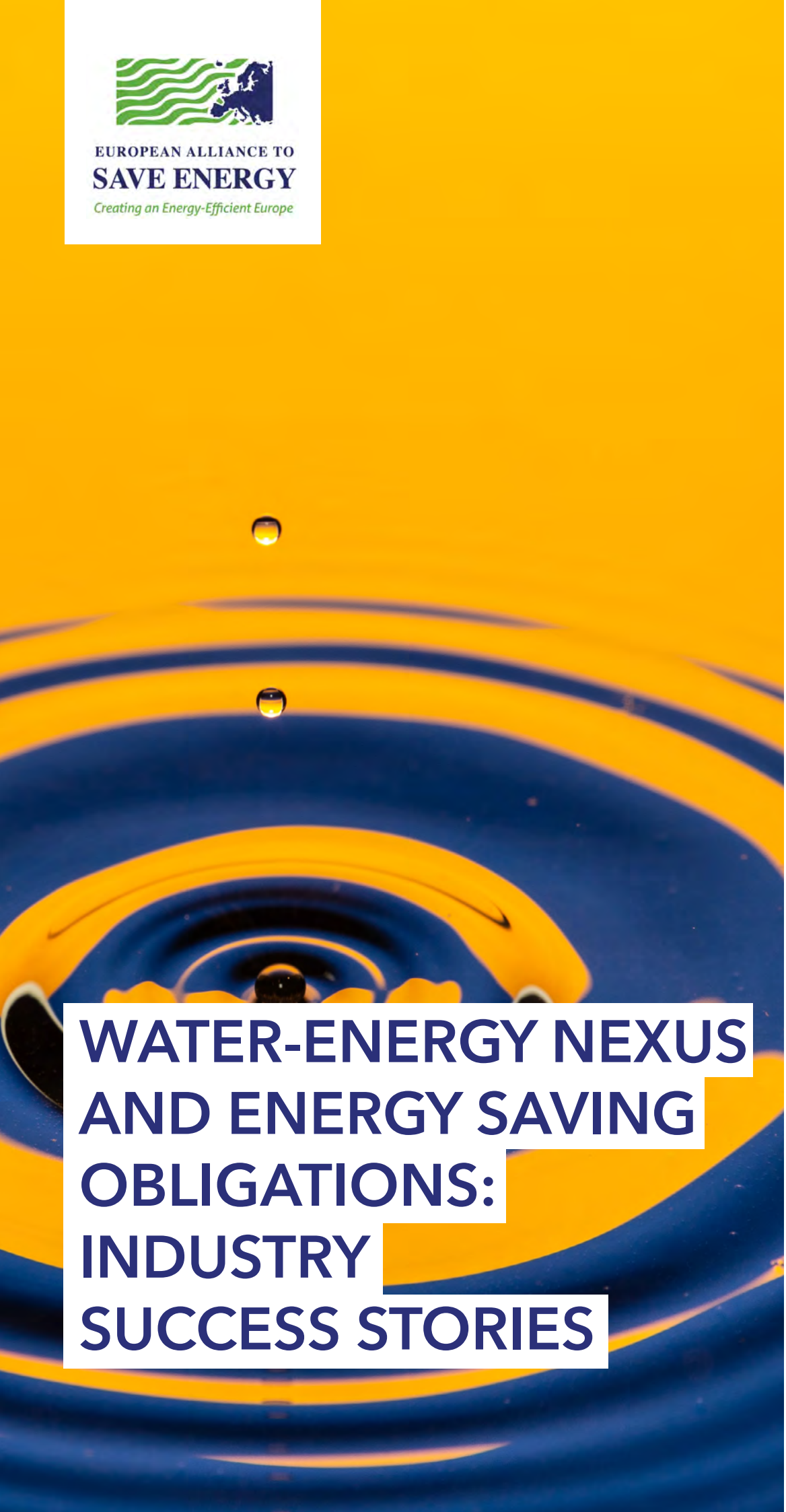
EUROPEAN ALLIANCE TO
SAVE ENERGY
Creating an Energy-Efficient Europe



WATER-ENERGY NEXUS AND ENERGY SAVING OBLIGATIONS: INDUSTRY SUCCESS STORIES

Danfoss
Kingspan
KNAUF INSULATION
Signify
Schneider Electric
SIEMENS
SAINT-GOBAIN
VEOLIA
E3G
European Climate Foundation
Kyoto Club
ECOLAB
ORBITAL SYSTEMS
xylem
Let's Solve Water

WATER-ENERGY NEXUS AND ENERGY SAVING OBLIGATIONS: INDUSTRY SUCCESS STORIES

DECEMBER 2020

FOREWORD

Water and energy are deeply entwined. The water-energy nexus refers to the relationship between how much energy is needed for abstracting, moving, heating, cooling, storing, treating and disposing water and how much water is used for generation and transmission of energy. This nexus is expected to intensify in the coming years.

So far, Member States have notified a limited set of water-related measures in the framework of Article 7 of the Energy Efficiency Directive (EED). The most frequently notified measure is the production of hot water by solar collectors or more efficient gas water heaters. However, these measures rather relate to heat generation than water production, distribution, use, and wastewater treatment. Raising awareness about the energy-water nexus can help:

- Member States prioritise efficient use of both water and energy
- the business community to bring to market technologies and solutions designed to deliver water and energy savings across industries, municipalities and buildings
- the EU to deliver the energy savings and emission reductions necessary to achieve the ambitious goal of climate neutrality by 2050.

This paper showcases concrete examples of water and energy saving projects across sectors and European countries. The projects feature some of the most advanced environmental technologies currently available on the market. Technologies delivering environmental, economic and social benefits.

We hope that these successful projects will inspire policy and decision makers at all levels and especially those working on the energy saving obligations under Art. 7 of the Energy Efficiency Directive.

Monica Frassoni
President of the European Alliance to Save Energy

TABLE OF CONTENTS

Danfoss p.4
Knauf Insulation p.5
Veolia p.6
Ecolab p.7
Orbital Systems p.8
Xylem Inc. p.9

AN ENERGY INTENSIVE WASTEWATER TREATMENT PLANT TURNED INTO ENERGY PRODUCER

Marselisborg, Aarhus, Denmark.

Since 2010, the Marselisborg wastewater treatment plant has transformed its focus beyond minimising energy consumed, to maximising net energy surplus, making it the world's first climate-neutral water facility. Nowadays the facility has net production of both electricity and heat, supplying the district heating system in Denmark's second-largest municipality, Aarhus.

CHALLENGE

Water and wastewater treatment facilities are normally the single largest electricity consumer for a municipality. Typically, water and wastewater treatment processes account for 30% – 50% of the municipal electricity consumption. The high consumption is related to the energy intensive processes but also its continuous operation cycle, 24/7, everyday of the year.

SOLUTION

- Investments made in efficient real time process control.
- Transformation to more energy efficient operation.
- Upgrade of combined heat and power (CHP) process for energy production, with 90% energy efficiency.
- Digitalisation of the water facilities, including a much higher use of sensors, variable speed drives and advanced process control, offering both energy savings and increased energy production from the household wastewater.

RESULTS

- The treatment plant produces more than 200% of the energy it needs to operate
- 130% electricity production (30% excess electricity)
- Excess heat production of about 2.5 GWh/year
- Reduction of water losses by around 6% and water price for consumers decreased by 9%
- Carbon footprint of the plant reduced by 35%

A GREEN ROOF THAT SAVES ALMOST TWO OLYMPIC-SIZED SWIMMING POOLS OF STORMWATER EVERY YEAR

Champniers, France.

KNAUF INSULATION

Urbanscape Green Roof technology, provided by Knauf Insulation, covered 8,300 m2 of roof surface of a commercial building in France. The system, installed in only 8 days, allows to obtain huge cost savings and environmental benefits thanks to its water retention capacity. In addition, it contributes to cool down the building during summer months, reduces heat island effect, improves urban biodiversity and help with the absorption of air pollution.

CHALLENGE

- Heat island effect, cooling the building and reducing the temperature in urban areas.
- Low water-retention capacity, causing water runoff and surcharging of waste water treatment plants, with very high energy consumptions and pollution of local water sources.

SOLUTION

- Urbanscape's unique Performance Evaluation Tool (PET) was used to ensure the precise calculation of the roof's water retention potential.
- PET analyses complex local weather data, the area's climate history and the dimensions of the installation to produce reliable final figures.

RESULTS

- Storing of more than 4,800m3 of rainwater p/year – the equivalent of almost two Olympic-sized swimming pools of water.
- Up to 2.9 MWh of energy are saved - considering the average energy consumption on a yearly base in Waste Water Treatment Plants.
- Saving on real rain water treatment energy cost.

"Such a high level of absorption of the new 8,300m2 roof will make a major contribution to the local environment and have a huge impact on cooling the building during summer months as well as reduce heat island effect – where the urban environment is much hotter than surrounding countryside.

Julien Remy, Knauf Insulation National Director for Green Solutions in France.

SMART & INNOVATIVE UTILITIES DESIGN FOR A DANONE PRODUCTION PLANT

City of Haps (Cuijk), North Brabant, Netherlands.

VEOLIA

Veolia has supported Danone with the design and construction of the Estia project which consists of a new green field project for an early nutrition production plant worth €240 million of investment. Estia, a flagship facility for Danone, doubles its legacy plant. Its utilities designed, built, and operated by Veolia delivers the production plant with the necessary utilities, using 60% less water, 25% less energy and 50% less CO2 than the legacy plant.

Nutricia Cuijk also embraces the principles of the circular economy – 100% of the facility's waste is recovered, including all packaging waste. The new facility employs directly around 500 people and indirectly supports an additional 2,000 jobs.

CHALLENGE

The client was looking for an innovative, intuitive, and sustainable solution that reduces its greenhouse gas emissions while meeting its production needs. The installations had to meet the highest standards and supply water and energy with guaranteed efficiencies and availability for the food manufacturing process. To achieve the construction of the production plant, 6,000 people were involved (employees and subcontractors), amounting to 4,000,000 man hours, with 35,000 work permits, and zero lost time accidents. The coordination of the construction activities was a real challenge and required extremely rigorous safety management measures.

SOLUTION

- The newly-built Nutricia Cuijk facility uses advanced environmental technologies coupled with efficiently-designed manufacturing processes to ensure water and energy consumption as well as CO2 emissions are kept to a minimum.
- Danone invested in a utility generation plant with high efficient steam, compressed air, chilled recovery installation to supply low pressure hot water.

RESULTS

- Gas: 1,112 tonnes/year carbon footprint reduction
- Water: reduction of 20,000 m3/year
- Electricity: 172 tonnes/year carbon footprint reduction
- 100% of the electricity used is renewable

"The Design Build and Operation for the utilities of Nutricia Cuijk's facility is one of the main achievements of our Alliance with Danone. In addition to Veolia's contribution to Danone's sustainability agenda, the contract has been built to guarantee and incentivise Veolia for commitment on performance improvements. This is where Veolia is at his best and delivers the main value to its customers.

Hildegarde McCarville , CEO Veolia Netherlands

COOLING TOWER EFFICIENCY IMPROVEMENT IN A STEEL MILL

East of Romania, near the Danube delta and the Black sea.

ECOLAB

A large Eastern European steel mill producer has been investing time, money and effort into making its production more sustainable. Nalco Water proposed a detailed managed operations and performance improvement plan to aid this producer reach its established objectives. The plan included multiple projects each carefully reviewed with local plant leadership and procurement management to confirm the data and achieve the required savings. Nalco's product and process technologies helped to reduce water, energy and waste consumption. This has enabled the customer to honor its commitments in protecting the environment and improving sustainability.

CHALLENGE

The implementation was phased in over the course of 1 year. During the year, several different projects were implemented by the Nalco Water managed operations team to reduce water, energy and waste consumption. Improvement projects were identified in the area of cooling water, waste handling and disposal and energy management.

SOLUTION

NalcoWater's3DTRASAR™ Cooling Water Technology was implemented in the hot phase units to monitor and control water mass balance and treatment dosages and avoid over consuming water and chemicals.

RESULTS

- Fresh water usage reduced by 4.176.986 m3
- Power consumption reduced by 39.725.544 kWh
- Greenhouse gas emissions reduced by 27,918 tons CO2

"Large industrial customers are increasingly realising that improved water cycle performance can drive both cost efficiencies and corporate sustainability commitments. Driving continuous improvement on water and energy mass balance has become a critical performance indicator for industry as global competition increases pressures on productivity and costs while at the same time industry is called to support increasingly ambitious environmental regulation. Ecolab has invested in a range of proprietary technologies and core competences to drive water cycle improvements across customer operations bringing significant savings in costs, energy efficiency and emissions.

David Martin, Ecolab Vice-President & Market Head, Belgium and France

RECYCLING WATER AT END-USER LEVEL WITH A SMART SHOWER

Malmö, Sweden

ORBITAL SYSTEMS

Orbital System water saving recirculating solution for showers saved up to 90% of water and 80% of related energy in a hotel in Malmö, Sweden. The system collects the water that would normally go down the drain, analyses its quality, cleans, heats it and reuses it in the same shower cycle. The sensors in the systems analyse the quality of water up to 20 times per second and decide whether it is good to be sent back for re-use.

CHALLENGE

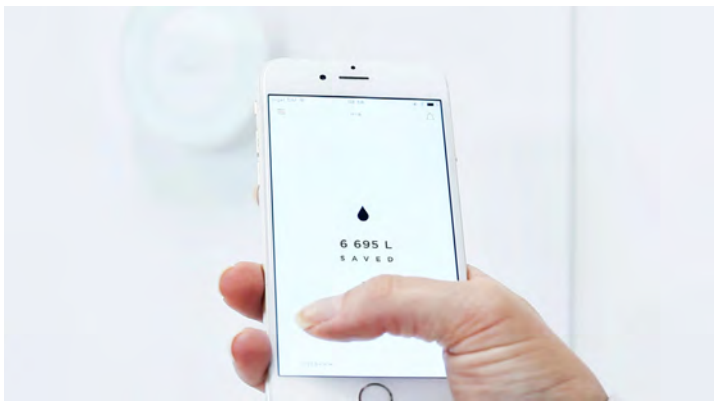
- Water heating is the second-largest energy expense in the home, and some showers use twice as much energy and hot water than we need.

SOLUTION

- The smart system filters, purifies, reheats and then recirculates the water used during a shower.
- The purification is done by a micron filter and a UV light.
- The system also collects data on water quality and usage that can be monitored by a mobile app.

RESULTS

- If an average 10-minute shower consumes about 100 litres of water, the Orbital Shower uses only a fraction of this, saving up to 90% of water.
- 80% of related energy is saved.



IMPROVING THE EFFICIENCY OF COOLING WATER PROCESSES FOR YOGHURT PRODUCTION

South Tyrol, Italy.

xylem
Let's Solve Water

The Milchhof Sterzing performed a renovation of its yoghurt production facility including a new ice water system in order to treat the daily milk volumes of around 470 dairy farmers. Milk and yoghurt production is an extremely energy intensive process due to all the cooling water required. The dairy wanted to reduce the energy consumption for cooling in the ice water system.

Xylem was able to supply an intelligent frequency controlled pumping system to ensure optimal pump usage and energy management based on the fluctuating demand which led to a 70% reduction in energy costs for this system.

CHALLENGE

The intensive use of energy in the milk processing chain forces dairies and milk processors to use electrical energy more sparingly and efficiently. The dairy farm Sterzing in South Tyrol, took appropriate action and updated its yoghurt production facilities including an ice water plant as part of a comprehensive renovation. The purpose of the plant is to cool the milk when it is received and to cool it down again after the pasteurization and keep it chilled for further processing. The required amount of ice water for cooling the milk and milk products varies greatly depending upon the production quantity, the season, the daily demand and the difference between the actual and the set temperature. In the summer months there is a greater need for refrigeration for milk cooling. The provision of heat and cold during the various thermal processes today requires sophisticated energy management.

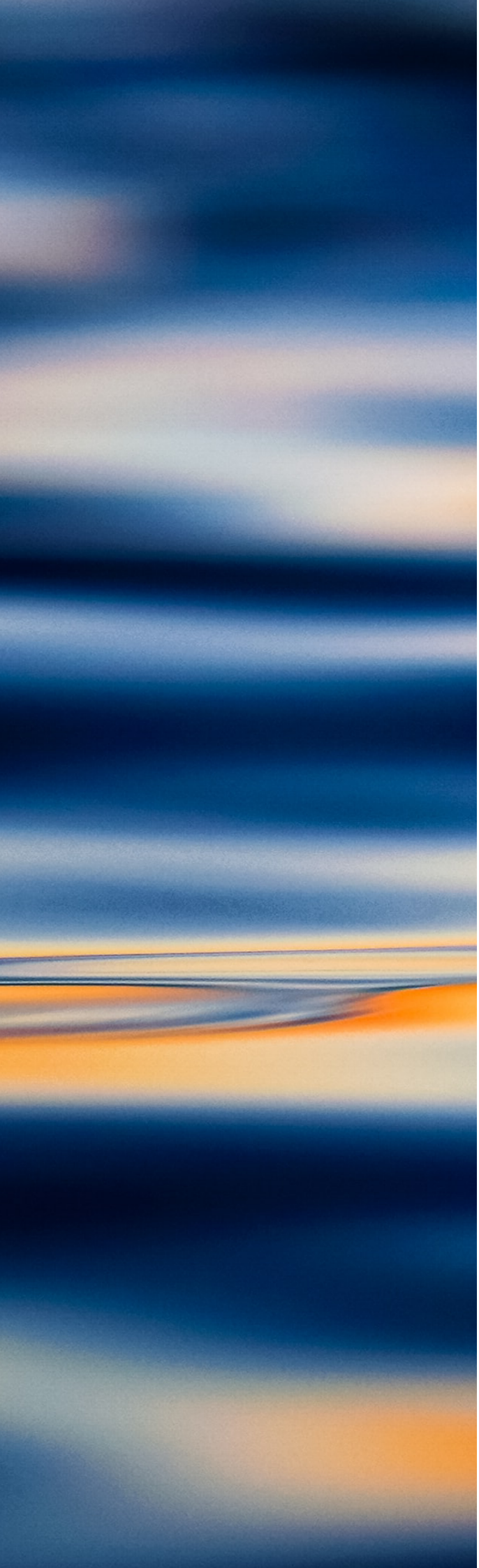
SOLUTION

Xylem's intelligent pumping system conveys the ice water from the ice water basin via a distributor into seven consumer circuits and ensures that the system operates as required and is energy-efficient. The pumps supply a total of 11 pickup stations. In order to ensure supply via the seven circuits, the pumps are regulated by the frequency converter based on the ice water pressure and additionally switched on or off as required. The number of operating hours of the three individual Lowara pumps regulates the pump control, so that uniform utilisation of all pumps is guaranteed.

RESULTS

- 70% reduction in electrical energy

NOTES:



The **European Alliance to Save Energy** (EU-ASE) creates a platform from which our companies (Danfoss, Ecolab, Kingspan, Knauf Insulation, Orbital Systems, Saint-Gobain, Schneider Electric, Siemens, Signify, Veolia and Xylem Inc.) can join with politicians and thought leaders to ensure the voice of energy efficiency is heard from across the business and political community.

EU-ASE members have operations across the 27 Member States of the European Union, employ over 340.000 people in Europe and have an aggregated annual turnover of €115 billion.

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