

**MAKING A  
DIFFERENCE**

Expect... **AVR**



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# EXPECT... AVK

BECAUSE OF OUR SOLID KNOW-HOW AND DECADES OF EXPERIENCE, IT IS SAFE TO EXPECT MORE FROM US - NOW AND IN THE YEARS TO COME. WE MAKE A DIFFERENCE ONLY BY ASSURING PROGRESS FOR OUR CUSTOMERS, AND FOR THE WORLD SURROUNDING US

## OUR BUSINESS IS CENTERED AROUND FIVE AREAS OF DISCIPLINE

As a global leader it is our obligation to keep pushing the boundaries of what the market can expect. In our business there are five cornerstones that must be in place in order to meet customer expectations:

### QUALITY

Quality guarantees customers that the solutions work, last and lives up to or exceed standards and requirements from the markets and prevent unforeseen additional costs. We continuously improve our skills and knowledge, and work and cooperate professionally and focused.

### INNOVATION

Change is the keyword for business today. Therefore, it is crucial that customers choose an innovative supplier who ensures easy adaptation to future market demands.

### RELIABILITY

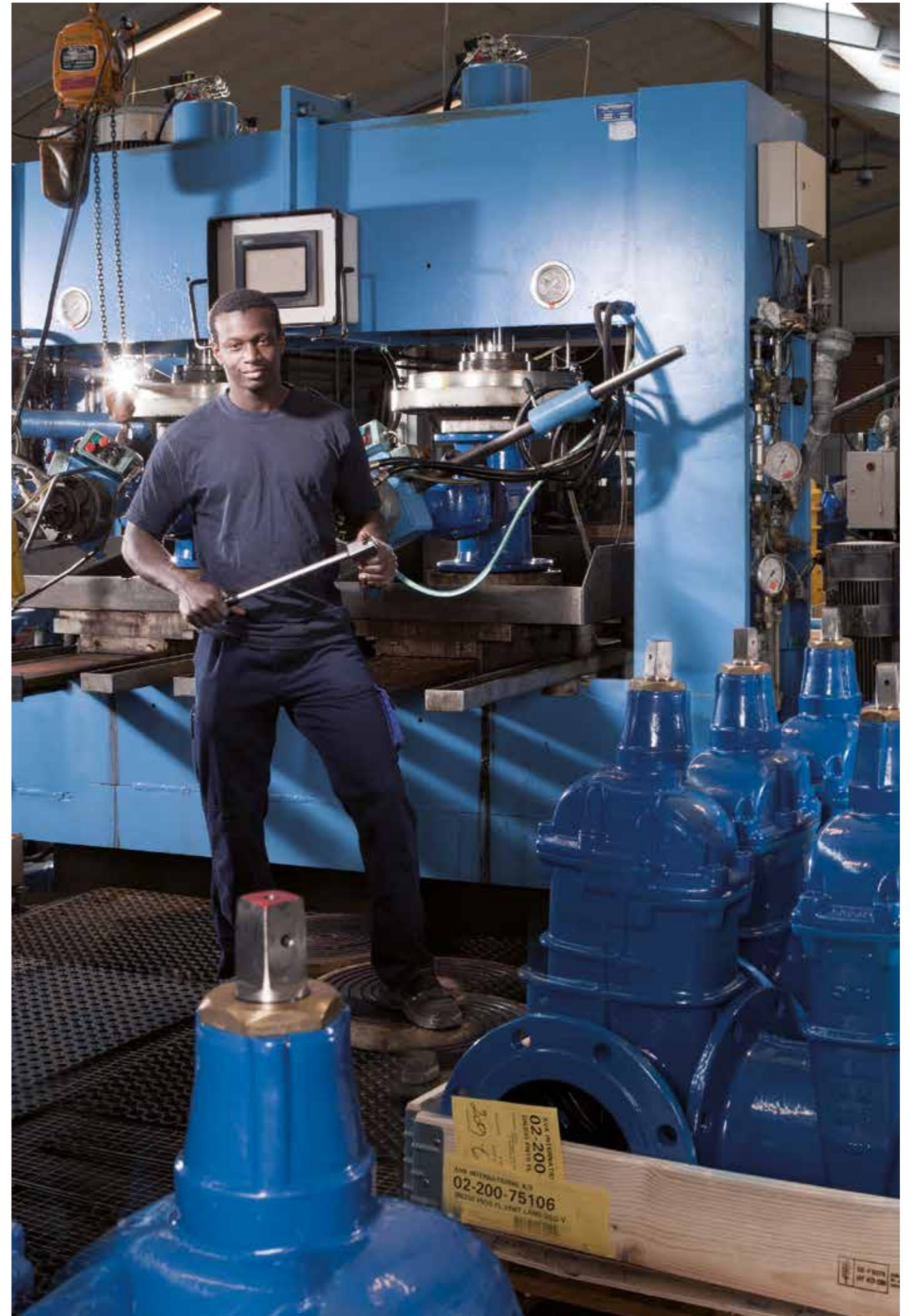
Reliability is becoming increasingly important in an uncertain business world. With one reliable supplier the customers can measure performance and make changes to constantly improve their business.

### SUSTAINABILITY

Sustainable development is essential for society and business to thrive and grow. Pursuing a sustainability strategy can lead to sustainable business, new business opportunities and significant cost savings for our customers.

### CUSTOMER SERVICE

Customer satisfaction does not only derive from our products, but from the service we offer to our customers as well. Customer service reflects the professional way a company handles the needs, queries and requests of its customers.



# SUSTAINABILITY

## TOMORROW MATTERS AS MUCH AS TODAY

TO US, SUSTAINABILITY MEANS UNDERTAKING INITIATIVES TO PROMOTE GREATER ENVIRONMENTAL RESPONSIBILITY AND ENCOURAGING THE DEVELOPMENT AND DIFFUSION OF ENVIRONMENTALLY FRIENDLY TECHNOLOGIES, SUCH AS THOSE WHICH REDUCE WATER WASTE

For AVK sustainability and sound economics go hand-in-hand. By reducing water waste you not only save money, you actively help reduce electricity consumption and protect one of our most valuable resources. Our high-quality solutions minimise environmental impacts caused by excavation, repair or replacement. This ensures that your business is based on a sustainable foundation living up to the requirements of social responsibility and environmental conscience.

### **Sustainable management of natural resources**

In every part of the world there is a need for using the available resources in the most efficient manner. Pure drinking water free from harmful bacteria as well as safe and efficient wastewater treatment are some of the benefits we invite you to profit from when using AVK products.

### **Lasting solutions**

Sustainability is about creating a sustainable business. Our solutions reduce water loss, electricity consumption and CO2 emissions in production facilities all over the world, and are financially tenable.

### **Optimisation for better results**

Today our innovative solutions significantly reduce water waste simply because we have put a lot of effort into optimising every design detail. Innovation is a central part of a modern business, and we are dedicated to finding new ways to reduce water waste and optimise your business.

### **Recognition of the united nations global compact principles**

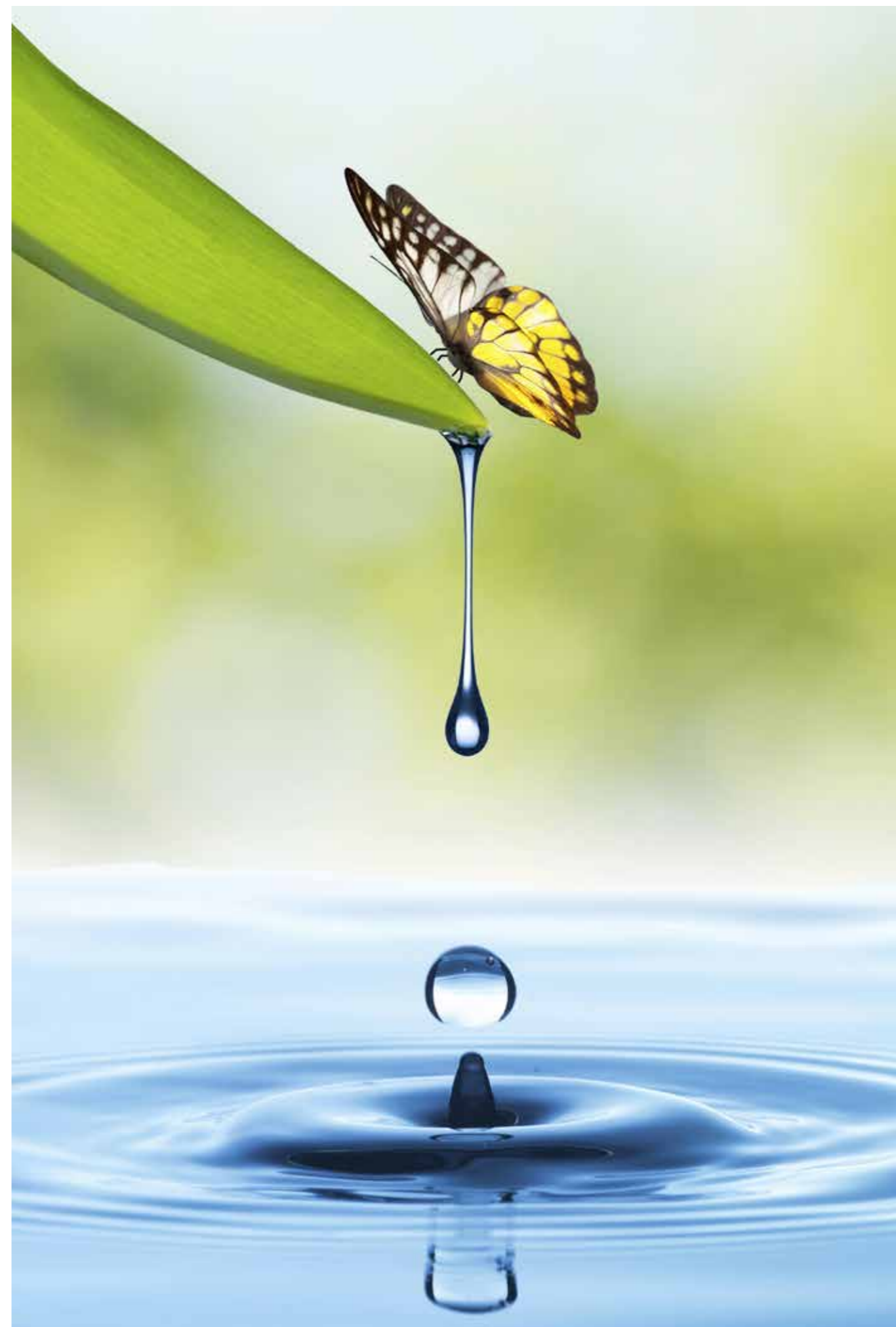
The AVK Group realises that a global presence demands high ethical standards. Throughout our organisation and in all our actions we therefore recognise the principles laid out in the United Nations Global Compact document.

### **International standard for environmental management (ISO 14001)**

AVK complies with the internationally accepted ISO 14001 standard, which provides a foundation for eco-management in companies. We work hard to fulfil local environmental standards and minimise our environmental impacts, both in terms of production processes and materials.

### **We expect more from ourselves**

The AVK Group has set stringent requirements to its production companies regarding energy and water consumption. We are aware of the importance of reducing electricity consumption as this contributes to the CO2 emission problem. We also know that pure water is a scarce resource and, and consequently, we oblige our companies to make a great effort to reduce their use.





# CUSTOMER SERVICE A NO-PROBLEM POLICY

OUR CUSTOMERS EXPECT A PARTNER WHO CAN COMBINE THE PRODUCT PORTFOLIO AND COST EFFICIENCY OF A GLOBAL LEADER WITH THE FLEXIBILITY AND ADAPTION OF A LOCAL TEAM

To brand and sell AVK's comprehensive product assortment, the AVK Group is present in more than 86 countries worldwide. Sales and distribution are handled by AVK sales companies, representative offices, agents and distributors. This wide sales network enables us to offer not only products of high quality, but also a good service and relevant information to our end users located around the world.

Our local presence is our reliable source of information about changes and requirements from the various markets. The AVK marketing departments provide AVK's

sales force with all necessary sales tools and product documentation, such as data sheets, catalogues, brochures, installation and maintenance instructions, and outline drawings.

Our website, [www.avkvalves.com](http://www.avkvalves.com) also features a pool of valuable and updated information about AVK developments within the company, the product assortment, the sales network and much, much more. We encourage you to frequently pay a visit to our website for news and updates.

To ensure that both the sales force and our customers are fully updated on AVK's

product programme we offer product seminars and guided tours at AVK's factories as well as assistance at exhibitions. A number of showbuses are touring the markets wherever needed as an "exhibition on wheels" with personal guidance and demonstration of specific products.

In 2010, AVK International A/S inaugurated a show lab where our customers, employees and stakeholders can learn how to install and use our products in a realistic system.

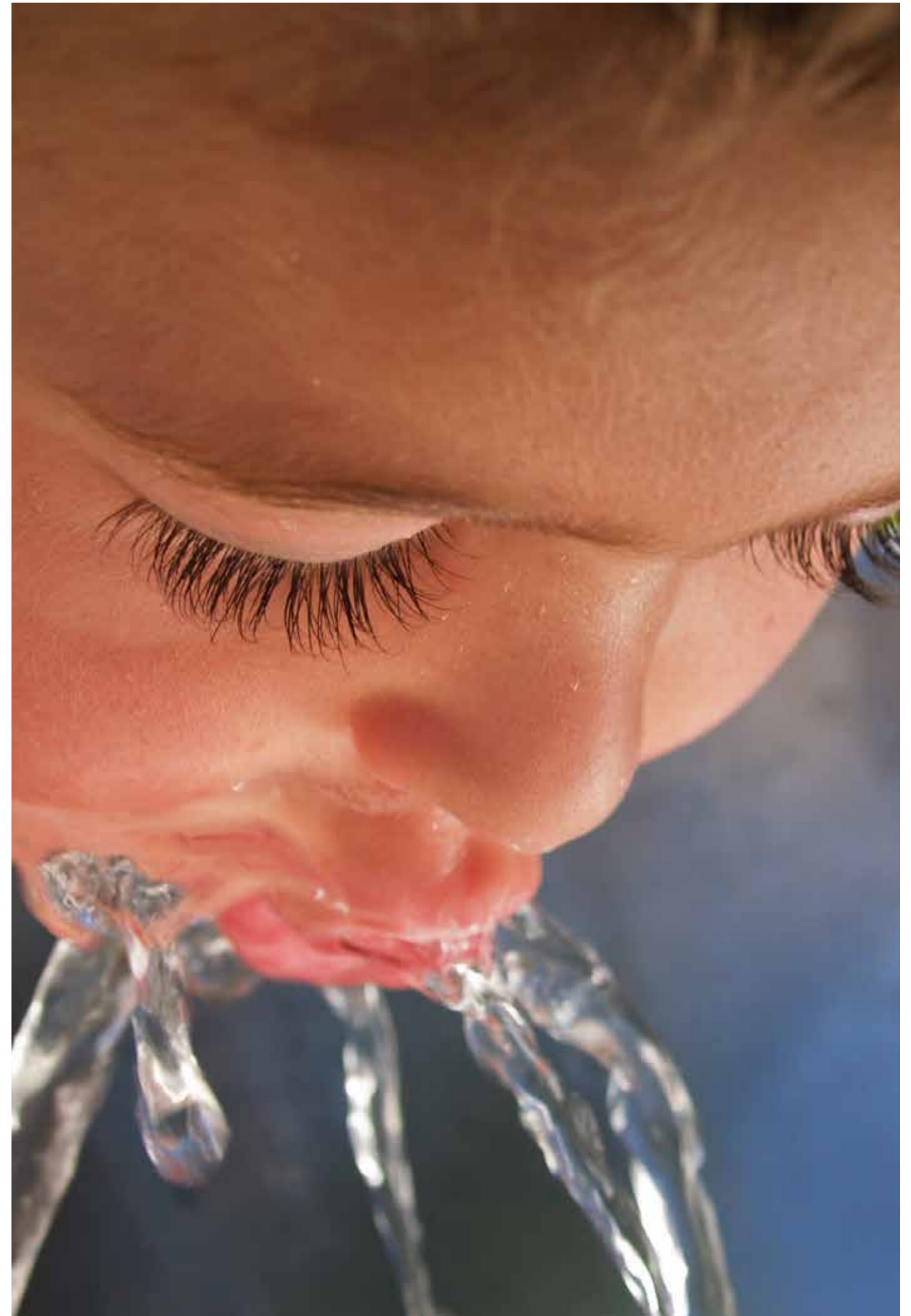


# HOW WE CONTRIBUTE

THE WORLD FACES HUGE CHALLENGES TOWARDS THE GREEN TRANSITIONS AND THE FULFILLMENT OF THE 17 SUSTAINABLE DEVELOPMENT GOALS AS ESTABLISHED IN 2015 BY THE UNITED NATIONS GENERAL ASSEMBLY WITH THE 169 TARGETS THAT ALL AIM AT MAKING THE WORLD A BETTER PLACE TO LIVE

For AVK, sustainability and sound economics go hand-in-hand. By reducing water waste you not only save money, you actively help reduce electricity consumption and protect one of our most valuable resources. Our high-quality solutions minimise environmental impacts caused by excavation, repair or replacement. This ensures that your business is based on a sustainable foundation living up to the requirements of social responsibility and environmental conscience.

## SUSTAINABLE DEVELOPMENT GOALS



# THE FUTURE IS TODAY



Access to water, sanitation and hygiene is a human right, yet billions are still faced with daily challenges accessing even the most basic of services.

Around 1.8 billion people globally use a source of drinking water that is fecally contaminated. Some 2.4 billion people lack access to basic sanitation services, such as toilets or latrines. Water scarcity affects more than 40% of the global population and is projected to rise. More than 80% of wastewater resulting from human activities is discharged into rivers or sea without any treatment, leading to pollution.

## THOUGH MOST OF OUR PRODUCTS ARE HIDDEN FROM SIGHT, THEY PLAY AN IMPORTANT ROLE IN MANAGING THE MOST PRECIOUS RESOURCES ON EARTH - FRESH WATER

Functional and operational valves are the backbone in any water distribution system.

Saving on quality can ultimately come with a very high price. A cost that far exceeds the investment at any time.

Tomorrow - and 50 years from now - our solutions have to perform flawlessly and effortlessly every time. When they do, it means that fewer leaks and breaches occur, and it is easy to close off and repair a network, if necessary. This means thousands and thousands saved on maintenance, lost water and electricity.

At AVK, we are dedicated to sharing our knowledge, and to expanding our reach by cooperating with other key players in water management. This is our way of contributing to the UN's #6 sustainable development goal - ensuring access to water and sanitation for all.



95% of urban expansion in the next decades will take place in developing countries.

Half of humanity – 3.5 billion people – live in cities today, and this number will continue to grow.

Because the future will be urban for a majority of people, the solutions to some of the greatest issues facing humans – poverty, climate change, healthcare, education – must be found in city life.

## THROUGH CONSTANT INNOVATION AND ADAPTATION, WE STRIVE TO DEVELOP INNOVATIVE SOLUTIONS THAT CONTRIBUTE TO LONG-TERM SUSTAINABILITY IN CITIES WORLDWIDE

Cities are hubs for ideas, commerce, culture, science, productivity, social development and much more. At their best, cities have enabled people to advance socially and economically.

However, many challenges exist to maintaining cities in a way, so that they continue to create jobs and prosperity while not straining land and resources. Common urban challenges include congestion, lack of funds to provide basic services, a shortage of adequate housing and declining infrastructure.

These challenges can be defeated in ways that allow them to continue to thrive and grow, while improving resource use and reducing pollution and poverty. The future we want includes cities of opportunities for all, with access to basic services, energy, housing, transportation and more.

# REGISTER FOR WORLD CHANGE

AS GLOBAL LEADERS WITHIN OUR FIELD, WE TAKE RESPONSIBILITY IN ASSURING A WELL-EQUIPPED SECTOR READY TO MEET THE NEEDS OF TOMORROW. THIS NOT ONLY GOES FOR PRODUCTS AND SOLUTIONS, BUT ALSO FOR THE PEOPLE WHO WILL BE DECISION-MAKERS, ENGINEERS, CONSTRUCTORS AND FIELD WORKERS ON FUTURE WATER PROJECTS



By including UN SDG #4 and #17, "Quality Education" and "Partnerships for the goals", we aim at a more sustainable water circle throughout societies worldwide.

## ADVANCED WATER CYCLE MANAGEMENT COURSE

Every August, we offer a complete knowledge-upgrade at our Water Summer School in Låsby, Denmark. The course is nominated as a 5-ECTS point-giving course, and consists of three theoretical tracks focusing on:

- water resource management,
- water distribution, and
- wastewater handling, including resource recovery.

The course is an intensive, two-week introduction to the latest water technologies, concepts and semi-practical tasks – and, of course, loads of fun and valuable networking with participants from all over the world.

The Summer School has been created together with Aarhus University, Aarhus University School of Engineering, Aarhus University Centre for Water Technology, Skanderborg Forsyningsvirksomhed A/S, Kamstrup, Grundfos, NIRAS, AquaGlobe, Aarhus Vand, DHI and I-GIS. All take part in the intensive two-week tuition, contributing with their particular area of expertise.

## ADVANCED VALVES

Since September 2016, AVK Valves Southern Africa has offered courses through their 40-seater in-house training facility. The institute showcases an impressive flow lab which demonstrates the flow of water through a series of valves allowing attendees to gain a comprehensive understanding of water related processes.

Since its establishment, two courses have been launched;

- The Valves Fundamentals Course, which provides a sound introduction to acquire an essential knowledge of valves, in theory and practice, and
- The Advanced Valves Course which provides greater insight into principles and practices that address the theories of fluid pressure, fluid flow and field applications.

Both courses are accredited by ECSA (Engineering Council of Southern Africa) and attendees receive 2 CPD-points upon completion.

## PRODUCT FUNDAMENTALS AND



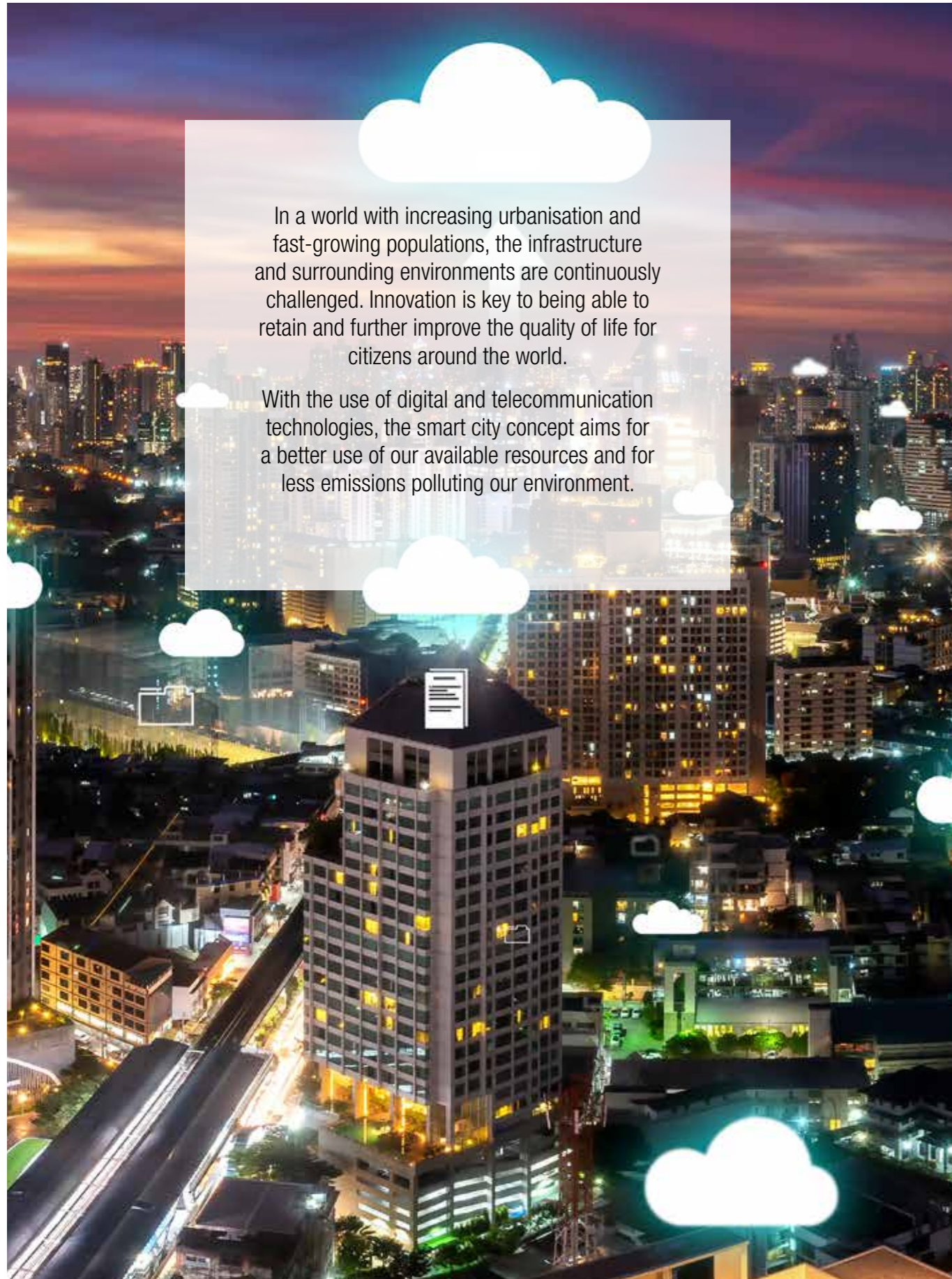
"Before 2030, the global energy consumption will have increased by 50%, triggering a rise in water consumption of about 85%. In Denmark, we have found a way of using our resources efficiently and carefully, and this knowledge should be passed on to these students, for them to actively use the knowledge in solving today's and tomorrow's water challenges."

- Global Brand Manager at AVK, Michael Ramlau-Hansen.





# SMART WATER



In a world with increasing urbanisation and fast-growing populations, the infrastructure and surrounding environments are continuously challenged. Innovation is key to being able to retain and further improve the quality of life for citizens around the world.

With the use of digital and telecommunication technologies, the smart city concept aims for a better use of our available resources and for less emissions polluting our environment.

## LARGE-SCALE PROJECT FOR EFFICIENT WATER SUPPLY MANAGEMENT REDUCING CRITICAL WATER LOSSES

### CASE STORY

Georgian Water and Power (GWP) has chosen AVK International to supply more than 500 pressure reducing valves in order to significantly improve and efficiently manage their water supply.

A water loss level at around 70% in the Tbilisi-region, Georgia has previously given rise to leakage reduction initiatives. Now, GWP has decided to go all the way to obtain an efficient water supply management, and 150 pressure reducing valves (PRV) already installed as part of the initiative are to be replaced by AVK valves in addition to more than 350 new PRV installations. The expected savings on water production is more that six million USD - every year.

### LESS WATER LOSSES AND MILLION-DOLLAR SAVINGS

Pressure management has proven to efficiently reduce leakages and thereby also lower the non-revenue water level. This improves energy efficiency as well as operation and maintenance costs. Pressure management using PRVs can really make a difference and besides savings on produced and pumped water it can also improve e.g. consumer satisfaction by minimised disruptions. A major benefit of pressure management in the Tbilisi-region is specifically the allowance for control of the excess pressure that arises as the water flows from the high situated reservoir.

The benefits of pressure management are many – most of them having the overall theme of minimising water loss. There are benefits for consumers and water utilities as well as for sustainability.



After installation of 235 valves, overall water distribution in the supply area has been reduced by seven percent compared with the past year. The risks of water hammer and pipe bursts are minimised, and the electricity consumption and the amount of pumped water is reduced;

- Electricity consumption is reduced by approx. 10%
- Less risk of water hammer, and pipe bursts are reduced by 25%
- Pumped water is reduced by 27,740,000 m<sup>3</sup>/year

### Expected results after installation of 500 PRVs:

- Pumped water reduced by 58.000.000 m<sup>3</sup>/year
- Saved production costs 6.380.000 USD/year\*

\*The cost of producing 1 m<sup>3</sup> water in Tbilisi being 0.11 USD

# SMART WATER IRRIGATION

Water is the foundation for all life on the planet - directly and indirectly. While humans need drinking water in order to survive, so do all other living organisms, meaning that our food supply is just as much dependent on water.

72% of the earth's surface is covered with water, of which almost all is salty and therefore not fit for drinking or irrigating. In fact, only 1% of the freshwater available can be used for these purposes. Of this one percentage, around 70% is used in food production.

By 2030, the UN predicts that we will be as many as 10 billion people populating this planet. This means an increasing food supply of 70%, only adding to the pressure on available water reserves.

This means there is every reason to take good care of the water we have, and to use efficient and sustainable methods in distribution. This includes drinking water supply, but certainly also water for irrigation purposes.

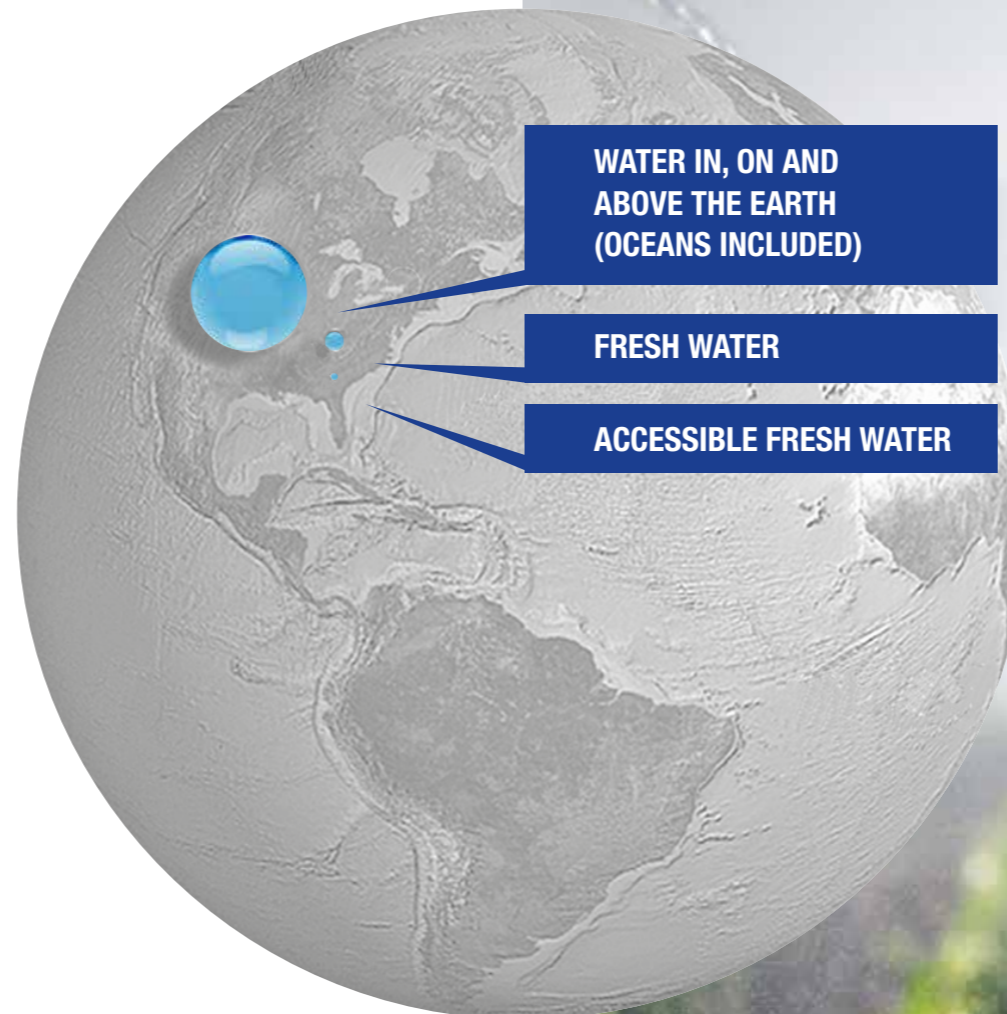
A great challenge within irrigation is timing. To reach optimum efficiency, it is crucial to only water when the soil is dry, no rain is forecasted, and the sun isn't out to dry up the water immediately. For these reasons, it makes sense to rely on a data collecting system.

## SMART WATER MANAGEMENT

Smart water has become one of AVK's main topics. We offer products built for a digital control system, both within drinking water and irrigation distribution. Areas, where it is crucial to only deliver the necessary amount at the correct time.

HYDROPASS is the ultimate surveillance- and controlling system for irrigation where the user can optimise based on proper planning. The system can be connected to national geo-data, delivering information about the soil's status at the time of planned irrigation, and about the local weather forecast carrying valuable data about approaching rain showers.

HYDROPASS also keeps track of water usage, and in case of alerts, it can shut down any activated irrigation.



The water used for the products we consume:

- An apple: 125 litres
- Carrots (1 kg): 131 litres
- Potatoes (1 kg): 225 litres
- Avocado (1 kg): 1800 litres
- Chicken (1 kg): 1972 litres
- Cheese (1 kg): 5000 litres
- Pork (1 kg): 5450 litres
- Tea (1 kg): 8062 litres
- Coffee (1 kg): 17,186 litres
- Beef (1 kg): 31.000 litres

(source: UN)



# SMART WATER IRRIGATION

## CASE STORY

### SMART IRRIGATION SAVES WATER AND ENERGY, CUTS COSTS AND CONTRIBUTE TO A MORE SUSTAINABLE INFRASTRUCTURE

In corporation with Consorzio di Bonifica Sannio Alifano, AC.MO S.r.l. has completed an extensive modernisation of irrigation systems.

In the Sannio Alifano area, which is situated around Naples, Italy, the local rural areas have been upgraded to meet the future needs and challenges of the farming business.

The main goals of the project were to upgrade the existing network of open channels to a complete piped pressurised network, to be able to achieve more productivity, to reduce the total water consumption, and to be able to manage the changes in climate.

#### USING DATA AND CALCULATIONS

Knowledge is power. This also goes for crop farming, where the more helpful information available, the higher water efficiency and the more yield as end-product.

The irrigation networks have been equipped with remote control systems and automated delivery groups for regulating water distribution to the users by means of an electronic card.

To manage water resources more efficiently, an irrigation advisory system (IRRISAT) offers farmers the opportunity to receive "irrigation advice" on the optimum moment to irrigate, and the appropriate amount of water. It integrates remote sensing and agrometeorology, and produces maps of crop water requirements:

## HOW IRRISAT WORKS

### IRRISAT PUTS DATA IN THE FARMERS' HANDS WITHIN 36 HOURS FROM THE SATELLITE PASS, FOLLOWING THIS SEQUENCE:

- monitoring the crop growth through the analysis of satellite data in the visible and near infrared wavelengths,
- acquisition of meteorological data,
- processing of images for the estimation of crop water requirements by using F.A.O. models, and integrating the data into a geographic information system (GIS).

Data is made available to the end user by e-mail, SMS and via a dedicated web-page.

### PROJECT RESULTS

To the project, which was realised in 2015, AC.MO S.r.l. delivered about 2,000 electronic hydrants. The complete management software is connected to satellite control and the existing billing system.

The project results show water savings of about 25 – 30% without loss of production, energy savings and community costs, Increased farmer competition within the market, and detection of unauthorized irrigation and over-consumption.

And in the bigger picture, efficiency in farming encourages biodiversity in production, and can help revert the depopulation which is a big issue in the area. Also, it will assist in securing the landscape and the necessary food supply.

The project is also an example of perfect collaboration between the ACMO technician, the water company and the final customers, the local farmers.



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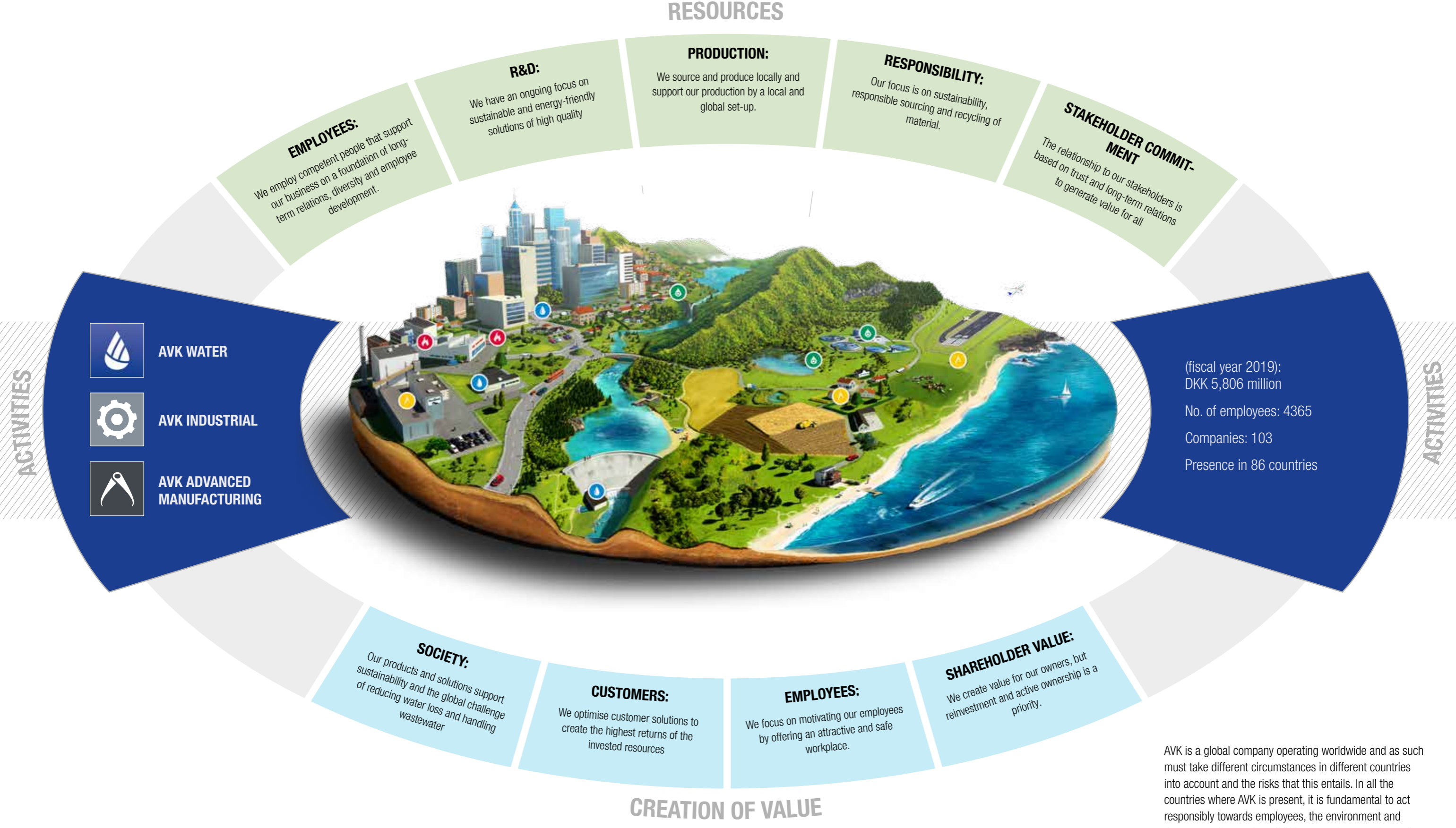
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# THE AVK BUSINESS MODEL



## RESOURCES

- EMPLOYEES:**  
We employ competent people that support our business on a foundation of long-term relations, diversity and employee development.
- R&D:**  
We have an ongoing focus on sustainable and energy-friendly solutions of high quality
- PRODUCTION:**  
We source and produce locally and support our production by a local and global set-up.
- RESPONSIBILITY:**  
Our focus is on sustainability, responsible sourcing and recycling of material.
- STAKEHOLDER COMMITMENT**  
The relationship to our stakeholders is based on trust and long-term relations to generate value for all

ACTIVITIES

- AVK WATER
- AVK INDUSTRIAL
- AVK ADVANCED MANUFACTURING

ACTIVITIES

(fiscal year 2019):  
 DKK 5,806 million  
 No. of employees: 4365  
 Companies: 103  
 Presence in 86 countries

## CREATION OF VALUE

- SOCIETY:**  
Our products and solutions support sustainability and the global challenge of reducing water loss and handling wastewater
- CUSTOMERS:**  
We optimise customer solutions to create the highest returns of the invested resources
- EMPLOYEES:**  
We focus on motivating our employees by offering an attractive and safe workplace.
- SHAREHOLDER VALUE:**  
We create value for our owners, but reinvestment and active ownership is a priority.

AVK is a global company operating worldwide and as such must take different circumstances in different countries into account and the risks that this entails. In all the countries where AVK is present, it is fundamental to act responsibly towards employees, the environment and the surrounding society. AVK keeps a close watch on all business units of the Group, and through regular visits ensures that the Group complies with the defined human rights principles and criteria.

# THE AVK CORE BUSINESS SEGMENTS

AVK IS DIVIDED INTO THREE MAIN BUSINESS SEGMENTS, AVK WATER, AVK INDUSTRIAL AND AVK ADVANCED MANUFACTURING

These segments are built upon companies that possess product and manufacturing competencies which are used in many different business segments throughout the world. To comply with the needs of our customers, we act as an international manufacturer – designing, producing and selling our own products.



**AVK WATER**

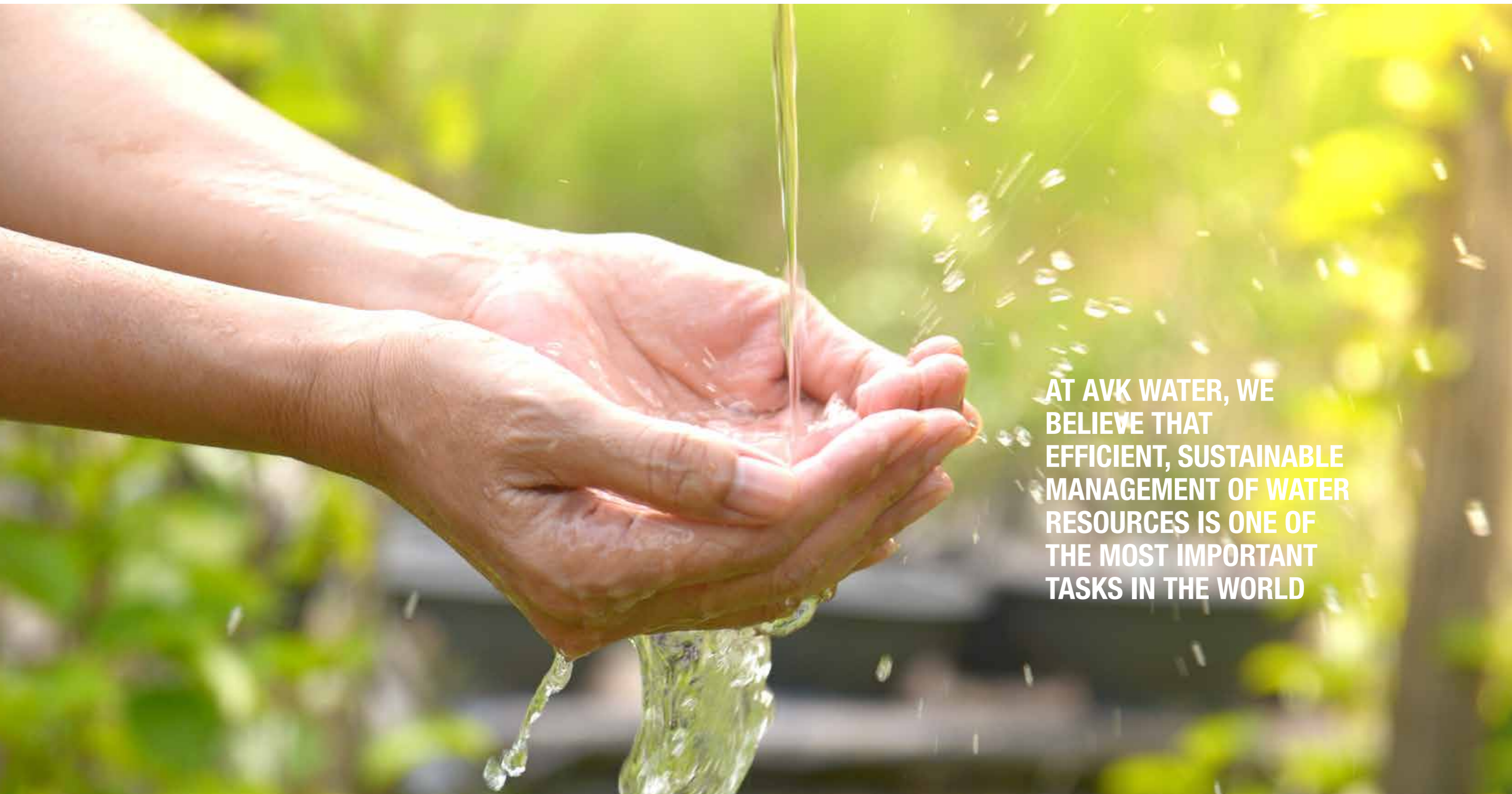


**AVK INDUSTRIAL**



**AVK ADVANCED MANUFACTURING**





**AT AVK WATER, WE BELIEVE THAT EFFICIENT, SUSTAINABLE MANAGEMENT OF WATER RESOURCES IS ONE OF THE MOST IMPORTANT TASKS IN THE WORLD**



# THE BACKBONE IN EVERY WATER SYSTEM

Access to clean water is often taken for granted, just like the fresh air we breathe. We forget that clean water is a product, and that producing enough is a comprehensive, detailed process. In 2030, half of the world's population will lack access to clean water based on UN prognosis. Globally, countless water supply networks are in such poor condition that about 40% of all distributed water worldwide is simply lost in transportation. Reducing water losses and non-revenue water levels are key priorities when working towards SDG #6: assuring access to water and sanitation for all.

## CASE STORY

### REDUCING WATER LOSSES IN MALAYSIA IS OF GREAT IMPORTANCE. FOR BOTH ENVIRONMENTAL AND FINANCIAL REASONS, THE GOVERNMENT FOCUSES ON REPAIRING OLD PIPELINES AND INSTALLING NEW ONES

The price of water in Malaysia is very low and does not cover the actual costs. Huge amounts of unidentified water losses call for the government to support the water board companies with major funding each year.

Many factors need to be considered when trying to identify water losses; leaking pipes, valves or tapping saddles as well as more difficult factors to identify such as malfunctioning domestic household meters, theft of water and lacking management skills of the water company.

Non-revenue water within a utility's network is a huge source of wastage. It adds greatly to operating costs, and leaks can add big complications and expenses to the sustainable management of water services. Hence, the Malaysian government and the Kelantan State decided to initiate the reduction of non-revenue water by focusing on repairing pipelines.

The project was for 60,000 tapping saddles, 60,000 repair clamps, 5,600 gate valves and 600 air valves. Quality was a very important issue, as well as the 10-year product warranty and our halal certificates for the grease used to assemble our valves.

Before the launch of the project, water losses in the state of Kelantan was measured to 45%. A year after our project ended, the non-revenue water is measured to 30%. The pipelines have been repaired and are working well. Some of the issues now to be addressed are the more difficult ones to identify. In Malaysia there is a huge problem with people tapping water directly from the pipelines trying to get around the household meters and with household meters that are malfunctioning or tampered with and therefore not measuring correctly. This causes a continuous huge amount of water loss.



# TURNING WASTEWATER INTO A RESSOURCE

30-50% of a municipality's energy consumption is used for water- and wastewater handling. The water- and wastewater sector accounts for 8% of the global energy consumption. What if wastewater is seen as a resource instead of a problem? What if we can turn wastewater into renewable energy, producing electricity, biogas, district heating or -cooling, and recover other valuable resources from the sludge, e.g. phosphorus? What if is no longer a relevant question. It is possible, and there a various benefits for both utilities and for our environment.

## CASE STORY

### COST-EFFECTIVE, ECO-FRIENDLY CENTRALISATION PROJECT AT DANISH WASTEWATER PLANT

With help from AVK, Mariagerfjord wastewater plant has been able to expand its capacity, cut costs and significantly reduce their environmental impact.

Centralising wastewater treatment in one large plant is a growing trend in Denmark. It makes it possible to treat the sludge and then stabilise it in an aerobic process in a digestion tank, where the organic material is transformed into methane and carbon dioxide. This, considerably, reduces sludge amounts making it a huge gain for the environment.

More specifically, a 2,000 m<sup>3</sup> digestion tank reduces the amount of sludge and makes it possible to produce biogas that is transformed into energy used for heating and electricity. The digested sludge is dewatered in decanters and

then transported in closed semitrailers, which is a cheap and "smell-safe" way to store the sludge. The cleaning process is so efficient that the discharge of organic materials, nitrogen, and phosphorus is significantly less than the total discharge of the 10 wastewater treatment plants it is replacing.





# THE BACKBONE IN EVERY GAS SYSTEM

Gas is an efficient energy source for production, heating and households. When working with gas supply, safety, quality and durability are indispensable elements – all of which are part of our range of valves and accessories. Applications include gas distribution, gas plant work and gas transmission. AVK valves and accessories for gas are thoroughly tested and approved by leading national and international testing institutes. AVK does not compromise on quality and offers reliable products that operate faultlessly even after many years of standstill.

## CASE STORY

### GREEN REVOLUTION: AIMING FOR BLUE SKIES

Decades ago, the Chinese government started looking into the misty phenomenon, which was first thought to be a type of fog lingering in especially larger cities. It turned out to be intense air pollution, or what we refer to as smog – tiny, emitted particles posing severe health risks and climatic impact.

Committed to change, China has introduced numerous game-changing alterations under an umbrella-project known as the Blue Sky initiative; an extensive shift to greener methods aiming to bring back the blue skies over the country.

To prioritise their efforts, the Chinese government conducted research to determine the primary sources to the harmful emissions. They found that about a third of the generated smog was connected to heating; more specifically, to the heavy use of coal gas throughout the country.

### FROM COAL TO NATURAL GAS

The smallest particles found in dense smog are too small to be seen with the naked eye. Being less than 2.5 microns in diameter, they are small enough to not only reach the lungs but to cross into the bloodstream as well. The World Health Organization (WHO) sets the maximum safe limit of exposure over a 24-hour period to 25 of the smallest (PM2.5) particles in every cubic metre of air. Regularly, and especially in winter times, this level exceeds well above 200, forcing public institutions, schools and work places to close down. A reality that the Chinese population would no longer accept.

Starting off with the bigger cities, the dedicated goal is to switch the entire country's heating sources to natural gas. As the installed coal gas pipes cannot carry natural gas, entire pipelines and equipment is being upgraded.

So far, The AVK Group has delivered more than 27.000 products to upgrade projects and expect to increase their contributions in the years to come. Primarily, these include series 36 and 46 from AVK International A/S, and ball valves from AVK Plastics.

Positive results are already seen in the Chinese skies, and at AVK we are proud to assist in the many transformative activities.



# FIRE PROTECTION SAFETY, RELIABILITY AND QUALITY

Fire protection installations are essential in societies aiming to protect people, environment, and buildings from uncontrollable fires. Fire fighters must react fast and be efficient in dangerous situations which calls for a reliable water supply and fire equipment. Even after prolonged periods of idle time, an AVK product will operate flawlessly. Applications within this segment include both indoor and outdoor fire protection.

## CASE STORY

### AVK ASSISTS IN THE FIRE PROTECTION OF VITAL STATIONS ACROSS A VAST, INTERNATIONAL NETWORK DELIVERING NATURAL GAS TO TURKISH AND EUROPEAN CUSTOMERS

Stakeholders from the Azerbaijani, Italian, and Turkish governments are working together with British Petrol (BP) in a project of bringing natural gas from Azerbaijan to Turkey and Europe. The gas will travel through a 1850 km main pipeline system across Turkey. The expected capacity of this massive project is the delivery of 16 billion cubic meters of gas per year; a volume that is anticipated to gradually increase to 31 billion cubic meters annually.

### PROTECTING CRUCIAL PIPELINE STATIONS

More than 10 sections have been tendered in the project and Tekfen Construction and Installation Co., Inc. – an AVK customer - is the contractor for one of these sections. This part of the project covers the compression and metering stations in Turkey, where Tekfen has engineered and constructed two compressor stations and four measuring stations over the pipeline. They preferred AVK fire protection solutions, consisting of UL and FM approved dry barrel hydrants, gate valves and post indicators for protection purposes, of which we have supplied more than 100 sets.

More specifically, AVK has delivered NRS gate valves with post indicator flange, post indicators and high-pressure dry barrel fire hydrants for the project. The chosen fire protection range is manufactured in Europe and has an important customer base in Turkish construction companies which serve both Turkey and abroad countries. One of the main criteria for AVK's success within this segment is the availability of UL and FM approved NRS and OS&Y gate valves up to DN400 as well as both dry and wet barrel fire hydrants - all with competitive lead times.





# AVK WATER GROUP MANAGEMENT

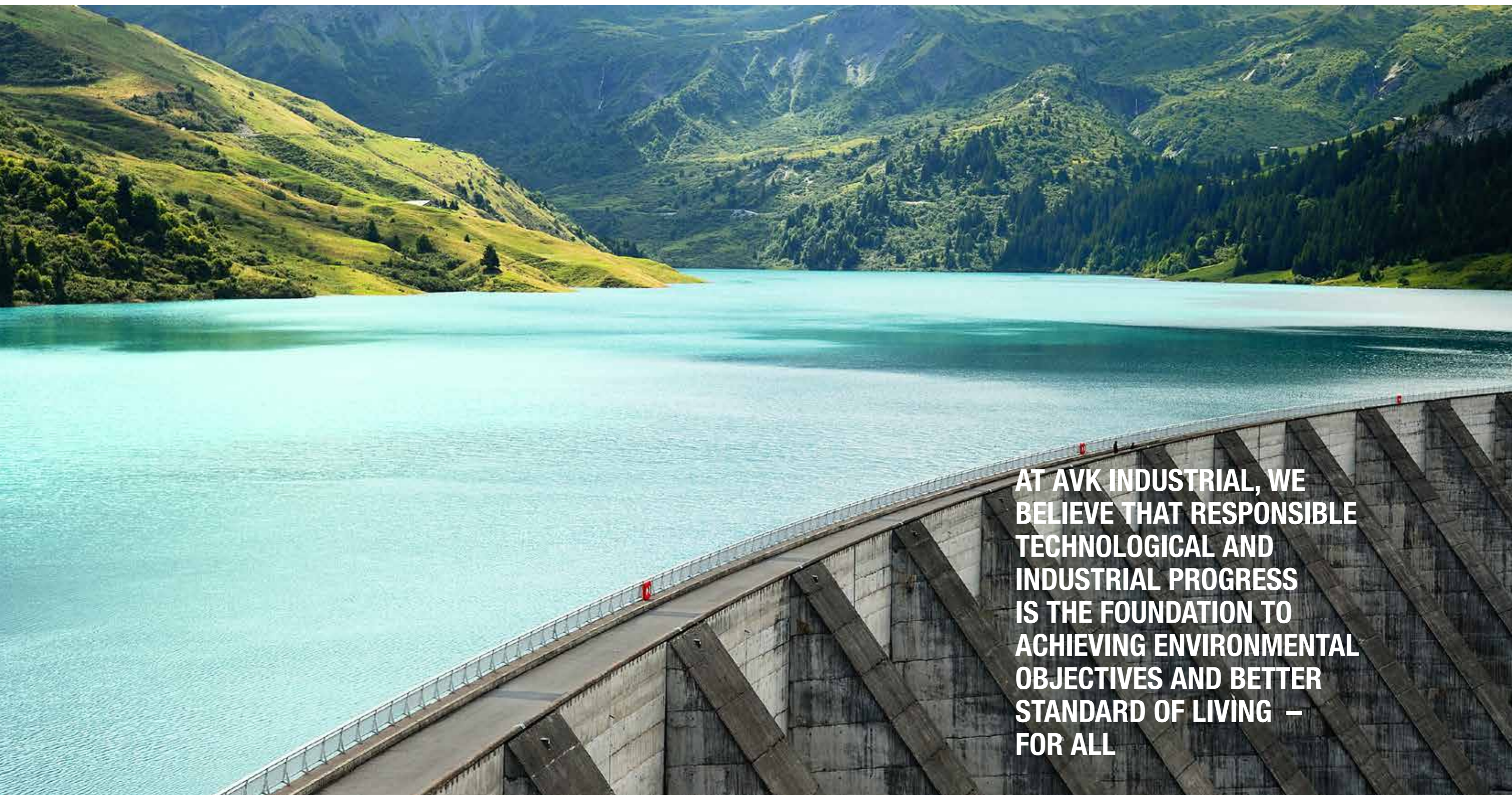


- Alan Jurkonis
- Ole Hedegaard
- Lars Kudsk
- Niels Aage Kjær
- Morten Sæderup Nielsen
- Bo Johansen
- Anne-Mette Kjær
- Paul Hubbard
- Søren Kjær
- Gert Borrits



THE AVK WATER COMPANIES COMPRISE OUR ORIGINAL CORE BUSINESS; VALVES FOR WATER AND GAS DISTRIBUTION, WASTE-WATER TREATMENT AND FIRE PROTECTION WORLDWIDE

	AVK		CYL
	ICV		FUSION
	GLENFIELD INVICTA		G+W
	WANG		SHIMIZU VALVES & TECH
	DONKIN		PREMIER VALVES
	SYDDAL		ACMO
	CTS		SUREFLOW
	AVK REWAG BV		JCH
	SMHM		FURNES
	AVK ARMATUREN		RANDERS
	GUNRIC		
	WATECOM INTERNATIONAL		
	VCW		



**AT AVK INDUSTRIAL, WE BELIEVE THAT RESPONSIBLE TECHNOLOGICAL AND INDUSTRIAL PROGRESS IS THE FOUNDATION TO ACHIEVING ENVIRONMENTAL OBJECTIVES AND BETTER STANDARD OF LIVING – FOR ALL**

# AVK INDUSTRIAL

**INDUSTRIALISATION  
DEPENDS ON ONGOING  
DEVELOPMENT, AND ON THE  
CONTINUOUS INNOVATION  
AND APPLICATION OF EVEN  
BETTER TECHNOLOGIES**

At AVK Industrial, we offer solutions that promote safety, efficiency and sustainability.

We deliver optimal valve solutions based on application knowledge and understanding, competent local support and international coordination.

AVK products are designed to the major international standards and are sold in more than 86 countries worldwide. When dealing with the AVK Group expect quality, reliability, functionality and long lifetime in service.

**9** INDUSTRY, INNOVATION  
AND INFRASTRUCTURE



**BUILD RESILIENT  
INFRASTRUCTURE,  
PROMOTE SUSTAINABLE  
INDUSTRIALISATION AND  
FOSTER INNOVATION**

Investments in infrastructure – transport, irrigation, energy and information and communication technology – are crucial to achieving sustainable development and empowering communities in many countries. It has long been recognised that growth in productivity and incomes, and improvements in health and education outcomes require investment in infrastructure.

# WASTE GAS PURIFICATION: REDUCING ENVIRONMENTAL IMPACT

## CASE STORY

### 30 LUXURY CRUISE SHIPS FROM ITALY GET EQUIPPED WITH WASTE GAS PURIFICATION SYSTEMS

During a joint project with Ecospray Technologies, InterApp was involved in the successful completion process by providing high-quality solutions and first-class logistics. At the same time, it helped to strengthen ecological values in the cruise ship industry.

Ecospray Technologies is specialised in developing innovative high-performance purification systems for regulating the production of waste gas in a variety of industries. The Italian company is committed to the climate requirements of our times, and their innovations enable system operators to reduce both their emissions and their environmental impact.

Ecospray has made a real name for itself, especially in the cruise ship industry, by providing multi-stage waste gas control systems to purify air. They prevent nitrogen oxide, sulphur, carbon hydride, heavy metal, soot and ash from being released into the atmosphere. This is one benefit that has an extremely positive impact on mankind and the environment, especially in port and coastal areas.

This project involved equipping 30 luxury cruise ships with waste gas purification systems. Ecospray was seeking a reliable technical partner capable of supplying the entire range of butterfly valves. It opted for InterApp, since its products met the project's ambitious targets in terms of quality and material requirements. InterApp has been providing Ecospray with support since the development phase and supplied everything from one source.



# AVK INDUSTRIAL

## THE AVK INDUSTRIAL DIVISION OFFERS COMPETENT FEEDBACK AND LONG-TERM PARTNERSHIP

A broad combination of strengths and competencies within various industries. The companies in our Industrial Division are each responsible for their product package to the industrial segments. Each of the companies, counting their present partners, has great expertise within customised valves and accessories, as well as complete solutions. Therefore, we find it essential to keep developing the existing sales organisations and partners.



### LIFE SCIENCE

Products from the AVK group of companies comply with the most demanding requirements for applications within pharmaceuticals and biotechnology, food, and beverage as well as the cosmetics industry.



### WATER TREATMENT PLANTS

Covers applications such as drinking water, industrial wastewater, high purity water, demineralised water, and desalination processes including thermal process, reverse osmosis and EDR process.



### POWER GENERATION

Applications include hydro power, fluegas desulphurisation, cooling water, steam, waste incineration and renewable energy.



### MARINE

Valves and actuators from the AVK group of companies can be found in various places on board any type of ship, wherever critical applications demand maximum reliability.



### DAMS & RESERVOIRS

AVK's product portfolio comprises a large and comprehensive range of gate valves, butterfly valves, check and recoil valves as well as a proven and most reliable range of submerged discharge and free discharge valves.



### DISTRICT COOL- AND HEATING

We supply a wide range of valves, gears and actuators for district cooling and heating systems. These products are distinguished by robust design, corrosive resistance, minimum condensation and long, maintenance free life. Our valves can be used in all applications both within and outside the buildings.



### MINING / SLURRY

The product range covers valves and accessories for applications such as acid and solvent extraction of metals, slurries and cooling systems.



### BULK HANDLING

Equipment for the handling of a wide range of dry solids of different granulometries which involve severe working conditions of pressure, temperature, and abrasiveness.



### METERING

Our range of smart meters excels in precision and usability. Meters are quickly and easily customised and adapted to various standards and specifications. Quality and safety are paramount in metering and hence never compromised.



### PULP AND PAPER INDUSTRY

Valves for applications within the paper, cardboard, and recycling industries.



### CHEMICAL PROCESSING

The chemical processing field covers a number of applications such as production, distribution, surface treatment, and biofuels.



### OIL AND GAS

Applications include petrochemical, gas distribution and production, coal seam gas, LNG, floating production, storage and operation, fire protection as well as cooling water.



### AIR SEPARATION

Engineered valves used in the process of separating atmospheric air into its primary components.



### STEEL INDUSTRY

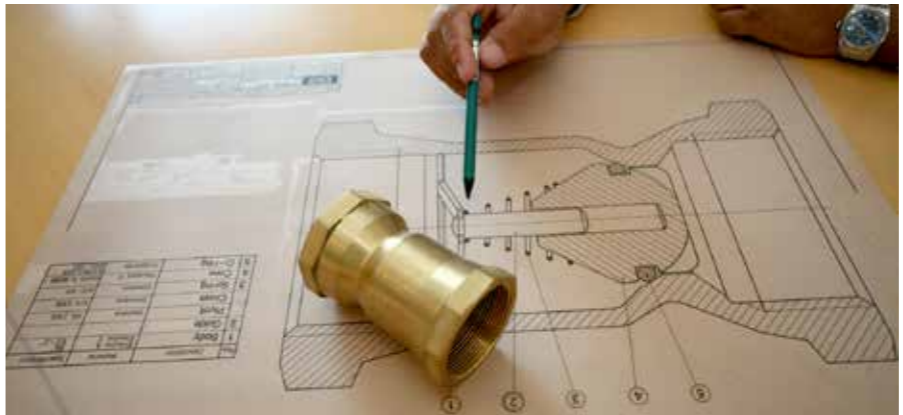
Engineered valves and dampers to control gases in the steel manufacturing process.

# AVK INDUSTRIAL GROUP MANAGEMENT



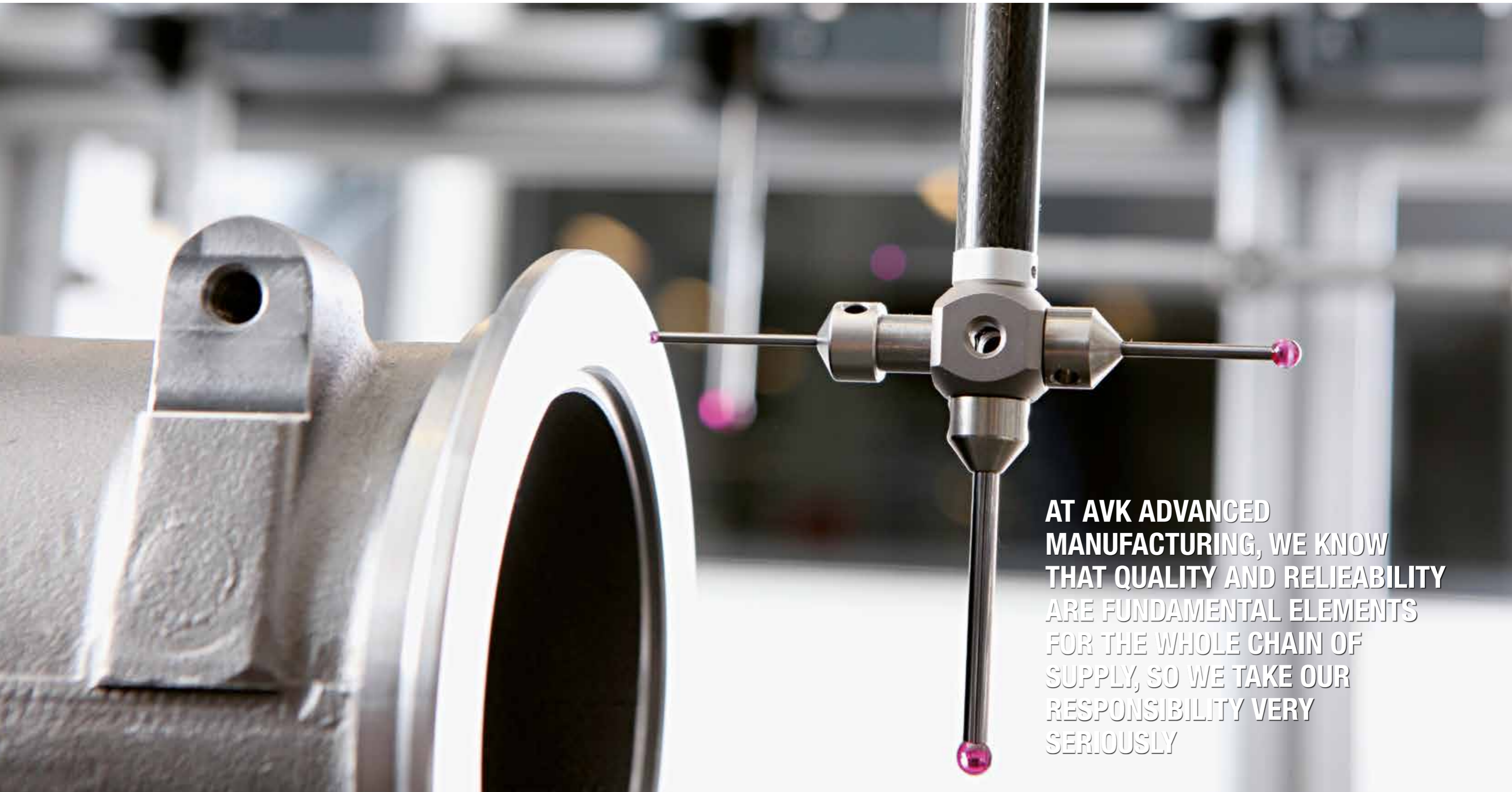
Finn Langballe	Sten Dyrmosé	Lars Kudsk	Niels Aage Kjær	Bo Johansen	Søren Kjær	Joseba Azurmendi	Guido Baldini	Peter Heijink
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THE AVK INDUSTRIAL DIVISION COMPRISES A NUMBER OF STRONG BRANDS WITHIN PRODUCTION AND SALES OF VALVES AND ACCESSORIES FOR A BROAD ROW OF INDUSTRIAL SEGMENTS



ORBINOX	InterApp
TEC artec	WOUTER WITZEL
	FLONIDAN


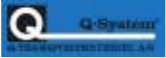




# AVK ADVANCED MANUFACTURING



**AT AVK ADVANCED  
MANUFACTURING, WE KNOW  
THAT QUALITY AND RELIEABILITY  
ARE FUNDAMENTAL ELEMENTS  
FOR THE WHOLE CHAIN OF  
SUPPLY, SO WE TAKE OUR  
RESPONSIBILITY VERY  
SERIOUSLY**

# AVK ADVANCED MANUFACTURING

THE AVK ADVANCED MANUFACTURING COMPANIES ARE LEADING EXPERTS AND PRODUCERS WITHIN THEIR LINE OF BUSINESS, COMPRISING STATE-OF-THE-ART RUBBER TECHNOLOGY, PLASTIC MOULDING, INTERNAL TRANSPORT AND TOOLHOLDER EQUIPMENT

	<b>AVK GUMMI</b>		<b>Q-TRANSPORT</b>
	<b>AVK SYNTEC</b>		<b>AVK TOOLING</b>
	<b>AVK PLAST</b>		<b>AVK PLASTICS</b>



## RUBBER MATERIALS MEET THE STRONGEST DEMANDS

No single type of rubber is universally suitable for all areas of use. Based on numerous tests and many years of experience, AVK GUMMI A/S produces and delivers rubber sealing solutions for components such as valves, pumps and various fittings. AVK rubber is developed to perform in demanding applications within drinking water, food, healthcare and technical industries, securing human compliance, optimum resistance, function and visual appearance.

We benefit from high-tech production facilities and from one of the world's most advanced, fully automatic mixing plants. Raw materials are automatically weighed and dosed with the greatest precision, which makes it possible to manufacture rubber compounds of a uniquely high quality and uniformity - reducing the risk of human error considerably. Each charge subsequently undergoes thorough inspection.

### TRACEABILITY

Data are continuously collected during the manufacturing process for each rubber charge, creating a basis for locating the precise reason or a potential problem and thereby eliminating consequences. Data collection includes all processes of decisive significance for the finished product.

### QUALITY

Our quality management systems include 100% control of each rubber compound, full traceability with the help of our charge number system, SPC control, FMEA and a zero-defect production. In addition, our extraordinarily clean and safe production environment makes it possible to provide rubber components of a continuously high quality at the agreed time of delivery.

### FOR HEALTHCARE AND FOOD INDUSTRIES

The main objective is to protect all consumer products from contamination and to ensure that all product surfaces can be mechanically cleaned, sterilised or easily dismantled for manual cleaning.

AVK GUMMI A/S is certified by The Danish Ministry of Health and 3-A SSI as manufacturer of rubber compounds for food and dairy applications. The Third Party Verification includes specific compounds within the range of EPDM, FPM, NBR, HNBR and silicone.

### NO CONTAMINATION OF DRINKING WATER

AVK has developed an EPDM rubber compound which minimises the buildup of bio-film. This prevents the bio-film acting as a breeding ground for bacteria. We regularly perform laboratory testing of the rubber applied in our products to ensure that it is odour-free, colour-free and taste-free, even after many years of use.



# CASTING FOUNDRY RUN ON 100% HYDROPOWER

## CASE STORY

AT OUR CASTING FOUNDRY IN NORWAY, WE ARE COMMITTED TO TAKING CARE OF OUR NATURE, AND IN RUNNING OUR BUSINESS IN A WAY THAT HAS THE MINIMUM IMPACT ON THE ENVIRONMENT AS POSSIBLE

### ENERGY-NEUTRAL PRODUCTION AT FURNES JERNSTØPERI AS

For our casting production, where we cast and mould many different types of industrial products, we use an energy provider that produces renewable energy in the nearby hydropower plants in Hallingskarvet and Hardangervidda, Norway.

By attaching a guarantee of origin to our electricity contract, we can ensure that the corresponding amount of electricity consumed is produced from

energy sources that are 100% renewable. At an additional NOK 0,025 / kWh we can make an active choice for renewable energy.

With our consumption last year, a guarantee of origin will cost us an extra NOK 400,000,- a year, in addition to the cost of the electricity.

At the moment, Furnes Jernstøperi AS is also working to establish an environmental accounting for their business.



# LOST FOAM TECHNOLOGY

## CASE STORY

BOOSTING EFFICIENCY IN PRODUCTION WHILE REDUCING THE ENVIRONMENTAL IMPACT

At our Advanced Castings A/S foundry, which is supplying the AVK Group with valve, hydrant and other metal castings, we use the innovative lost foam method.



### ENVIRONMENTALLY FRIENDLY PRODUCTION

The lost foam method refers to the process of creating a foam model of the desired casting, embedding it in binder-less molding sand and finally replacing the foam with molten metal. This opens a world of design opportunities and offers longer tooling life, as foam tooling can last for hundreds of thousands of cycles, corresponding to millions of components.

The process allows the creation of complex parts with near net shape and with no use of cores, making it possible to reduce or eliminate the material waste. Production allows low wall thickness and draft angles, which helps reduce the component weight.

The sand used to embed the foam model is ceramic sand, and no use of binder is required. This makes demoulding easy, and the sand can be

reclaimed to a very high degree; in general, above 99% in total. The process therefore only leaves around 1% of sand for disposal and barely any dust.

The process allows an improvement in performance, reducing the energy consumption and particle emissions into the atmosphere. Also, it helps to create a safer working environment in our production.

We use recycled steel scrap as the main material in our castings, constituting 85-90% of the total melt. Melting is done in electric induction furnaces.

AT AVK Advanced Castings A/S, we have a safety-oriented culture and are renowned for our clean working environment. Our foundry is regularly visited by other foundries and government officials looking for updated knowledge and valuable experience.method.



# RECYCLING IN AVK PRODUCTION

## DECADES OF PLASTIC DUMPING HAS LEFT OUR NATURE AND OCEANS POLLUTED AND SUFFERING

Luckily, we see many great initiatives to collect plastic waste all over the world. And it's one thing to remove the unwanted plastics scattered around, reducing the direct contamination of the environment. But what if it could gain new life as a valuable product somewhere else?

These were the key reasons for our Group owner and CEO, Niels Aage Kjær, to start incorporating recycled materials in AVK production. AVK is now a big customer to recycled plastic materials, producing and selling products with recycled materials for more than 26m EUR every year.

When used properly, plastic is in fact environmentally friendly. Every year, AVK production of primarily plastic pallets and surface boxes is based on more than 19,000 tonnes of recycled plastic materials in our production sites in Denmark and the Netherlands - AVK Plast A/S and AVK Plastics BV. The plastic is mostly bought from Sweden and Holland, as they are very efficient in their recycling efforts.

### WASTED OPPORTUNITIES

In Denmark alone, more than 400,000 tonnes of plastic waste are discarded every year. Half of the amount is incinerated and used for heating, emitting huge amounts of carbon dioxide into the atmosphere. The remaining is roughly sorted due to inefficient sorting and recycling efforts, and more than half is shipped out of the country. While some is lost in nature, only around 50,000 tonnes are left for recycling.



Among other types, the recycled plastic includes grinded soda caps and cutting waste from used airbags. As new quality products, the lifetime of the "old" plastic is extended with about 50 years.

# GREEN POWER GENERATION AND MARITIME TRANSPORTATION

## HARNESSING THE WIND CONTINUES TO BE ONE OF THE FASTEST GROWING INDUSTRIAL SEGMENTS IN THE WORLD



In the landscape of more than half of all countries worldwide, you'll find wind turbines including key components from AVK Tooling's factories in Denmark and Poland.

The components comprise a steel insert, which is used at the root connection of the turbine, making sure that the blade is firmly secured to the wind turbine. Within the wind industry, AVK Tooling's biggest customers include Vestas and Nordex, with a combined experience of more than 75 years.

### SINGLE SUPPLIERS TO LEADING ENGINE SYSTEMS

Through a long-term cooperation, we have achieved the status of being single supplier of machined bronze parts for Volvo Penta's IPS propulsion system. Every year, more than 2000 parts are delivered to their assembly lines.

The IPS system is used within both luxury and commercial boating and can be found in harbors all over the world.

### DIRECT DELIVERY

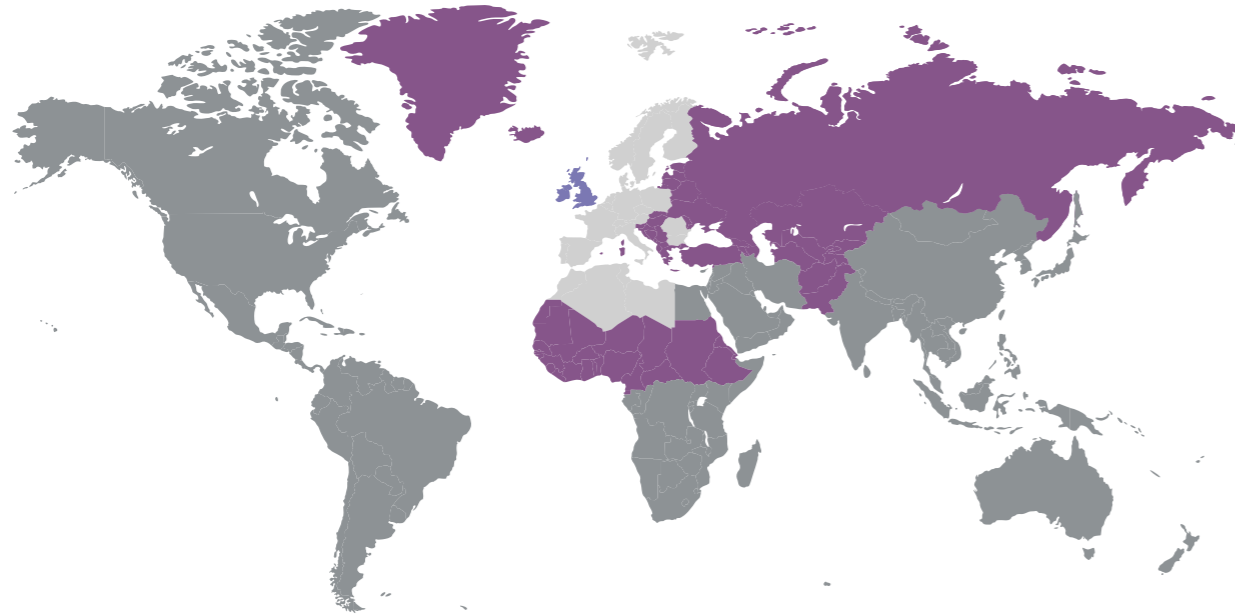
For various industries, AVK Tooling deliver items in various materials such as cast iron, aluminum, bronze and from steel bars. Their services cover raw-material, machining, surface treatment and final assembly if required.

As tier 1 suppliers, AVK Tooling produces and delivers directly to the assembly lines. All customers are supplied from fully automatised production lines, covering both machining and surface treatment. Quality is always documented through a state-of-the-art quality department.



# EUROPE

# EUROPE



- UK and Ireland – **AVK UK Ltd.**
- Continental Europe, Russia, Northern and Central Africa, South Eastern Europe – **AVK International A/S**

## EUROPE

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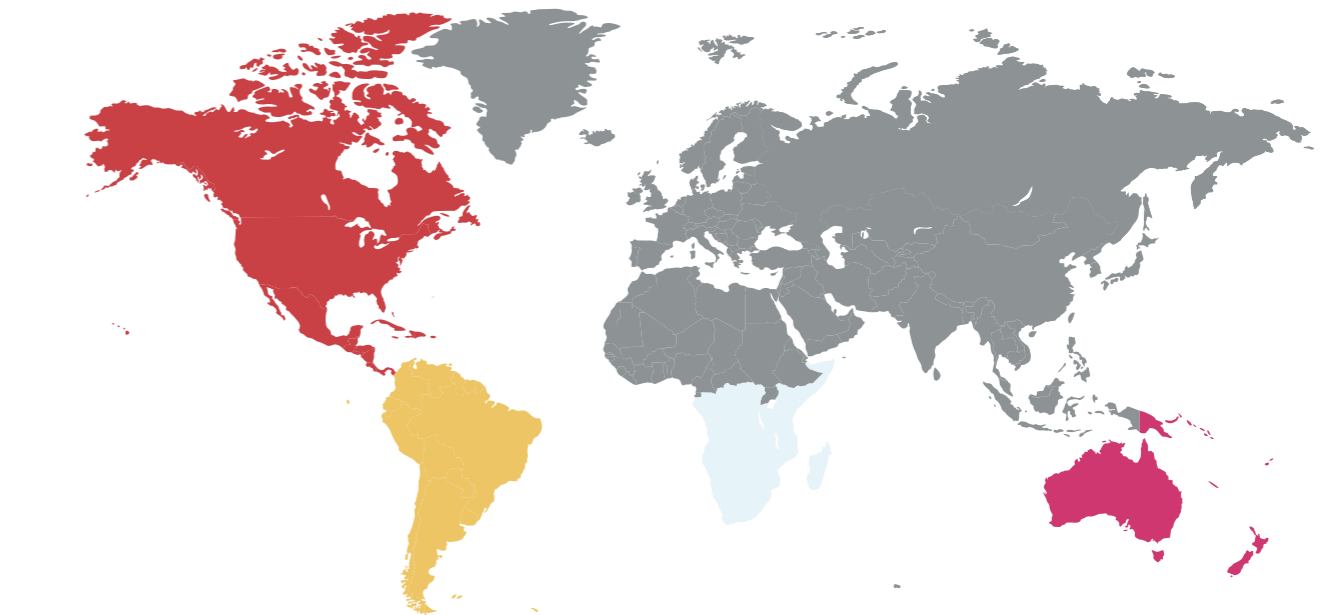
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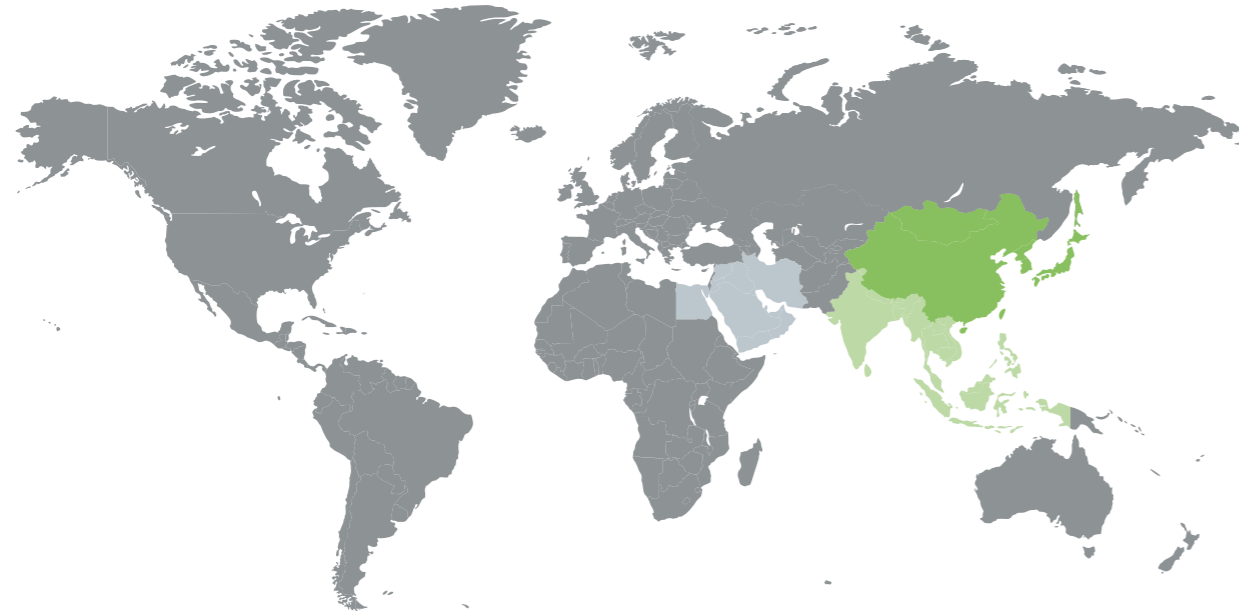
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# MIDDLE EAST AND ASIA



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