NO. 33
AN INTERNATIONAL MAGAZINE FROM ALFA LAVAL

here

Technology's role in nourishing a growing world population

THE COAL GOAL
Can ICTL help China achieve energy security?

TASTE OF ITALY
Tech and tradition combine to make the best olive oil.

COOL MASTERPIECE
District cooling that serves Louvre is a real work of art.

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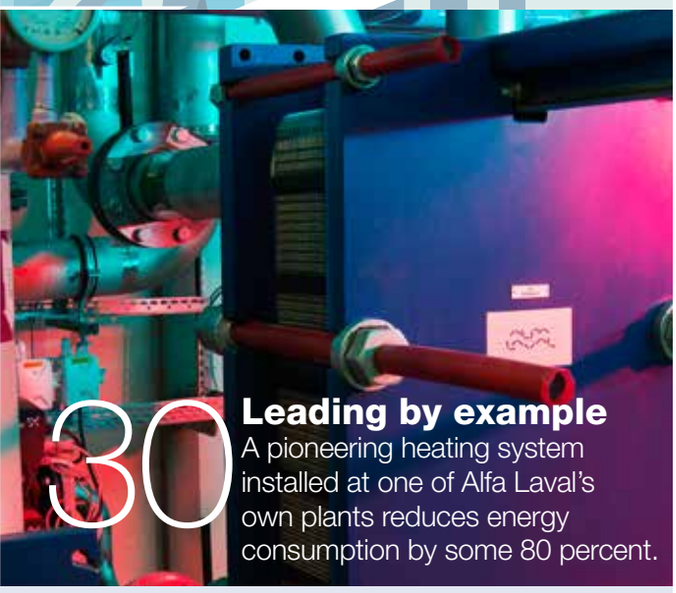

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Alfa Laval Corporate AB
PO Box 73
SE-221 00 Lund, Sweden

Publisher: Peter Torstensson
Editor-in-chief: Eva Schiller
e-mail: eva.schiller@alfalaval.com, tel. +46 46 36 71 01

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Food for thought

editorial

Many trends are driving the global demand for processed food – urbanization, a growing middle class in emerging markets, and more women at work among them.

In the developed world today some 80 percent of all food consumed is processed, while in the emerging nations the share is much lower. But the gap is closing; India's food processing industry is growing by 10 percent per year and China is about to become the world's largest consumer of processed food.

As it grows, the industry is striving for process optimization, and technology can play an important role in minimizing the use of water and energy, and in guaranteeing safe and hygienic food processing. Alfa Laval has been part of the food processing industry since 1883 when Gustaf de Laval introduced the continuous milk separator. Since then other applications and products have been added, and today we have the broad portfolio and expertise necessary to help producers increase yield while perserving the world's natural resources.

NOW THAT I AM HEAD of the Western Europe and North America (WENA) region for Alfa Laval I regularly visit Italy where food is at the heart of the country's culture. We have served the Italian food industry for more than 100 years, and the innovative process solutions we set up there are often exported to other parts of the world. In this issue you can read about the award-winning Italian olive oil producer il Frantolio di D'Amico Pietro which has used our equipment since the 1970s.

But Alfa Laval is involved also in other areas far from food. In China we are supplying highly efficient heat exchangers that are used to produce liquid fuel from coal – a process that holds potential for boosting the country's energy security (read more on page 18). And our membranes play a vital role in the reuse of municipal and industrial wastewater – a solution that will only grow in importance as water security climbs up the international agenda.

Perhaps the "coolest" solution we report on in this edition of *here* is a system that lies hidden beneath the streets of Paris. This district cooling system, one of the largest of its kind in the world, keeps the Louvre's many masterpieces and its millions of visitors at just the right temperature using water from the Seine and Alfa Laval heat exchangers. As technical solutions go, it's a real work of art.

Enjoy

NISH PATEL
EXECUTIVE VICE PRESIDENT, WESTERN EUROPE AND NORTH AMERICA REGION

BASF celebrates 21 years of optimized processes

The Alfa Laval Compabloc heat exchangers have saved BASF an estimated €300,000 to €400,000 a year

BASF's acetylene and naphthalene plant in Ludwigshafen, Germany, first installed an Alfa Laval Compabloc heat exchanger in 1993. Twenty-one years later that same unit is still in operation and another 25 units have since been installed.

Prior to installing an Alfa Laval Compabloc, BASF had been experiencing problems with leaking gaskets, which caused product loss, costly downtime and created a safety hazard. The plant originally decided to try Alfa Laval Compabloc as it is a gasket-free heat exchanger that is as compact as a plate heat exchanger. With no leaks or production stops in the first two years, BASF decided to replace more heat exchangers with Alfa Laval Compabloc. In 2007-08, four units were used to replace 12 shell-and-tube heat exchangers.

"The Compablocs were around 25 percent lower in cost compared to re-tubing the existing shell-and-tube heat exchangers," says Frank Steiglich, Project Operation Manager Acetylene, BASF. "On top of that, a lot of space was freed up, which resulted in a safer plant for the operators."

In addition to putting an end to leaks and downtime, Alfa Laval Compablocs also practically eliminated maintenance costs. In fact it is estimated that the heat exchangers have saved BASF between €300,000 and €400,00 a year.

Nuclear industry first in China

Alfa Laval's Jiangyin factory has been awarded Nuclear Safety Administration (NSA) certification, making it the first foreign company to hold this authorization in China.

The permit, issued in May 2014, allows the factory to manufacture gasketed plate heat exchangers (GPHEs) for the Chinese nuclear industry. The Chinese government strives to use equipment produced in China, and a ban on imported equipment for Chinese nuclear installations is expected in the near future.

After the Fukushima incident in Japan, China put a hold on all new nuclear power plant projects to make detailed safety reviews. From 2014, projects will gradually kick off again.

NSA certification is the culmination of six years of work by Alfa Laval's project team in Jiangyin, with help from Alfa Lava's Chinese sales company and its factory in Lund, Sweden.

MEET US AT ACHEMA 2015

Alfa Laval will be among the exhibitors at ACHEMA, a world forum for chemical engineering and the process industry, which will be held in Frankfurt, Germany, in June 2015.

The event is expected to attract more than 3,800 exhibitors from over 50 countries, as well as 170,000 participants from more than 100 countries.

The Alfa Laval stand, with the theme "Make it happen", will display a wide range of products and be staffed by solution experts.

ACHEMA showcases the industry's latest innovations, technology, and global trends and offers the opportunity to network with executives and experts from around the world.

Expertise and experience for booming West Africa

Alfa Laval has opened a new sales office to serve the booming West African region. The office, located in Accra, Ghana, will focus primarily on the rapidly growing oil and gas, food, and marine and diesel sectors in the area.

"Companies in this region face a number of trends and challenges," says Cyril Massard, the newly appointed regional business manager for West Africa. "On the one hand there are increasing standards of living and rising energy prices, and on the other companies are using ageing equipment and have to work within confined spaces. These trends and challenges require the experience and expertise that Alfa Laval has, and can now provide locally."

6.9%
West Africa's 2014 GDP growth (forecast)

West Africa has outperformed the rest of Africa in recent years. In 2013 the region's GDP grew by 6.7 percent, a figure that is expected to grow to 6.9 percent during 2014, which compares with 4.7 percent for the continent as a whole.

Massard says that Alfa Laval's wide range of solutions for the oil and gas industry will address the needs of the region's growing offshore exploration and production sector, while equipment for food applications can help the local food industry satisfy increased demand for processed food from the growing West African middle class. For marine and diesel, there is growing demand for equipment to generate the electricity that will attract new investors to the region.

Until recently, North and West Africa, which consists of 22 countries from Tunisia to Congo, was served from France. The new West Africa office, which opened in September, will concentrate on the countries with highest potential: Nigeria, Ghana, Cameroon, Ivory Coast, and Senegal.

PureSOx 2.0 unveiled

In January 2015 the enforcement of Emission Control Areas (ECAs) to tackle air pollution from ships commences. Alfa Laval has launched a new generation of its exhaust gas scrubber with a wide range of enhancements and options.

Alfa Laval PureSOx has been operating at sea since 2009 and is among the most reliable solutions on today's market.

Now a new generation of the system, PureSOx 2.0, has been presented.

Alfa Laval PureSOx 2.0, which is smaller and more flexible than its predecessor, suits an even wider range of vessels and offers even more benefits. These include new placement possibilities and lower installation costs. "PureSOx 2.0 retains the well-documented PureSOx strengths," says René Diks, Alfa Laval Manager Marketing & Sales, Exhaust Gas Cleaning. "What it adds are new advances that reinforce the system's position at the leading edge of marine scrubber technology."

Diks says that PureSOx 2.0 represents a major milestone, both in the technology itself and in terms of Alfa Laval's overall commitment to exhaust gas cleaning.

"But development will continue, both at Alfa Laval's own R&D facilities and at sea in cooperation with our customers."

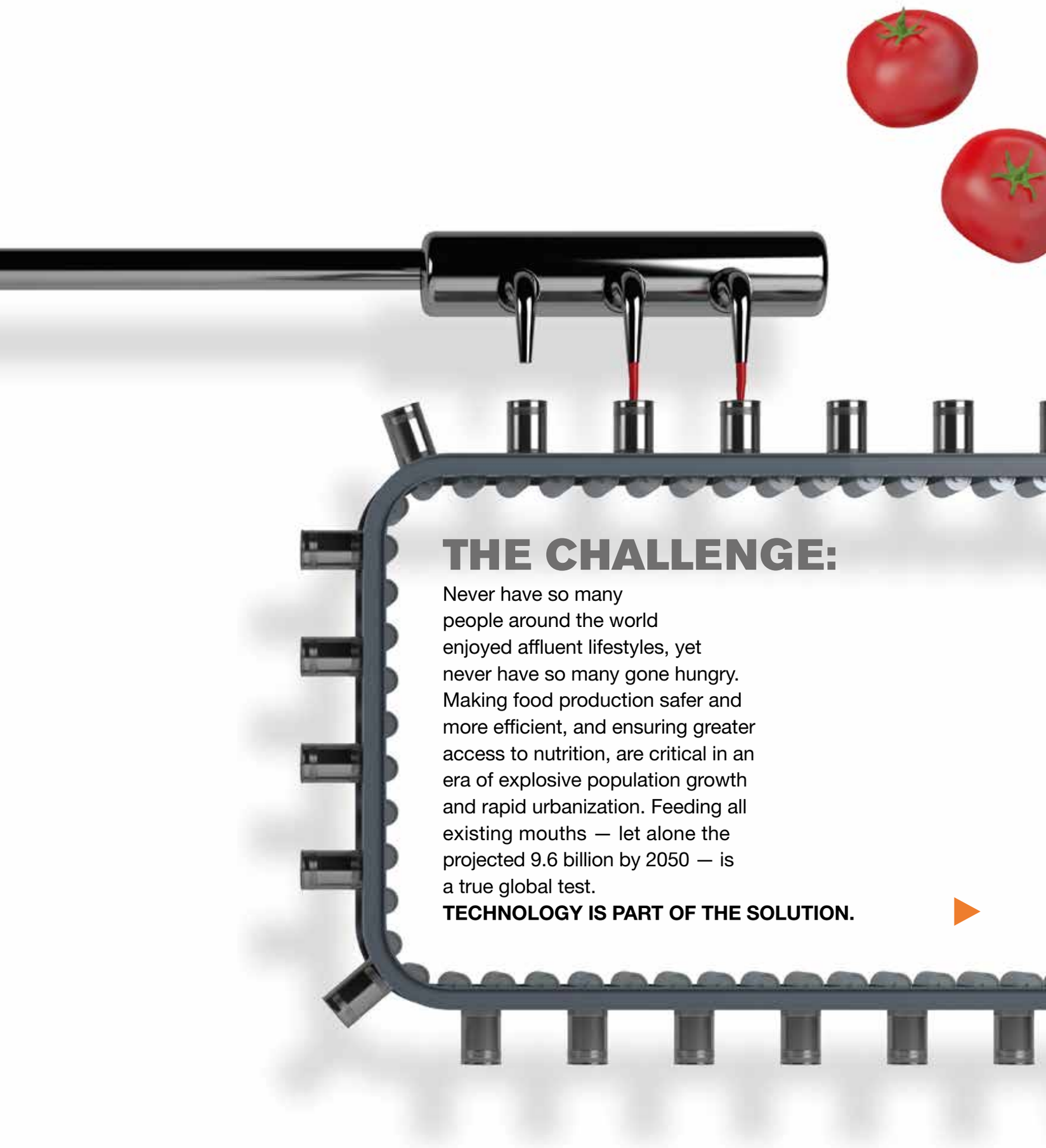
Many happy returns!

2014 is a jubilee year at Alfa Laval. The sales companies Alfa Laval Poland and Alfa Laval Baltic are both celebrating their 90th anniversaries; Alfa Laval China its 30th; while Alfa Laval as a whole is marking 50 years as a supplier to the OEM Engine & Transport sector. Leading the celebrations this year is Alfa Laval Argentina, which has reached the impressive milestone of 100 years in business.

2015 will be another landmark year. Alfa Laval in the Czech Republic, Hungary and Slovakia is marking its 95th anniversary, Singapore its 20th, Japan its 90th, and Dubai its 25th. Denmark will celebrate 115 years in business, Pakistan 30 years, while the US celebrates 130 years.

THE FACTS:

Projected world population 2050:	**9.6 bn**
Developing world population living in cities 2050:	**64.1%**
People without enough food for a healthy life:	**805m**
Number of overweight or obese people in the world:	**2.1bn**
Amount of food wasted globally each year:	**1.3bn tonnes**
Processed food as % of consumption, developed world:	**80**
Annual growth of food processing industry in India:	**10%**
China to be world's largest consumer of processed food:	**2015**



THE CHALLENGE:

Never have so many people around the world enjoyed affluent lifestyles, yet never have so many gone hungry. Making food production safer and more efficient, and ensuring greater access to nutrition, are critical in an era of explosive population growth and rapid urbanization. Feeding all existing mouths — let alone the projected 9.6 billion by 2050 — is a true global test.

TECHNOLOGY IS PART OF THE SOLUTION.

From improved harvesting and crop management techniques to new food processing know-how and savvier distribution, food production must become more efficient and less wasteful if we are to feed the world.

Consider that around one third of the food produced in the world for human consumption every year – approximately 1.3 billion tonnes – is lost or wasted.

In many parts of the world, especially in emerging markets, population growth, rapid urbanization and other megatrends are transforming food consumption patterns and making ever-greater demands on the food chain.

Rising disposable incomes, increased purchasing power and growing consumer awareness of food quality and safety across the developing world, notably in countries like China and India, are fuelling a sharp increase in demand for processed foods.

THE MASS ENTRY of women to the workplace is a key driver. Across the world, women in dual-income households are spending less time in the kitchen and turning to processed foods to feed their families.

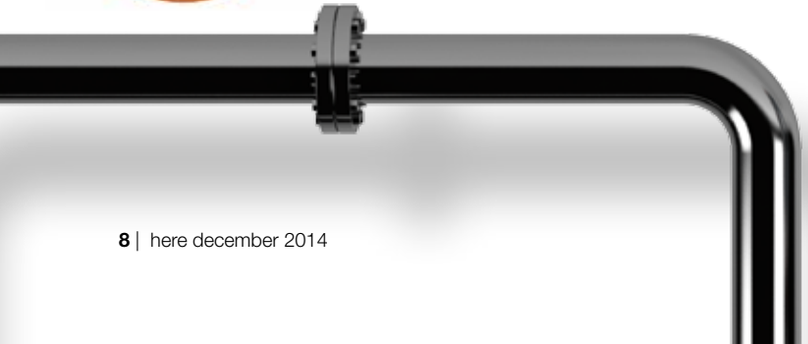
This shift reflects a lack of time but is also a matter of choice. As Siddharth Jain, executive director of LMJ Group, a leading Indian agribusiness, wryly observes: "About 85 percent of women are responsible for cooking the family dinner, and 84 percent wish they didn't have to."

Processed food accounts for some 80 percent of food consumed in the developed world, compared to 25 percent in China and 32 percent in India. As the gap closes, processed food will see exponential growth. In these developing markets and others, adopting new techniques can help raise food production, increase crop yields, create better markets, improve food supply chains and get more from raw materials.

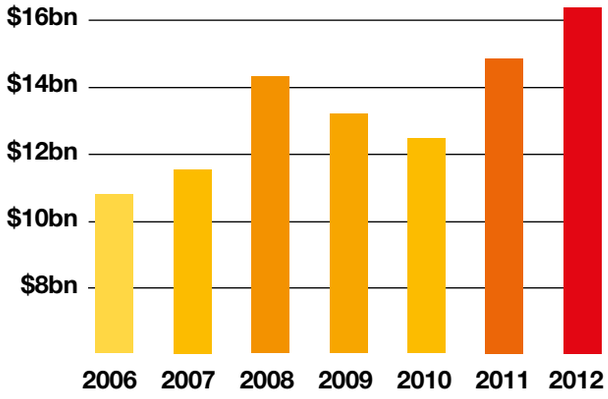
"FOOD PRODUCERS and processors in industrialised and developing nations alike require science and technology to ensure a sustainable supply of safe, nutritious, and affordable food and satisfy a rapidly growing demand," says John Floros, head of the food science department at Penn State University in the US.

"People's food, be it fast or slow, local or global, whole, natural, fresh or processed, industrial or not, will require more food science and technology, not less."

In China, growing affluence stemming from urbanization has triggered rapid growth in processed food consumption. The country is expected to become the world's largest consumer of processed food by 2015. But the growth of processed food has created its own challenges, with food safety scandals caused by producers taking shortcuts, which has in turn led to both tighter regulations and growth in demand for hygienic food processing solutions.



India:
growth of the food processing industry



ESPECIALLY IN DEVELOPING COUNTRIES – where food processing is comparatively underdeveloped – huge opportunities exist to develop the food production chain by establishing or improving infrastructure for food storage, transport, packaging and logistics.

In India, the food processing industry is growing at more than 10 percent per year, albeit from a relatively small base. The Indian government sees growth in food processing as essential to meet its twin objectives of inclusive growth and food security. To this end, it has launched Vision 2015 – an initiative to increase the processing of perishable foods from 6 percent in 2010 to 20 percent.

As part of the plan, the government is establishing a nationwide network of mega food parks, including Chittoor (Andhra Pradesh), Dharmapuri (Tamil Nadu), and Mandya (Karnataka), to create a "farm to fork" infrastructure that will connect the food processing industry and farmers.

Mega food parks are revolutionising India's food supply chain by integrating different stages of food processing and agriculture in one location and building the capacity of producers. Each mega food park is structured to host 30-40 industries.

By bringing food producers, buyers, processors and distributors together, mega food parks are also designed

SAFER SUSTENANCE: In China, which is expected to become the world's largest consumer of processed food by 2015, food safety scares have fuelled demand for hygienic food processing solutions.

to attack wastage – a major problem in a country where up to a quarter of all food is lost or wasted due to inadequate infrastructure for harvesting and processing of cultivated food.

Food technology is an eclectic arena covering a vast range of techniques and innovations under development around the world. It ranges from advanced plant breeding techniques that produce varieties of plants tailored to specific climates and soil types to enhanced refrigeration to improve the cold chain. And from hydroponic systems that water plants in greenhouses to satellites that monitor crop development, observe disease and assess fertiliser needs.

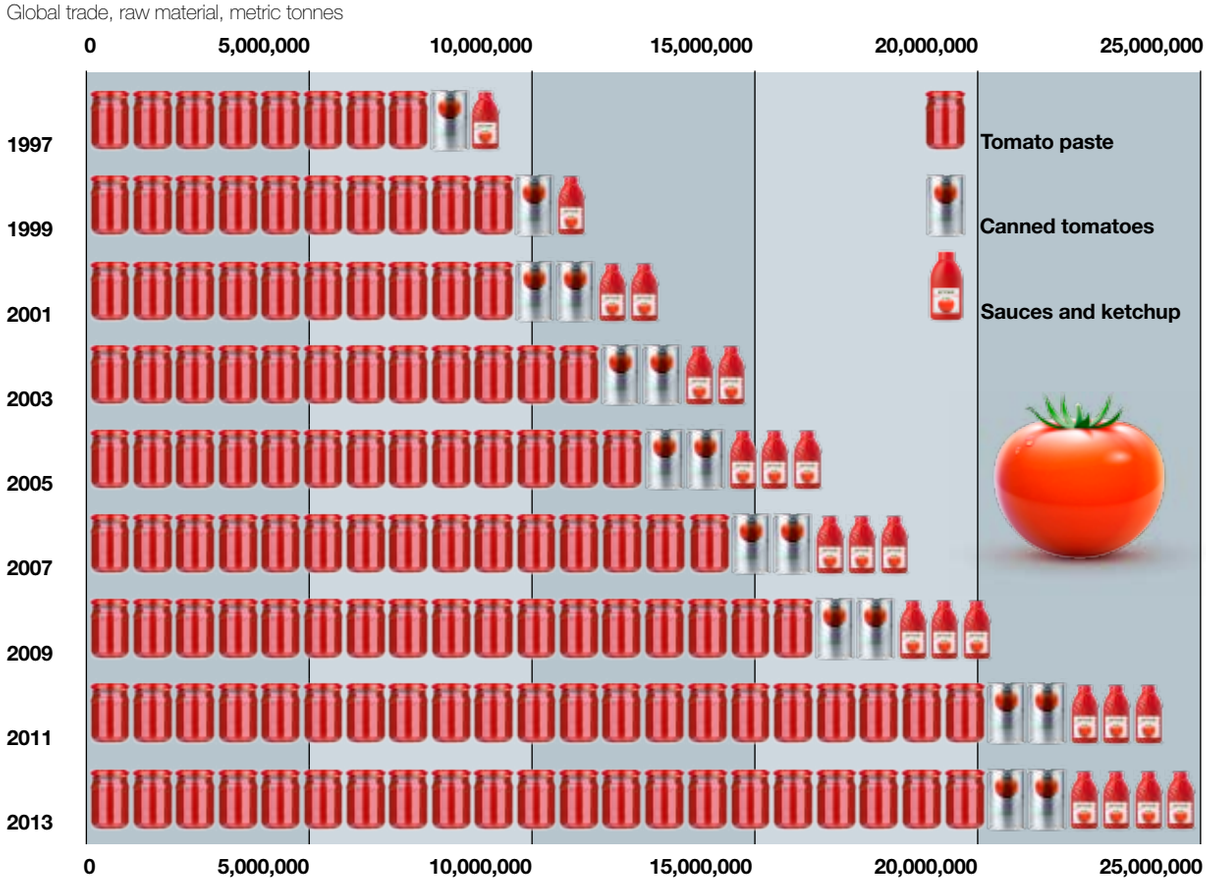
In Iceland, technology is being used to turn fish waste into fishmeal and fish oil for small and medium-sized fish producers. The Héoinn Protein Plant uses fish waste that would otherwise be discarded to turn a profit and make a positive environmental impact at the same time.

RESEARCHERS IN THE UK are going one step further by exploring new ways to turn fish waste into protein-rich value-added "neutraceuticals".

"Food producers and processors in industrialised and developing nations alike require science and technology to ensure a sustainable supply of safe, nutritious, and affordable food and satisfy a rapidly growing demand."

JOHN FLOROS, HEAD OF THE FOOD SCIENCE DEPARTMENT, PENN STATE UNIVERSITY

The ketchup effect: global consumption of tomato-based products on the rise



"We use the waste products, including fish skin and bones, and process the proteins through hydrolysis into bioactive peptides," explains Nazlin Howell, professor of food biochemistry at the University of Surrey and coordinator of the Securefish project.

Scientists have discovered that some of the bioactive peptides isolated from fish waste can act like a class of blood-pressure-lowering drugs called ACE inhibitors. Others exhibit antioxidant properties and could have implications for cardiovascular disease and cancer prevention. Howell says these could be put into food products such as yoghurt and milk drinks due to their potential health benefits.

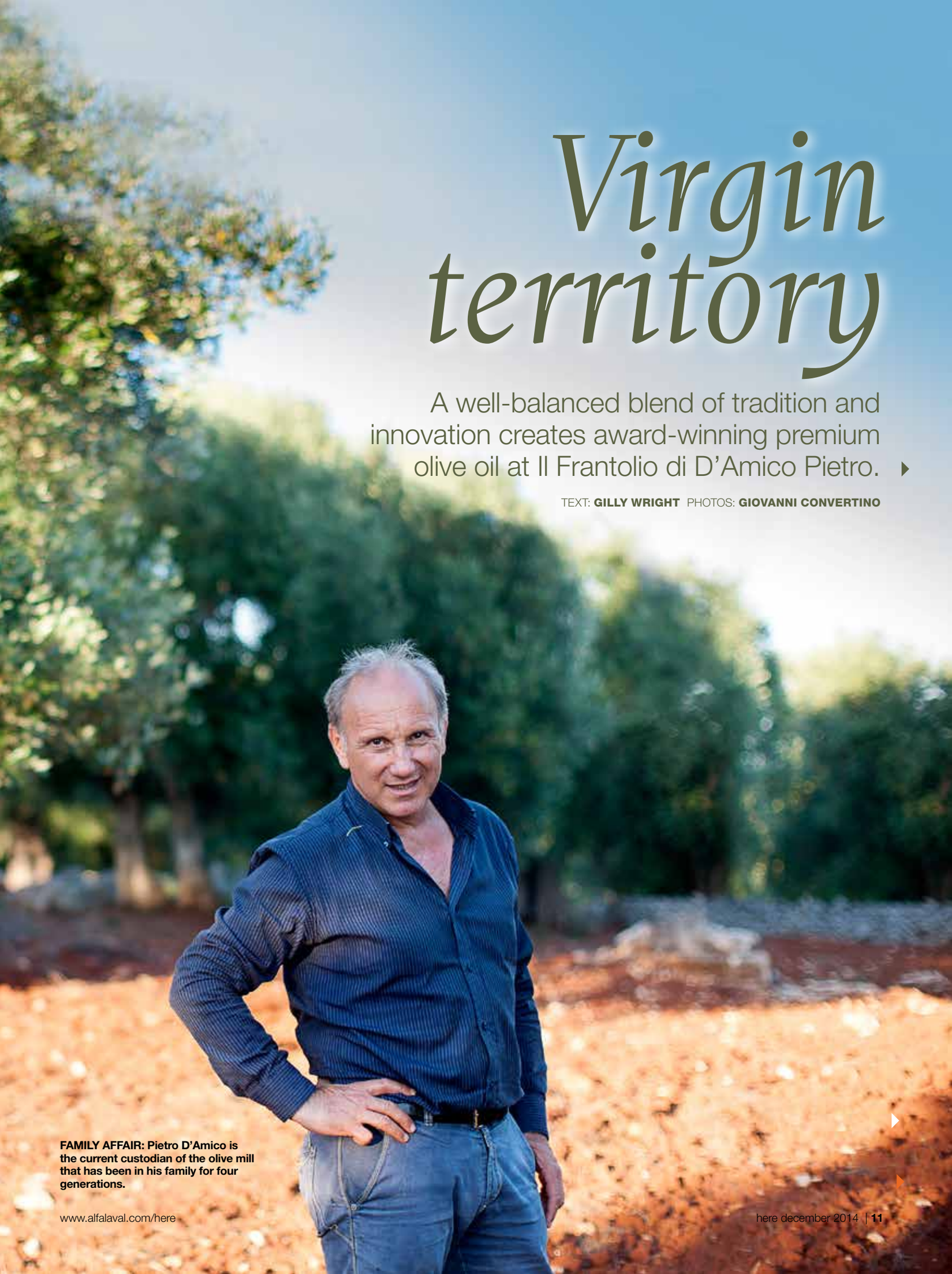
THE ISSUE OF FEEDING the world's growing population is increasingly in the spotlight, as indeed it must be. Expo 2015 held in Milan has as its central theme "Feeding the planet, energy for life". The exposition will bring together international players to explore if it is possible to guarantee water and food for the world's population, and increase food security with new solutions that take into account the planet's biodiversity.

As it has throughout human history – from the plough to fermentation, the water mill to refrigeration – technology will continue to play a central role in feeding the planet. ■

Virgin territory

A well-balanced blend of tradition and innovation creates award-winning premium olive oil at Il Frantolio di D'Amico Pietro.

TEXT: **GILLY WRIGHT** PHOTOS: **GIOVANNI CONVERTINO**



FAMILY AFFAIR: Pietro D'Amico is the current custodian of the olive mill that has been in his family for four generations.

At the Il Frantolio di D'Amico Pietro, Alfa Laval equipment has played an important role in production at the mill since the 1970s.

In Italy's sun-kissed heel lies Puglia, an ancient land of red, rocky soil, whitewashed hilltop towns, enchanting conical-roofed trulli and over 60 million olive trees. Many of the trees are more than 1,000 years old and it's humbling to think that these twisted and gnarled remnants of the past still produce olives today.

OLIVE TREE CULTIVATION in Puglia dates back to the start of the region's colonisation by the ancient Greeks, some 5,000 years ago. Today, thanks to the region's lime-rich soil and dry climate, it accounts for 40% of Italian and 15% of global olive oil production.

Olive oil is key to the economy of Puglia and it has more olive mills (frantoio) than any other Italian region. One of Puglia's most prestigious mills is Il Frantolio di D'Amico Pietro, situated in Cisternino, in the heart of the Itria Valley. A member of the coveted "Collina di Brindisi DOP" issued by the EU to protect destination or origin status and certified organic by Bioagricert, D'Amico was awarded a silver medal for its Trisole extra-virgin olive oil at the 2014 International Biol organic extra-virgin olive oil awards – the first time a Puglian olive oil has won an international award.

The olive mill has been owned and run by the same family for four generations since opening in 1917, and today's owner Pietro D'Amico says that timing and a combination of both traditional and modern techniques are needed for high quality, award-winning

DID YOU KNOW?

- Archaeological evidence shows that olives were being turned into oil by Canaanites in what is now Israel by 4500 BC.
- The oldest olive tree in the world, on the Greek island of Crete, is believed to be 2,000 to 3,000 years old.
- Greece has by far the largest per capita consumption of olive oil worldwide, at more than 26 litres per person per year.

“Thanks to the technology of Alfa Laval in synergy with traditional methods, we produce oil of the very best quality.”

PIETRO D’AMICO

olive oil. “Our secret is that we hand pick the olives off the tree between the beginning of October and the end of December and then press them within 12 hours,” he says. “This is important for us because it ensures that the oil is really rich and full of polyphenol and vitamins and has low acidity.”

IL FRANTOLIO DI D’AMICO PIETRO uses two systems: a traditional system under pressure, with millstones and presses, plus the latest generation continuous processing line, not under pressure, but with good centrifugation. “Thanks to the technology of Alfa Laval in synergy with traditional methods, we produce oil of the very best quality,” says D’Amico.

Next year, with the help of Alfa Laval, D’Amico says he is looking to produce flavoured oils, infused with tomato, herbs, chilli and citrus. The two companies are also collaborating on a project to transform water regeneration by reusing water with polyphenols to water olive trees.

Respect for the past and continued innovation has not only brought D’Amico’s Trisole oil global recognition but has also helped make Il Frantolio di D’Amico the first choice for local olive farmers who press between 2 and 2.5 million quintal of olives at the mill each year. ■

A history of collaboration

IL FRANTOLIO DI D’AMICO PIETRO first introduced an Alfa Laval continuous extraction line in the 1970s, adding another the following decade to improve productivity. In the 1990s D’Amico added one more line and began working with Alfa Laval to fine tune its ARA system. This system controls the decanter liquid level, which both reduces water consumption in the extraction process and produces better oil.

The ARA System is still included in Alfa Laval’s three-phase decanters and D’Amico installed an X6 (a three-phase diversified mill system, with modular kneading, a new decanter platform and separators) in 2008.

This system also comes with a stoner, which removes the core from the olives, for the extraction of oil from the pulp alone, which has a more delicate flavour and excellent quality. “This opens many market possibilities,” enthuses Pietro D’Amico. “We can produce different oils of different qualities for different markets.”

A QUESTION OF TASTE

Extra-virgin olive oil: virgin olive oil that has a free acidity, expressed as oleic acid, of not more than 0.8 grams per 100 grams. Superior taste.
Virgin olive oil: virgin olive oil which has a free acidity, expressed as oleic acid, of not more than 2 grams per 100 grams. Good taste.
Ordinary virgin olive oil: virgin olive oil which has a free acidity, expressed as oleic acid, of not more than 3.3 grams per 100 grams.
Source: International Olive Council

Quality, safety and efficiency guide product development

Alfa Laval's presence in food processing extends far beyond the olive mills and wineries of Italy. From breweries in the UK to Chinese dairies, the company's components, modules and complete processing lines enable the food and beverage industry to make processes more energy and cost effective, while improving safety and quality.

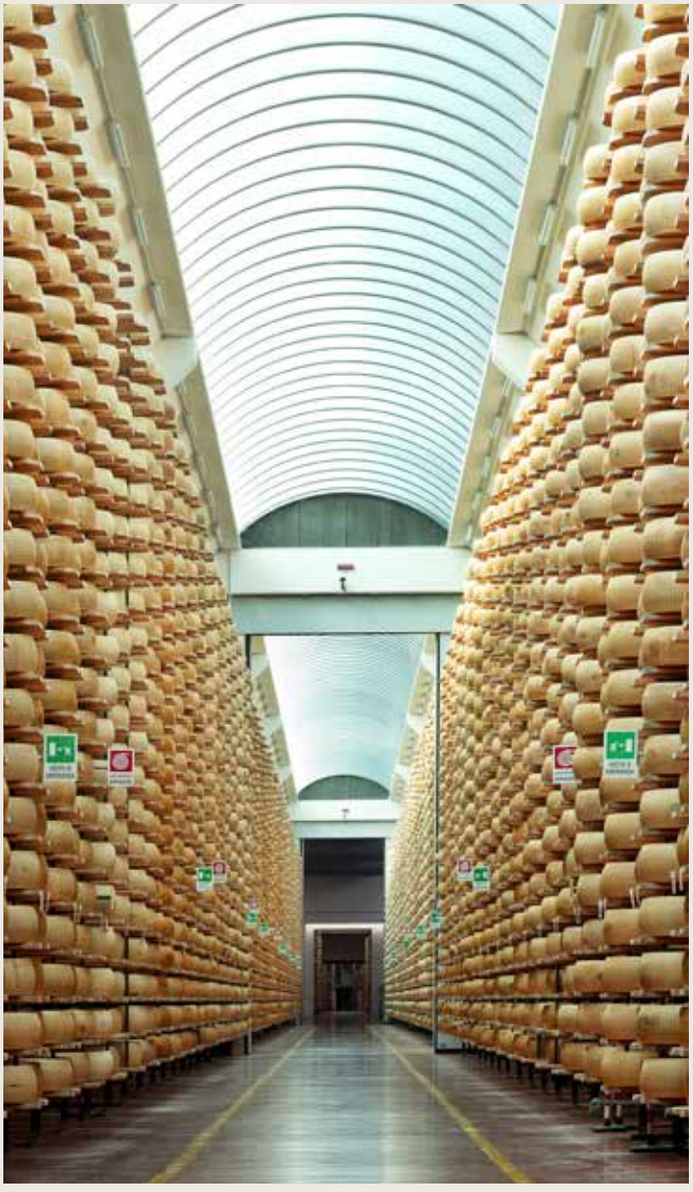
SUSAN SCHOUV, Global Market Unit Manager at Alfa Laval's Market Unit Food, says that the company has identified four key drivers in the food industry that it focuses on in product development: reduce waste and emissions; deliver safe and hygienic products; supply products at a competitive price; and get the most out of raw materials. "These drivers are our guiding stars when we develop new products or upgrade existing ones. We have developed a range of products that really make a difference, reducing waste, water and energy use and improving the safety of food processing."

One example is Alfa Laval Unique Mixproof valves. They can be cleaned more efficiently between batches than conventional valves, requiring less time and less water. This can be done while the plant continues to operate, which contributes to overall plant efficiency and flexibility. In one food protein factory where Alfa Laval Unique Mixproof valves are in use, cleaning-in-place time has been reduced by more than 70 percent, with similar reductions in water and power use.

Alfa Laval Unique Mixproof SeatClean is the choice for standard installations that handle products with solids. Seat lift during normal cleaning procedures cleans plug seals and seats.

WHEN IT COMES TO PRODUCT SAFETY, it is all about hygienic design. This covers cleanability, the nature of the equipment's surfaces, and protecting the food product against the surrounding environment. "For babies' sensitive digestion systems it is of utmost importance that any contamination is avoided," says Schouv. "When designing flow components, all possible steps are taken to avoid what we call 'dead ends' and spots that are difficult to clean." Examples of hygienic design are the option for cleaning the valve seat, seals and stems of Alfa Laval Unique Mixproof valves, and the flushed seals in Alfa Laval LKH centrifugal pumps. Both ensure that no product residue remains.

"THERE IS MORE FOCUS on food safety today among consumers and producers," says Schouv. "Scandals have raised focus on the safety of food production and on suppliers' trustworthiness. We offer premium products and so need to be able to guarantee safety, which is exactly what we do. We can provide documented and certified compliance with a broad spectrum of international and local hygiene standards." ■



MATURED SOLUTIONS: Alfa Laval products are proven to make a difference, reducing waste, water and energy use and improving the safety of food processing, such as cheesemaking.

MOSE to part the sea in Venice

Construction of the MOSE flood barrier in Venice, which will protect the threatened Italian city from rising waters, has entered its final stretch.

The final section of the flood barrier is towed into place.

THE EUR 5BN PROJECT, which is Italy's greatest post-war civil engineering feat, got underway in 2003 and is due for completion by 2017.

The project is being constructed by the Ministero delle Infrastrutture e dei Trasporti – Provveditorato Interregionale per le Opere Pubbliche del Triveneto through Consorzio Venezia Nuova.

Now 85% complete, the project is the final and most important part of a major programme in the Venetian lagoon – unmatched internationally in its size and scope – combining physical defence with the restoration of the lagoon ecosystem.

WITH A NAME that alludes to the biblical leader who is said to have parted the Red Sea (MOSE actually stands for MOdulo Sperimentale Elettromeccanico, or Experimental Electromechanical Module), the barrier will separate the lagoon in which the city lies from the Adriatic Sea beyond when flooding is forecast.

The system comprises a series of gates at the lagoon inlets that in normal tide conditions are filled with water and rest on the seafloor. To raise them, the water is pumped out by compressed air and the gates rotate into position. Alfa Laval is delivering air heat exchangers as liquid coolers with the vital role of cooling that air from 80 degrees Celsius to 40 degrees.

THE BARRIER – made up of 78 gates – will close in about 30 minutes, protecting Venice from tides up to 3 metres. The worst ever flooding to hit the city, which came in 1966, reached a height of nearly 2 metres. ■

Strong demand from the oil and gas industry

WITH THE GLOBAL OIL AND GAS industry having experienced rapid growth, Alfa Laval has seen a surge in orders from the sector. The current growth is being spurred by the development of shale gas in the United States and increased demand for production vessels made in South Korea.

TOBIAS SVENSSON, manager Market Unit Oil & Gas at Alfa Laval, says: "We are having a very productive dialogue with the actors in the oil and gas industry. Through this our customers have gained access to our technologies, expertise and engineering capabilities. This allows them to focus on their core business while feeling secure that they get high performance equipment and solutions."

IN JANUARY, Alfa Laval won an order worth SEK 110 million from Korean company Daewoo Shipbuilding & Marine Engineering, to provide a freshwater generator module for an offshore oil platform in the North Sea.

This was followed by an order in May to supply SEK 55 million worth of air cooler systems to a US export terminal for natural gas liquids. In June, Alfa Laval won two large orders for heat exchangers, each worth around SEK 50 million: one from a natural gas stabilization plant in Russia, and another from an offshore platform in the UK. In August, Alfa Laval was awarded a massive SEK 240 million order for offshore pumping systems from Samsung Heavy Industries in Korea. ■

PUMP ACTION: Framo pumping systems maximize the utilization of product and chemical tankers, and contribute to safe and efficient operation of offshore installations.

Acquisition boosts marine

A major extension of Alfa Laval's product offering to the marine and offshore industries is in the pipeline after the successfully completed acquisition of Norwegian marine and offshore pumping system specialist Frank Mohn AS and the Framo brand.

TEXT: **DAVID WILES** PHOTOS: **STEPHEN SCHAUER AND ØYSTEIN KLAKEGG**

Alfa Laval is the only company we could see as a responsible and long-term owner of Frank Mohn AS," says Trond Mohn, chairman of Frank Mohn AS. "Through Alfa Laval's industrial platform and global reach we are confident that Frank Mohn AS will continue to serve demanding customers and foster its position as a global leader."

The acquisition – Alfa Laval's largest ever – makes Alfa Laval a leader in pumping solutions for the oil and gas industry. Framo pumping systems are vital for maximizing the utilization of product and chemical tankers, and contribute to safe and efficient operation of offshore installations.

In the oil and gas segment, Frank Mohn AS offers packaged pumping systems for offshore installations including seawater lift, water injection and fire water pumping systems contributing to safe and efficient operations.

IN MARINE PUMPING, hydraulically driven submerged cargo pumps provide safe and flexible handling of any type of liquid cargo, giving quicker turnaround time and fewer voyages in ballast.

The service organization of Frank Mohn AS provides technical support during the installation phase of a project, as well as professional service throughout the

PERFECT MATCH: Trond Mohn, left, Chairman of Frank Mohn AS, with Lars Renström, President and CEO of the Alfa Laval Group. Trond Mohn says the two companies share a heritage of quality products.

and offshore offering

> **"Frank Mohn has highly skilled employees, high quality products and a market leading position."**
>
> LARS RENSTRÖM,
> PRESIDENT AND CEO, ALFA LAVAL GROUP

lifetime of the installed systems.

Based in Bergen, Frank Mohn AS will become Alfa Laval's operational centre for marine and offshore pumping systems.

"Frank Mohn AS is an excellent company that we have been following closely for several years," says Lars Renström, President and CEO of the Alfa Laval Group. "It has highly skilled employees, high-quality products and a market-leading position within segments offering attractive long-term growth prospects."

THE COMBINATION of Frank Mohn AS and Alfa Laval will provide a very attractive offering of products, systems and services and will strengthen Alfa Laval's leading position as a provider of critical systems for ships and offshore oil and gas production units.

TROND MOHN SAYS that Frank Mohn AS and Alfa Laval share a heritage of commitment and focus on quality products to an international market. "Our customers and employees have recognized Alfa Laval as a reliable supplier of heat exchangers and separators for generations." ■

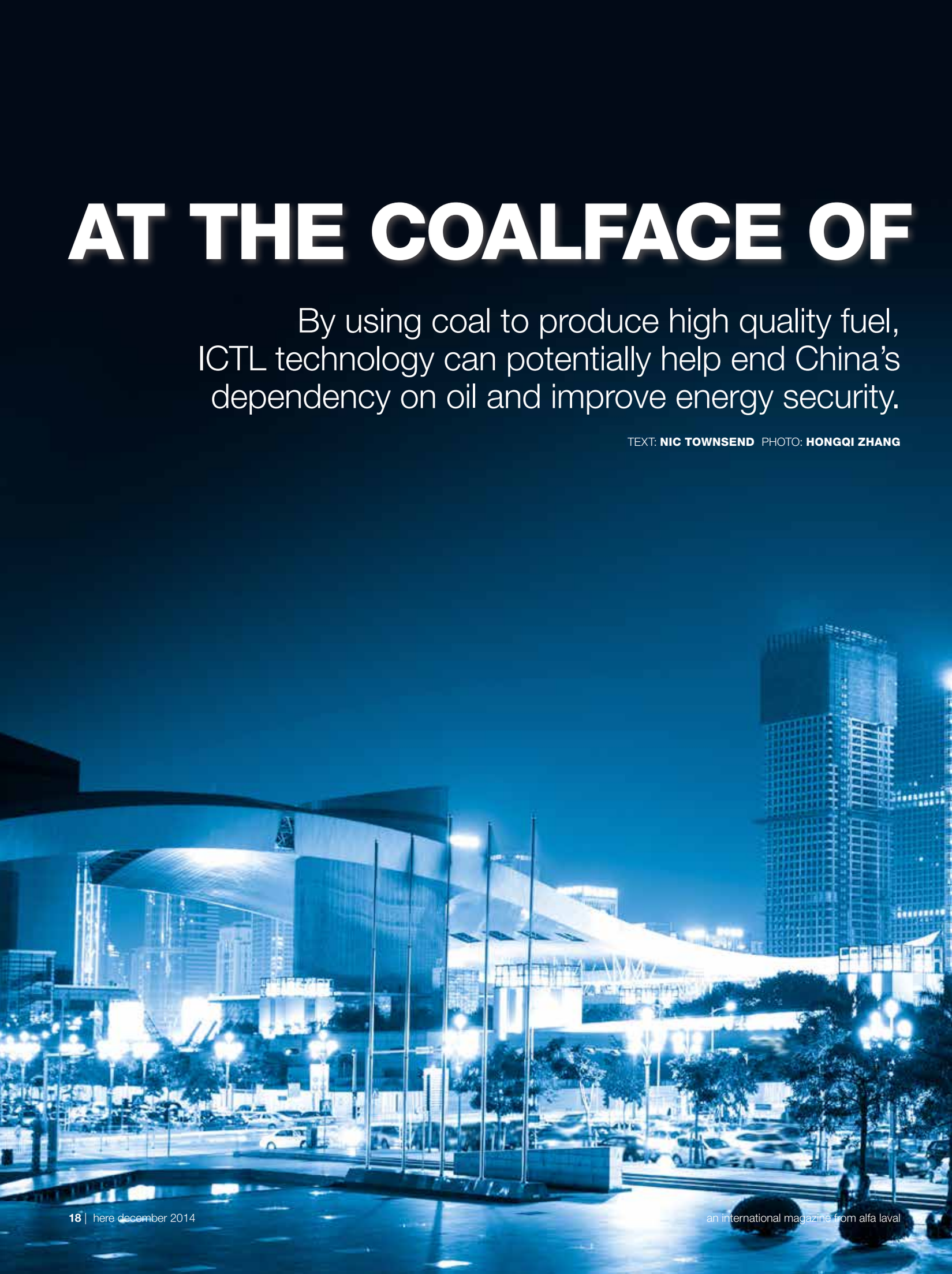
FRANK MOHN AS

- Founded in 1938
- Headquarters in Bergen, Norway.
- Manufacturing at three sites in Norway.
- Approx. 1,200 employees worldwide.
- Product brand name is Framo.
- Manufactures submerged pumping systems for the shipping and offshore industry.
- Operating segments include marine pumping, offshore pumping, oil recovery systems, and parts and service.
- Framo's hydraulically driven submerged cargo pumps handle various types of liquid cargo with an efficiency that saves time for customers.

AT THE COALFACE OF

By using coal to produce high quality fuel, ICTL technology can potentially help end China's dependency on oil and improve energy security.

TEXT: **NIC TOWNSEND** PHOTO: **HONGQI ZHANG**



ALTERNATIVE ENERGY

An economy is only as safe as its energy supply, and without adequate fuel even the most industrious nations will quickly come to a standstill. China's booming economy is heavily reliant on imported crude oil, leaving the country vulnerable to price fluctuations and external suppliers. In an attempt to end this dependency, the Chinese government is investing significantly in alternative energy sources and is quickly becoming a leader in the field.

One of the more promising breakthroughs in recent years comes from China's research and development into indirect coal-to-liquid (ICTL) technology. Simply put, this is the process of converting coal into liquid petrochemical products, including fuel. It starts by gasifying coal to produce synthesis gas. Using the Fischer-Tropsch method, the synthesis gas is then converted into hydrocarbon compounds. The resulting fuel is far cleaner than conventional fuel, containing less sulfur and fewer aromatic hydrocarbons.

“Despite the technology still being in its infancy, Alfa Laval already has extensive experience working with ICTL and the Fischer-Tropsch process through its partnership with South African energy company Sasol, which goes back to the 1950s.”

At the same time it also offers a cetane number (measurement for combustion performance) as high as 70. In comparison, premium diesel fuel is usually around 60. Given China’s huge coal reserves (the third largest in the world) ICTL has the potential to offer a new domestic source of energy.

THE ORIGINS OF ICTL technology go back to the 1930s, however after investing significantly in its development, China is now at the forefront. In recent years, state-owned mining and energy companies have progressed from bench-scale to large-scale demonstrations, giving China first-hand experience in industrial scale up.

Construction recently began for a new ICTL project in Ningxia province, which is due to be completed in 2016 and will be able to produce 4 million tonnes of liquid fuel per annum. Similar coal liquefaction and gasification projects are also planned for Inner Mongolia, Shaanxi, Xinjiang and Liaoning.

HOWEVER while China’s ICTL industry is making significant progress, a number of obstacles still remain before it becomes commercially and environmentally viable. Start-up costs for production are prohibitively high, and while ICTL fuel is better for the environment, the production process is not as it consumes large quantities of coal and water. The next big challenge is to improve the production process so that it is cleaner, more efficient and cost-effective. The key to achieving this will be finding new breakthrough technology.

Despite the technology still being in its infancy, Alfa Laval already has extensive experience working with ICTL and Fischer-Tropsch processes through its partnership with South African energy company Sasol, which goes back to the 1950s. Sasol was the first company to use the technology on a commercial scale, and today is the world’s largest producer of ICTL fuels, supplying almost 30 percent of South Africa’s motor fuel. Sasol has used Alfa Laval plate heat exchangers since the mid-1950s, and as it has developed and expanded its operations, more and more Alfa Laval components have been incorporated, with Alfa Laval’s compact heat exchangers proving to be more cost-effective than traditional shell-and-tube technology.

WITH CHINA NOW TAKING ICTL technology to the next level and expanding to an industrial scale, Alfa Laval’s products are continuing to help improve and refine the process. Recently Alfa Laval won a contract to supply compact welded plate heat exchangers to a new ICTL facility in China, where they will be used in the process of converting synthesis gas to liquid fuel, such as diesel fuel and LPG. The compact design of Alfa Laval’s heat exchangers enables more components in the same space, thus contributing to making the production process more efficient.

If proven successful, ICTL technology can potentially play an important role in helping China, and many other nations, become less dependent on oil. ■

INDIRECT COAL-TO-LIQUID — A SHORT HISTORY

IN 1923, German scientists Franz Fischer and Hans Tropsch invented a process for converting carbon monoxide and hydrogen into liquid hydrocarbons. The patented Fischer–Tropsch process continues to be the basis for gas-to-liquid technology.

The first ICTL plants were built in Germany between 1934 and 1945. During World War II, ICTL technology was particularly useful due to a shortage in petroleum and an abundance of coal.

With large coal reserves and little oil, South Africa was the next country to invest in ICTL technology, with energy company Sasol opening the first commercial-scale plant in 1955.

Sasol would continue to develop the technology over the next 50 years and today is the world’s largest producer of ICTL fuels.

In 1980, China began investigating ICTL technology as a potential alternative to oil. The subsequent research and development has seen China become a world leader in the field, expanding production to industrial scale.

Over the next few years, construction will begin on a number of megaton-scale industrial plants.

SEA CHANGE

A new Alfa Laval separator that recovers and recycles fuel oil that would otherwise go to waste is making waves in the shipping industry.

THE ALFA LAVAL PUREDRY separator can cut a ship's fuel bill by about 2 percent – equivalent to around USD 300,000 a year for a cruise vessel. The technology, which can pay for itself within a year, also offers compelling environmental benefits.

Though only just coming to the market, it is capturing the attention of major international shipowners, says Pauli Kujala, Senior Business Manager, Marine & Diesel Equipment.

"Alfa Laval PureDry has brought about a change in the marine industry. Shipowners are re-engineering their ships to accommodate it. This is an industry changer," says Kujala.

ALFA LAVAL PUREDRY is unique among separators in having a solid bowl that is self-cleaning. It ejects solids in "super-dry" condition, including no water or fuel.

The separator removes the fuel oil from the oily water in a ship's fuel oil waste tank and returns it to the main oil tank for reuse. This not only cuts waste volume by a massive 99 percent but also produces a dry solid waste residue that can easily be disposed of when the ship arrives in port.

Typically an Alfa Laval PureDry separator produces five to 15kg of non-pumpable super-dry solids per day that can be landed as dry waste and easily disposed of in the same way as oily rags. Traditionally, ships must land tanks of liquid fuel oil waste at portside, sometimes at substantial cost.

ALREADY THE WORLD'S three largest cruise line operators have embraced Alfa Laval PureDry, as have companies like Mediterranean Shipping Company, the world's second-largest container operator. Crude oil, product and gas tankers are another key market.

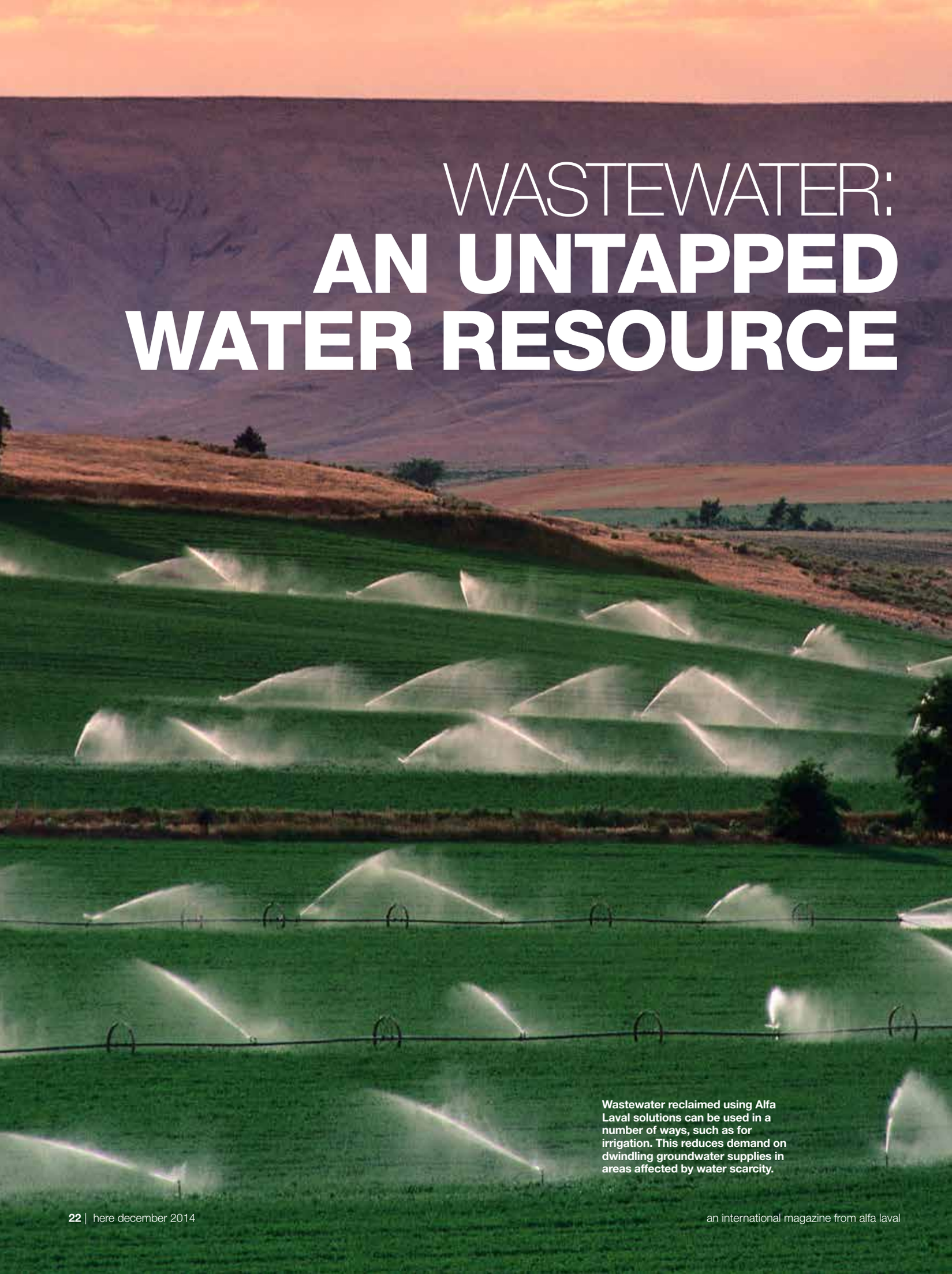
"The gains are biggest for the ships that consume most fuel," Kujala explains. "There's a great need for operators to save every drop of fuel, eliminate onshore waste disposal costs and make sure the fuel waste footprint of every ship is as low as possible."

The cost of installing Alfa Laval PureDry, either in new ships or retrofitted in existing vessels, can be recouped in as little as 12 months thanks to the amount of fuel oil saved – an attractive proposition in an era of high oil prices. ■

ALFA LAVAL PUREDRY – THE NUTS AND BOLTS

- Novel separator that cleans and recovers waste fuel oil from waste oil.
- Cuts ships' fuel bills and saves on waste oil incineration or landing for disposal.
- Helps shipowners meet stringent emissions controls.
- Makes it possible to reduce waste oil tank volume and waste by at least 50 percent on newly built vessels, saving valuable space.

WASTEWATER: AN UNTAPPED WATER RESOURCE



Wastewater reclaimed using Alfa Laval solutions can be used in a number of ways, such as for irrigation. This reduces demand on dwindling groundwater supplies in areas affected by water scarcity.

With water scarcity increasing globally, greater efforts are being made to find ways of reusing municipal and industrial wastewater, such as for irrigation and industrial processes. In fact the technology is so advanced that it can even make wastewater drinkable.

TEXT: **NIC TOWNSEND**

According to the UN, almost one-fifth of the world's population lives in areas experiencing water scarcity. By 2025, it is estimated that two-thirds will experience water shortages. Yet at the same time, vast amounts of wastewater are generated daily, most of which is dumped into rivers and seas without adequate treatment, creating health and environmental hazards.

So increased focus is being put on water reclamation and efficient wastewater treatment, with ever-stricter regulations. "More and more people are realising that wastewater is a valuable resource," says Mai Møllekær, Managing Director of Alfa Laval Ashbrook Simon-Hartley. "With the right solution, reusing wastewater is environmentally, socially and economically beneficial. Alfa Laval offers two filtration methods that help turn municipal and industrial wastewater into clean water."

MEMBRANE BIOREACTORS (MBR) are an increasingly common solution for producing exceptionally clean effluent from biological wastewater treatment processes. They treat over 4 million cubic metres of wastewater every day – a figure that is expected to triple by 2018.

"Alfa Laval has developed a unique MBR technology, based on membrane filtration modules incorporating patented hollow sheet technology. Compared to other MBR solutions it offers improved safety, simplicity of operation, plus low operation and maintenance costs," says Thomas Møller, Segment Manager for Water and Waste Treatment at Alfa Laval. "Our MBR solution proves its value every day at numerous installations worldwide. Several customers specifically chose this because of its exceptionally clean final effluent, which they can reuse."

AT THE WASTEWATER treatment plant in Bassusary in southwest France, water treated using Alfa Laval MBR exceeds European standards, contains no bacteria, and is used to irrigate the local golf course. It also flows back into the town's river, which is the main source of drinking water. Another French city reuses treated wastewater for its public toilets.

Alfa Laval MBR technology also treats wastewater in the textile, detergent, starch, and food and beverage industries, among others. At the San Vicente de la Sonsierra winery in Spain, it treats wastewater from 13 wineries. Groundwater is limited in the region, so the reclaimed water is used to irrigate the vines.

Other types of Alfa Laval membranes treat wastewater from dairies and vegetable protein production to reuse the water for cleaning process equipment and to recover protein.

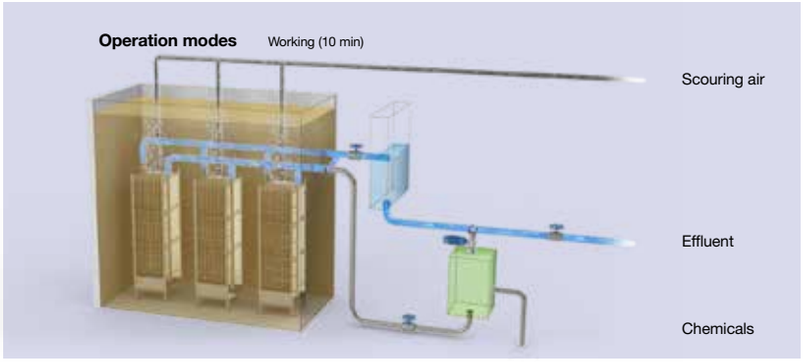
FOLLOWING ITS ACQUISITION of Ashbrook Simon-Hartley, Alfa Laval also offers a tertiary filtration technology. The gravity-driven continuous Alfa Laval AS-H Iso-Disc cloth media polishing filter removes residual solids from wastewater to a high final effluent quality suitable for reuse. It is a compact, high capacity and cost-effective alternative to traditional sand filters.

The filter is used in wastewater treatment plants in a number of communities in the United States, where the treated effluent is cleaner than state requirements. The Texan city of Meadows Place uses water reclaimed with Iso-Disc filtration to create a lake for recreation, and to irrigate local parks. The savings in water fees repay the investment cost in only a few years.

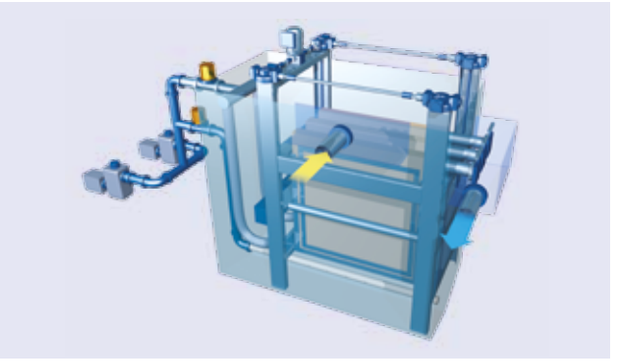
THE FILTER IS ALSO USED to polish industrial wastewater and remove accumulated inorganic solids in the food and beverage industry. It can also treat surface water for use in cooling towers or other process water requirements.

Some wastewater treatment plants install Iso-Disc cloth media filters as a pre-treatment for downstream microfiltration or ultrafiltration membranes to polish the secondary effluent. This increases the filtration and economic efficiency of the membranes. In Big Spring, Texas, a final reverse osmosis membrane treatment step has also been added. This enables the biologically treated wastewater to be reused as potable water, by conveying it to the city's water treatment plant.

"With a variety of filtration technologies available, more communities and industrial producers are able to benefit from cheaper and cleaner water, as well as ease the pressure on the environment and the world's depleting water supplies," says Møllekær. ■

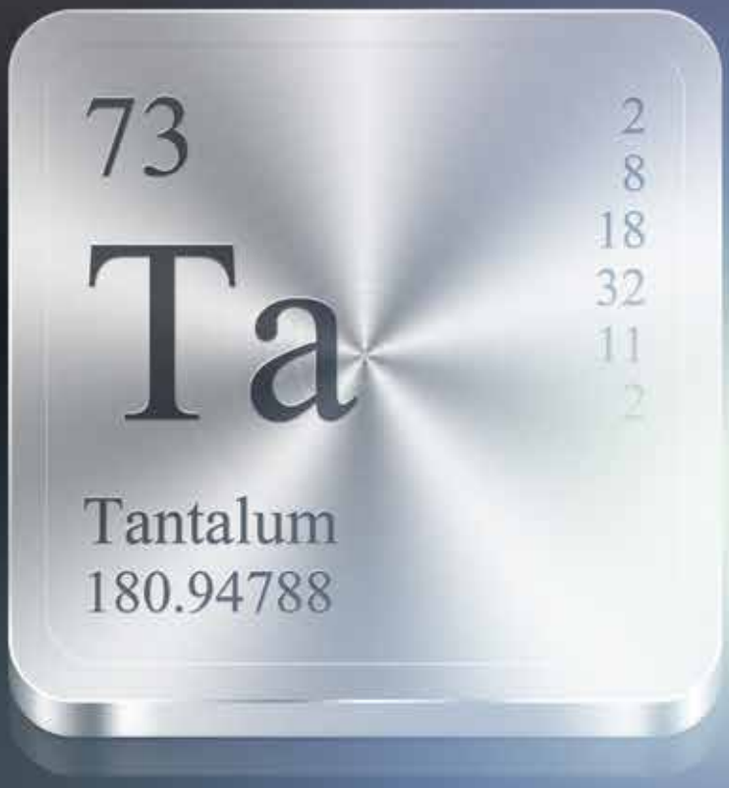


Alfa Laval's compact, operator-friendly gravity-driven MBR technology delivers a very high effluent quality (effective filtration to 0.01 µm) without pumps and with low energy consumption.



The cloth media filter is a compact high-capacity process for tertiary filtration (down to 5 to 10 microns) that enables reuse of treated wastewater for many purposes.

TANTALUM



TANTALUM IN BRIEF

Symbol: Ta.
Atomic number: 73.
Element category: transition metal.
Melting point: 2,996 °C.
Boiling point: 5,425 °C.
Density: 16,654 kg/m^3.
Properties: blue-grey, dense, ductile, very hard, and at temperatures below 150°C almost completely immune to attack by aggressive acids.
Application areas: electronic components and in demanding applications such as jet engine components, chemical process equipment, nuclear reactors and implants.

MYTHOLOGICAL METAL

It takes its name from Greek mythology and its ability to withstand corrosive media is itself legendary. Now Alfa Laval is using the exotic metal tantalum in a new and cutting-edge range of heat exchangers.

TEXT: **ULF WIMAN** PHOTO: **MARTIN MAGNTORN**

"I put the heat exchanger on the table and said, 'Let's sign a confidentiality agreement right now.'" Mats Nilsson, R&D Manager at Alfa Laval's product centre compact heat exchangers, is recalling his first meeting with the external partner that Alfa Laval has cooperated with to develop its new and unique tantalum heat exchanger range.

Responsible for technology scouting, Nilsson had come across a small Danish company that used the metal tantalum to treat various products. "I immediately thought of our compact heat exchangers," he says. "They had done some tests with other heat exchangers, but lacked the product knowledge to succeed. We could provide that."

Tantalum may be a well-kept secret, but it is probably right in front of you – in your mobile phone. It is mainly used for electronic components, but given its properties, it is finding increased use in other industries.

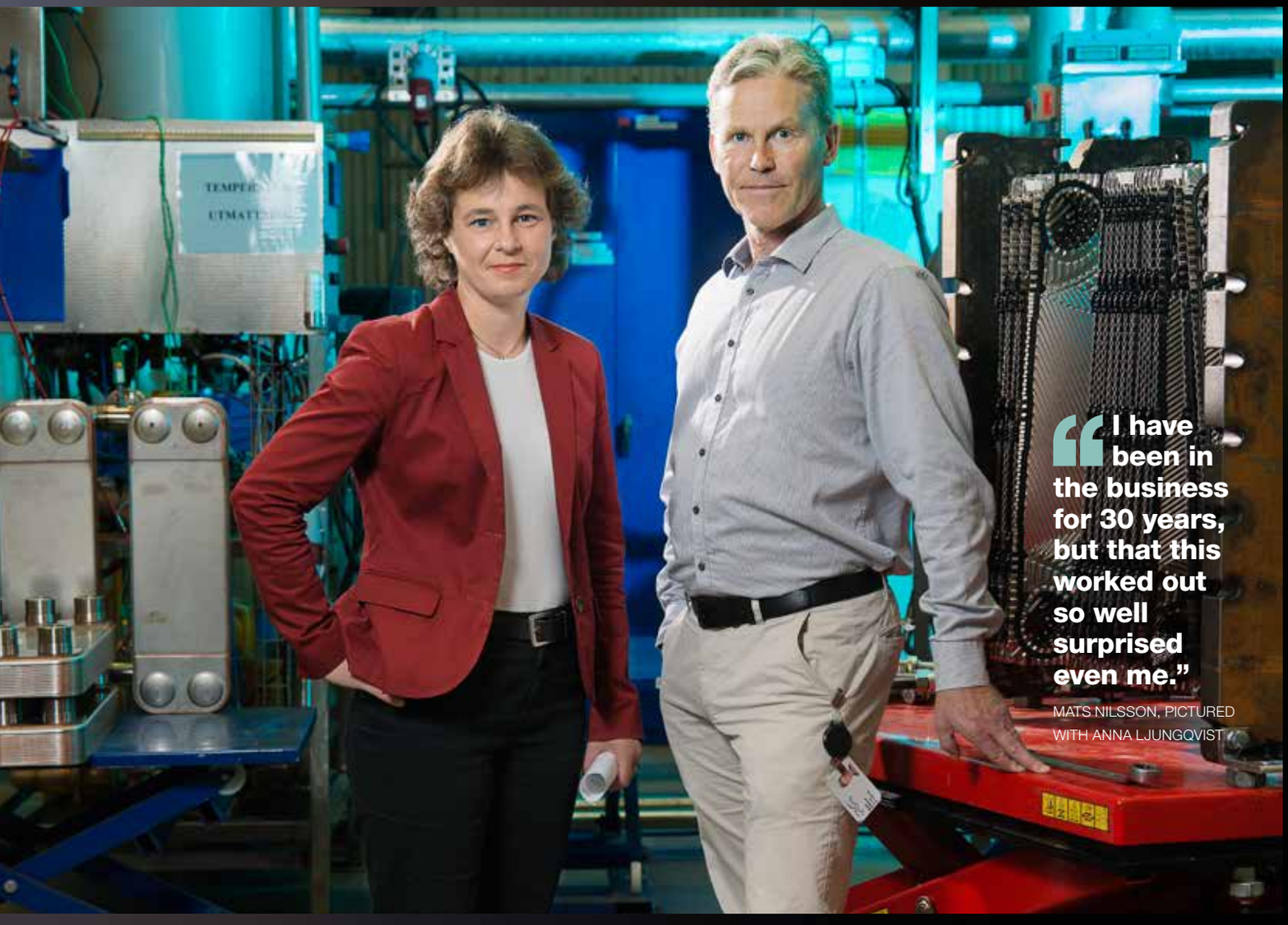
ALFA LAVAL TANTALUM HEAT EXCHANGERS

- Excellent for handling hot, highly corrosive media.
- Minimal maintenance.
- Very low lifecycle cost.
- High thermal efficiency.
- Cost efficient solution.

"It is perfectly suited to fine and speciality chemicals companies that heat exchange hot, corrosive media, for example in recovery and dilution of sulphuric acid, agrochemical and flow battery applications," says Market Manager Anna Ljungqvist.

STORING ELECTRICITY is a great challenge. Flow batteries may play an important part in the future, using wind and sun energy to load chemical batteries. These chemicals are often aggressive acids, which makes tantalum heat exchangers a perfect fit.

Tantalum is a rare, very costly metal, whose melting point is exceeded only by that of tungsten, rhenium, osmium and carbon. The new heat exchangers only use a 50µm thin layer (the thickness of hair), which is metallurgically bonded to all steel surfaces that come in contact with corrosive media. Ljungqvist says: "It is enough to give the heat exchanger its characteristics, and makes it a cost-effective solution."



> **“I have been in the business for 30 years, but that this worked out so well surprised even me.”**
>
> MATS NILSSON, PICTURED WITH ANNA LJUNGQVIST

The thin layer says a lot about the properties of tantalum. Still, post-production testing is crucial: an uncovered spot of just one square millimetre would lead to a heat exchanger corroding in a matter of hours.

Alfa Laval’s new tantalum range offers end users robust and compact high-performance heat exchangers that provide long lifetime, minimal maintenance and low installation costs for applications using hot strong acids. There are currently some 20 Alfa Laval tantalum heat exchangers installed in assorted processes around the world.

One is at an American speciality chemicals manufacturer that previously used a three-metre-long graphite block heat exchanger to handle hot sulphuric acid. Once a year the heat exchanger had to be hoisted down from its fourth-floor position, opened and repaired – a costly and time-consuming process.

“When they received our 30cm-high tantalum heat exchanger they thought that we must have miscalculated,” smiles Ljungqvist. “How could it possibly be up to the task? But now all the maintenance required is a weekly hot water flushing, which is performed in place.”

IT’S NOT ONLY customers’ jaws that have dropped. “I have been in the business for 30 years, but that this worked out so well surprised even me,” says Nilsson, who stresses that Alfa Laval R&D is constantly on the lookout for new technologies and continually visits customers to learn more about their business challenges. There are some 25 development projects on-going at any given time.

He concludes: “It is key that we understand new technologies and how they can lead to innovative solutions that benefit our customers.” ■

A tantalizing story

TANTALUM was discovered in Sweden in 1802 by Anders Gustaf Ekeberg and got its name from Greek mythology. Tantalus had been condemned by the gods to be “tantalized” by hunger and thirst for eternity; he was made to stand immersed in water and with fruit growing above his head. When he bent to drink the water, it drained away, and when he reached for the fruit, the wind blew it beyond his reach. Ekeberg wrote: “This metal I call tantalum... partly in allusion to its incapacity, when immersed in acid, to absorb any and be saturated.”

Paris' coolest attraction

Every year nearly 10 million people visit the Louvre in Paris to marvel at iconic works of art such as the Mona Lisa and Venus de Milo. What they don't see is the elaborate cooling system that ensures these priceless masterpieces can be enjoyed in comfort. ▸

TEXT: **NIC TOWNSEND** PHOTOS: **VICHAYA KIATYING-ANGSULEE** ILLUSTRATION: **TOBIAS FLYGAR**

With one of the world's greatest art collections, the Louvre's air conditioning is far from its main attraction. But this iconic building in the heart of the French capital is cooled by one of the world's largest district cooling systems. In fact the 52km underground network, which snakes beneath the city's historic centre, serves over 500 buildings. In addition to the Louvre, this also includes other famous landmarks such as Paris Opera, the Forum de Halles, the Banque de France, the Galleries Lafayette and the Ritz Hotel.

THE BASIC CONCEPT behind the district cooling system is that one central source supplies multiple buildings. This offers a number of advantages over individual air conditioning systems, particularly for a city like Paris, where many of the buildings have significant historical and architectural value that prohibits the installation of air-conditioning units. Having one central source also frees up space, which is a significant advantage given real estate value in Paris.

Furthermore the district cooling system reduces energy consumption and environmental impact. It is estimated that a typical building using the system creates 20 percent lower carbon dioxide emissions and 30 percent less refrigerant leakage compared to an individual air conditioning system.

EACH BUILDING IS SERVED by a fully automated intelligent delivery substation, which is connected to a network of six district cooling plants. All six plants are located underground, and three of them use water taken directly from the River Seine. The other three use a cooling tower for refrigeration and are used only during the summer when demand peaks. It is estimated that using river water saves some 500,000 cubic metres of drinking water every year.

The river water is pumped into the station and filtered to remove foreign objects before passing through a heat exchanger in the cooling liquid circuit. The cooling liquid then passes through a refrigeration unit containing a condenser and evaporator, which chills the water in the air-conditioning circuit. The water is then pumped away to the individual clients.

Initially Climespace, the company behind the system, used different heat exchangers in each substation, but it was soon realised that it would be more efficient to use one supplier. And so the company signed a three-year contract with Alfa Laval to supply plate heat exchangers for 100 substations.

Shortly afterwards, the partnership expanded when Climespace decided to find a supplier that could develop a standardised concept and offer complete substation units rather than just heat exchangers. Together with French system builders BBS, Alfa Laval has been able to offer a total concept from the supply of new equipment, to installation and maintenance.

THE LATEST INSTALLATION has seen the district cooling system extended to the Carrousel du Louvre, a shopping mall located right in front of the Louvre, serving as one of the museum's main entrances.

"Over the years, Alfa Laval has become a true partner and has contributed, thanks to its expertise and technology, to the performance of the Climespace energy network, which is the first district cooling system in Europe and one of the biggest in the world," says Jean Levezac, Head of Cluster Connections/Substations at Climespace Engineering. ■

THE PARISIAN UNDERGROUND

Paris' district cooling system is one of the largest of its kind in the world and services over 500 buildings including:

Museums:
- The Louvre
- Musée d'Orsay
- Musée du quai Branly
- Musée Grévin
- Salle Pleyel
- Cité de la Musique
- La Philharmonie

Palaces:
- Péninsula
- Le Meurice
- Le Bristol
- Le Ritz
- Plazza Athénée
- Le Georges V

Corporate head offices:
- AXA
- BNP
- Natixis
- Gecina

Shopping centres:
- Beaugrenelle
- Galeries Lafayette

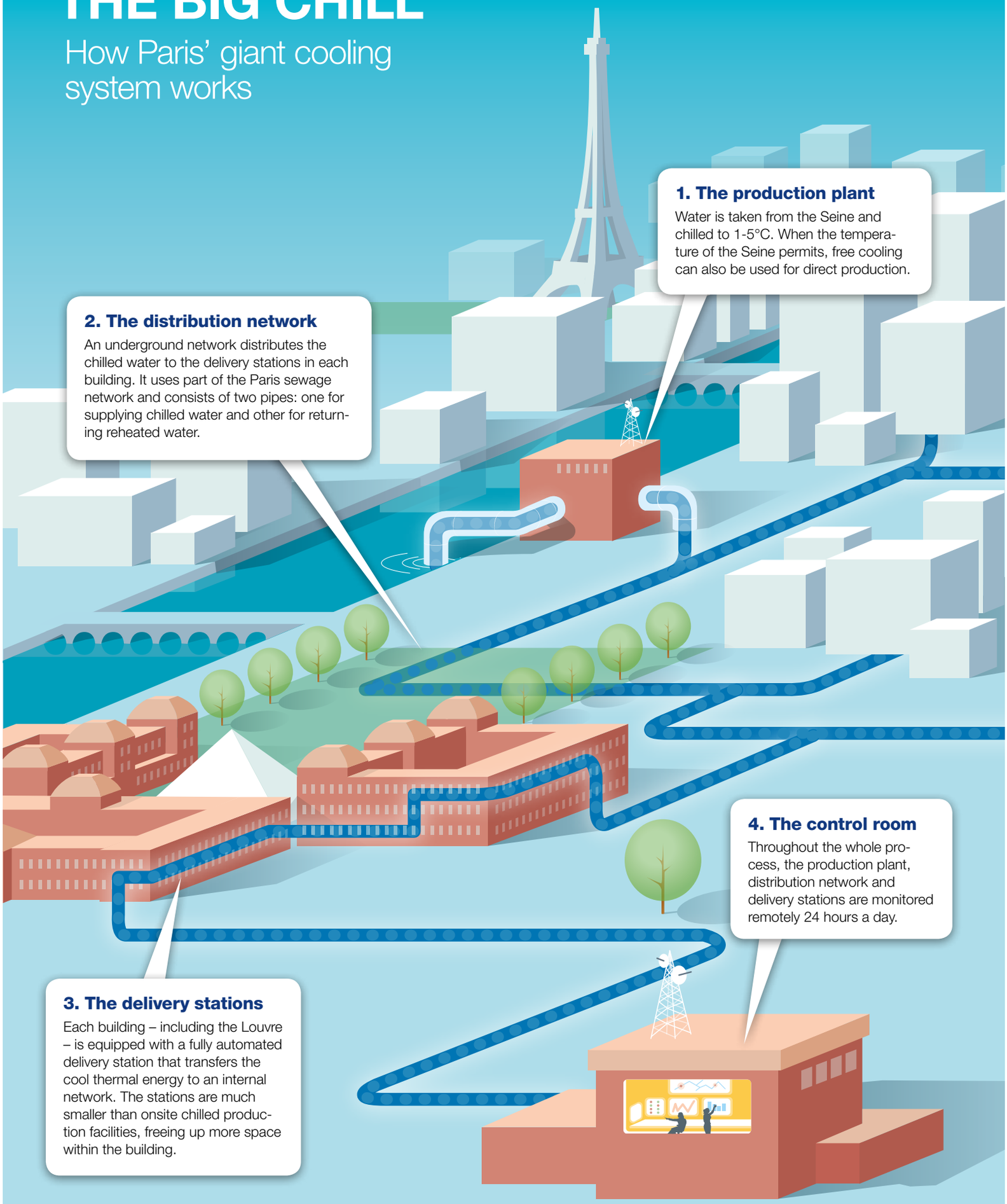
Government buildings:
- Ministry of Defence
- National Assembly

The solution: a masterpiece of efficiency

The Alfa Laval gasketed plate heat exchangers (GPHEs) used in the Paris system have been specially adapted with a range of unique features that make them ideal for installation in district cooling applications.
The tailored gasket profiles give an optimized sealing force to avoid leakage and thereby maximize uptime.
And the five-point alignment system that keeps the plates perfectly in place during the critical procedure of closing the heat exchanger minimizes the risk of damage and the downtime that can follows.
The result is reliable operation and performance, which in turn means the lowest-possible total cost of ownership.

THE BIG CHILL

How Paris' giant cooling system works



1. The production plant

Water is taken from the Seine and chilled to 1-5°C. When the temperature of the Seine permits, free cooling can also be used for direct production.

2. The distribution network

An underground network distributes the chilled water to the delivery stations in each building. It uses part of the Paris sewage network and consists of two pipes: one for supplying chilled water and other for returning reheated water.

3. The delivery stations

Each building – including the Louvre – is equipped with a fully automated delivery station that transfers the cool thermal energy to an internal network. The stations are much smaller than onsite chilled production facilities, freeing up more space within the building.

4. The control room

Throughout the whole process, the production plant, distribution network and delivery stations are monitored remotely 24 hours a day.

THE ART OF ENERGY EFFICIENCY

PHOTO: **MARTIN MAGNTORN**

ALFA LAVAL HAS long promoted to the global market the benefits of its equipment for increasing the energy efficiency of industrial processes. Now the company is showing that it walks the talk by investing in a pioneering solution that reduces heating costs at its biggest plant by some 80 percent.

The installation, at Alfa Laval's Gunnesbo site in the company's hometown of Lund, Sweden, will make the entire site virtually self-sufficient in heating for 10.5 months of the year. The heat recovered from the oil cooling system for the plant's press lines, which was previously vented externally, is now used for heating the facility, including its tap water.

THE INSTALLATION, which uses natural refrigerant and, of course, Alfa Laval products, also supports the company's corporate strategy. "Alfa Laval focuses on sustainability and on manufacturing environmentally friendly products," says site manager Arne Hermansson. "This solution will make waste energy useful and reduce our carbon footprint. We will also use this installation as a showroom for inspiring customers and colleagues."

Today the Gunnesbo facility – which includes the world's largest heat exchanger plant – consumes in the region of 3,700MWh of district heating per year.

"Our estimation is that we will cut that by 80 percent," says Hermansson. "In doing so we will reduce our annual carbon dioxide emissions by 140 tonnes, which equals 40 return flights from Copenhagen to Cairo."


VARNING
HETGAS
HETG

POWER TO THE PEOPLE!

Booming Angola needed electrical power, and needed it fast. By choosing modular power stations based on shipping containers, the southern African country had a reliable source of power up and running within just months.

TEXT: **GILLY WRIGHT** PHOTOS: **WINPOWER**

Alfa Laval separators (left) and air coolers (above) are crucial equipment on WinPower's modular power plants. Heat recovery and booster systems could feature on future projects.

With growth expected to reach 7.9 percent in 2014 and as much as 8.8 percent in 2015, Angola has one of the world's fastest growing economies. Such rapid expansion requires a reliable source of energy – which oil-rich Angola was lacking – so the country's Ministry of Energy in 2011 set out in search of a solution for generating power that was reliable and robust, but could still be delivered quickly.

PORTUGUESE POWER PLANT construction and operation specialist WinPower, along with Brazilian construction company Zagope and local firm Grupo Gema headed the winning consortium for seven power plants for the southern African country. WinPower developed Boost, a modular system consisting of shipping containers that is both cost-efficient and more flexible than standard power plants. "Our challenge," says WinPower CEO Luis Mendes, "was how could we design power plants that suit different requirements, with different throughputs, to be installed quickly but still with conventional standard power plant quality in terms of fuel treatment and other features."

By modularising the power plants into around seven or eight different types of module, the Boost system is both competitive and scalable. The modules include gensets (generator sets – a packaged combination of a diesel engine, a generator and various ancillary devices), radiators and equipment for plant functions such as fuel treatment, steam and control.

"Each module is housed in a 40ft shipping container, which we adapt in Portugal, and which is then closed off and shipped as shipping containers, with all the materials already inside," says Mendes.

These Angolan power plants feature, between them, 67 Alfa Laval separators (for lube oil, heavy fuel oil and gas oil separation) and 75 Alfa Laval air coolers (or radiators). On new projects, Mendes says they also plan to modularize the Alfa Laval heat recovery and booster systems.

"WE USED SO MUCH ALFA LAVAL equipment for this project as it's the equipment that had the right features and the appropriate benefits for the solution and for us as

suppliers," he says. "The client decided not to use emergency gensets, as they do not have industrial long-time features that come with the system, such as the fuel treatment that we are doing through Alfa Laval equipment for each of the 49 engines used in Angola."

MENDES CONTINUES: "Alfa Laval is recognised as a top brand and we only use tier-one equipment for our systems. Quality, reliability and good local support are crucial, which is why we chose them."

The modular approach enabled a 40MW power plant to be assembled and become operational in less than eight months – a fraction of the time a traditional plant would have taken to build. Most of the Angolan plants are now fully operational and the power generated is being fed into the national grid for use by the general population. "Angola is developing at 7-8 percent per year and so has huge needs for power, but not everybody has electricity and a lot of houses have their own small generators," says Mendes. "So this project and others like are crucial to the continued economic development of the country." ■

WINPOWER

Established: 1992.
Business: builds and operates power plants (both thermal and renewable or a combination).
Location: Headquarters in Lisbon, Portugal and an office in London.
Installations: Angola, Mozambique and Cape Verde.

150

…new ice hockey rinks are built in Canada each year There are more than 7,600 rinks in Canada, of which about 2,600 are indoors.

About 45,000 to 57,000 litres of water are use to form an ice hockey rink surface. The ice is put down in several different layers

2 cm

The layer of ice in a pro hockey rink is about 2cm thick and is kept at a temperature of -9 degrees Celsius

1851

The first covered rink in the world was built in Québec City in 1851 on a quay on the St. Lawrence River

The Alfa Laval U-Turn is a liquid separator designed for use with plate heat exchangers in ammonia applications. The module – including the separator and heat exchanger – ensures minimum pressure drop losses and maximum energy efficiency.

FREEZE!

By switching to Alfa Laval separators, the City of Montreal has improved the safety of its urban ice rinks' refrigeration systems. And the benefits don't stop there.

TEXT: **DAVID WILES** PHOTO: **GETTY IMAGES**

"ICE HOCKEY IS Canada's national sport, and Montreal is its mecca. The city hosted the first-ever organized indoor ice hockey game way back in 1875, and students at Montreal's McGill University came up with the first set of rules a few years later.

Today the city is home to more than 40 municipal rinks – used almost exclusively for hockey – which are in the process of being converted from Freon to the more environmentally friendly and efficient natural refrigerant ammonia. "Our rinks are surrounded by people's homes and we need systems that are as secure as possible," says Claude Dumas, engineer at the City of Montreal who is an expert on refrigeration systems for sports arenas. "We want to be good corporate citizens and protect our neighbours."

As the city converts its ice rinks to ammonia it is also using a standard refrigeration solution. And this is where Alfa Laval comes in to the picture. "We are converting about four rinks a year from synthetic refrigerant to ammonia and we want all rinks to look alike and operate in the same way," says Costas Labos, another engineer at the City of Montreal. "Alfa Laval equipment has become part of our evolving standard specifications."

USING THE ALFA LAVAL U-Turn separator in combination with an Alfa Laval M10 semi-welded gasketed heat exchanger for the evaporator, and an Alfa Laval AlfaNova 400 for the condenser, creates a number of advantages for the city and its engineers. "The small footprint of the U-Turn separator requires less floor space, and it is much faster to install a U-Turn compared to a surge drum, which we used before," says Labos. "There are also cost savings in the amount of insulation and structural steel required."

But the key benefit is the reduction in the quantity of ammonia in the ice rinks' cooling systems that the Alfa Laval U-Turn allows for. "In essence we are minimizing the risk factor, which is a very important element for us," says Labos. At the newly converted Ahuntsic Arena in Montreal, the amount of ammonia used in the system has been reduced by about a quarter.

With the same Alfa Laval system set for installation in the next batch of ice rinks, Dumas declares himself "extremely happy" with the performance. "The system has run perfectly from day one." ■

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