Sida

SEPTEMBER 2005

Cleaning up the Baltic Sea

St. Petersburg on the move

St. Petersburg

Solving the problem together

St. Petersburg is the largest single source of pollution into the Baltic Sea. Taking into operation the Southwest Wastewater Treatment Plant will bring about a sharp fall in the discharge levels. Wastewater from about 700,000 people will now be treated instead of going straight into the River Neva and out into the Gulf of Finland.

The project is a good example of how local authorities, governments, international finance institutions and the private sector can cooperate in providing a better environment.

The view from the control room is magnificent. It is like gazing out from an air-traffic control tower – a flat landscape with a glimpse of small cottages (datjas), green space and rows of apartment buildings far beyond. Underneath are the aeration tanks. The wastewater fills the basins and is treated step by step before being discharged into the River Neva for further transport to the Baltic Sea. The operators sit in a row at their computers in intense activity. After several months' training the new staff have now taken over the operation of the treatment plant.

A long process achieved its goal

St. Petersburg is one of Europe's most beautiful cities. A combination of Paris and Venice, the town spreads into the wetlands formed by the River Neva as it empties into the Gulf of Finland. St. Petersburg is a town on water. A beautiful summer day the canals are full of tourist boats. Fishermen line the banks of the Neva, sunbathers lie underneath the Peter-Paul fortress.

The completion of the Southwest Wastewater Treatment Plant means the water that is so important for the city is now much cleaner. This is a crucial step in reducing the pollution load on the Baltic Sea from St. Petersburg, but it has been a long and difficult process.

In the mid 1980s work began on a new treatment plant for the southwest area of St. Petersburg but had to be abandoned due to the collapse of the Soviet Union and the economic crisis that followed. Work stood still for ten years. The concrete deteriorated, water filled all the holes, trees and bushes started to grow.

After extensive preparations and extremely complicated negotiations a model was found for financing and implementing the project. A part of the half-finished plant could still be used. Construction commenced in early 2003 and was completed in just over two years. The pressed time schedule was adhered to with just a few weeks' delay.

Felix Karmazinov is in charge of Vodokanal, the municipal water com-

TURNING ON. The new treatment plant is the most modern in Russia. Left side: The aeration tanks from above with primary sedimentation and equalization tanks in the background.

FELIX KARMAZINOV receiving the 2005 Swedish Baltic Sea Water Award. One of several paintings on the wall outside of Vodokanal main office in St. Petersburg

WHAT DO THE PEOPLE OF ST. PETERSBURG THINK?

NADINE KRYLOVA
"The environmental situation is not so good, there are far too many cars and industries polluting.

What happens to the wastewater? I've no idea but I would imagine that half gets treated. I think the environment is important, as does my entire family and I think my parents would be willing to pay more for water and wastewater treatment if it meant better water and a cleaner environment."

pany in St. Petersburg with overall responsibility for cleaning the town's wastewater.

"Nothing was simple, neither with regard to bringing into effect a financial solution or the actual construction of the treatment plant. All of us involved have without doubt learnt a great deal during the process," he says.

Since Felix Karmazinov became the Director General of Vodokanal in 1987 the company has evolved from being a sluggish Soviet bureaucracy into the most modern and market-oriented of all the water companies in Russia. In August 2005, Felix Karmazinov received the Swedish Baltic Sea Water Award. In its citation, the Nominating Committee said Mr. Karmazinov and Vodokanal "have fostered an understanding that the city's wastewater must be cleaned" and that they are "role models in the international efforts to achieve a cleaner Baltic Sea through sound wastewater treatment solutions."

Along the street outside Vodokanal's entrance runs a long concrete wall built from grey blocks as in many other places in St. Petersburg. But this wall is full of pictures painted by children: mermaids, dangerous fish, wastewater running out to sea and much more. No other Russian public utility could boast of having a similar mural. But then getting children and youth involved is a crucial part of Vodokanal's operation:

"We were greatly impressed by how you work with children during our visits to Sweden and realised we could benefit from that experience," explains Felix Karmazinov.

Many years of Swedish commitment

In 1974 the Baltic States adopted the Helsinki Convention. The governing body of the commission is the Helsinki Commission (HELCOM). In 1990 a summit conference was held in Ronneby with the aim of speeding up environmental work in the Baltic Sea region. This resulted in a programme of measures called the Baltic Sea Joint Comprehensive Environmental Action Programme that was adopted in 1992. The programme contains a long-term plan of measures to be implemented over a 20-year period.

In the mid 1990s the first Swedish support was provided for building treatment plants in Poland and the Baltic States. But it was soon clear that for the investments to be sustainable in the long-term the local water and wastewater companies would have to be restructured and customer oriented. This required a businesslike approach, improved service and a model where everybody pay tariffs according to what they consume. Up until then the water and wastewater companies had been a part of the municipal administration with insufficient funding and inadequate organi-

sation and management. Many times responsibility for municipal service was placed on the shoulders of the industry. The aim now was to establish separate, municipality owned companies with their own budgets supplying a service at an affordable price.

"Customers having to pay full tariff for the services and the installation of water meters were the most dramatic changes. It also had a dramatic effect on consumption, which fell from 300-400 litres per person a day to in some cases as little as 70 litres, way below the Swedish level of 150-200 litres," says Lars Eklund, in charge of Sida's support.

SEK 100 million to St. Petersburg

Ever since the mid 1990s Sida and Swedish experts have contributed to developing and modernising St. Petersburg's water company Vodokanal. Sida has contributed to the construction of the SWTP with grant financing to the amount of SEK 100 million, mainly used for purchasing mechanical and electrical equipment from Sweden.

"Our contribution in St. Petersburg is significantly greater than our contribution in the Baltic States. The project also has high political priority in both Sweden and Finland," continues Lars Eklund.

Sida offered a large contribution to the project at an early stage, on condition that Finland did the same, that there was local Russian financing and that the Nordic Investment Bank took main responsibility for the total financ-

REUSING PART of the old structure. Work at the construction site in September 2003.

ST. PETERSBURG at night, a magic city with beautiful waterways as here, just off the main boulevard Nevskij prospekt.

ANDREJ SULEYMANOV
"I'm a seaman and am away from my family six months at a time so obviously the sea means a lot to me. Here in St. Petersburg the environment is bad in the inner city, the traffic is the greatest problem. Out here where we live it's a little better.

I've no idea what happens to the wastewater but I would imagine that everything gets treated. My daughter would certainly know, she learns a lot about the environment at school."

ing. Sida has since been actively involved supporting the development and implementation of the project.

Oddvar Rönsen from the Nordic Investment Bank (NIB) thinks the project is a good example of the Nordic way of working:

"Swedish Prime Minister Göran Persson and former Finnish Prime Minister Paavo Lipponen both played a crucial role in the process that preceded the project start. Their commitment attracted Brussels, giving the project a vital political emphasis. But there is no doubt that Sida played a decisive role. Without Sida's initiative and active participation there would never have been a treatment plant," he says.

Felix Karmazinov also points out the importance of Nordic cooperation:

"Vodokanal has progressed under a strong influence from our Nordic neighbours, especially with regard to technology and strategic development. We had our first contact with Sida in 1995. I recall the first time we took part in the Stockholm Water Festival. It was very impressive," says Felix Karmazinov, who notes an increased interest in environmental issues in the city:

"The environmental awareness of St. Petersburg citizens is far from perfect. However, there is some progress: ...some progress: ecology, including water ecology, is attracting increasingly more media attention, the mentality of factory management is slowly changing and environmental classes are being widely introduced at upper secondary school level. Still, it will take generations before we see any significant change in our attitude to water as a most precious natural resource."

FACTS: THE BALTIC SEA
– AN ENDANGERED ENVIRONMENT

EVERY SUMMER people wake up to the fact that things are not right with their sea. The debate normally blossoms up in connection with algal bloom. Like a green sludge, the poisonous, rotting algae fill bathing spots and fishing water. It is then that the processes that have taken place for many decades under the surface become apparent for the people living around the Baltic Sea.

The Baltic Sea is shallow. The average depth is 60 metres while the depth at the two outlets, The Great Belt and The Sound, is not deeper than 22 metres. This makes the Baltic Sea almost completely closed. While the water in The Cattegat changes every few months, it takes between 25 and 50 years for the water in the Baltic Sea to be completely changed. This means that hazardous substances remain for a very long time. Around 80 million people live around the Baltic Sea. Shipping is very intensive and for many decades the Baltic Sea was exposed to uncontrolled discharge from towns, industries and agriculture.

As early as the mid 1950s attention focused on what was happening to the environment. Studies showed how the salt level was falling and how some animal and plant life on the seabed was destroyed due to the drop in the oxygen content. In 2002 the area of oxygen deficit in the seabed was estimated at 40,000 km^2, equate with 10 per cent of the total land area of Sweden. Eutrophication at sea is the result of a heavy intake of two main fertilisers, nitrogen and phosphorus. Oxygen deficit in its turn is caused by oxygen being used to degrade dead organic material that falls to the bottom. More nutrient causes an increase in the production of organic material, which requires more oxygen to degrade.

Discharges from treatment plants are relatively easy to identify and remedy from a technical point of view, but it is considerably more difficult to do anything about the agricultural discharges because the discharge points are so many and widely spread. Atmospheric pollution also plays a significant role.

HEINRICH MAEVSKY loves to swim. With SWTP ready the water will be much better.

ANNA PAUVLONA
"No I'm not happy about the state of the environment. It's much too dirty.

Yes I am aware they're building a treatment plant and sludge incinerator. I live not far from there. I'm concerned for the wastewater from the treatment plant running out into the river that runs past where we live. We catch and eat fish from it, trout."

WATER AND WASTEWATER PROJECTS FINANCED BY SIDA

Project	Inhabitants	Project cost in totalt MSEK	Of which Sida MSEK	Reduction of discharge, tonnes/year* BOD	phosphorus	nitrogen	Status	Country
Liepāja	108 000	150	49	950	60	210	Completed	Latvia
Daugavpils	120 000	160	22	3 210	54	180	Completed	Latvia
Riga	800 000	700	40	4 000	500	330	Completed	Latvia
Klaipéda	204 000	168	38	2 600	75	202	Completed	Lithuania
Kaunas	450 000	700	31,5	6 600	255	250	Completed	Lithuania
Šiauliai	150 000	160	31,5	800	55	250	Completed	Lithuania
Panevezys	120 000	95	25	90	55	180	Ongoing	Lithuania
Haapsalu	15 000	45	12	284	14,5	10	Completed	Estonia
Narva	80 000	84	17	220	24	185	Completed	Estonia
Sigulda	11 000	30	5,4	6,0	4,2	18	Completed	Latvia
Jurmala	60 000	171	31	–	12	35	Ongoing	Latvia
Saulkrasti	5500	14	5,6	160	1,6	6,2	Completed	Latvia
Kaliningrad	420 000	500	120	9000	20	150	Ongoing	Russia
St. Petersburg**	700 000	1800	100	14 800	370	2200	Completed	Russia
Sestroretsk	100 000	130	21	110	1,4	28	Completed	Russia
Lviv	830 000	350	48	6000	100	–	Ongoing	Ukraine

**All figures are based on pre-project estimates.*

***South West Wastewater Treatment Plant.*

FACTS:

ST. PETERSBURG is the largest town in the Baltic Sea region with a population of around 4.5 million. More than 25 per cent of the wastewater goes straight out to Neva and further into the Baltic Sea without any form of treatment. The new treatment plant will treat 330,000m³ of wastewater from around 700,000 people, cutting by half the amount of untreated wastewater going straight out into the Baltic Sea.

The quality of the treated water will fullfill the HELCOM recomendations.

TARIFFS FOR water and wastewater services in St. Petersburg have gradually risen during recent years. The building of the new treatment plant will therefore not bring about a drastic increase in the tariffs. Today water costs 4.85 roubles a cubic metre and wastewater services about the same. The average cost for water and waste services is 85 roubles per person a month, around SEK 20. As prices rise people become more aware of cutting their consumption.

Compared to Sweden and many other western European countries water consumption in St. Petersburg is high, at present 350–400 litres a day per person. Consumption in Sweden is 150–200 litres. Reducing consumption is therefore one of Vodokanal's most important long-term goals (for more technical information on SWTP se page 15).

THERE ARE already two larger treatment plants in St. Petersburg, The Central and the Northern wastewater treatment plants. With the SWTP there is now capacity to treat all the wastewater in St. Petersburg.

The largest single obstacle for treating the rest of the wastewater is the insufficient sewer network, which means that part of the wastewater is pumped straight into the River Neva.

Parallel with the construction of the SWTP, work has also begun on a northern tunnel collector. The purpose of the collector is to connect the tunnel sewers in the central and southern part of the right bank of the River Neva to the Northern wastewater treatment plant, which has free capacity. Due to difficult geological conditions the collector will be laid at a depth of 45–70 metres below ground level. The collector is expected to be put into service by 2008, meaning that almost 100 per cent of the wastewater from St. Petersburg will be treated. Another challenge will be in achieving and maintaining the highest possible treatment efficiency in the three treatment plants.

SWTP in late November 2004.
Only nine months left to go!

Important monitoring

ALLA PLISKEVICH checking samples (above).
Konstantin Tarlov on the move (right).

The stainless steel sinks and flasks used to test the water are glistening in the sunlight. The staff at the newly built laboratory have the task of measuring discharge levels and following up the function of the treatment plant. Starting up and operating the biological process for removal of nitrogen and phosphorous in the basins requires constant monitoring.

"A large part of the equipment we use is new compared to what exists in other labs in Russia so the staff have undergone extensive training," explains Antonida Shikuera, head of the laboratory.

The Southwest Waste Water Treatment Plant is the first automated plant of its kind in Russia. New staff were employed in the summer of 2005 who have now taken over the operation of the plant.

One of them is Konstantin Tarlov, a process engineer:

"I previously worked within the processing industry, but never at a wastewater treatment plant. It's an interesting job and it's exciting to work on something involving so much new technology and which means something positive for the environment," he says.

Financers working together

The turnkey contract for the new treatment plant amounts to Euro 128 million. Added to this is around Euro 50 million for peripheral work such as the sludge incineratin plant and inlet structures. Financing was on condition that a large number of stakeholders worked together. The project is in partnership between the water company in St. Petersburg and the three construction companies NCC, Skanska and finnish YIT and is financed by several banks with the Nordic Investment Bank as lead bank, Sweden, Finland and the EU. The project is a so-called Public-Private Partnership model (PPP), which among other things means that the three construction companies will take part in running the plant for twelve years, after which the responsibility will be handed over to Vodokanal.

"This is an extremely interesting project. I have been involved in a range of projects for more than thirty years, but this one is without doubt the most complex I have seen. At the outset many considered the PPP model as sheer madness, especially with so many players involved, but it has proven to be far from it as everything worked out nicely," says Jan-Olof Andersson, Head of the Project Monitoring Unit, the team assigned by the financiers to monitor the procurement procedures.

Matti Rantala is MD of Nordvod, the company joint-owned by Vodokanal and the construction companies and the loan recipient and coordinator of the project:

"I believe this is the first time ever that three large companies have jointly implemented a project of this proportion. We have of course been involved in several other projects in which public and private sector players have participated but nothing can be compared with this," he says.

Things went well despite the model being untried. Further proof of the PPP model being an interesting alternative was that it is used in the predominantly Japanese funded new drinking water plant in St. Petersburg.

"One advantage we can see with the PPP model is that it has been much easier to get things to happen with the

MANY SPECIALISTS have contributed to the completion of the plant. Picture from workgroup meeting

MARINA SELINKAYA (left) AND MARGARITA KALININA
"I love swimming so for me the Baltic Sea means bathing. The Baltic is our common sea so it is important to keep it clean. I think the town environment has improved, but traffic is still the greatest problem.

Wastewater? I'm an optimist and like to think that all of it is treated – at least I hope so! I'd gladly pay more for better quality. Health is crucial for us, we should never forget that."

Russian authorities. Here Vodokanal's total commitment has been a great help," says Matti Rantala.

Bearing in mind the complexity of the Russian bureaucracy, a strong local partner has been a prerequisite in order to pursue the legal issues that are central to the project.

"I think the typical Russian qualities of stubbornness and belief in achieving the seemingly impossible is appreciated by our foreign cooperating partners. I hope this experience will be utilised in other similar projects in Russia," asserts Vodokanal's chief Felix Karmazinov.

At most 600 people have worked on the construction site at the same time, mainly from Russian subcontractors. Safety has been an important aspect and there have been very few accidents.

"It is a complex structure with so many people involved. Despite this, the work has progressed very well," says Björn Larsson from NCC, MD of SWTP Construction Oy, the company owned by the three construction companies that built the treatment plant.

Swedish companies on the ground

One of the Swedish companies supplying Sida-financed equipment is electrical wholesalers SWEL AB. As well as many kilometres of cable, SWEL has also supplied light masts, cable ladders and other peripheral equipment to the amount of SEK 16 million.

In 1994, a few years after the liberation of the Baltic States, SWEL did its first business dealings on the other side of the Baltic Sea. Support from the Sida Start East programme later enabled SWEL to implement staff training and set up a subsidiary in Lithuania, now with a workforce of seven.

"The wastewater treatment plant requires top quality electrical material and the assignment puts great demands on logistics, security and a well-functioning supply system. We keep a regular check by following our cables from factory to project. Furthermore, we have a good knowledge of the region and having worked in the Baltic States is now proving beneficial to us in Russia," explains Per Ivarsson from SWEL.

Handling sludge from the plant

The treatment of wastewater produces sewage sludge as a residual product. The sludge contains 80 per cent water and is a very difficult material to further dewater. Storing it requires large areas of land, practically impossible in large cities such as St. Petersburg. This is also dubious for environmental reasons because the sludge can contaminate the ground water and is very marshy and does not become firm for at least 10 years.

According to the original plans a sludge incineration plant was to be built parallel with the treatment plant but the project funding was not sufficient. But now the financial problem has been solved and the plant should be up and running by early 2007. The incinerator is a turnkey plant, financed by EU/TACIS and Vodokanal to the amount of Euro 25 million and 5 million respectively.

The problem of handling sewage sludge exists in all countries with treatment plants. A common method in Europe is to incinerate sewage sludge. In some parts of Sweden sewage sludge is incinerated together with solid waste from households. In some cases it is also possible to use the sludge within agriculture, on condition that the amount of heavy metals and toxic substances is not hazardous.

In St. Petersburg natural gas is used at the incinerator because it is more environmental than oil. The heat generated is used for producing electrical power and in the area's district heating network and corresponds to a third of the energy used for operating the SWTP treatment plant.

All incineration produces flue gases that have to be filtered. The sludge incinerator fulfils EU guidelines for flue gas emissions. Several independent environmental studies were carried out during the planning stage to ensure compliance with environmental demands. Ash formed during incineration is sent to one of the city's landfill sites. This landfill must also fulfil stringent environmental demands.

"In Russia the water entering the treatment plant is a mixture of household wastewater and rainwater from the streets containing high levels of heavy metals and other substances, along with industrial wastewater that is difficult to have any form of control over. The sludge is therefore not suitable for use within agriculture," explains Ulf Weidling from the Danish Ramböll consultancy that won an international tender as supervising consultants for the project.

Young people committed to the environment

Previously Vodokanal was seen as a boring institution that few cared about. But when the tariffs were increased and the company was customised it became more important to have contact with people and explain what has been done and why.

Several public meetings were arranged during the planning stage for the new treatment plant to give people the opportunity to put questions to the company management.

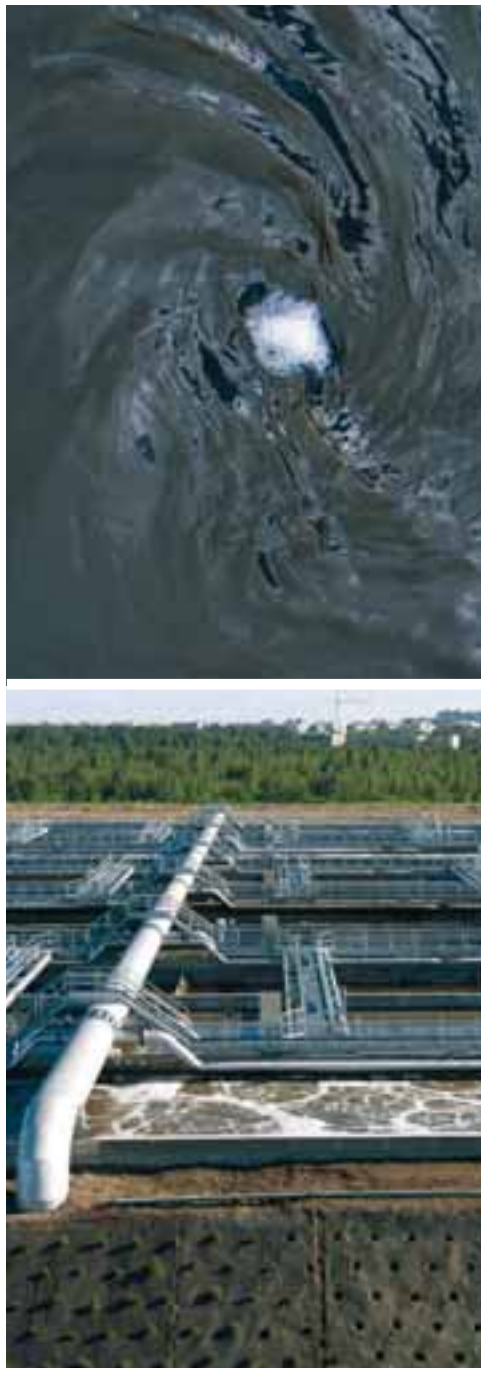
The training centre for, above all, schoolchildren is another good example of the change in attitude.

"We want to increase our students' motivation and commitment to the environment and hope to see the centre being used as much as possible. It involves a new pluralistic approach, bearing in mind that students will be using their knowledge in real life. They could for example be measuring their family's water consumption," says Natalia Koriakina who is working at the centre.

Today a competition is underway between young people in the 12-16 age group to make the best local environmental magazine.

The centre is a hive of activity as the groups draw logotypes and invent

SLUDGE contains 80 per cent of water, storing is not advisable.



"WE WANT TO increase our students' motivation and commitment to the environment and hope to see the centre being used as much as possible. It involves a new pluralistic approach,", says Natalia Koriakina at the Vodokanal training centre.

magazine names. One group has just decided to call their magazine – Baltic City, special Russian Edition. The main article will cover what it is like living in a Baltic town.

"We who live around the Baltic Sea have many joint environmental problems, but here in Russia we know very little of how they deal with environmental problems in other countries," says Polina Korostyshevskaya.

Customer service, what customer service?

What does the Russian public think of the service, cost and how much should be invested in purifying wastewater?

It is early afternoon at one of Vodokanal's customer centres. The phone rings and Anna Yung on Vodokanal's hotline lifts the receiver: "Welcome to Vodokanal, how can I help you?" She talks a while, asks a few questions and searches on the computer terminal before hanging up.

"So far I've received several inquiries about the latest price rises. Others phone to ask how to get a meter installed in their apartments or to inquire about invoicing," she explains.

Customer requirements or the notion of providing a customer service was never part of the Vodokanal agenda until now. Today they provide a 24-hour customer hotline – service has become a concept. It is also possible to visit the customer centre. Irina Pereverzeva has purchased a piece of land near St Petersburg on which she intends to build a summer cottage. She wants to know how water and drains are being installed and what it will cost. With the drawings in front of her she sits with one of the administrators at Vodokanal discussing the best solution:

"Everything is included in the rent, we live in a block of flats so we've never had to consider the cost of water until now. I've never had direct contact with Vodokanal before, but it's functioning well. It was just to come here and get my questions answered," says a satisfied Irina Pereverzeva before she leaves.

It is now Alexandr Stepanov's turn. He is an architect presently engaged in the building of a café in one of the new areas springing up on the fringes of St Petersburg.

"I'm here because I need to know the specifications for connecting to Vodokanal's network," he explains.

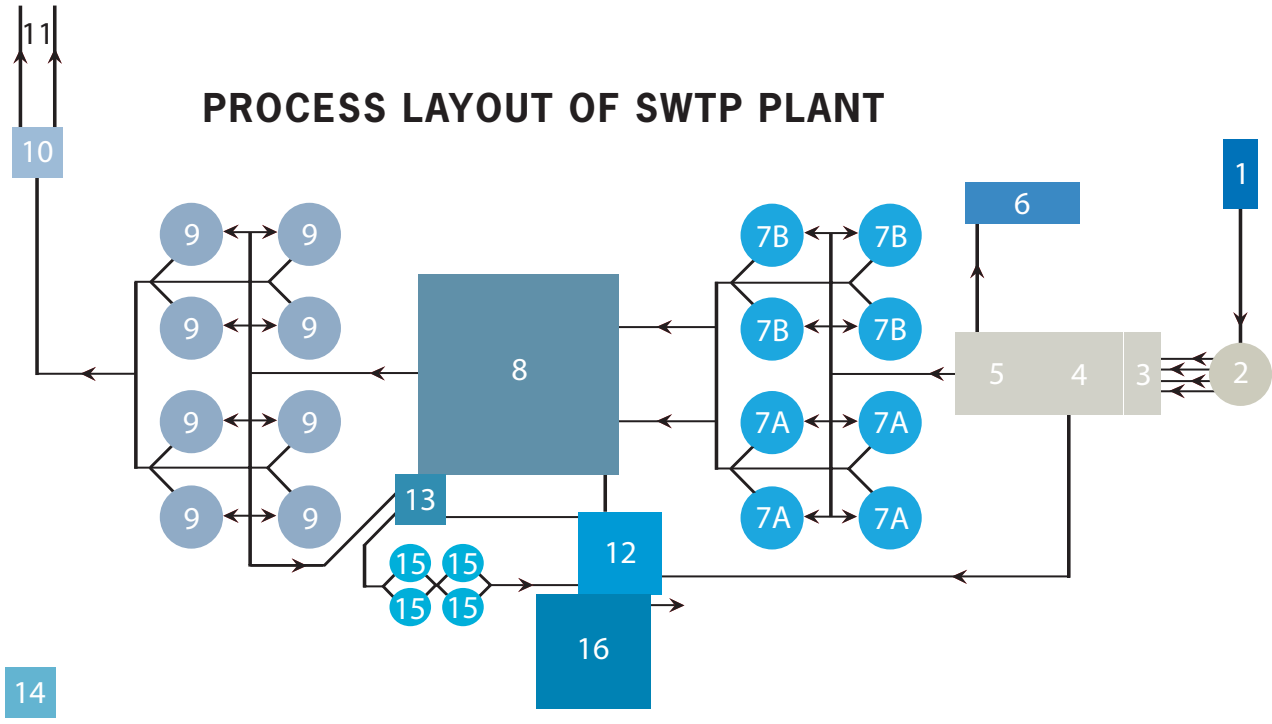
Alexandr Stepanov has had regular contact with Vodokanal for several decades and he says a lot has happened during recent years:

"It's an amazing difference. Vodokanal is a much better company today. Equipment, technology and customer relations have greatly improved. The company is much more efficient – and the staff are more polite," he continues, which gets a laugh from the woman in the reception.

IGOR AVILCHENKO
"The environment is not so good here. Most of all I think they should improve the street cleaning. I know the wastewater must be treated before going out to sea. It appears to work, so at least part of it is probably treated. The drinking water is also okay, but we filter all the water we drink.

I don't trust the authorities but if the water does actually improve then I would consider paying more for water and wastewater management."

PROCESS LAYOUT OF SWTP PLANT



1. Inlet gate chamber
2. Inlet pumping station
3. Screening chamber
4. Grit and grease removal
5. Distribution chamber
6. Sand stockpile

7a. Primary sedimentation
7b. Equalization tanks
8. Aeration tanks
9. Secondary sedimentation
10. Desinfection and outlet chambers
11. Effluent pipe
12. Sludge dewatering, blower station and control room
13. Return sludge pumping station
14. Administration, laboratory, air raid shelter
15. Thickeners
16. Incineration plant

FACTS ABOUT THE PROJECT

SOURCE OF FUNDS SWTP TURNKEY CONTRACT:

NIB	41 300
EBRD	32 400
EIB	15 500
Sida	11 000
MoEF	10 000
NDEP	5 800
Nordvod	5 500
SWEDFUND	3 250
FINNFUND	3 250
SUMMARY	128 000

*All figures are in EUR*1000.*

ENVIRONMENTAL IMPROVEMENTS:

Parameter	Reduction in per cent	Reduction ton/a
BOD	<90	<14800
PHOSPHORUS	<75	<370
NITROGEN	<60	<2200

Design capacity 300 000 m^2 / dygn

SWEDISH SUPPLYERS OF SIDA FINANCE EQUIPMENT:

Purac AB, EI och Industrimontage Svenska AB, Saxlund AB, ABS Pumps, Swel AB, Scania AB.

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Halving poverty by 2015 is one of the greatest challenges of our time, requiring cooperation and sustainability. The partner countries are responsible for their own development. Sida provides resources and develops knowledge and expertise, making the world a richer place.

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