all together

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new edition

TEMAK®
TOTAL WATER SOLUTIONS

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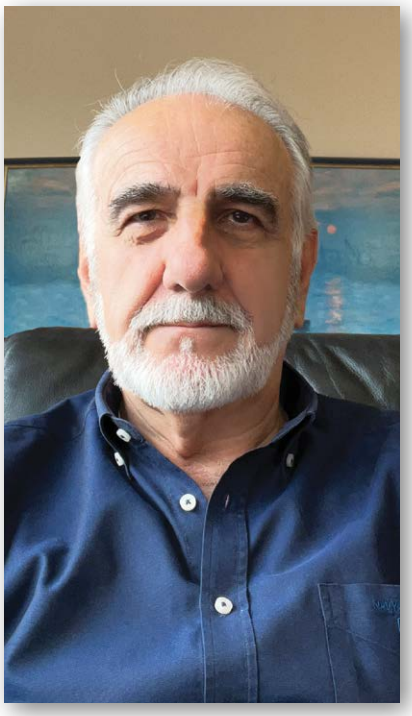

Herodes Mitsopoulos
President & CEO
of TEMAK

Quality in every aspect of our lives

Each and every one of us, whether we are consumers or professionals, regurarly hold discussions about the quality of things and it's one of the main criteria that defines our choices.

A product is considered of high quality when it is properly studied and designed, the people that made it are specialized for such applications, state of the art machinery is used for its manufacturing, first class raw materials are used and it satisfies the needs of the client in the safest, most complete, efficient and most economical way possible.

A high quality product is the one that has a long lifespan, that doesn't cause any problems while being used, that helps and does not hinder the work of the user, that is at all times ready to be used by the customer and does not require the constant care and attention of the customer due to malfunctions.

Moreover, once a quality product leaves the premises of the producer and is shipped to the customer, it should not bother the producer ever again, as it is not returned to him and labeled as defective but it rather promotes the excellent craftsmanship of the producer.

Furthermore, when the product/machinery is related to Industrial or Hospital applications, where their quality, economical, reliable and long running operation is crucial and the main factor of the well being of a company, of good health and well-being of the people living in a city or the patients of a hospital, then the quality of the products that is supplied to them holds a multidimensional part in achieving the target of such a unit.

In order to achieve the high quality of the product, it is mandatory for the business to operate in a CERTIFIED quality manner as a whole. This includes the organization, the operation, the communication with the customers and the suppliers, the agreements, the relationships between the employees, the obligations towards the employees, the state, the society, the environment and in general all the processes that are performed until the product is made.

Us in TEMAK, since our beginnings 45 years ago, study, design, produce and supply Industries, Municipalities, Hotel Complexes, Hospitals, Ships, residencies and professionals in GREECE and ABROAD, with devices and systems on water treatment applications, having as our outmost priority the QUALITY of them.

The high quality water treatment systems offered by TEMAK, operate in our clients' premises for many decades, unceasingly, reliably, economically, smoothly producing water of high quality, benefitting thousands of our customers.

Our vision of offering high quality products and services, of creating stable and long relationships based on trust with our clients, the society and our employees, keeps growing and being materialized steadily and consistently, as it always has.

In conclusion, quality should follow us in every aspect of our lives!

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TEMAK® & Energy

We, at **TEMAK, invest in innovative technologies of high quality for the energy-saving design** of the water treatment systems in order to significantly reduce the environmental footprint and the energy consumption of the systems. **We protect and support each client against the world energy crisis of the latest years** which has caused a continuous energy shortage all over the world and the increase price of energy.

We study, design, develop, produce, install and support innovative projects for projects operating with renewable energy sources. One of our most important projects is the installation of a **sea water reverse osmosis system** producing 850 l/h of drinking water operating with solar panels in Strogili Island, Greece. The desalination system operates with electricity produced from solar panels, is equipped with energy recovery device and achieves energy savings at 50%.

The result of our consistent efforts comes with our **awards in national and international contests**. TEMAK has been awarded:

- ✓ With the **gold award in the Best City Awards in 2017** in the category: **Green City - Management of Water Resources - Desalination** for the desalination system operating with solar panel in Strogili.
- ✓ With the **second Global Water Award "Mohammed Bin Rashid Al Maktoum Global Water Award" in 2017**, in the category: **Innovative Projects**, Small and big projects of the institute UAW Water Aid Foundation (Suqia), using innovative projects (desalination operating with solar panels) for combating the global water scarcity problem. Our project was evaluated among **138 projects in 43 countries** participated and competed for the conception of innovative solutions against the global water scarcity problem.

We participated in the **Desalination for the Environment Clean Water and Energy** that was held in September of 2018 in Athens and in May 2023 in Cyprus as a golden sponsor. Nonetheless, in **TEMAK** we do not restrict ourselves only by the Energy design of the systems, the **Continuous Learning** and the **Support of Initiatives for Clean Water, Environment and Energy**. By designing and implementing an Energy Management System according to **ISO 50001:2018**, we recognize our responsibility and obligation towards **Humans, Society, Environment and Sustainable Management** of our energy resources. We identify all the energy variables that are related to our activities and develop procedures that **upgrade** our offered products and services, aiming to continue improving our energy performance and support energy design activities that promote the decrease of our environmental impact

For a better & Safe Tomorrow:

- ✓ We trust the know-how and suggestions of TEMAK **(www.temak.gr)**
- ✓ We protect the enviroment
- ✓ We support activities and systems of energy management




Kithira Municipality: Sea water desalination systems producing 3x300 m³/day for the residential areas of Agia Pelagia and Diakofti

PROJECT COMPLETION DATE
May of 2023

INTRODUCTION
After a public tender procedure the region of Attica assigned the project of <<Manufacturing and Operation of mobile desalination systems for the residential areas of Agia Pelagia and Diakofti>> to TEMAK, in order to install three mobile desalination plants producing 300 m³/day of potable water each.

THE CHALLENGE
The desalination systems were manufactured in TEMAK's factory and where afterwards installed and commissioned in a short period of time in order to cover the high demand for potable water during sumertime. TEMAK performed a remarkable work, not only in manufacturing the systems, but also in manufacturing the sea water pumping and feed networks, as well as the potable water distribution network, leading the water to the tanks of the municipality and finally the brine reject network.

SOLUTION
The desalination systems use the method of reverse osmosis (RO) and are designed in a way that make them autonomous, user and environmental friendly. The equipment for each of the desalination systems(pre-treatment, post-treatment, filters, membranes, high pressure pumps etc.), are installed in a 40 feet container of standard dimensions.

The layout of the equipment in the containers ensures the systems easy operation and maintenance. Each of the desalination system's is equipped with its own energy recovery device, achieving a reduction in the electrical energy consumption of up to 50%.
Every system has the right equipment to ensure that the water treatment procedure is fully autonomous (sea water intake pumps, feed pumps, high pressure pumps, desalination membranes, dosing pumps, CIP equipment etc.).

RESULT
Potable water sufficiency for the Agia Pelagia (600 m³/day) and Diakofti (300 m³/day) residential areas.

Nisiros Municipality: Sea Water Desalination System producing 600 m^3/day of potable water

PROJECT COMPLETION DATE
March of 2023

INTRODUCTION
After a public tender procedure the Ministry of Maritime Affairs & Insular Policy assigned TEMAK with the installation of a sea water desalination system producing 600 m^3/day of potable water under the project << PROCUREMENT OF A NEW SEA WATER DESALINATION PLANT PRODUCING 600 m^3 OF POTABLE WATER PER DAY AND UPGRADE OF THE CURRENT ELECTRICAL ESTABLISHMENT IN THE MUNICIPALITY OF NISIROS

THE CHALLENGE
The goal of this project is to further increase the capacity of the TEMAK desalination plants that were at that time installed in the municipality, in order to cover the increased needs of the island during summertime and at the same time to offer redundancy in case of a malfunction of one of the plants. TEMAK also undertook the project of installing a new modular switchboard and a transformer that would allow the simultaneous control of both the new desalination plant and the old ones that were previously installed in the municipality.

SOLUTION
The desalination systems use the method of reverse osmosis (RO) and are designed in a way that make them autonomous and user and environmental friendly. The equipment for each of the desalination

systems (pre-treatment, post-treatment, filters, membranes, high pressure pumps etc.), are installed efficiently in the pre-existing desalination plant building of the municipality.

The layout of the equipment ensures the system's easy operation and maintenance. Each of the desalination systems is equipped with its own energy recovery device, achieving a reduction in the electrical energy consumption of up to 50%.

Every system has the right equipment to ensure that the water treatment procedure is fully autonomous (sea water intake pumps, feed pumps, high pressure pumps, desalination membranes, dosing pumps, CIP equipment etc.).

RESULT
The system was installed at the same area that our company had previously installed systems of a total capacity of 1000 m^3/day, thus increasing the total daily capacity to 1600 m^3 of potable water. In this way a permanent and definite solution is offered for the issues that the island had been facing regarding water scarcity.

Oinousses Municipality: Sea Water Desalination System producing 370 m³/day of potable water

PROJECT COMPLETION DATE
December of 2022

INTRODUCTION
After a public tender procedure the Oinousses Municipality awarded TEMAK with the installation of a desalination system that produces 370 m³/day of potable water under the project << PROCUREMENT OF A DESALINATION PLANT FOR THE AGIOS IOANNIS AREA OF OINOUSSES ISLAND>>.

THE CHALLENGE
The goal of this project is to further increase the capacity of the TEMAK desalination plants that were at that time installed in the island in order to cope with the high demand of water during summertime and also to offer redundancy in case of a system malfunction. The port of the island is not large enough to allow a large ship to reach it and transport the system, so TEMAK had to come up with a solution in order to face this issue, by chartering a smaller ship to perform the transportation of the system.

SOLUTION
The desalination systems use the method of reverse osmosis (RO) and are designed in a way that make them autonomous and user and environmental friendly.
The equipment for each of the desalination systems (pre-treatment, post-treatment, filters, membranes, high pressure pumps etc.), are installed in a 40 feet container of standard dimensions.
The layout of the equipment in the containers ensures the systems easy operation and maintenance.

Each of the desalination systems is equipped with its own energy recovery device, achieving a reduction in the electrical energy consumption of up to 50%.
Every system has the right equipment to ensure that the water treatment procedure is fully autonomous (sea water intake pumps, feed pumps, high pressure pumps, desalination membranes, dosing pumps, CIP equipment etc.).

RESULT
A 370 m³/day increase to the total potable water production in order to cover the full needs of the island.

Fournoi Korseon Municipality: Sea Water Desalination System producing 100 m³/day of potable water for the Chrysomilia residential area

PROJECT COMPLETION DATE
December of 2021

INTRODUCTION
After a public tender procedure the Municipality of Oinousses assigned TEMAK with the installation of a mobile desalination system producing 100 m³/day of potable water, under the project << PROCUREMENT OF A MOBILE DESALINATION SYSTEM PRODUCING 100 m³/day OF POTABLE WATER FOR CHRISOMILIA >>.

THE CHALLENGE
The goal of this project is to further increase the capacity of the TEMAK desalination plants that were at that time installed in the island in order to cope with the high demand of water during summertime and also to offer redundancy in case of a system malfunction.

SOLUTION
The desalination systems use the method of reverse osmosis (RO) and are designed in a way that make them autonomous and user and environmental friendly.
The equipment for each of the desalination systems(pre-treatment, post-treatment, filters, membranes, high pressure pumps etc.), are installed in a 20 feet container of standard dimensions.
The layout of the equipment in the containers ensures the systems easy operation and maintenance. Each of the desalination systems is equipped with its own energy recovery device, achieving a reduction in the electrical energy consumption of up to 50%.

Every system has the right equipment to ensure that the water treatment procedure is fully autonomous (sea water intake pumps, feed pumps, high pressure pumps, desalination membranes, dosing pumps, CIP equipment etc.).

RESULT
The system was installed at the same area as the system that we had previously installed back in 2008, increasing the total capacity from 100 m³/day to 200 m³/day of potable water. With the help of the new installation, the potable water sufficiency issues for the residential area of Chrysomilia of the Fournoi Korseon Municipality were solved once and for all.

Hotel in Kos island: Brackish Water Desalination System producing 100 m^3/day of potable water

PROJECT COMPLETION DATE
April of 2022

INTRODUCTION
A 4* hotel complex based in the Lampi area of Kos island solved its water supply issues by installing a desalination system that produces potable water. The hotel management entrusted TEMAK with this project in order to upgrade the quality of their services, by improving the quality of the distributed water to its 160 rooms and the 10 buildings of the complex.

THE CHALLENGE
The water that was used in the hotel facilities was originated from two boreholes and had a high conductivity of up to 9000 μS/cm, while also being rich in Manganese and Iron, elements that rendered its use troublesome. Moreover, this project required a fast and flawless solution due to the hasty nature of the touristic sector.

SOLUTION
TEMAK, after taking into consideration all the variables that made this project difficult, designed a solution that would offer water of the highest quality, while also undertaking the installation and commissioning of it.

The initial step of the offered solution was the filtration via a multi-layered twin turbidity filter, in order to remove the total suspended solids, the Iron and Manganese and the solid particles in general. An activated carbon filter was installed afterwards, in order to remove organic compounds and free

chlorine. To minimize any hydraulic issues, the valves in the filters are electromagnetic. To achieve the best permeate water quality possible, a 10 membrane reverse osmosis system was installed, operating at a high pressure value, which can be achieved by using a centrifugal high pressure pump which is made of passivated AISI 316L, which offers increased durability against the heavy brackish water of this project.

RESULT
Even though the desired delivery time of the system was limited, due to the need of the system being operational before the touristic season start, TEMAK managed to tackle this issue by utilizing its huge experience and know-how on these kind of projects.

The flawless operation of the system was achieved by the start-up and calibration of the system, performed by our technician's excellent craftsmanship. The hotel complex was able to cover its potable water needs and upgrade its services to its customers.



Hotel in Corfu Island: Brackish Water Desalination System producing 740 m³/day of potable water

PROJECT COMPLETION DATE
May of 2023

INTRODUCTION
The hotel complex where the system was installed is part of a group that operates units in Corfu, Kos, Chalkidiki and also in Mallorca and Andalusia. TEMAK was entrusted with the procurement and installation of the desalination plant in the new hotel complex of the group in Corfu. TEMAK has been collaborating successfully with this hospitality group for many years now, as our company has been entrusted with installing a desalination plant in 2019 in Kos with a capacity of 700 m³/day and a desalination plant in 2018 in Corfu with a capacity of 610 m³/day.

THE CHALLENGE
The origin of the water used by the hotel facilities was 4 boreholes with high levels of turbidity. Apart from that, there were also challenges that had to do with the installation of the system, as this had to be performed simultaneously with the hotel complex construction. All the equipment needed had to be transported at first on a loader and afterwards on palette carriers.

SOLUTION
After taking into consideration all the variables, while aiming to offer a custom made solution to produce potable water of the highest quality for the hotel complex, TEMAK designed, manufactured, installed

and commissioned the system. The offered solution consists of multilayered filtration performed by a twin turbidity filter, in order to remove any suspended solids, iron and debris and a reverse osmosis unit of 24 membranes producing 760 m³ of of potable water per day in order to cover the needs of the hotel facilities.

RESULT
Even though the desired delivery time of the system was limited, due to the need of the system being operational before the commissioning of the hotel, TEMAK managed to tackle this issue by utilizing its huge experience and know-how on these kind of projects. The flawless operation of the system was achieved by the start-up and calibration of the system, performed by our technician's excellent craftsmanship. The hotel complex was able to cover its potable water needs and upgrade its services to its customers with the total operational cost being only 0.39 €/m³ of produced water.

Water Park - Corfu island: Brackish Water Desalination System producing 180 m³/day

PROJECT COMPLETION DATE
February of 2023

INTRODUCTION
Our system was installed in a Water park located in the island of Corfu which is one of the largest ones in the world, having 51 water slides and swimming pools. The company entrusted TEMAK with offer a complete solution in order to improve the quality of the water used in its facilities.

THE CHALLENGE
The feed water of the water park, is of high conductivity with its value being 4300 μS/cm. The bad quality of feed water was causing issues to the park facilities, as scaling had been observed on the water slides, which caused an increased roughness on them and was also an unpleasant sight.

SOLUTION
TEMAK undertook the project of studying, designing, manufacturing, procuring, installing and commissioning with the help of its exclusive partner in the island of Corfu, Aqua Pro, taking into consideration the client's need to produce water with a lower salt content which would be eligible for human consumption.

In order to produce the required water quantity which would also meet the quality demands for human consumption, a turbidity filter was offered as a first filtration step in order to remove any suspended solid sand as a second step a brackish water reverse

osmosis system consisting of 6 membranes, producing 180 m³ per day and covering the demands of the facilities

RESULT
The effective installation of the system was achieved due to the huge experience and knowhow of TEMAK. The flawless operation of the system was achieved by the start-up and calibration of the system, performed by our technician's excellent craftsmanship. The Water Park covered their needs for water of the highest quality, improved the quality of their services and eradicated the problems that were caused by the use of the high conductivity water. The company was furtherly benefitted by offering water that has a production cost of less than 0,35€ per cubic meter.

Psara and Oinousses Municipality: Water Kiosk, Automated system, producing and distributing 6000 lt/day

PROJECT COMPLETION DATE
December of 2022

INTRODUCTION
TEMAK was assigned to install one automated system that produces 6000 lt/day of potable water on each island.

THE CHALLENGE
The water kiosk offers potable water to the visitors of Oinousses and Psara or a 24 hours basis.

SOLUTION
Each of the systems is equipped with everything that will be needed in order to treat brackish water and produce potable water, store it, disinfect it and distribute it, which are a turbidity filter, an activated carbon filter, a reverse osmosis system, a UV lamp etc. The system is installed in a kiosk with the following dimension 2 m x 2 m x 2,5 m. A coin slot is installed on the kiosk in order to distribute water, depending on the price set by the Municipalities.

RESULT
Distribution of potable water to the residents and the visitors of the islands. The kiosks offer both environmental and economical benefits, since the bottled water consumption is minimized.

Hotel – Rodrigue Islands: Sea Water Desalinat on System for a Hotel Complex in the Rodrigue Islands

PROJECT COMPLETION DATE
June of 2022

INTRODUCTION
TEMAK was assigned with manufacturing a sea water desalination system, for a hotel complex that is located in Rodrigue islands, which produces 250 m^3/day of potable water.

THE CHALLENGE
There were some significant difficulties regarding the installation of the system, as it had to be installed in the basement of the hotel, where the only access was via an elevator. As a result, the equipment used had to be selected in such a way that would fit in an elevator and not surpass the maximum weight that it could lift. For this reason, TEMAK designed and built a tailor made solution to meet the demands of this project.

SOLUTION
The system consists of a sea water desalination unit which is equipped with an energy recovery device, that produces 10,70 m^3/h.

The pretreatment of this project consists of turbidity filters, activated carbon filters, cartridge filters and dosing systems. For the posttreatment, TEMAK offered a rehardening filter, to increase the hardness and alkalinity levels of the permeate water and a sodium hypochlorite dosing system for disinfection purposes.

The product water is collected in a tank and then distributed to the various hotel facilities.

RESULT
250 m^3/day of potable water produced according to the standards set by the World Health Organisation (WHO).

Hotel - Seychelles: Sea Water Desalination System for a Hotel Complex in Seychelles

PROJECT COMPLETION DATE
March of 2022

INTRODUCTION
TEMAK was assigned with manufacturing two water treatment systems that would be installed in a hotel complex in Seychelles, with a total potable water production of 250 m^3/day.

THE CHALLENGE
We faced two challenges during this project. The first one was the imperative time-schedule set by the contractor as he needed the system to be operational in a short amount of time, resulting in us modifying our usual delivery time for containerized units in order to meet his demands. The second challenge had to do with the thorough inspection of the company that was assigned to issue the inspection release notice, that would allow us to load and transport the system.

SOLUTION
The system consists of two sea water reverse osmosis systems, equipped with an energy recovery device each, producing 5.3 m^3/h each.

The pre-treatment consists of turbidity filters, activated carbon filters, cartridge filters and dosing systems.

The post-treatment consists of a rehardening filter that will enrich the permeate water by increasing its hardness and alkalinity levels and a sodium hypochlorite dosing system for disinfection purposes.

The product water is collected in a tank before it is distributed to the various hotel facilities.
The installation of each system including its respective pre and post treatment was in one 40 feet container.

RESULT
The total production of the two systems is that of 250 m^3/day of water potable for human consumption according to the World Health Organisation (WHO) standards.

Clinic - Nicosia: Water Treatment System for the Hemodialysis Unit of a Clinic in Nicosia

PROJECT COMPLETION DATE
August of 2022

INTRODUCTION
TEMAK and its local partner in Cyprus for medical applications were assigned with the manufacturing and installation of the water treatment system that would feed the hemodialysis units of the first private hemodialysis clinic in Nicosia.

THE CHALLENGE
Undertaking and completing the project that is the installation of the first private water treatment system meant for hemodialysis in Cyprus.

CERTIFICATES
Our system is equipped with a CE certificate, according to chapter V of the directive 93/42/EEC and its incorporation to the Greek legislation for water treatment systems for the production and dilution of hemodialysis solutions.

SOLUTION
The system consists of a double pass reverse osmosis online system. At every stage of the process there is an 100% redundancy to ensure the system's unceasing operation. The system produces 2000 lt/h of permeate water which is suitable for hemodialysis applications, which is then distributed to the hemodialysis units of the clinic via a loop ring. A pressure regulating system ensures that the water reaches each of the hemodialysis units with the appropriate pressure value.

RESULT
Production of 2000 lt/h of water suitable for hemodialysis applications, according to the European Pharmacopoeia and AAMI standards, ensuring at the same time the absence of any pathogens.

Hotel - Oman: Brackish Water Treatment System for a hotel complex - Resort at the Jabal Akhdar mountain of Oman

PROJECT COMPLETION DATE
August of 2022

INTRODUCTION
TEMAK supplied our partner in Oman with a brackish water treatment system that produces 120 m^3/day of water, after our partner was assigned the project to install this system in a hotel complex, stationed in the Jaba Akhdar mountain of Oman.

THE CHALLENGE
The system was to be installed in a new hotel complex, placed on a mountain, an area which is not easily accessible from Muscat. TEMAK had to coordinate its partner, in order to ensure that the installation would be performed flawlessly. Additionally, the final client required the system to be fully operational in a tight time-frame, which TEMAK was able to complete.

SOLUTION
The system consists mainly by our TFA500/MG turbidity filter and our TBW34L brackish water reverse osmosis system.

RESULT
Production of 20 m^3/day of water with a total dissolved solids concentration of < 50 ppm, of general use around the hotel's facilities.

Water Treatment System for a shrimp breeding factory in Madagascar

PROJECT COMPLETION DATE
January of 2023

INTRODUCTION
This specific shrimp farm was the first one worldwide to get the official organic certification AB Label (France / EU n°2092-91 regulation). After being completely satisfied with the water treatment system that TEMAK supplied to them back in 2015, they assigned TEMAK with this new project where they needed potable and filtrated water for their factory.

THE CHALLENGE
The source of the water to be treated is a lagoon, which had a high concentration in TSS/NTU and its quality is not consistent all year around. This project needed to be studied meticulously and the client needed to be guided carefully in order to ensure that the data we received and based our design on were the worst scenario possible. Moreover, the filters had to be sized in a way to ensure that they would be able to process the high TSS/NTU concentration in order to lower it to levels below the limitations set by the reverse osmosis membrane manufacturers.

SOLUTION
The system is comprised of a turbidity filter to suspend the turbidity, an activated carbon filter to remove any free chlorine and any organic compounds. The filters were sized in a way to maintain a low filtration velocity in order to achieve a more efficient filtration. We also included PBH bag filters before the turbidity filters, to protect the control valves of the turbidity and activated carbon filters. As a final step of filtration, 2 gradual filtration cartridge filters were added to ensure that the standards for the inlet water quality set by the high pressure pump and membrane manufacturers were met.
The reverse osmosis system is equipped with low energy consuming sea water membranes, in order to maintain a low pressure value thus save more energy. The maximum recovery after taking into consideration the parameters of the project, was set to 41% to achieve the best combination of salt rejection and pressure value. The operating pressure value at the lowest temperature is 55.66. The pump used in this occasion is a DANFOS positive displacement pump, made of Super Duplex Stainless Steel and is controlled by a VFD (Variable Frequency drive). The high pressure piping is made of Super Duplex SS to minimize corrosion and increase its longevity.
The system includes an automated CIP/FLUSH system, which collects permeate water to the Flush tank(500L) and flushes water into the piping and membranes whenever the system stops. This way we eliminate the chances of corrosion in the high pressure piping and we protect the membranes.
The product water is dosed with caustic soda for pH correction and afterwards with sodium hypochlorite to keep the water disinfected while stored in the product water tank before usage.
All the equipment was installed in a 40ft HC sea worthy container, which has thermal insulation, ventilation and AC. The system went through in house hydraulic and electrical testing before it was packaged and shipped to our customer.

RESULT
Production of 80 m^3/day of potable water according to WHO standards with a TDS concentration of <450 ppm. Filtrated water for general use of the various activities of the factory.

Water Supply for the villages Crivina & Vrancea in Romania: Heavy brackish water of 10.400 ppm TDS concentration treated with reverse osmosis in order to be used in these areas

PROJECT COMPLETION DATE
May of 2023

ΕΙΣΑΓΩΓΗ
The Romanian government has undertaken the completion of water treatment projects all over the country, to ensure that every single one of the villages has access to potable water. In one of these projects, TEMAK was assigned with the procurement of a brackish water desalination system that produces 260 m^3/day to supply water to the Crivina & Vrancea villages.

THE CHALLENGE
The feed water had an extremely high concentration in total dissolved solids (10.400 ppm), ammonium ions (6.4 ppm) and silica (47 ppm). The temperature of the borehole water during the winter can reach a value as low as that of 10 degrees Celsius. The system design had to be done in a way that would allow for an efficient salt rejection rate and ensure that there would be no scaling on the surface of the membranes due to the presence of silica and calcium carbonates.

SOLUTION
The system is comprised of a turbidity filter that suspends turbidity, an activated carbon filter that retains organic compounds and free chlorine. The reverse osmosis system is equipped with low energy consuming membranes in order to reduce the operating pressure. The recovery of the system was set to 50% in order to achieve the desired salt

rate rejection while maintaining a low pressure value. The operating pressure value at the lowest measured temperature (10 degrees Celsius) is 29 bar. The pump used is a centrifugal multistaged vertical one with 13 impellers made of stainless steel.

The reverse osmosis product water goes through a rehardening filter. The total production of the system is 11 m^3/h. The ammonium ions concentration is higher than 0.5 ppm, which is the maximum valume set by the European standards for potable water. In order to further decrease that, the product water is dosed with sodium hypochlorite in the product tank, in order for the remaining ammonium ions to be oxidized, with the product of this reaction being nitrogen in a gas form. The free chlorine surplus is retained by an activated carbon which is installed in the distribution line.

RESULT
Production of 11 m^3/hour (260 m^3/day) of potable water, according to the European Union Standards for potable water

Djibouti: Soft Drink Production Industry - Sea Water desalination reverse osmosis system to treat a 38.000 ppm TDS feed, for the various needs of the factory

PROJECT COMPLETION DATE
January of 2022

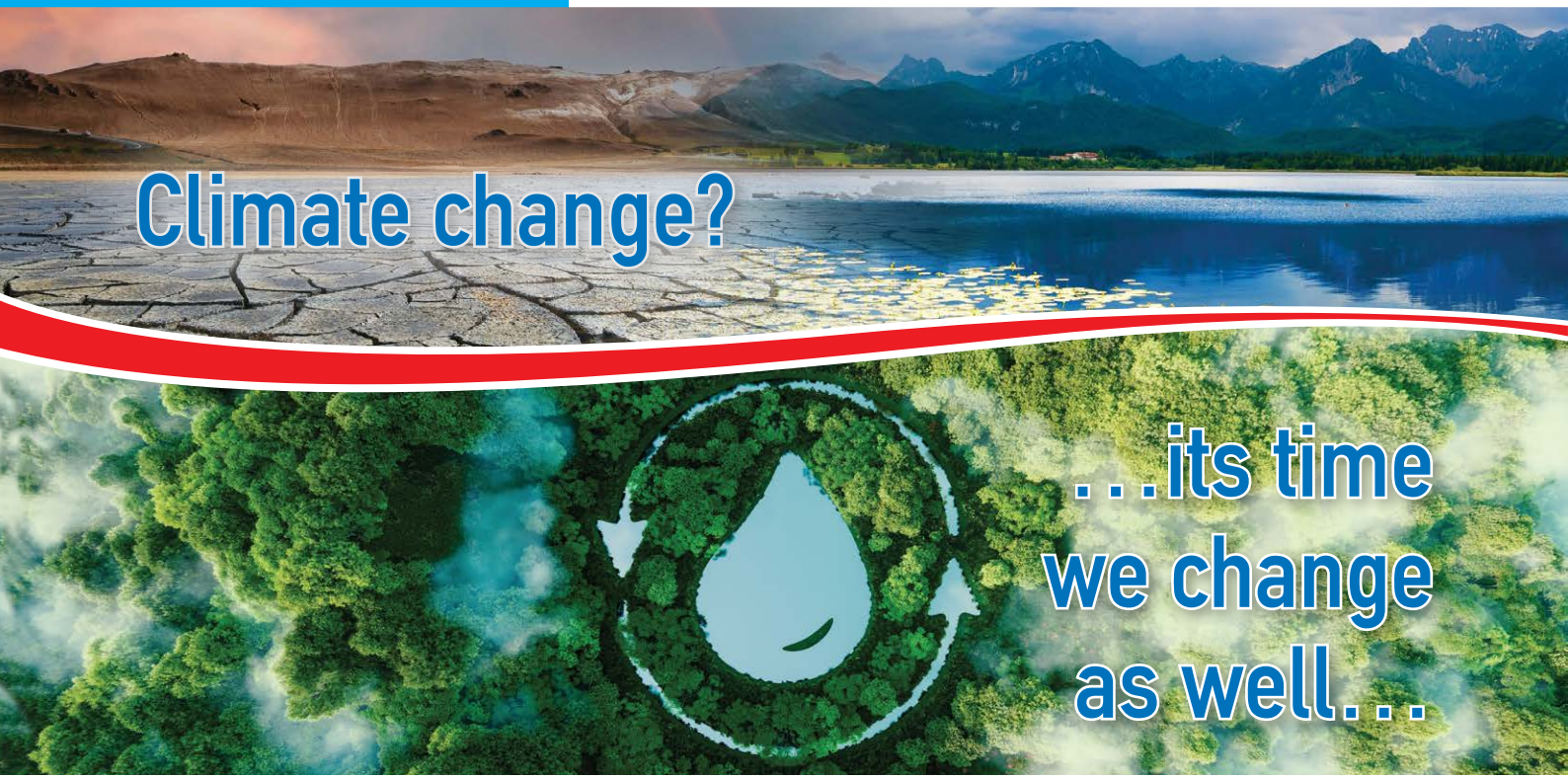
INTRODUCTION
The soft drink factory in Djibouti assigned TEMAK with the procurement of a sea water desalination system that would produce 500 m^3/d of water with a TDS concentration of less than 400 ppm, which is of appropriate quality to be used for their production applications.
The product water is collected in a tank and is then fed in a pre-existing reverse osmosis unit, in order to achieve a final product water TDS concentration of less than 50 ppm.

THE CHALLENGE
Undertaking this project by itself was a huge challenge as the factory belongs to an international company that is known worldwide and TEMAK had to be flawless at every stage of this project, as this would act as a significant reference for our company. The dimensions of the system were 9.3 m x 2 m x 2.3 m (L x W x H). Because of that the loading of the system in the container as well as its transportation and unloading to the installation area had to be done with the outmost caution. The delivery time was 14 working weeks and the system had to be installed before the 31st of December 2021.

SOLUTION
The pre-treatment system is comprised of a TWIN turbidity filter, that suspends the water turbidity and a double multicartridge filter equipped with cartridges of 1 micron pore size, that withhold any suspended

solids, thus protecting the high pressure pump and energy recovery device.
The reverse osmosis system is equipped with membranes that guarantee high salt rejection rate in order to achieve the customer's product water requirements. The recovery was set to 45%, as our goal was a high salt rejection rate while also maintining the pressure to a low level. The operating pressure at the lowest temperature (25 degrees Celsius) is 63 bar.
The pump that is used in this application is a Danfos positive displacement pump that is made of Super Duplex Stainless Steel τηç. The reverse osmosis product water is subject to no further treatment and is stored in a tank, before being led to a second pre-existing reverse osmosis system achieving a final TDS concentration of less than 50 ppm.

RESULT
Production of 500 m^3/day of potable water, according to the standards set by the World Health Organisation (WHO) for potable water with a total dissolved solids concentration (TDS) of < 400 ppm.



Climate change consists of variations of the climate and fluctuation in the weather conditions of the planet. A few of the results that have occurred due to climate change are the rising temperatures, the melting of ice caps, the rising level of the sea and which indicate the significance of this problem and the fact that it is not an issue that is temporary and will just go away, but it is a situation of the outmost peril that needs to be dealt with.

The consequences of the climate change are immeasurable for both the environment and the human civilization. The danger of the temperature rising to levels where living would no longer be sustainable for humans is always lurking. Moreover, the ice caps melting and consequently the rise of the sea water level due to the extreme heat, pose a new threat of having land areas with low altitude completely flooded. Meanwhile, this heat poses an imminent threat to forests as wildfires may break out at any time because of the extreme drought.

Scientists have reached the conclusion that human civilization is to blame for this situation, as its ever increasing industrial activities and the modern way of living, result in the increased carbon dioxide emissions, which further escalate global warming.

It is worth noting, that the chances of the the temperature chances occurring naturally without any human involvement are 1 in 100.000. Thus, it is crucial for mankind to reconsider its modern practices in order to contain, the situation.

TEMAK and its personnel, having always the respect for the environment as their outmost priority, ensure that our systems and our company's way of operation is always in line with the environmental directives in order to minimize our environmental impact.

Regarding our systems, we always make sure that our designs are flawless and automatic, in order

to minimize the consumption of water, energy and chemicals. Specifically, our desalination systems are designed to achieve the maximum permeate water recoveries, while also maintaining the operating points (pressure and water flow) at a lower level than the maximum. Our practices allow for the minimum water waste and for the maximum longevity of the system, while also avoiding the unnecessary use of consumables and energy.

Regarding the energy saving practices, we offer frequency transformers to the pumps that are used in our systems, which allow us to optimize their operation point and minimize the waste of energy by the pumps, which are the most energy–consuming devices in our systems. The water flow, as well as the pressure levels are extremely high in the desalination plants where Reverse Osmosis is utilized. As a result the energy consumed for these high flows to reach these high pressure values is extremely high and is mostly led to the drain line.

That is why we suggest and integrate in our systems energy recovery devices, which utilize this energy that is led to the drain line, which would otherwise go to waste and offers it to the feed flow of the desalination system. Consequently, part of the feed flow receives the needed energy to reach the high pressure value from the energy recovery device, which as a result reduces the volume of the flow that is led to the high pressure pump, hence reducing the pump's size. This means that the energy consumption and therefore the environmental impact are almost cut in half.

It is also worth noting that TEMAK manufactured and commissioned a desalination plant in 2013 in Stroggili island, which is completely autonomous and powered by solar panels. The system has been working non-stop till this day, producing potable water for the residents of the island while consuming no electrical energy.

It is also worth mentioning that the wide range of solutions that are offered by TEMAK, are based in processing brackish and sea water instead of depleting the fresh water sources. The permeate water is then led to the distribution network, where

it can be consumed for various purposes while the reject water can be led to the drain network. Treating the urban liquid waste that are produced by the biological water treatment, with the right procedures, increases the wateravailability that can be used for irrigation purposes, thus improving the quality of the underground water and facilitating the Cycle of Water proper operation.

TEMAK complies with the international environmental management system ISO 14001: 2015 aiming to protect the environment, conform to the environmental legislation, as well as contributing to natural resources saving. TEMAK showing its environmental sensitivity, has installed solar panels in our factory, which is located in the industrial zone of Menidi, in order to cover all the energy needs of our operations. Our personnel contributes to power saving by performing simple, everyday actions (turning off computer monitors, switching off lights, air conditioning heat etc.) when out of office.

Furthermore, the majority of our internal procedures are performed digitally, minimizing the need for printed copies. Finally, **TEMAK** encourages its personnel to recycle by placing recycling bins for paper and batteries in every floor of its building.

The aforementioned details are just a part of the actions that our company is willing to take regarding environment protection, taking always into consideration the accountability that we hold against it.

TEMAK®
TOTAL WATER SOLUTIONS

TEMAK has been your reliable and consistent partner in water treatment since 1980 covering the needs of Municipalities, hotels and hospitality complexes, ships and residencies, in potable water, the needs of hospitals and clinics in water of special quality and the needs of industries with water of special quality for industrial applications.

TEMAK studies, designs, manufactures, installs and supports the after sales of the water treatment systems, producing water of the highest quality and value, both locally and internationally, contributing to the economic growth of the country.

Thanks to the manufacturing of the systems in our factory in Greece and the highly specialized executives in our company, **TEMAK** is able to offer complete and thorough water treatment solutions, from studying and designing to manufacturing and installation of the systems.

The 750.000 m^3/day of potable water or water for various applications, that are produced by the systems installed in **TEMAK** applications in Greece and 30 different countries abroad, vouch for our experience and specialty in the water treatment sector.

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