Working together for the people of Nicosia

The New Nicosia Wastewater Treatment Plant

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"Water is at the core of sustainable development. This year's observance of World Water Day focuses on the links between water and energy. […] Climate change driven in great part by the unsustainable use of energy will exacerbate water stress and scarcity in many regions. […] The many strong links between water and energy demand coherent, integrated policies and innovative strategies. Water must be used -- and electricity must be generated and distributed -- equitably and efficiently, so all users get a fair share. These are the goals of the ongoing work of UN-Water and of the Sustainable Energy for All initiative. On World Water Day, let us pledge to develop the policies needed to ensure that sustainable water and energy are secured for the many and not just the few."

UN Secretary-General Ban Ki-moon
Message on World Water Day 22 March 2014

"Cyprus suffers from water scarcity. It is therefore no coincidence that a substantial share of the EU's aid programme for Turkish Cypriots has been allocated to the water sector, including for wastewater collection and treatment.
This new water treatment plant will benefit the environment as well as human health by protecting drinking and bathing waters from contamination. On top of that, it opens up the potential to allow wastewater a second life in irrigation. This can promote economic activity, to the benefit of all.
I am therefore delighted that this new bi-communal wastewater treatment plant is ready to start its activities, and that the EU has contributed to this success. This project showcases how joint, consensual decisions can take shape and work to the benefit of both communities."

Štefan Füle
Member of the European Commission

OVERVIEW: WATER COOPERATION AND PEACEBUILDING

The project - worth approximately 25 million Euros - was jointly funded by the Sewerage Board of Nicosia and the European Union and implemented by UNDP Partnership for the Future.

Bi-communal teams of engineers working together

The new plant will serve a population of 270,000 people from both communities and will be able to treat an average of 30,000 m3/day.

When water is scarce reusing it is beneficial for everyone.

In many countries, water and wastewater management has proved to be a powerful incentive to overcome political and cultural tensions, and build trust and peace between different communities.
In Cyprus, wastewater management has been at the core of bi-communal cooperation between the two communities of Nicosia since the 1960's.

Through the project for the new Nicosia Wastewater Treatment Plant (WWTP), the Sewerage Board of Nicosia, the European Union and the United Nations Development Programme (UNDP), have been promoting and facilitating access to wastewater services for **both communities** of Nicosia as a fundamental contribution to the ongoing peace and confidence-building process.

Lellos Demetriades - Mustafa Akıncı

Since 1978, the local Representatives of the two communities in Nicosia and their corresponding engineers have been working together for a bi-communal wastewater treatment plant project. Since the beginning of its operation in the year 1980, the plant has been a perfect example of the bi-communal co-operation between sewerage engineers from both sides, with main objective the provision of the best possible service to both communities of Nicosia. In 2009, the two communities escalated their cooperation efforts towards the finalization of an agreement for the construction of a new wastewater treatment plant, now in operation since July 2013. The EU and UNDP have fully supported all the above efforts and sincere cooperation between the two communities of Nicosia.

Kutlay Erk - Michael Zampelas

Eleni Mavrou - Cemal Bulutoğluları

Kadri Fellahoğlu - Constantinos Yiorkadjis

The project for the New Nicosia Wastewater Treatment Plant started in March 2010 and was completed in June 2013.

A LONG-LASTING BI-COMMUNAL COLLABORATION

In 1978, following delicate negotiations, the local representatives of the two communities, with encouragement and assistance from the UNDP and the World Bank, reached an agreement to complete the construction of a **common sewerage system.**

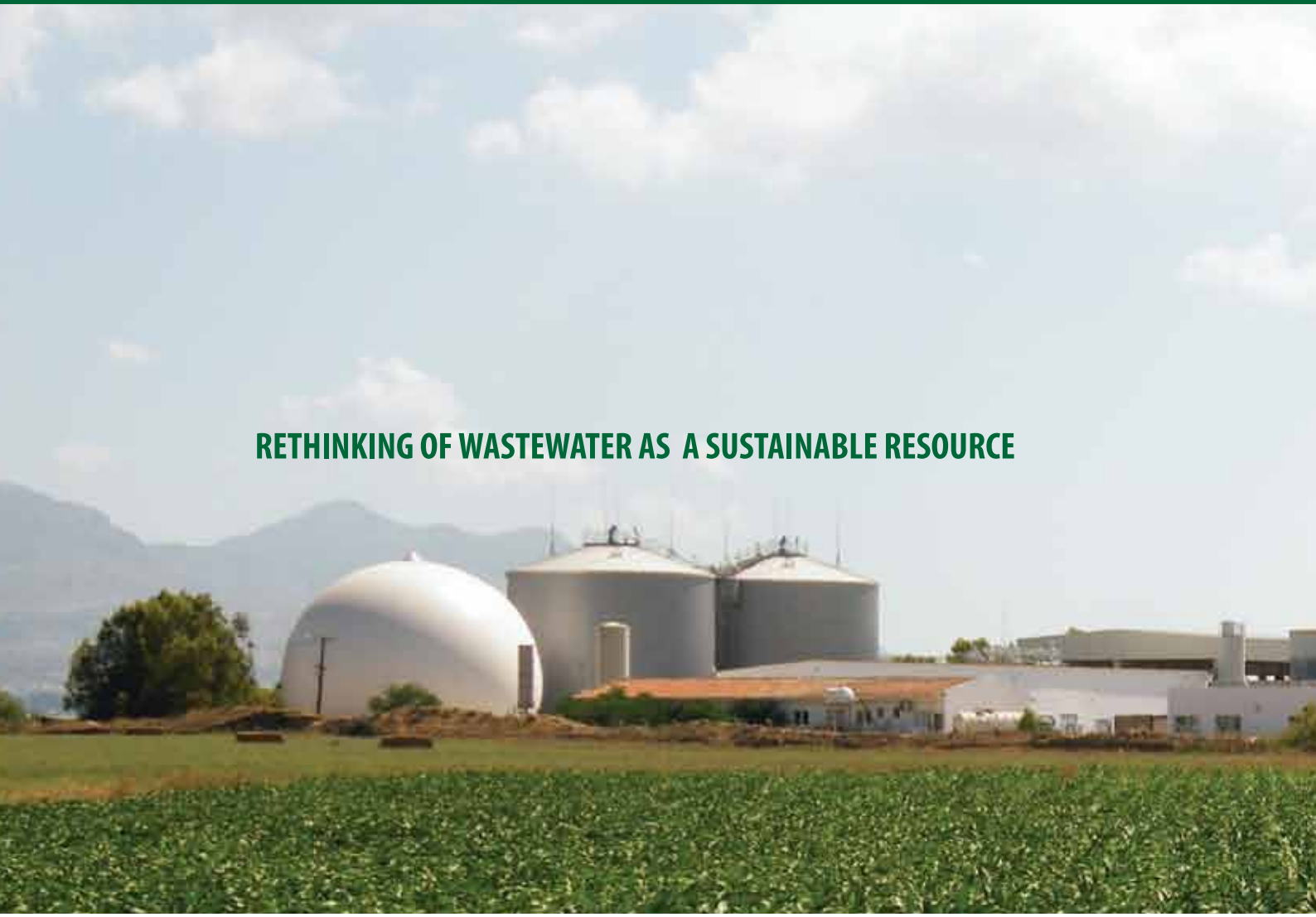
Since the beginning of its operation, in 1980, the plant has been a perfect example of the **bi-communal co-operation** between Greek Cypriot and Turkish Cypriot sewerage engineers, with the provision of the best possible service to both communities of Nicosia as the objective.

In early 2003, the plant started to face growing environmental problems. This led the new representatives of the two communities to discuss the future of the Nicosia WWTP. Joint efforts allowed for the design of a new plant, using state-of-the-art membrane technology not only to solve the existing environmental problems, but also to allow for more sustainable reuse of treated water.

The European Commission has actively supported this project from its inception, fully financing the design of the new plant and 30% of its construction, the balance being provided by SBN.

The UNDP provided assistance in implementing the project. It promoted and facilitated dialogue between the two communities, and oversaw the implementation of the project.

RETHINKING OF WASTEWATER AS A SUSTAINABLE RESOURCE



In the past, wastewater treatment was a method of processing contaminated water so that it would not harm the local communities or the environment. However, in recent years, throughout Europe, wastewater treatment technology has been developed in order to allow wastewater to be reused.

State-of-the-art wastewater treatment technology using membrane bioreactors allows safe reuse of the treated water in agriculture. Side-products of the wastewater treatment are converted into renewable bioenergy (biogas) and biosolids which can be reused as fertilizers, substantially reducing its environmental footprint.

Through the project for the new Nicosia Wastewater Treatment Plant the **two communities of Nicosia have placed Cyprus at the forefront of wastewater treatment in Europe,** *as it is now the second largest wastewater treatment plant in Europe to use membrane technology.*

Existing Plant: 900 000 m²

New Plant: 35 000 m²

THE NEW NICOSIA WASTEWATER TREATMENT PLANT

In recent years, due to a **growing urban development** in both sides of Nicosia, the existing WWTP began to increasingly experience **capacity overload** and could not meet European Union effluent quality requirements. This led to **heavy environmental burdens** for the neighbouring areas, and unpleasant odours had become a serious nuisance to Nicosia residents.

This challenge brought the two communities of Nicosia to consider the opportunities offered by wastewater and to start thinking of it as a resource.

A new state-of-the-art wastewater treatment infrastructure was designed which has resulted in a very significant improvement of wastewater collection and treatment.

The new wastewater treatment plant serves the needs of both the **Turkish Cypriot and Greek Cypriot communities** and produces **high-quality treated sewerage effluent** (TSE) which can be used for irrigation. TSE complies with applicable standards for irrigation and any discharge of TSE will have a positive impact on the environment.

Beyond the scope of this project, new projects are in the planning stage to find an agreement between the two communities of Nicosia for the **reuse of the treated water for irrigation purposes** as well as for **the reuse of the sludge produced as a natural fertilizer.**

The use of membrane bioreactors resulted in a very significant improvement of the treated water quality while at the same time substantially reducing the footprint on the land. The old plant covered an area of 900 000 m² while the new plant requires 35 000 m² only.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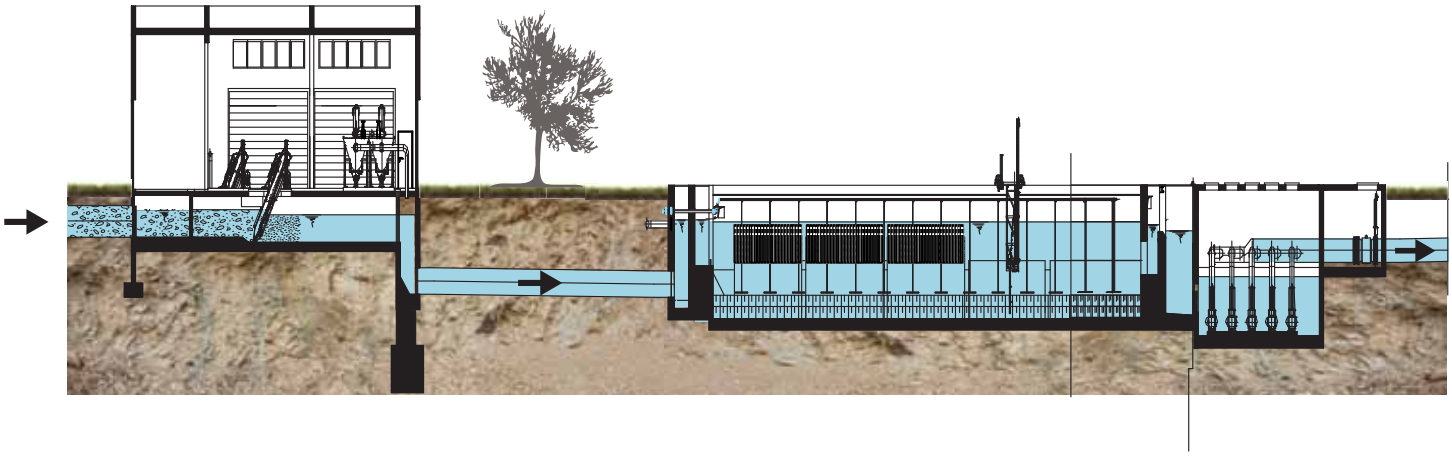
Google earth

1 SCREEN BUILDING

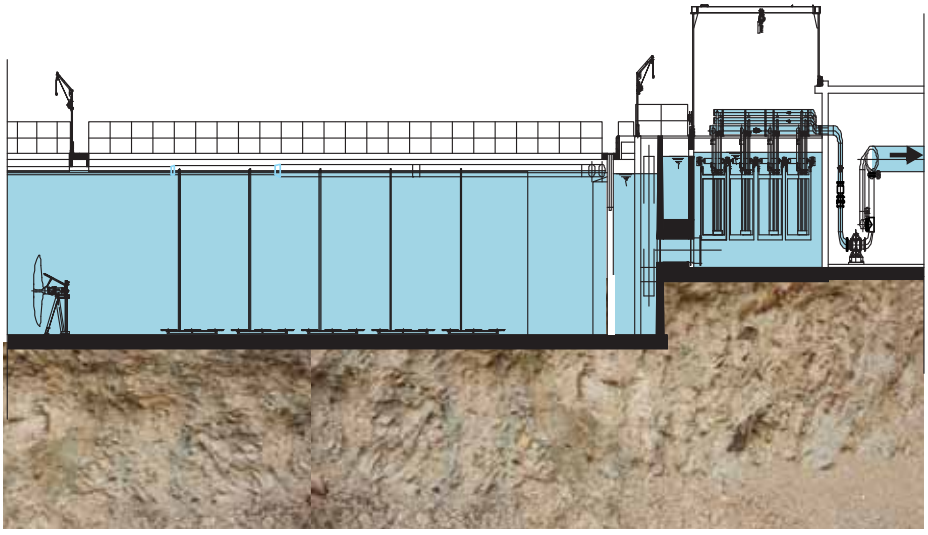
2 GRIT AND GREASE CHAMBER

3 PUMP STATION



7 NITRIFICATION

8 MEMBRANE TREATMENT

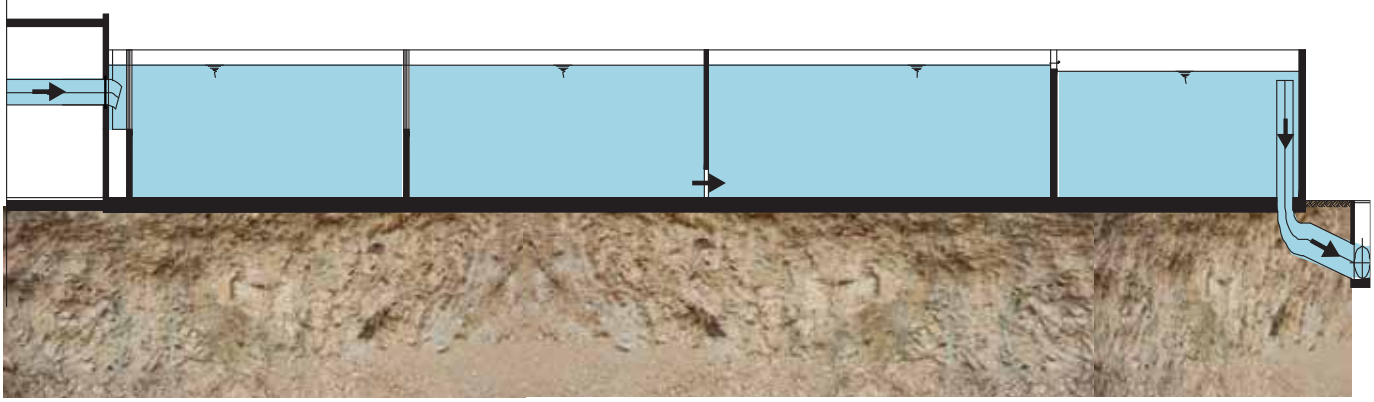


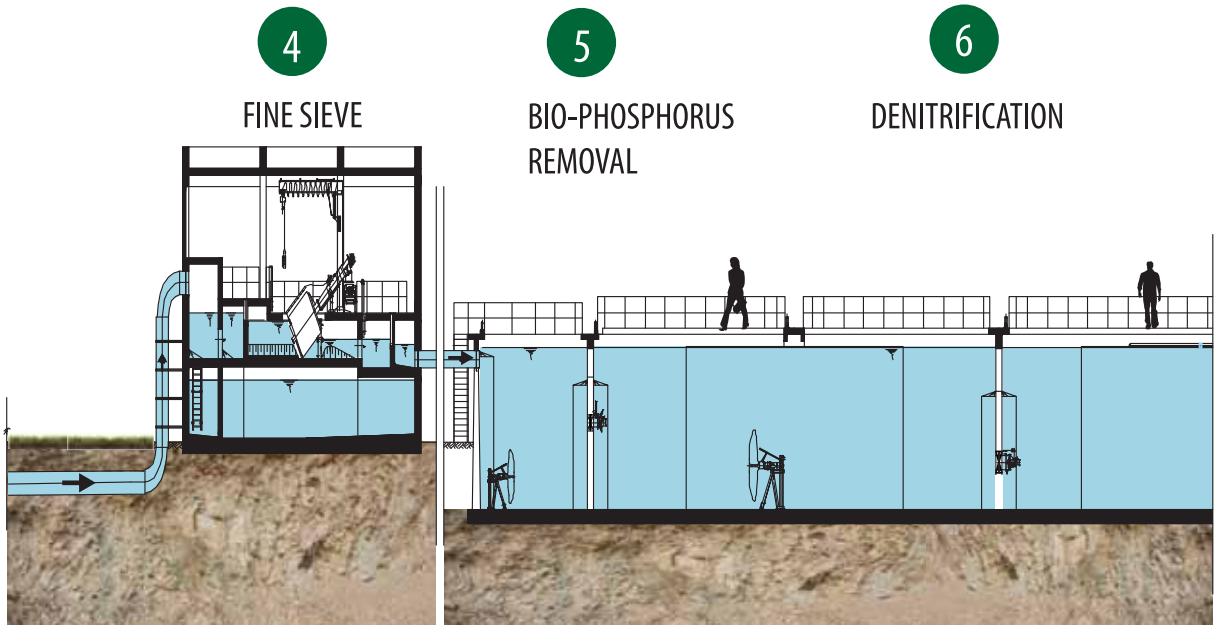
HOW DOES THE NEW TREATMENT PLANT WORK?

9 MACHINE ROOM

10 CHLORINE CONTACT TANK

11 TREATED SEWAGE EFFLUENT TANK





First of all, sewage is separated into liquid and solid waste. The wastewater goes through the first chamber (1) where it is passed through a screen that removes solids larger than 6mm. The flow then slows down so that the heavy solids (grit, sand) can fall to the bottom and oil and grease float to the surface (2). This is then removed. The water is then pumped (3) to a fine sieve to remove solids larger than 2mm (4).

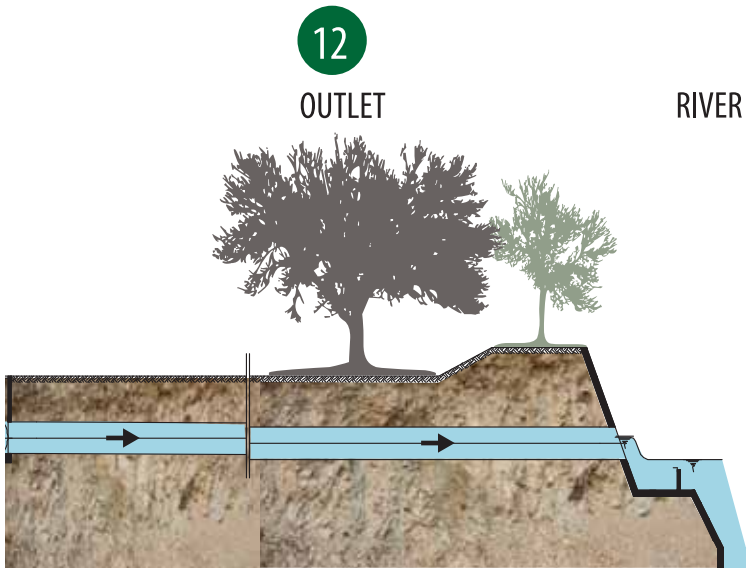
The next step is the biological treatment of the waste. This includes creating conditions to encourage bacteria to grow by controlling the oxygen supply (5,6,7). The bacteria then consume the waste.

The next stage is the separation and treatment of the by-products of the process into clean water, fertilizers and biogas.

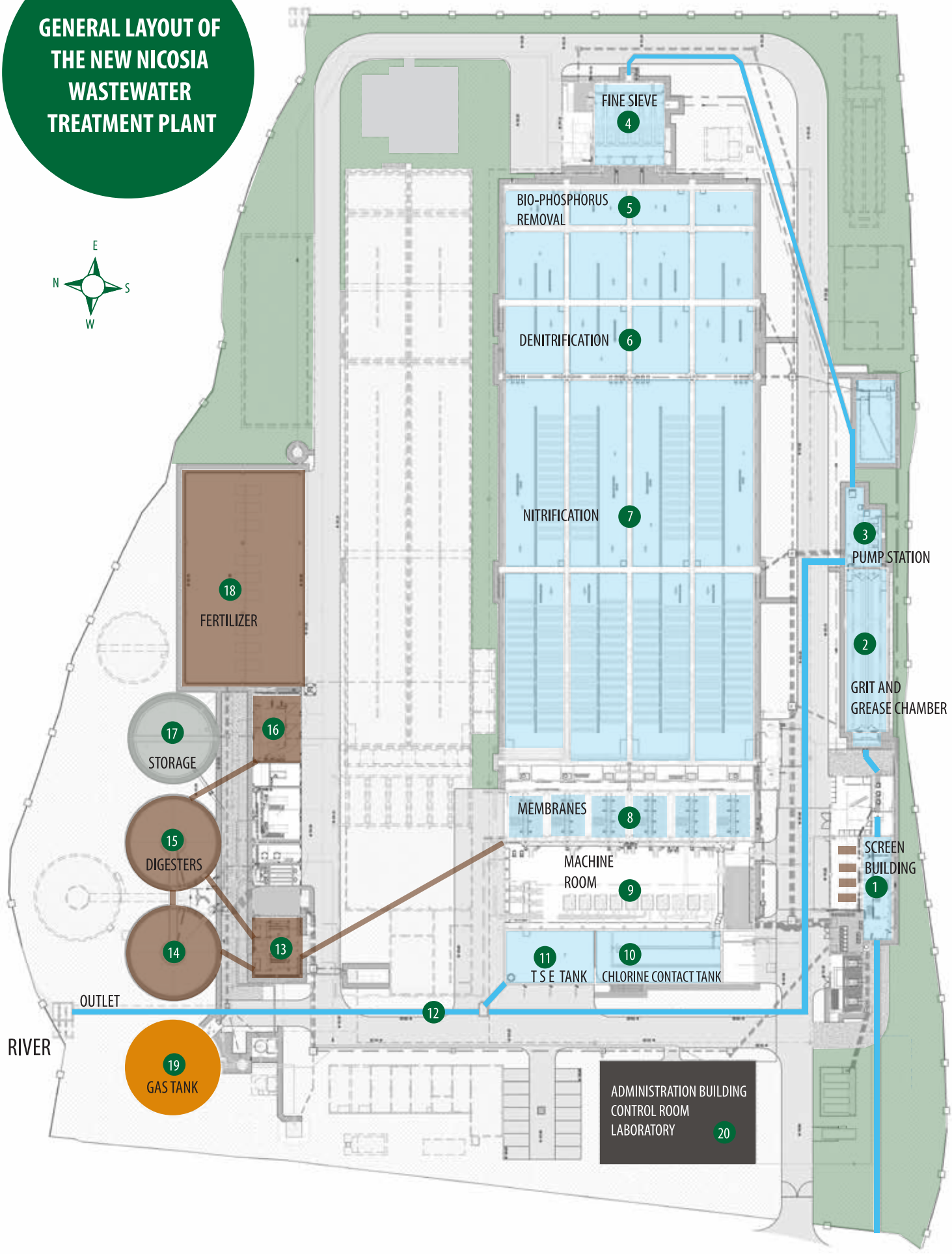
The clean water is separated from the sludge (which is mainly bacteria) using special membranes (8). The water is disinfected (10) and discharged into the river (12). It can be used for irrigation, but not for drinking.

Most of the sludge is recirculated through the biological treatment section (5,6,7). But as the biomass grows with all the "food" and oxygen available, excess sludge is produced and taken out of the process. It is thickened, digested and then dewatered to make "sludge cake", which can be used as fertiliser.

The biogas produced in digesting the sludge is used to make heat and electricity, which helps to reduce the cost of running the plant.



GENERAL LAYOUT OF THE NEW NICOSIA WASTEWATER TREATMENT PLANT



THE WATER LINE

1. SCREEN BUILDING

This is where the treatment of wastewater begins.The influent is passed through a screen so that larger solids such as plastic, glass and stones are removed.

2. GRIT AND GREASE CHAMBER

Here the heavy solids (grit, sand) fall to the bottom and oil and grease float to the surface. This is taken away periodically in skips.

3. PUMP STATION

At this point there is a meter that measures the flow into the plant and a pumping station pumps the wastewater to the next stage.

4. FINE SIEVE BUILDING

The water is further cleansed in order to remove small solids and fibres.

5,6,7. BIOLOGICAL TREATMENT/AERATION

This stage includes controlling various conditions so bacteria can grow by using organic matter in the wastewater as food. These bacteria remove the biological pollution in the water.

8. MEMBRANE TREATMENT

The water is separated from the sludge (which is mainly bacteria) using special membranes that are then periodically cleaned through a process of reverse pumping.

9. MACHINE ROOM

This is where the machines that are used in the membrane treatment process are located.

10. CHLORINE CONTACT TANK

A twenty minute contact with chlorine ensures that the water is disinfected.

11. The treated water flows into the TSE tank and then through the outlet (12) into the river.

THE SLUDGE LINE

13. The volume of sludge that is separated from the water during the membrane treatment is reduced here by thickeners.

14 and 15. ANAEROBIC DIGESTERS

The digesters are insulated and kept at 37°C with no oxygen to encourage bacteria to grow and thus reduce and stabilise the excess sludge. This gives off methane as a by-product that is used in the gas line (see below).

16. The sludge is further dewatered here by Centrifuges to a 30% consistency, so it is no longer liquid.

17. Storage tank for excess sludge.

18. Temporary storage area for sludge cake, reusable as fertiliser.

THE GAS LINE

19. This is the gas tank where the biogas that is produced in the anaerobic digesters is kept. It is then fed back to the combined heat and power units. These produce the heat needed for the digesters and also electricity, to help reduce the costs of running the plant.

ADMINISTRATION

20. The administration building, which consists of the control room, a laboratory and offices, is located near the entrance to the plant.

Anaerobic Digesters

THE NEW PLANT IN FIGURES

270,000 people from both communities will be served by the new plant.

30,000 m^3 of wastewater will be treated in the new plant everyday on average.

10 million m^3 of treated water per year could be reused for agricultural irrigation.

Depending on the type of crop and the crop rotation strategy, approximately **500 hectares can be irrigated with the treated water** reducing the over-extraction of groundwater in the area, thus enhancing water resources and water conservation.

Over **3,000 tons** of dry solids suitable for use as natural fertilizer will be produced every year. The sludge resulting from the treatment will be converted into dry sludge compost.

The WWTP has anaerobic sludge digesters and **is capable of producing electricity from biogas.**

The operation of the plant will therefore be partly powered by renewable energy (10% to 20% on average), reducing its CO2 emissions.

Aeration Tanks

THE NEW PLANT IN PICTURES

1. SCREEN BUILDING
2. GRIT AND GREASE CHAMBER
3. BIOFILTERS
4. FINE SIEVE BUILDING
5,6,7. AERATION TANKS
8. MEMBRANE TREATMENT
9. MACHINE ROOM
10. AN OVERVIEW OF PARTS OF THE NEW PLANT
11. EFFLUENT TANK (TSE)
12. OUTLET OF WATER INTO THE RIVER
13. SLUDGE DEWATERING
14,15. ANAEROBIC DIGESTERS
16,17,18. SLUDGE DEWATERING AND STORAGE
19. GAS TANK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16 17 18


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Engineering students from both communities visiting the plant on World Water Day 2013

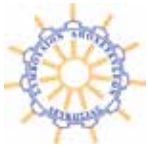
MUTUAL TRUST AND COOPERATION: THE FUTURE MANAGEMENT

The new wastewater treatment plant entered into operation in June 2013.
At present, the treated water is diverted in the river. Both communities are working together towards its re-use for irrigation purposes.

"We consider this an extremely important achievement for both communities in the greater Nicosia area. We would like to express our gratitude and congratulations to the European Union, the United Nation Development Programme and all those who contributed in making this project a reality."

Constantinos Yiorkadjis and Kadri Fellahoğlu, local Representatives of the two communities in Nicosia.

A project jointly funded by:
Sewerage Board of Nicosia and European Union



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