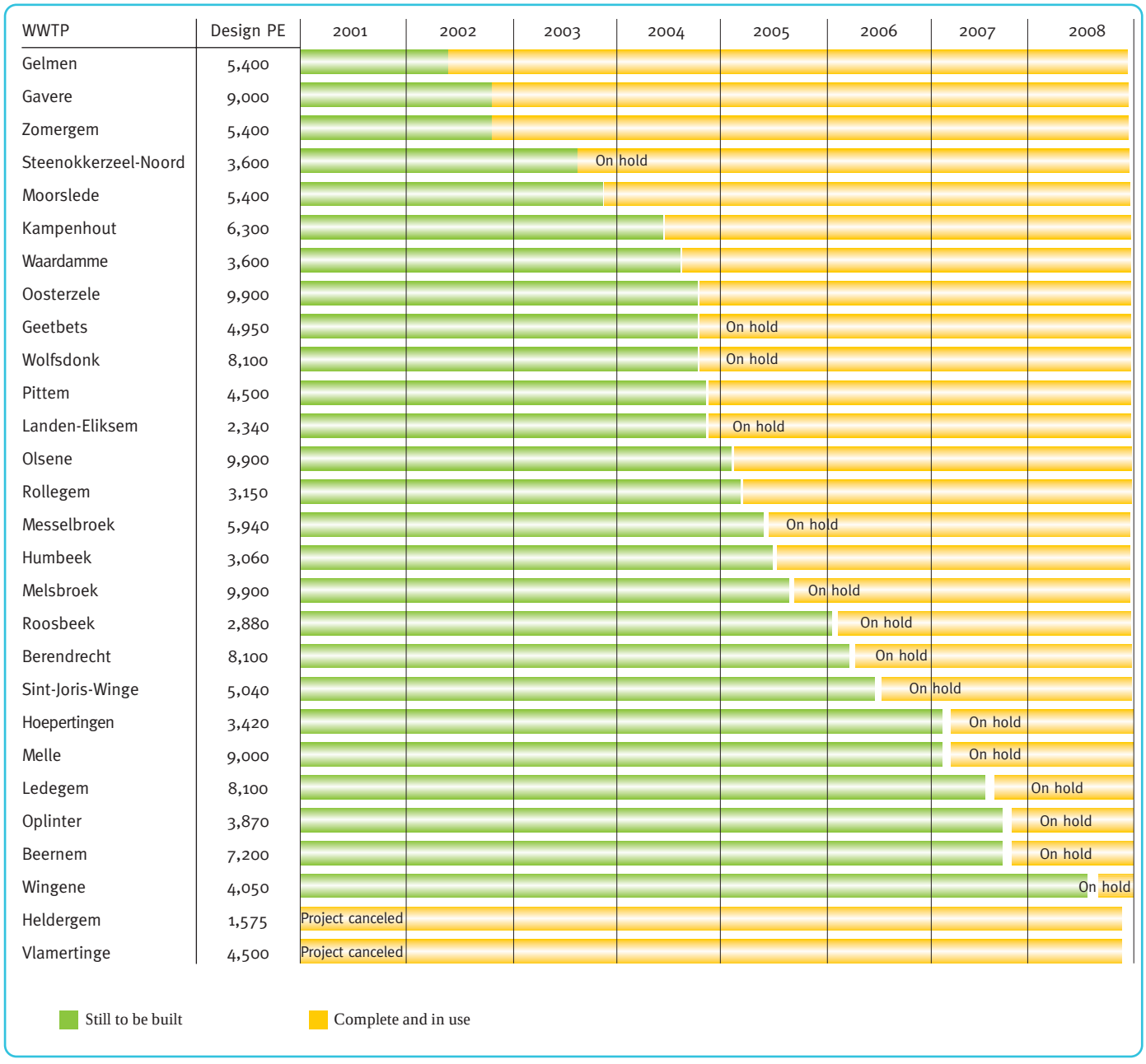
According to the Flemish Environment Agency (FEA) there are 84 agglomerations between 2,000 and 10,000 PE in the Flemish Region. According to the European Urban Wastewater Directive these agglomerations must be provided with biological treatment by 31 December 2005.

On 1 January 1994 Aquafin took over operation of all WWTPs from the FEA. 23 of these former FEA installations are situated in an agglomeration between 2,000 and 10,000 PE. All comply with the standards for BOD, COD and SS, at least with the current waste volume and the current pollution load pumped. Most of the plants with stricter effluent standards also comply with the parameters for nitrogen and/or phosphorus. Renovation is planned for 6 of these installations; this still has to happen for others.

Since 1991 Aquafin has constructed 33 installations with a design capacity of between 2,000 and 10,000 PE. These installations comply with all standards imposed.

28 installations still have to be built. An approved Technical Plan exists for these: 3 of them are under construction, 1 is in the contracting out/granting phase, 4 are in the design phase and 4 are in preliminary study. But construction has been delayed for 17 installations due to problems with urban architectural and environmental permits or acquiring land.

WWTPs between 2,000 and 10,000 PE



WWTPs of less than 2,000 PE

According to the European Urban Wastewater Directive the agglomerations of less than 2,000 PE must also be provided with modified treatment by 31 December 2005. The number of WWTPs still to be built has not been established yet. On 31 December 2001 Aquafin had 36 WWTPs in operation. The authority to construct WWTPs between 500 and 2,000 PE no longer lies with Aquafin alone. The municipalities' initiative right was increased from 500 PE to 2,000 PE.

The high-jump bar is still high

In 2001 Aquafin proposed a new SWWTP-matrix. Although flexible discharge standards apply to small-scale installations, Aquafin is pursuing the standards for WWTPs up to 10,000 PE with the proposed process choices (BOD/COD/SS: 25/125/60 mg/l). If the receiving stream requires this, stricter standards for ammonium can also be achieved. Some systems can realise nutrient removal.

Natural value

Quite a number of green accents can be found in the new SWWTP-matrix because small-scale installations can provide extra natural value. For example, a technical system (compact and reliable) can be linked preferably to a post-connected root zone reedbed. As far as possible components are installed underground and are worked into low grass banks. Fencing and access are kept simple without losing out on safety.

Proposed process choices for small-scale wastewater treatment

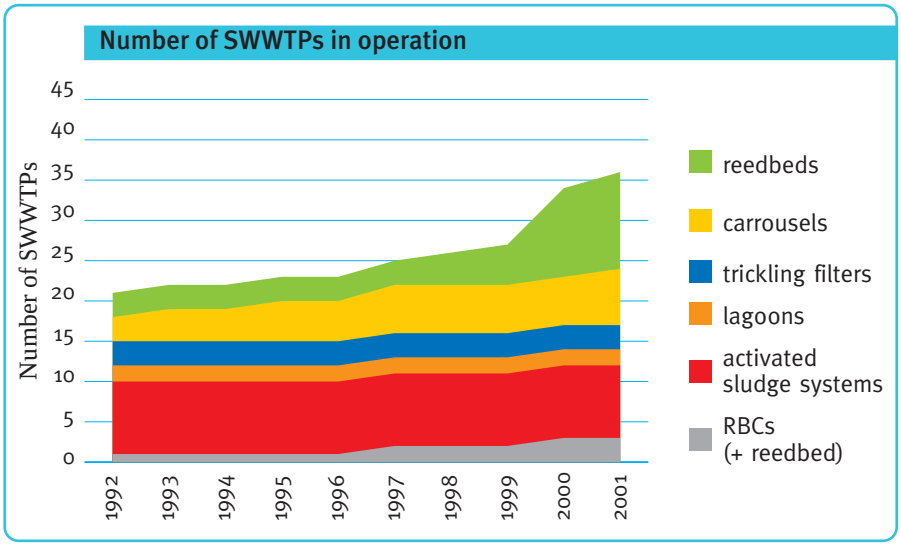
Up to 100 PE: Two step root zone reedbed
Following pre-sedimentation the wastewater flows horizontally through a gravel filter bed below the surface through the underground parts of plants. The most important advantage of this two-step system is its flexibility. One of two reedbeds can be taken out of service; they can be driven in parallel or in series. In the case of stricter effluent requirements a technical system can be connected at the front end.

From 100 to 450 PE: Compact technical single tank installation, followed by a root zone reedbed (RBC or SAF package)
All steps in the treatment process are concentrated in one tank: preliminary clarifying, treatment and secondary clarifying. Both an RBC and a SAF (Submerged Aerated Filter) are considered for the biological treatment. Suspended solids are removed further in a post-connected root zone reedbed. This is referred to as 'effluent polishing'.

From 450 PE to 1,000 PE: Technical multiple tank installation followed by a root zone reedbed (modular RBC or SAF)
The technical system is not a 'package' but consists of separate modules (preliminary clarifier, treatment, secondary clarifier), because the dimensions of these design capacities are too large to be supplied in one unit.

More than 1,000 PE: Low loaded carrousel
In future it will be possible to opt for a membrane bioreactor (treatment using membrane technology), certainly when the treated wastewater is reused.

Two-step reedbed Zemst-Kesterbeek SWWTP.



Collecting wastewater

In June 2001 the last heavy manoeuvre was carried out for the placing of the trunk sewer under the Scheldt quays in Antwerp. A connecting construction was placed between an outlet from the city canals and the trunk sewer.

According to the European Urban Wastewater directive all agglomerations, even those of less than 2,000 PE, must collect their wastewater by 31 December 2005.

Of the 1,876 trunk sewer projects in Aquafin's approved investment programmes up to 2003, 1,089 have been implemented, 166 are in implementation and 621 are in preliminary study. According to FEA however the trunk sewer network will only comply with the requirements in accordance with the European Directive after implementation of the 2007 investment programme. That means that an additional 410 projects above municipality level must be implemented.

One problem with the expansion of the trunk sewer network is the delay in implementing municipal investment programmes. Of the 2,728 sewerage projects placed in the municipal investment programmes less than 400 have been implemented as yet. A consequence of this is that the construction of a number of Aquafin's trunk sewers was delayed by a lack of waste volume that could be picked up immediately.

Thrustboring under the Brussel-Schelde sea canal in Grimbergen.

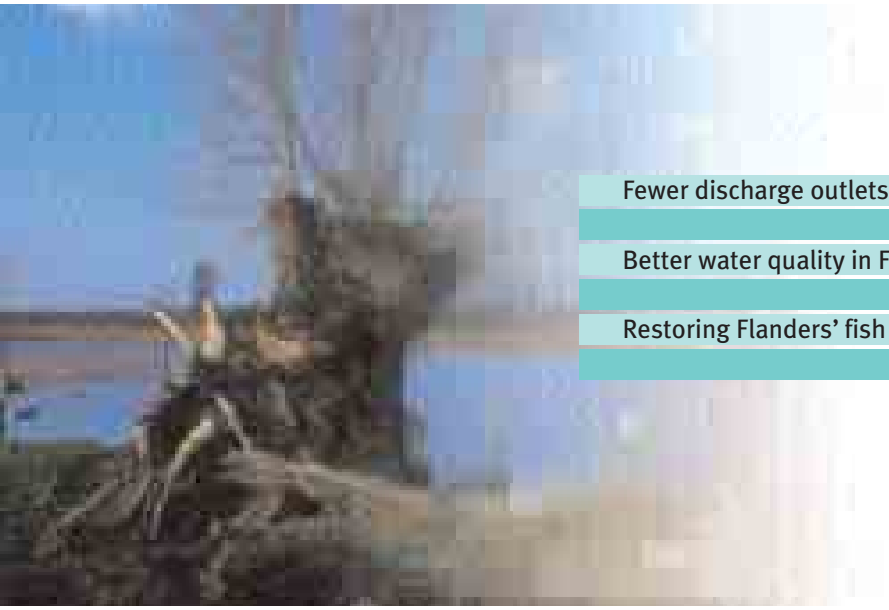
A number of important trunk sewer works are still on the programme: the Woluwe trunk sewer cleans the wastewater of 255,785 PE from the Woluwe

The Brussels-North WWTP with a capacity of 1,100,000 PE will deliver the largest contribution to the treatment of the River Zenne. It will be built in Haren, on the border with Vilvoorde and Machelen. The WWTP and most of the trunk sewers are situated in the Brussels Capital City Region. A number of trunk sewers like the Woluwe trunk sewer also come from Flanders.

In the Flemish section of the Woluwe flow area the pollution load from Wezembeek-Oppem, Kraainem, Zaventem, Machelen and a small part of Vilvoorde and Tervuren is drained off towards the River Zenne. There is already a whole trunk sewer network along the Woluwe and its side streams, the Kleine beek, Vuilbeek and Kleine Maalbeek. On Machelen territory the existing Woluwe trunk sewer disappears into the Woluwe, which in turn pollutes the Zenne.

The new Woluwe trunk sewer starts at the point where the Woluwe River and the existing trunk sewer come together alongside the Woluwe. Straight away it will have to swallow a waste volume of 225,000 PE. The total project consists of a trunk sewer longer than 6 km. The diameter varies from 1.6 m at the starting point to 2.2 m at the connection to the Brussels-North WWTP. Due to the traffic situation 3 underpasses have been provided. The cost price was estimated at almost EUR 13 million. The Technical Plan was submitted in October 2001 and has been approved in the meantime. Execution of the works is anticipated from the end of 2003.

Assessment of 10 years of environmental action



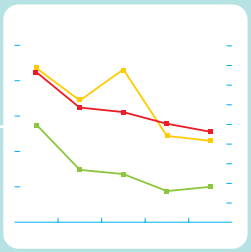
Fewer discharge outlets and cleaner effluent

Better water quality in Flanders

Restoring Flanders' fish population

In 2001 Aquafin NV had been in operation for 11 years. The company was set up in response to an emergency situation. Flanders was at a huge disadvantage when it came to a wastewater treatment infrastructure compared to neighbouring areas. The decision was made not to operate on the basis of targeting areas for wastewater treatment, but rather to carry out a clean-up operation throughout the whole of Flanders at the same time. This meant that Flanders became one big building site with the aim of making our black, stinking watercourses clean again.

In the meantime, it is the right moment to carry out an initial evaluation of what has been achieved. Numerous outlets have been cleaned up, new wastewater treatment plants have been built and older plants renovated. This chapter provides an overview of all the improvements made, which includes the operation of our wastewater treatment plants, and even more importantly, the quality of Flanders' streams and rivers. The evaluation of the last item is based on two components: the chemical water quality and the biological water quality, which together provide a complete assessment. The improvement in water quality has to lead to the ecological recovery of our streams and rivers, an absolute must, if the fish populations and their different types are to be restored.



Fewer sewage outlets and cleaner effluent

Since Aquafin was set up the treatment level has risen from 34 % to 52 %. Major sewage outlets have been disappearing rapidly. In addition to this, there has been an improvement in the effluent quality at our wastewater treatment plants.

Better water quality in Flanders

The biological water quality has improved and the number of very heavily polluted streams has decreased. 25 % of our surface water areas have good or very good water quality. Pollution has been reduced by a factor of 3 to 4. This improvement in quality can often be undoubtedly attributed to the clean-up operations carried out by Aquafin.

Restoring fish populations in Flanders

Meanwhile, anglers are beginning to appear once again on the banks of our streams and rivers. Sea fish are coming up as far as Antwerp and the surrounding area, where there is now, once again, growing populations of brack water type fish. Migratory fish are also moving from the sea into freshwater and are appearing again. People don't know them anymore, as they had been gone for so long.

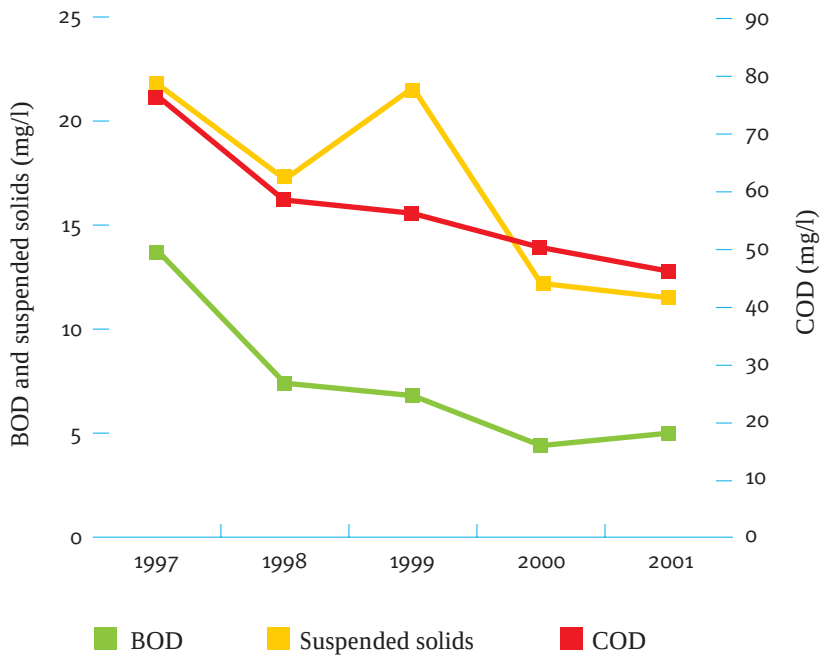
Fewer sewage outlets and cleaner effluent

In a period of 10 years Aquafin has managed to raise the wastewater treatment level in the Flemish Region from 34 % to 52 %. The treatment level represents the percentage of the population whose wastewater is treated at a wastewater treatment plant. This rise was achieved by building more treatment plants and installing trunk sewers. Meanwhile, the percentage of the population connected to the sewer system has risen from 79 % to 84 %.

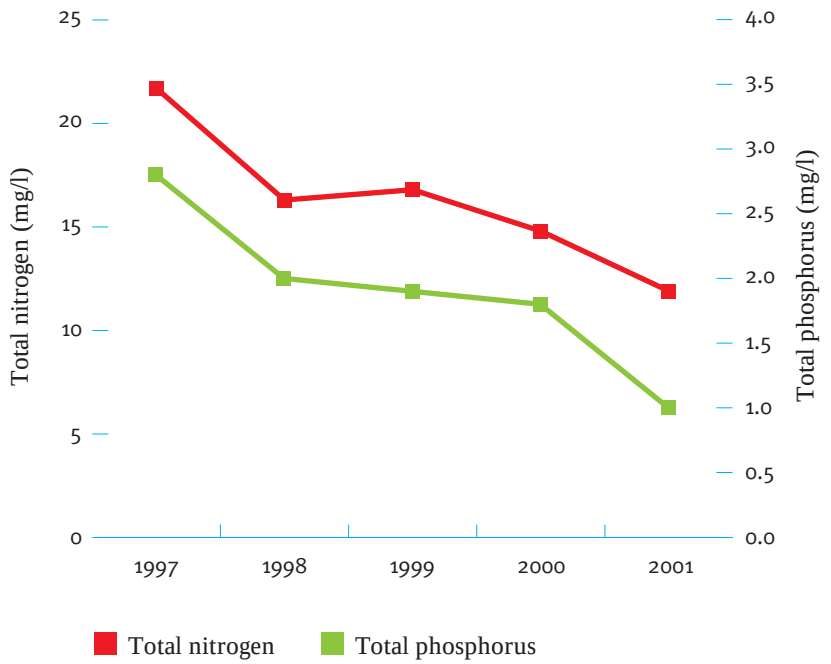
Another upshot of the increase in the treatment level to 52 % has, of course, been that the rivers in Flanders themselves have to process less household wastewater. An increasing number of sewage outlets have also disappeared. Furthermore, this has been accompanied by an improvement in the quality of the treated wastewater from our WWTPs, which is discharged to surface water. This is clearly illustrated in the graphs. Over a 5-year period, the average BOD concentration of our effluent has dropped from 14 mg/l to 5 mg/l. During the same period the COD concentration has fallen from 77 mg/l to 46 mg/l. Another striking fact is that there has been a decrease in the nutrient concentrations in our effluent. For instance, the nitrogen concentration has dropped from 22 mg/l to 12 mg/l, while that for phosphorus has dropped from 2.8 mg/l to 1.0 mg/l. Significant reductions are involved in each case, which means that there is less harm caused to receiving waters than in the past.

Fewer remaining sewage outlets, more wastewater treatment plants and cleaner effluents. These results cannot but have a positive impact on our streams and rivers.

Average pollution concentrations in effluent



Average nutrient concentrations in effluent

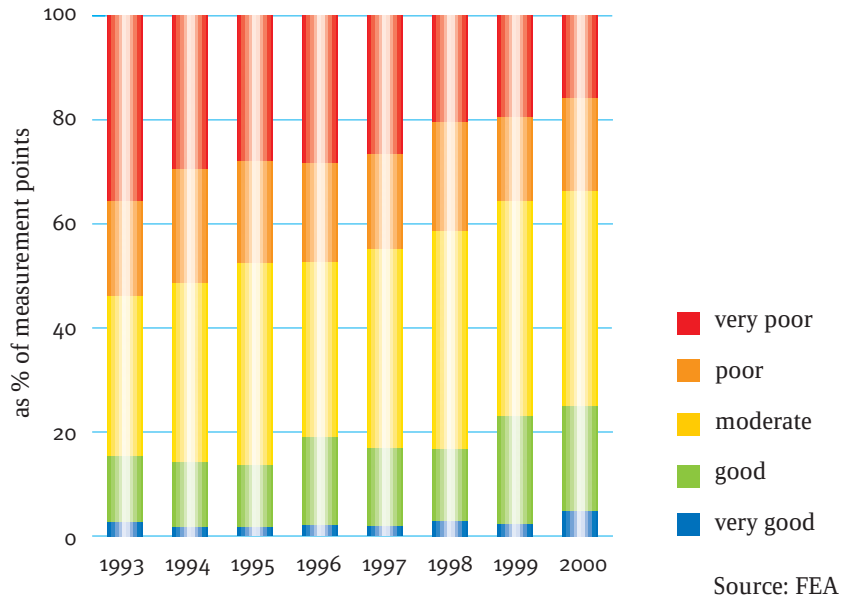


Better water quality in Flanders

The clean-up operations have, in fact, resulted in an improvement in water quality. This is indicated by an improvement in the biological water quality, which has been confirmed in the Flemish Region by the Flemish Environment Agency (FEA) with the occurrence of small invertebrates. The trend during the period 1993-2000 is indicated above. 25 % of the streams and rivers examined in 2000 had a biological water quality which was good to very good. The data from the FEA on the reduced pollution in our surface water is even more conclusive. All the indications are there: the drop in ammonium, COD and phosphate concentrations in streams and rivers. The level of pollution has dropped by a factor of 3 to 5 over 10 years. This positive development is nothing short of spectacular, especially as it has been achieved over a particularly short time.

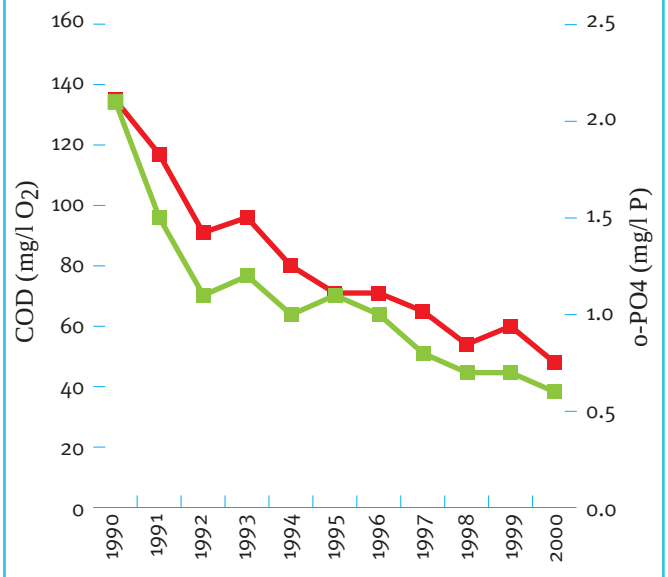
The oxygen level over the last 10 years has risen from 6 mg/l to 7 mg/l. This gives therefore an average rise in the oxygen content of 1 mg/l. This might seem little, but is not too bad at all, if you think that at 15°C water already becomes saturated with oxygen if

Development of biological water quality



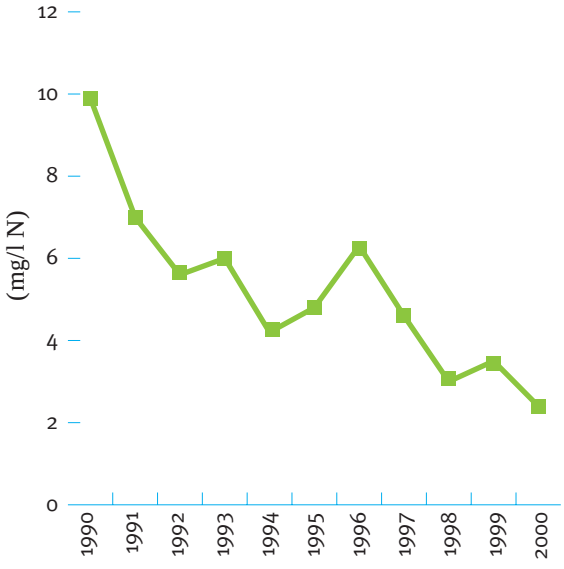
Source: FEA

Reduced level of pollution: drop of COD and orthophosphate concentrations



Source: FEA

Drop of ammonium concentrations in the Flemish streams and rivers

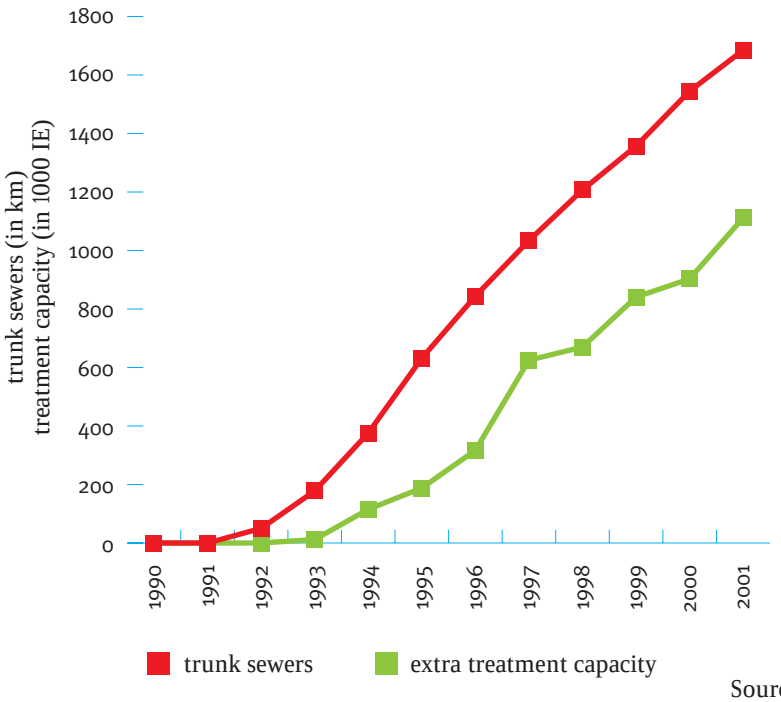


Source: FEA

10.6 mg/l of oxygen is dissolved in the water, knowing that the standard basic quality is 5 mg/l.

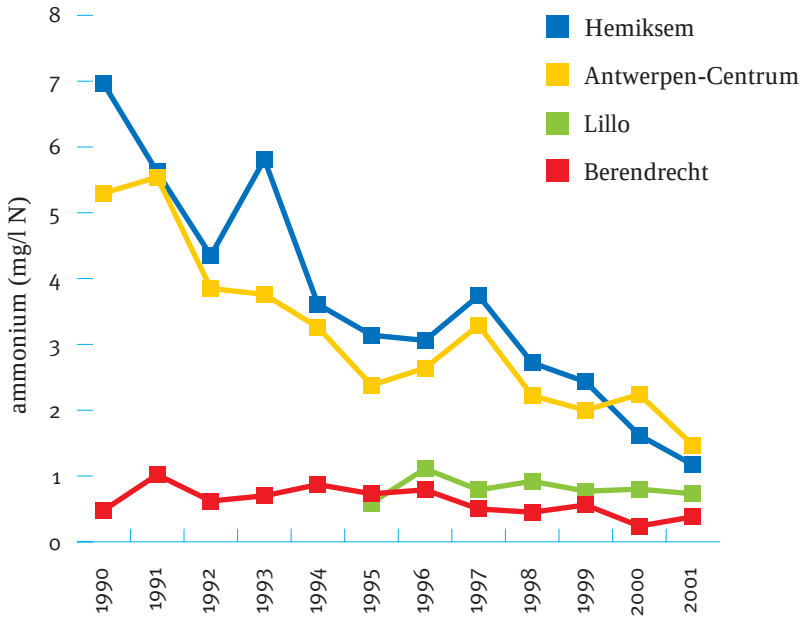
What is even more interesting is to assess the trend for each river. Let us look at, for instance, the most important river in Flanders, the Scheldt. Aquafin has installed in the Scheldt basin (including the basin from the Ghent canals) nearly 1,700 km of trunk sewers and expanded the existing water treatment capacity to more than 1,100,000 PE. We found the following data from the FEA on the Scheldt estuary between Antwerp and the Dutch border. Over 10 years the ammonium concentration at Hemiksem has fallen from 7 mg/l to a little over 1 mg/l! The Scheldt water at the Kallebeekveer changed colour. The water in the late 80s was still black and stank, but now the colour varies between green caused by the presence of small microscopic creatures, and brown resulting from the sand brought in. In this situation the oxygen content rose from 1 mg/l in 1990 to 4 mg/l in 2000, even in spite of the pollution of the Zenne by Brussels and its surrounding area. In barely 10 years the level of pollution in the Scheldt estuary has therefore been hugely reduced.

The further expansion of the trunk sewer network and the treatment capacity in the Scheldt basin

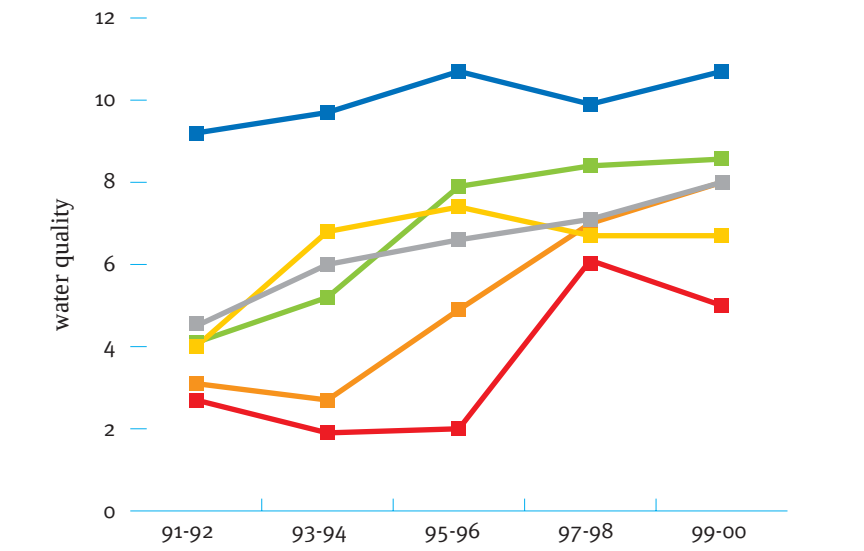


Source: FEA

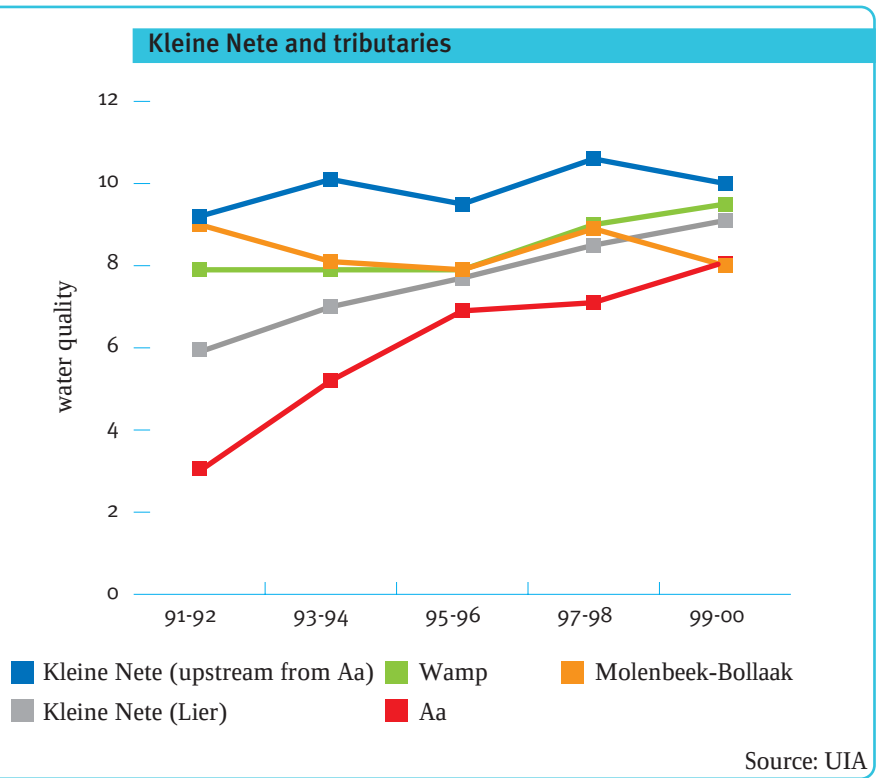
Reduction in water pollution in the Scheldt estuary



Source: FEA



Source: UIA



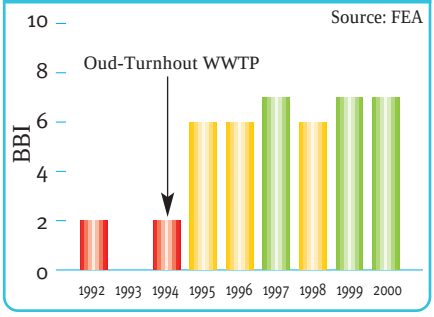
Source: UIA

These kinds of analyses we can also adapt for the various larger and minor streams in the river basin. Let us look at, for example, the development of water quality within the Nete stream. The index used in this case is based on the measurements of dissolved oxygen, ammonium and BOD taken by the University of Antwerp. The water quality for both the Grote and Kleine Nete has steadily improved over the last 10 years. This was also the case when the most important tributaries were examined.

The quality improvement in the Wamp can be attributed to the construction of Arendonk WWTP.

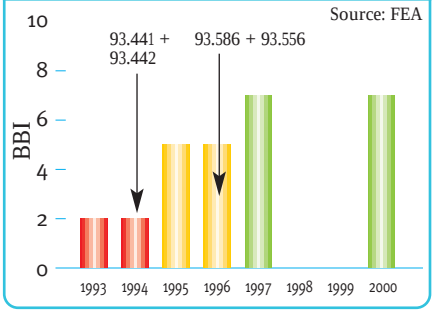
The reason for this quality improvement is, for the most part, clear. For instance, the improvement in the Molse Nete can be attributed to the renovation of the WWTP at Mol; the improvement in the Wamp to the construction of the WWTP at Arendonk, and the improvement in the Gestelbeek to the construction of the Berlaar WWTP. Conversely, we know from the above that the streams with poorer quality water should benefit from the plants being planned. This means, for instance, that the quality of the Molenbeek will improve after the renovation of the Pulderbos WWTP, but especially after the Malle WWTP has been renovated. The water quality of the Wimp will also improve after the planned renovation of the Morkhoven WWTP. In other words, the ecological improvement brought about by Aquafin's most important activities can be definitely predicted, and are therefore also easy to control later on. In the *Aqua* newsletter from Aquafin we publish reports with these analyses. It seems on numerous occasions that after the sewage outlets are cleaned up, the chemical water quality immediately improves and the ecological revival is, in most cases, surprisingly quick to follow. This applies to installing trunk sewers as well as building and renovation work at the wastewater treatment plants. Hereby two examples: the remediation of the Aa at Oud-Turnhout after the construction of a WWTP and the remediation of the Poekebeek at Aalter after sewerage works by Aquafin.

Cleaning up the Aa at Oud-Turnhout



very poor moderate good

Cleaning up the Poekebeek at Aalter



very poor moderate good

Restoring the fish population in Flanders

Restoring the water quality in our streams and rivers also means that fish are coming back to these waters, very closely followed by the fishermen. On the banks of the Dender, Demer and Dijle fishermen are to be seen again, often after many decades of forced absence. Scientific monitoring of fish stocks is being carried out by two scientific institutes in Flanders and our universities. The Institute for Forestry and Game Management has devised a network for taking measurements throughout the whole of Flanders.

According to the research from the Catholic University in Leuven and the University of Ghent, there are around 40 types of brack water and sea fish to be found in the lower Scheldt estuary downstream of Antwerp. There are also more frequent signs of migratory fish, migrating between the sea and freshwater.

One of the first positive signs was the appearance of the flounder, a flat fish similar to a plaice. Since the mid-1990s flounder have been encountered in large numbers in the Scheldt estuary downstream from Antwerp. There have also been reports of them occurring elsewhere. Flounder have already been sighted further upstream, in the direction of Ghent, in the Antwerp docks, Albert Canal and the sea canal between the Rupel and Brussels. Since 1994 anglers have been catching flounder in the lower reaches of the Kleine Nete. According to fish caught for scientific purposes, we know that flounder are also present in the tidal waters of the Grote Nete and even further inland as far as Geel.

The twaite shad, a clupeid fish, was fished commercially a long time ago in the Scheldt and Rupel. It was believed to have died out until it reappeared in 1996. Since then, it has been caught in increasing numbers.

Another remarkable comeback involves the river and sea lamprey. Since the mid-1990s there have been huge numbers of young adult river lampreys occurring in the Scheldt estuary downstream of Antwerp. These creatures swim out to the North Sea where they spend another 2 to 3 years growing. They then migrate back to the rivers for spawning. These creatures, which can reach a length of 40 cm when fully grown, have not been recorded in Belgium since 1964, probably due to the pollution in the major rivers. In January 2002, for the first time ever, hundreds of them were caught at the same time in the nets of the Institute of Nature Conservation placed in the Scheldt at Merelbeke and Melle.

Sea lampreys are also swimming from the sea up the rivers to spawn. These were caught for the first time again in 1999 in the lower Scheldt estuary, around the Groot Buitenschoor area, to be precise. In April 2002 a 90-cm specimen of a sea lamprey was caught in a net placed at the Sint-Anna beach, on the left bank of the Scheldt. In the same net, some weeks before that, there was also a school of bitterlings caught, as well as a rainbow and large sea trout. Sea and river lampreys are parasites feeding off other fish. This also indicates therefore the presence of large fish in our watercourses, which, in turn, are able to attract seals more often inland.

Sea lamprey caught in the Scheldt at the Antwerp left bank.

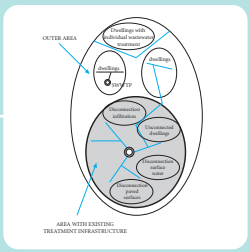
What does the future hold?

- Zone planning basis for local wastewater treatment policy
- Master planning: prioritising future tasks
- RIO-Totaal, driving force for municipal integrated water policy
- Water treatment for companies
- Recycling treated wastewater

The catch-up operation undertaken by Aquafin NV may be called a success. Within 10 years Aquafin has achieved what water companies abroad took 20 years to do. We have delivered and financed 1,172 clean-up projects amounting to EUR 1.23 billion. We have brought the operation of the entire network of wastewater treatment plants in Flanders into line, which is already resulting in higher treatment standards. In the meantime, we have a workforce of 850 and we employ indirectly another 2,500 people via contractors, engineers and suppliers. But our environment is changing all the time, which means the work to be done is changing as well. But Aquafin does not hang around waiting either. At the moment we are adapting our internal organisation to meet the needs of the future. We are a process-driven organisation with the river basins providing our management units. On 13 September 2001 Aquafin NV's articles of association were modified, allowing us to return to our original commercial form, which means that we can carry out commercial activities. Aquafin would very much like to make available its knowledge and experience to other organisations, including local authorities. We have refined our RIO-Totaal services application so that it can be used in the expansion and management of intricate municipal networks. Aquafin has also acquired the shares in Aquaplus NV. This subsidiary valorizes our expertise with public administrations in (candidate) EU countries and with the industry. Our experience in optimising wastewater treatment processes and carrying out pilot projects using membrane technology has opened up for us opportunities to cooperate with industry and the drinking water sector. Aquafin is no longer just a construction company; it is becoming a water company.

Zone planning basis for local wastewater treatment policy

It is often not clear to ordinary citizens and the local authorities who has to install an individual wastewater treatment installation and who can be connected to the sewer system. Aquafin devised a methodology in 2001 for providing a clear solution to these issues without infringing on the local authorities' autonomy and wishes.



Master planning: prioritising future tasks

In 2001 Aquafin devised a methodology for planning investments aimed at optimising the wastewater treatment process. Based on its predicted ecological return a mathematical model calculates the priority of each project.

RIO-Totaal, driving force for municipal integrated water policy

The local authorities are receiving more responsibilities and tasks to carry out as part of integrated water management. Aquafin is able to offer its RIO-Totaal services application, which is a tool customised for each local authority with modules for extending and managing the local authority wastewater treatment infrastructure.

Wastewater treatment for companies

A ministerial circular clarifies the opportunities Aquafin has to sign contracts with companies which want to commission Aquafin to treat their wastewater. In order to protect the Kleine Nete fishing waters Aquafin will continue to process liquid calf manure in the Kempen region until the middle of 2002.

Recycling treated wastewater

The extensive purification of our effluent water should benefit sustainable production of drinking water in coastal areas. It can also provide protection to the threatened shelf water to the south of West Flanders, thereby helping the textile sector to survive.

Future?

ZONE PLANNING BASIS FOR LOCAL WASTEWATER TREATMENT POLICY

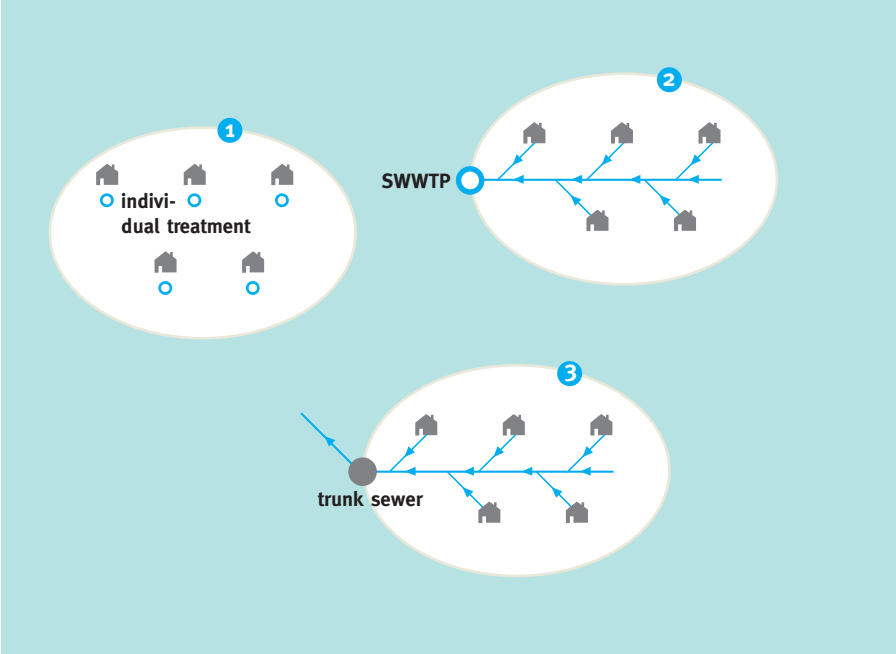
- area already sanitized
- collective wastewater treatment
- preference collective wastewater treatment
- preference individual wastewater treatment

(preference collective wastewater treatment and preference individual wastewater treatment: allocation to other zones)

- individual wastewater treatment

Sample zoning plan.

Following the introduction of the VLAREM environmental permit system, Flanders has been divided into three zones: zone A is already connected to wastewater treatment plants, zone B will be connected as part of an investment programme carried out by Aquafin or the local authorities and zone C is not connected within an approved investment programme. In zone C people have to treat their wastewater themselves. It is possible however that areas in zone C will be able in the somewhat longer term to be connected to the sewer system and a treatment plant. The current zoning is based on the rate of implementing investment programmes and represents a dynamic variable, which is not sufficiently clear to citizens and the local authorities. Aquafin was commissioned by the Minister for the Environment in 2001 to devise a methodology for marking out new treatment zones in areas where currently there are no water treatment facilities provided. The zoning plan is aimed at providing wastewater treatment for the 25 % of Flemings who still have no water treatment facilities provided. In each case, the issue involved is whether treatment is best provided on a collective or individual basis. Some of the areas where the water has not yet been treated are fairly built-up. This issue does not therefore simply concern open rural areas.



The mathematical model considers three options per cluster.

According to Aquafin's methodology the existing built-up areas will be divided into geographical clusters. The possible infrastructure elements (individual wastewater treatment, sewer system, connecting trunk sewers, new small-scale wastewater treatment plants, expansion of existing (small-scale) wastewater plants) required to provide complete sanitation for these remaining areas are being drawn up. Based on this data the mathematical model considers the following 3 options per cluster:

- individual treatment per dwelling.
- sewer system within the cluster connected to a small-scale wastewater treatment plant
- sewer system within the cluster connected to other clusters.

The aim of this model is to keep the costs involved to a minimum (investment and operating costs). Water quality objectives and protected areas can be introduced as ecological pre-conditions. The end result of this model is that the areas with no sewer system facilities have been divided into 5 treatment zones. Zone 1 covers the area already sanitized. Zone 2 will have collective treatment facilities. In zones 3 and 4 can be chosen between collective or individual treatment. In these 'halfway house' areas both solutions are even possible. In zone 5 individual treatment is the appropriate solution. This makes it possible to draft a zoning plan, which provides the local authorities with plenty of scope for their choices and what they want to focus on. The most important benefit of this exercise is that the zone for individual treatment is very precisely defined, which brings clarity to everyone involved. The way in which the collective system will be expanded is a later topic for discussion and is no part of the actual zoning process.

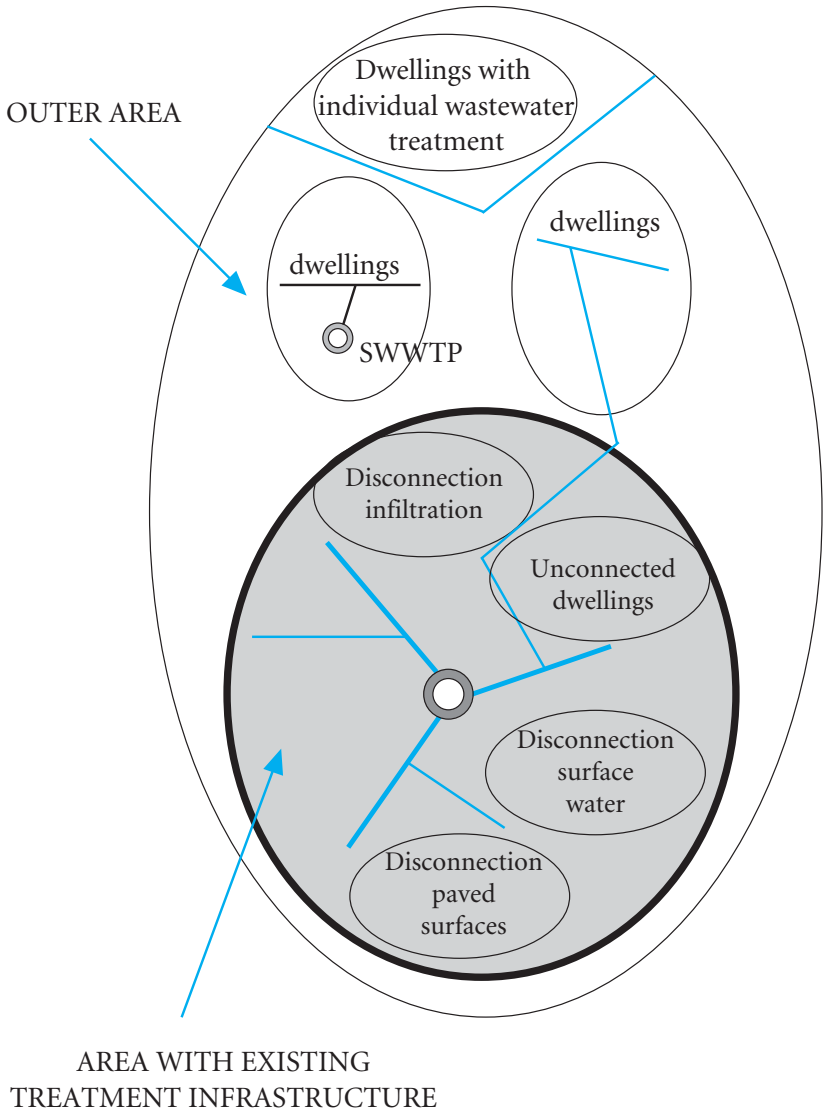
In 2001 40 treatment zones were studied, including the whole Dender river basin. As soon as Vera Dua, the Flemish Minister for the Environment, has given her approval to this methodology, Aquafin can make a start with preparing draft zoning plans for the whole of Flanders.

MASTER PLANNING: PRIORITISING FUTURE TASKS

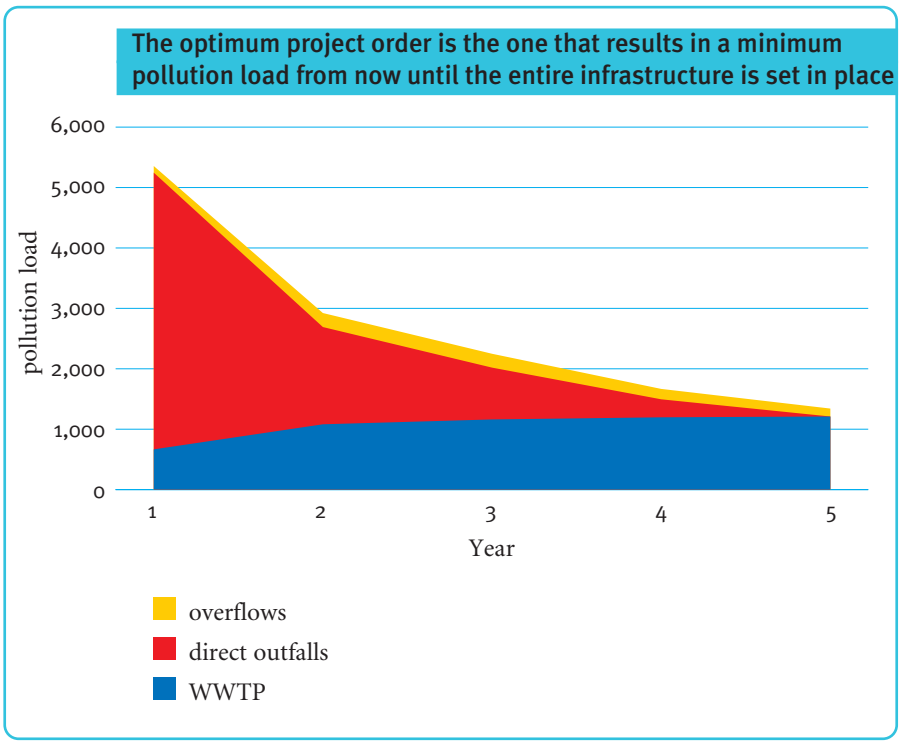
Defining the priority of projects with the least waste output into the stream

Once, after consultation with the local authorities, zone boundaries have been clearly established, the projects to be carried out can be defined. In 2001 Aquafin devised a methodology for optimising the planning of investments in water treatment infrastructure.

To begin with, all the projects still needed to achieve the end objective are defined. They are gathered together in a project 'basket'. The end objective is to achieve a balance where the maximum pollution load can be treated at the minimum cost.



Prioritising projects in project basket.



The second phase will involve establishing the best order of priority for these projects, in other words 'prioritising the project basket'. The optimum order is the one that results in a minimum pollution load from now until the entire required infrastructure is set in place. Given the large number of links in any system, this means that in a fair-sized treatment zone there will soon be a countless number of possible orders.

To help with prioritising these projects a 'Priority model for treatment infrastructures' was developed in cooperation with KU Leuven (Leuven Catholic University). This model determines the best project order of priority for achieving the maximum ecological return, taking into account the available budgetary resources.

For all outfalls, the pollution load to the watercourse can be calculated. This applies to the following locations:

- discharge points (both high concentration discharge points, as well as discharge points for individual dwellings, companies, etc.)
- effluent outfalls from WWTPs
- overflows from a mixed or semi-separate system.

Using this model means that remediation projects of different types and with different impacts (e.g., connecting pollution loads, disconnecting surface runoff, building a small-scale wastewater treatment plant, expanding storage) can be compared with each other in an objective way according to their ecological return. This is a dynamic model, so that projects can be continually planned in such a way as to achieve the best result.

A prototype of the 'Priority model for treatment infrastructures' is already available. This model is currently being tested at 5 smaller test sites. In 2002 a model adapted for a larger scale will be tested at 21 large test sites.

Future?

RIO-Totaal, driving force for municipal integrated water policy

The local authorities are receiving greater responsibilities within the area of integrated water policy. Aquafin's RIO-Totaal services application is a technical and conceptual tool customised to the requirements of local authorities. It comprises a number of modules for expanding and managing the municipal sewer system. Depending on their requirements, the local authorities can use each module separately. RIO-Totaal provides real added value through the constant cross-references between the various modules.

RIO-Herrekening (TRP-herrekening/Hydronaut)*

This module for recalculating sewer system requirements is based on a hydrodynamic model or a simulation of the behaviour of the sewer system. The best hydraulic design takes into account the expansion of the sewer system in order to remediate the remaining outfalls. This integrated approach also includes all the necessary measures for disconnecting runoff from streets, squares, large parking areas and canals from the sewer system. RIO-Herrekening also closely examines problems involving flooding. The updated sewer system plan sets out, therefore, the optimum hydraulic 'equilibrium' for the sewer system. It provides ready-to-use applications, as well as a specific action list indicating the required investments (new sewers, disconnecting canals and surface runoff, separated systems, etc.).

*Sewer system recalculation (TSP recalculation/Hydronaut)

RIO-Investering*

RIO-Investering calculates the total costs involved in implementing the action list provided by the RIO-Herrekening module, adapting this to the actual financial resources the local authorities have available. This produces an investment programme for new projects over a realistic timescale (10,15, etc. years).

*Sewer system investment

DEVELOPMENT

RIO-Management*

The local authorities can now also, when laying non-subsidised sewers or setting up a small-scale wastewater treatment plant, call upon Aquafin NV's expertise in these matters and sign an agreement with the company on providing legal and technical advice on selecting consultant engineers, drawing-up the design, issuing invitations to tender and awarding contracts, as well as implementation and delivery.
This agreement can be extended to negotiations on land acquisition and on the daily supervision of building sites.

*Sewer system management

RIO-Exploitatie*

Using RIO-Exploitatie local authorities can assign the management of critical points in the sewer system (SWWTPs, pumping stations, overflows, valves, major sewers etc.) to Aquafin NV. This helps ensure that problems can be tackled quickly and effectively. It also requires the best possible coordination between maintaining the local authority system and that above local authority level. RIO-Exploitatie can also help a local authority make unexpected savings. For example, suspiciously high peaks at a pumping station can indicate that canals still have some unknown connections to the sewer system. Aquafin NV can assess this bottleneck with RIO-Herrekening. Prompt action will prevent the local authority from receiving an energy bill which has been running sky-high for years.

*Sewer system Operation

RIO-GIS (AquaGIS)

A computer-generated model requires a database to operate. This is where Aquafin's RIO-GIS can be used. This central database provides all the information required for RIO-Totaal's various modules. It can be regularly updated using the output from the separate modules. This database also provides an important source of information for local authority services.

otaal

MANAGEMENT

RIO-Financieel*

*Sewer system financing

The financial module RIO-Financieel, also known as Hydroplan-Financieel, reconciles from a budget perspective the maintenance schedule and renovation projects based on the sewer system management plan with the resources the local authorities actually have available. It therefore presents several different scenarios, which could be developed. For instance, it might be decided to resolve only priority bottlenecks, maintain the quality of the sewer system at a steady level, or restore the sewer system to A1 condition. This will produce a rolling sewer system management plan running over a timescale of 10 to 15 years.

RIO-Plan (Hydroplan)*

The purpose of the RIO-Plan module, also known as Hydroplan, is to maintain the sewer system, the underground treasure of every local authority, in the best possible condition. RIO-Plan clearly highlights the system's critical points. The analysis of any consequential damage together with a hydraulic, structural and ecological risk analysis helps to generate a cost-effective sewer system management plan. This plan includes the monitoring and maintenance schedule (inspections, clearing, renovation of joints, etc.) required to ensure the sewers' adequate operation. The plan allocates vital priority to carrying out more regular inspections and clearing. Using the ageing analysis function also means that the occurence of 'suddenly' collapsed sewers, with all the inconvenience this entails, is a thing of the past. Using RIO-Plan local authorities are able to plan and estimate the cost of predicted renovation projects. It goes without saying that the impact of any major intervention is assessed on the basis of the ideal balance established using RIO-Herrekening.
RIO-Plan/Hydroplan provides an answer to the questions about when and which sewers to monitor, maintain, renovate or replace, so that the quality of the existing sewer system can be improved in a cost-effective way.

*Sewer system plan

Future?

Water treatment for companies

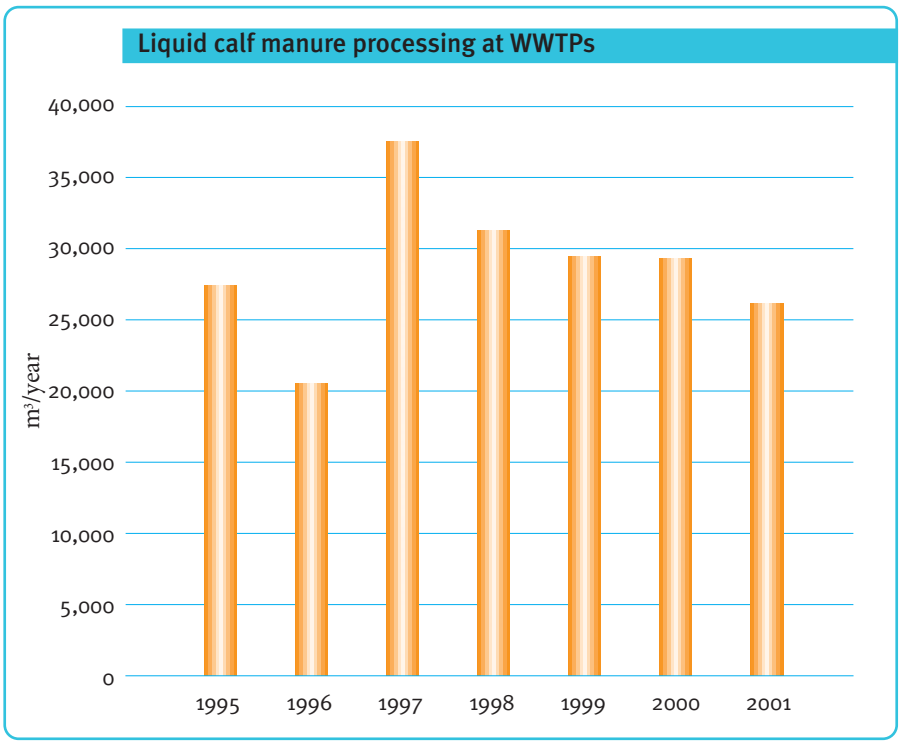
Roeselare wastewater treatment plant.

Industrial wastewater discharge in 2001

At the moment, most companies without their own water treatment system discharge their wastewater to the sewers. They pay an environmental charge to have it processed at a wastewater treatment plant. In 2001 14 companies discharged 151,000 m^3 of wastewater directly to WWTPs. They have an agreement with Aquafin to do so. The charge paid is transferred to the MINA fund for the environment and nature. These companies transport their industrial wastewater in tankers. One exception to this is the Antwerp waste dumpsite, de Hooge Maey, which is suitable for 90 % of the volume of this separately discharged water. The leachate from this waste dumpsite is then discharged to the WWTP in the north of Antwerp along a transport pipe.

Ministerial circular on the future

On 21 November 2001 a ministerial circular was approved on the discharge of commercial wastewater to the public sewer system. The general principle is that priority companies, known as P companies, will treat their wastewater themselves. Treated water needs to be released into surface water and even better still, as much of it as possible should be recycled. It is possible however to have this wastewater treated at a wastewater treatment plant, subject to a number of conditions being met. After all, water treatment is not the core activity for these companies, but it is for Aquafin. Indeed, sometimes from an ecological standpoint it is more beneficial for wastewater to be treated at a WWTP. Our effluent standards are stricter than many of the sector-related discharge regulations companies follow. It is only possible to be connected to the sewer system if there is no major risk of any possible contamination via overflows. Aquafin can, in the relevant cases, organise industrial wastewater to be transported to a WWTP by tanker or using a separate pipe. The discharge of industrial wastewater must not, of course, have a detrimental effect on the WWTP's operation and the WWTP's nutrient removal operation should function as required.



Aquafin can sign contracts with companies for extending the capacity of WWTPs and for laying discharge and effluent pipes. Aquafin's services may also be called upon for collective treatment and laying effluent pipes.

Calf manure adequately treated before being discharged to the Kleine Nete fishing waters

Calf manure can be biologically reprocessed at a wastewater treatment plant. In the past this processing was only carried out at the WWTP in the north of Antwerp, leaving aside a test carried out at Lichtaart. In accordance with the decree on calf manure, the cattle-breeding industry is developing the required calf manure processing capacity in the province of Antwerp itself. The manure processing plant in Kasterlee still had a few teething problems in 2001. For this reason, Vera Dua, the Minister for the Environment, requested Aquafin to continue processing calf manure until the summer of 2002. As a result, liquid calf manure does not flow inadequately treated into the Kleine Nete, ecologically valuable fishing waters. A good thing for the environment, because this way we do not return to the problems with contamination caused by the cattle-breeding sector in the 1980s.

The graph illustrates the progress in the amount of processed liquid calf manure. As soon as this sector has its own processing plant up and running, we can cease to process liquid calf manure.

Future?

Recycling treated wastewater

Test setup for reverse osmosis in Waregem.

In Flanders 40 % of the available water per inhabitant is used. At an international level a use exceeding 30 % is viewed as problematic in order to be able to maintain long-term savings. Based on existing regulations and environment action plans, the recycling of effluent needs to be given a boost. At most wastewater treatment plants effluent is used as processing water for producing chemicals, processing sludge and for cleaning and sanitary use. The advantage gained in doing so is that our drinking water bill is still hovering around EUR 200,00 for years, in spite of the considerable rise in prices by an average of 38 % over 5 years.

Using effluent water can help restore the groundwater level

In Wulpen and Heist there have been projects carried out involving discharging effluent water after extensive treatment to the dunes so as to secure the collection of water and counter the inflow of salt water. In May 2002 the first plant using membrane technology for producing drinking water from effluent will come into operation in Wulpen, the first of its kind in Europe as well. The cooperation between Aquafin and IWVA (Veurne-Ambacht intercommunal water company) will benefit sustainable production of drinking water in coastal areas.

In the south of West Flanders the level of the deep water-bearing stratum (Palaeozoic Shelf) has dropped due to overexploitation. As a result of this, 150 companies in the region are faced with water shortages.

In order to prevent further depletion of the groundwater reserves, the option was examined of channelling effluent from WWTPs, after further purification, into the Palaeozoic Shelf water-bearing stratum. With this in mind a pilot plant was set up in Waregem. The WWTP is already equipped with a sand filter, which purifies the biologically treated water further. The pilot plant uses microfiltration and reverse osmosis. The study shows that it is probably better to

Membrane technology is being introduced in the wastewater treatment process.

provide the effluent directly to industry as process water. After all, if companies can use an alternative water source, this will stop overexploitation of the groundwater and help its level to rise again naturally.

The study carried out in Waregem also shows that effluent, after microfiltration, reverse osmosis and disinfection, is perfectly suitable for use by a number of large textile companies in the area. Minister Dua is looking into the possibility of providing companies with a financial incentive in the form of subsidies to switch to an alternative, environment-friendly water source.

BIOMAC, new technology for the comprehensive removal of COD

Aquafin has cooperated in 2001 with Severn Trent and Prof. dr. W. Verstraete from the University of Ghent in designing and testing a new purification technology intended to extensively remove COD from wastewater. This technology is known as BIOMAC (biological membrane activated carbon) and involves concentrating COD on active carbon, which is then broken down using specialised bacteria. A patent application has been filed for this new technology. BIOMAC can then increase in the future the possibilities of recycling effluent.

Report of the statutory auditor

on the financial statements of Aquafin NV for the year ended 31 december 2001
to the shareholders' meeting of 17 may 2002

In accordance with the legal and regulatory provisions we report on our audit engagement which you have entrusted to us.

We have examined the financial statements for the year 2001 ended 31 December 2001 which have been prepared under the responsibility of the Board of Directors which show a balance sheet total of EUR 1,678,890 thousand and a profit for the year of EUR 11,589 thousand. In addition we have carried out specific additional audit work required by the law.

Unqualified audit opinion on the financial statements

Our examination has been conducted in accordance with the auditing standards of the "Institute des Reviseurs d'Entreprises". Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement and are in compliance with the Belgian legal and regulatory requirements with respect to financial statements.
In accordance with these standards we have taken into account the administrative and accounting organisation of your company as well as the procedures of internal control. The responsible officers of the company have clearly replied to all our questions for information and explanations. We have examined on a test basis, the evidence supporting the amounts included in the financial statements. We have assessed the accounting policies used, the significant estimates made by the company and the overall presentation of the financial statements. We believe that our audit provides a reasonable basis for our opinion.
In our opinion, taking into account the legal and regulatory requirements which are applicable to them, the financial statements present fairly the financial position of the company as of 31 December 2001 and the results of its operations for the year then ended and the information given in the footnotes is properly presented.

Additional certifications

We supplement our report with the following certifications which do not have any impact on our audit opinion on the financial statements:

- The directors' report includes the information required by the law and is in accordance with the financial statements.
- Without prejudice to certain formal aspects of minor importance, the accounting records are kept in accordance with the applicable Belgian legal and regulatory requirements.
- No action or decision taken which does not comply with the Company Law or the statutes needs to be reported to you. The result appropriation proposed to the General Meeting complies with the law and the statutes.

Gent, 29 April 2002

Ernst & Young Reviseurs d'Entreprises
S.C.C. (B 160)
Statutory auditor
represented by

ROSITA VAN MAELE
Partner

Balance sheet after profit sharing

ASSETS (IN THOUSAND EURO)	31-DEC-01	31-DEC-00
Fixed assets	**1,422,767**	**1,250,007**
III. Tangible assets	**1,421,038**	**1,249,916**
A. Land and buildings	34,654	30,837
B. Plant, machinery and equipment	1,089,873	973,117
C. Furniture and vehicles	1,205	1,050
D. Leasing and other similar rights	3,119	3,338
E. Other tangible assets	778	855
F. Assets under construction	291,409	240,719
IV. Financial assets	**1,729**	**91**
A.1. Participating interests	1,681	
C.2. Amounts receivable and cash guarantees	48	91
Current assets	**256,123**	**46,724**
VI. Stocks and contracts in progress	**2,410**	**2,535**
B. Contracts in progress	2,410	2,535
VII. Amounts receivable within one year	**249,116**	**42,576**
A. Trade debtors	23,482	34,771
B. Other amounts receivable	225,634	7,805
VIII. Investments	**2,974**	
B. Other investments and deposits	2,974	
IX. Cash	**788**	**874**
X. Accruals	**835**	**739**
TOTAL ASSETS	**1,678,890**	**1,296,731**

LIABILITIES (IN THOUSAND EURO)	31-DEC-01	31-DEC-00
Shareholders equity	**345,079**	**297,185**
I. Capital	**99,426**	**99,340**
A. Issued capital	198,400	198,314
B. Uncalled capital	-98,974	-98,974
IV. Reserves	**13,730**	**13,235**
A. Legal reserve	6,131	5,550
B. Reserves available for distribution	7,599	7,685
V. Accumulated profits	**4**	**17**
Reimbursements from the Flemish Region	**231,919**	**184,593**
VI. Reimbursements from the Flemish Region	**231,919**	**184,593**
Provisions for liabilities and charges	**5,463**	**6,344**
VII. Provisions for liabilities and charges	**5,463**	**6,344**
A.4. Other liabilities and charges	5,463	6,344
Creditors	**1,328,348**	**993,202**
VIII. Amounts payable after one year	**717,568**	**635,564**
A. Financial debts	717,542	635,542
3. Leasing and other similar obligations	4,009	4,105
4. Credit institutions	713,533	631,437
D. Other amounts payable	26	22
IX. Amounts payable within one year	**600,948**	**347,487**
A. Current portion of amounts payable after one year	67,182	57,166
B. Financial debts	207,538	203,013
1. Credit institutions	207,538	203,013
C. Trade debts	84,876	70,669
1. Suppliers	84,876	70,669
D. Advances received on contracts in progress	1,954	2,093
E. Taxes, remuneration and social security	228,355	4,849
1. Taxes	224,508	1,704
2. Remuneration and social security	3,847	3,145
F. Other amounts payable	11,043	9,697
X. Accruals	**9,832**	**10,151**
TOTAL LIABILITIES	**1,678,890**	**1,296,731**

Profit and loss account

(IN THOUSAND EURO)	31-DEC-01	31-DEC-00
I. Operating income	261,171	245,659
A. Turnover	78,831	74,518
B. Increase in stocks of finished goods, work and contracts in progress	-125	244
D. Other operating income	182,465	170,897
II. Operating charges	-186,628	-179,536
A. Raw materials, consumables and goods for resale	57,833	55,916
B. Services and other goods	18,017	17,783
C. Remuneration, social security costs and pensions	32,528	30,229
D. Depreciation of tangible fixed assets	76,569	73,794
E. Increase in amounts written off trade debtors	-291	244
F. Provisions for other liabilities and charges	-881	609
G. Other operating charges	2,853	961
III. Operating profit	74,543	66,123
IV. Financial income	371	173
B. Income from current assets	364	163
C. Other financial income	7	10
V. Financial charges	-53,928	-48,984
A. Debt charges	53,600	48,683
C. Other financial income	328	301
VI. Profit on ordinary activities before taxes	20,986	17,312
VII. Extraordinary income		
E. Other extraordinary income		
VIII. Extraordinary charges		
E. Other extraordinary charges		
IX. Profit of the year before taxes	20,986	17,312
X. Income taxes	-9,397	-7,110
XIII. Profit of the year available for appropriation	11,589	10,202

PROFIT DISTRIBUTION (IN THOUSAND EURO)	31-DEC-01	31-DEC-00
Appropriation account		
A. Profit to be appropriated	11,606	10,213
1. Profit for the period available for appropriation	11,589	10,202
2. Profit brought forward	17	11
C. Appropriation to capital and reserves	-581	-521
2. To legal reserve	-581	-521
D. Result to be carried forward	-4	-17
1. Profit to be carried forward	-4	-17
F. Distribution of profit	11,020	-9,676
1. Dividends	11,020	9,676

Statement

III. Statement of tangible fixed assets (in thousand EURO)

	Land and buildings	Plants, machinery and equipment	Furniture and vehicles
a) Acquisition cost			
At the end of the preceding year	39,757	1,338,740	8,077
Movements during the year			
- Acquisitions, including the produced fixed assets	5,293	1,372	1,030
- Sales and disposals (-)			
- Transfers from one heading to another		189,019	
At the end of the year	45,050	1,529,131	9,107
c) Depreciation			
At the end of the preceding year	8,920	365,624	7,027
Movements during the year			
- Recorded	1,476	73,634	875
- Recorded after sales and disposals			
At the end of the year	10,396	439,258	7,902
d) Net book value at the end of the year			
(a) - (c)	34,654	1,089,873	1,205

	Leasing and other similar rights	Other tangible assets	Assets under construction
a) Acquisition cost			
At the end of the preceding year	4,374	3,001	240,719
Movements during the year			
- Acquisitions, including the produced fixed assets		287	239,709
- Transfers from one heading to another			189,019
At the end of the year	4,374	3,288	291,409
c) Depreciation			
At the end of the preceding year	1,036	2,145	
Movements during the year			
- Recorded	219	365	
At the end of the year	1,255	2,510	
d) Net book value at the end of the year			
(a) - (c)	3,119	778	291,409

IV. Statement of financial fixed assets (in thousand EURO)

	Affiliated companies	Other companies
1. Participating interests and shares		
Net book value at the end of the preceding year	0	
Movements during the year		
- Additions	1,681	
- Reimbursements	0	
Net book value at the end of the year	1,681	
2. Amounts receivable		
Net book value at the end of the preceding year		91
Movements during the year		
- Additions		0
- Reimbursements		-43
Net book value at the end of the year		48

VI. Investements: other investments and deposits (in thousand EURO)

	Period
Term deposits with credit institutions	
falling due:	
- less or equal to one month	2,974

VII. Accruals (in thousand EURO)

	Period
Analysis of heading 490/1 of assets	
if the amount is significant	
- Costs paid in advance	456
- Interests	379

VIII. Statement of the capital (in thousand EURO)

	Amounts	Number of shares
A. Share capital		
1. Issued capital		
- At the end of the preceding year	198,314	
Capital increase	86	
- At the end of the year	198,400	
2. Structure of the capital		
2.1. Categories of shares		
Ordinary shares	198,400	800,000
2.2. Nominative shares		800,000
B. Unpaid capital		
Uncalled capital	98,974	
Total	98,974	

IX. Provisions for other liabilities and charges (in thousand EURO)

	Period
Costs anticipated for late deliveries	561
Costs anticipated for legal disputes	3,445
Disputes with regard to the Agreement with the Flemish Region	311
Costs anticipated for sludge disposal	1,160

X. Statement of amounts payable (in thousand EURO)

	Not more than 1 year	Between 1 and 5 years	Over 5 years
A. Analysis of debts with an original maturity of more than one year, according to their residual maturity			
Financial debts	67,182	268,123	449,419
3. Leasing and other similar obligations	96	578	3,431
4. Credit institutions	67,086	267,545	445,988
Other amounts payable		26	
Total	67,182	268,149	449,419

	Year
C. Amounts payable with respect to remuneration and social security	
1. Taxes	
b. Non expired taxes payable	221,327
c. Estimated taxes payable	3,181
2. Remuneration and social security	
b. Other amounts payable relating to remuneration and social security	3,847

XI. Accruals (in thousand EURO)

	Year
Accrued interests	9,754
Other accruals	77

XII. Operating results

	Year	Previous yera
C1. Average number of persons employed		
a. Total at the closing date	704	670
b. Average staff, calculated in full-time equivalents	674.4	652.1
c. Number of hours worked	1,101,788	1,062,912
C2. Personnel charges		
a. Remuneration and direct social benefits	23,130	21,265
b. Employer's contributions for social security	6,931	6,446
c. Employer's premium for extra-statutory insurance	993	977
d. Other personnel charges	1,473	1,541
e. Pensions	1	
D. Amounts written off		
2. Trade debtors		
Write-downs	405	468
Write-backs	-696	-224
E. Provisions for liabilities and charges		
Increases	1,350	1,905
Decreases	-2,231	1,296
F. Other operating charges		
Taxes related to operations	1,005	773
Other charges	1,848	188
G. Agency staff and other people available to the company during the financial year		
1. Total at closing date	10	8
2. Average number in full-time equivalents	12.9	9.6
Average number of hours worked	25,494	22,038
Company costs	465	410

XIII. Financial results (in thousand EURO)

E. Other financial costs		
Bank costs	324	295
Other financial costs	4	6

XV. Income taxes (in thousand EURO)

	Year
A. Analysis of the heading 'Income taxes'	
1. Income taxes of the current year	8,754
a. Taxes and withholding taxes due or paid	6,059
c. Estimated additional charges for income taxes	2,695
2. Income taxes on previous periods	643
a. Additional charges for income taxes due or paid	147
c. Additional charges for income taxes	496

XVI. Other taxes and taxes supported by third parties (in thousand EURO)

	Year	Previous year
A. Value added tax, turnover taxes and special taxes charged during the year		
1. To the enterprise (deductible)	63,525	61,969
2. By the enterprise	66,244	49,958
B. Amounts retained on behalf of third parties for:		
1. Payroll withholding taxes	6,869	6,186
2. Withholding taxes on investment income		865

XVII. Rights and commitments not reflected in the balance sheet (in thousand EURO)

	Year
Granted projects not yet activated	229,381
Obligations to purchase land	4,156

XVIII. Relationships with affiliated enterprises and enterprises linked by participating interests (in thousand EURO)

	Year	Previous year
1. Financial fixed assets: investments	1681	
2. Amounts receivable within one year	80	
Statement with regard to the consolidated annual account		
B. Information to be given by the enterprise if it is a subsidiary or a communal subsidiary		

A consolidated annual account is drafted and published by: Vlaamse Milieuholding N.V.
Uitbreidingsstraat 62, 2600 Antwerpen – Berchem. V.A.T.-number: BE 440.019.813

Social balance sheet

I. Statement of employees

A. Employees registered in the staff register 1. During the financial year and the preceding financial year	Full-time (financial year)	Part-time (financial year)	Total or total in full-time equivalents (financial year)	Total or total in full-time equivalents (preceding financial year)
Average number of employees	627.8	63,8	674.4	652.1
Average number of hours worked	1,030,734	71,054	1,101,788	1,062,912
Personnel costs (in thousand EURO)	30,792	1,736	32,528	30,229
Benefits in addition to the salary			211	208

2. On the date of closing the financial year	Full-time	Part-time	Total in full-time equivalents
a. Number of employees registered in the staff register	639	65	686.5
b. According to the nature of the contract			
Contract for indefinite duration	617	65	664.5
Contract for definite duration	22		22.0
c. According to gender			
Male	500	10	507.9
Female	139	55	178.6
d. According to professional category			
Management			
White collar	617	65	664.5
Other	22		22.0

B. Agency staff and other people available to the company during the financial year	Agency staff
Average number of people employed	12.9
Number of hours actually worked	25,494
Company costs (in thousand EURO)	465

II. Table of staff changes during the financial year

	Full-time	Part-time	Total in full-time equivalents
A. Incoming			
a. Number of employees registered in the staff register during the financial year	172	2	173.3
b. According to the nature of the contract			
Contract for indefinite duration	75	2	76.3
Contract for definite duration	97		97.0
c. According to gender and qualifications			
Male: secondary education	80		80.0
higher non-university education	25		25.0
university education	9		9.0
Female: secondary education	40	1	40.8
higher non-university education	8	1	8,5
university education	10		10,0
	Full-time	Part-time	Total in full-time equivalents
B. Outgoing			
a. Number of employees for whom the termination of their contract was recorded in the staff register during the financial year	135	5	138.7
b. According to the nature of the contract			
Contract for indefinite duration	57	5	60.7
Contract for definite duration	78		78.0
c. According to gender and qualifications			
Male:			
secondary education	61	1	61.8
higher non-university education	13		13.0
university education	12		12.0
Female:			
secondary education	37	1	37.8
higher non-university education	8	3	10.1
university education	4		4.0
d. According to the reason for terminating the contract			
Pension	1		1.0
Prepension	1		1.0
Dismissal	11	2	12.6
Other reason	122	3	124.1

III. Statement on the use of measures to combat unemployment during the financial year

1. Measures with a financial benefit for the employer relating to the person or his replacement	Number	In full-time equivalents	Financial benefit (in thousand)
1.9 Full carreer break	5	4.5	143
Number of employees involved in one or more measures to combat unemployment			
- Total for the financial year	5	4.5	
- Total for the previous financial year	57	56.5	

IV. Information on employee training during the financial year

	Number of employees involved	Total training hours	Cost for the company (in thousand)
Total training initiatives to the charge of the employer			
- Male	495	16,916	1,011
- Female	187	4,337	259

Additional information

I Summary of the valuation rules

1 Starting-up costs - costs of capital increases

Starting-up costs are booked in P & L at acquisition value in the year in which they are incurred or in which commitments were made.

Costs for capital increases are booked in P & L in the year in which the increase has taken place.

2 Tangible fixed assets

Tangible fixed assets are booked at their acquisition price, i.e. purchase price plus related costs.

Following depreciation percentages are applied:

- **For permanent assets proper to the main office:**

office materials:	lineair 20 %
furniture:	lineair 14.25 %
vehicles and mobile plant:	lineair 25 %
telephone installation:	lineair 20 %
computer hard- and software:	lineair 33.33 %
installation and furnishing costs of rented buildings:	lineair 33.33 %
machines and equipment:	lineair 20 %
establishment of laboratory:	lineair 20 %
leased office buildings:	lineair 5 %
installation and furnishing costs of leased buildings:	lineair 33.33 %.

- **for permanent assets proper to the projects:**
  These assets are transferred from work in progress to tangible fixed assets when the project is delivered.

  Four classes are distinguished in function of their economic life, for which the following depreciation percentages are applied:

class 1: lineair 25 %
class 2: lineair 14.25 %
class 3: lineair 6.66 %
class 4: lineair 3.03 %

The following investments belong to class 1:
Computers, office machines, software, telemetry equipment, portable equipment, radio transmitters, telecommunication equipment, sampling equipment, measuring equipment, lawn mowers, laboratory equipment, private cars, light company vehicles.
This list is non-limitative.

The following investments belong to class 2:
Portable pumps, aerators, mixers and generators of ‹ 25 KW, agricultural machinery, renovation of the buildings, furniture, heavy mobile plant such as vehicles for transporting sludge, lorries, tractors and small bulldozers.
This list is non-limitative.

The following investments belong to class 3:
Fences, sampling and measuring instruments, workshop machinery, movable cranes, or pumps and generators › 25 KW, steel storage tanks, immovable electrical and mechanical equipment of new installations.
This list is non-limitative.

The following investments belong to class 4:
Roads, constructions for sewage treatment works and pumping stations, buildings, discharging constructions, sewers, collectors, priority sewers, pressure lines, manholes, roller bridges, plants.
This list is non-limitative.

Related costs – except for land – are taken into P & L in the year of delivery.

– for permanent assets of the operations department:
  The following depreciation percentages are applied:
  - for investments with regard to the renovation of buildings at Aquafin's disposal: linear 14.25%
  - for investments with regard to the construction of buildings: linear 3.03%

Moreover, two classes are distinguished in function of their economic life, for which the following depreciation percentages are applied:

class 1: linear 25%,
class 2: linear 14.25%.
The non-limitative list with the contents of classes 1 and 2 can be found above.

- ***For the renovation of VMM installations:***
  The reparation works for which a Technical Plan is being established are registered as assets. These are the reparation works with an estimated minimum life of more than 7 years, in accordance with the Agreement with the Flemish Region. These assets are transferred from 'works in progress' to 'other tangible fixed assets' when the project is delivered. The division into classes and the relating depreciation rates correspond to the rates for permanent assets proper to the projects.

No depreciation is applied to tangible fixed assets under construction.

Op materiële vaste activa kunnen aanvullende of uitzonderlijke afschrijvingen genomen worden, wanneer door verandering of wijziging van de economische en technologische omstandigheden, de gebruikswaarde voor de onderneming lager is dan de boekwaarde.

Additional or exceptional depreciation is allowed for material fixed assets when their utility for the company is below the book value due to economical or technological conditions.

Fixed assets which are no longer used or no longer permanently contribute to the activity are depreciated so that the book value corresponds to the estimated disposal value.

Invoices of assets with a value of less than 100,000 BEF are immediately taken into P & L, except for:
- assets that are acquired under an approved Technical Plan,
- advance invoices,
- invoices relating to parts or expansions of assets.

3 Financial fixed assets

Participations, shares and fixed income securities titles are booked at purchase price. Related costs are immediately taken into P & L.
In case of permanent depreciation or devaluation, the reduction in value of participations and shares may be written off when this is warranted by the status, the probability or the prospects of the company concerned.

4 Long-term receivables

Receivables are booked at face value except for fixed rate instruments which are booked at the lowest of the following values: purchase price or repayment price. Related costs are immediately booked against P & L.

A depreciation is applied when repayment at the expiry date becomes uncertain.

5 Receivables within one year

Receivables are shown in the account at their face value. Fixed rate instruments are booked at the lowest of the following values: purchase price or repayment price. Additional costs are immediately booked at the charge of the result.

Depreciations are applied when for the whole or a part of the receivable payment on the expiry date is uncertain.

6 Deposits

Deposits at financial institutions are booked at face value. Paper instruments are booked at the lowest of either purchase price or repayment price. Related costs are immediately booked at the charge of the result.

At the closing of the financial year depreciation is booked when the market value is lower than the booked value.

7 Cash

Is booked at face value. At the closing of the financial year depreciation is booked when the market value is lower than the booked value.

8 Debts

Are booked at face value.

9 Foreign currency

Debts and receivables in foreign currency are converted at the exchange rate of the last day of the financial year when closing the financial year.

10 Accruals

Are booked at acquisition value and posted to the balance sheet for the part which refers to the following financial year(s).

11 Orders in progress - Valuation of projects beyond the execution of the Agreement with the Flemish Region

Costs incurred in the framework of projects beyond the Agreement with the Flemish Region are booked as orders in progress.
Orders in progress are booked at manufacturing price.
The positive difference between the selling price and the manufacturing price (profit) is only taken into P & L once the order has been fully executed.
Upon the closing of the financial year orders in progress are depreciated if their manufacturing price plus the estimated amount of the costs still to be made are higher than the net purchasing price or the price stipulated in the contract.

II. Transfer of assets upon the expiry of the Agreement with the Flemish Region

Aquafin N.V. shall keep the full ownership of the installations which will be established on terrains forming part of the public domain, because the Flemish Region relinquishes its right of accession for the full period of the Agreement. From the moment when the Agreement expires, the title to ownership of these installations and other constructions shall be transferred to the Flemish Region, for which transfer the Flemish Region shall not be due any payment whatsoever.

If Aquafin N.V. erects all kinds of installations or other buildings on its own terrains which are indispensable for the execution of a Technical Plan, such installations and/or buildings shall be transferred to the Flemish Region after the expiry of the Agreement, for which transfer the Flemish Region shall not be due any payment whatsoever.

III. Disputes

1. Aquafin N.V. is involved in a number of disputes of which the result is not predictable. For the moment it is not possible to determine the responsibility for these disputes. Nor is the amount of the damage in the present status possible to estimate.

2. As from 1 January 1994 Aquafin has taken the place of VMM in a number of disputes. In the Agreement between the Flemish Region and Aquafin, the Flemish Region is prepared to pay the costs concerning Aquafin's utility right for the VMM installations.
   For all these disputes Aquafin expects a refund by the government for the costs and charges made, provided that they are not in consequence of faults or negligence caused by Aquafin N.V.

3. Aquafin is involved in an important dispute as a result of the rainfall of September 1998. The Board of Directors of Aquafin believes to have been confronted with an Act of God (cf. the indemnification of the disaster relief fund on the occasion of the rainfall of September 1998) and believes that Aquafin didn't commit an error. The court hasn't decided yet on any liabilities in this case.
   Though there is no certainty at the moment, the Board of Directors believes this dispute will not cause any damages which will not be reimbursed as acceptable costs by the Flemish Region or will not be refunded by the insurance company.

4. VAT dossier
   During the financial year a dispute arose with the VAT authorities regarding the rate that has to be charged on the invoices that Aquafin has submitted to the Flemish Region for the execution of its wastewater treatment tasks.

   In 1991 the VAT authorities formally approved the use of the reduced rate of 6 %. After the VAT legislation was amended in 1993, external advice was sought and, in the light of that advice, no new approval was requested. Provisions could still be found within the amended legislation to justify applying the reduced rate. This standpoint was also confirmed by the fact that no comments were ever made either when the VAT returns were submitted or during the various subsequent audits. In November 2001 however, following an extensive audit, the VAT authorities decided that, in future, a rate of 21 % would be applicable. Aquafin must also pay the difference of 15 % between the two rates, plus interest and penalties, from September 1996. This latter standpoint was communicated to Aquafin by means of a final demand dated 9 January 2002.

   Aquafin feels that it is entitled to the reduced rate and also argues that the VAT authorities have not respected the principles of sound administration. Aquafin has therefore lodged an objection to this decision.

   The above action is being launched in consultation with the Flemish Region. In the management agreement with

the Flemish Region there is a provision that taxation forms a reasonable cost element. As a result any additional demand can ultimately be charged on to the Flemish Region. In order to safeguard its interests Aquafin has therefore summoned the Flemish Region as an intervener in third-party proceedings.

The Board of directors thinks that the dispute with the VAT authorities cannot have any financial consequences for the company.

IV. Allocation agreement

Aquafin N.V. has signed an allocation agreement during the 1994 financial year. The agreement between Aquafin N.V., the Flemish Region, the European Investment Bank and the Gemeentekrediet stipulates that, in case Aquafin N.V. fails to fulfil its obligations to its long-term financiers, the claims on the Flemish Region for the investments and the interests on loans will not be paid to Aquafin by the Flemish Region any longer.

These claims will be paid by the Flemish Region as the solvens from Aquafin to the Gemeentekrediet, which acts as the agent of the long-term grantors of Aquafin N.V. Long-term credits with an original term longer than or equal to 5 year come under this agreement.

COLOPHON
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AQUAFIN NV

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