NO. 31
AN INTERNATIONAL MAGAZINE FROM ALFA LAVAL

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"The compabloc technology has contributed to our efforts to be as energy-efficient as possible."
En Ahmad Hamizan Hasan, Petronas Kerteh refinery

EXPERTS PREDICT:

GOOD BUSINESS IS HERE TO STAY

70 % of companies have placed sustainability permanently on their management agendas.

GENIOUS MEMBRANES
Danish food producer turns former waste into refined product.

EFFICIENCY BOOST
Compablocs help Malaysian refinery cut costs and energy use.

BIG JOB MADE BETTER
New decanters make all the difference to US wastewater giant.

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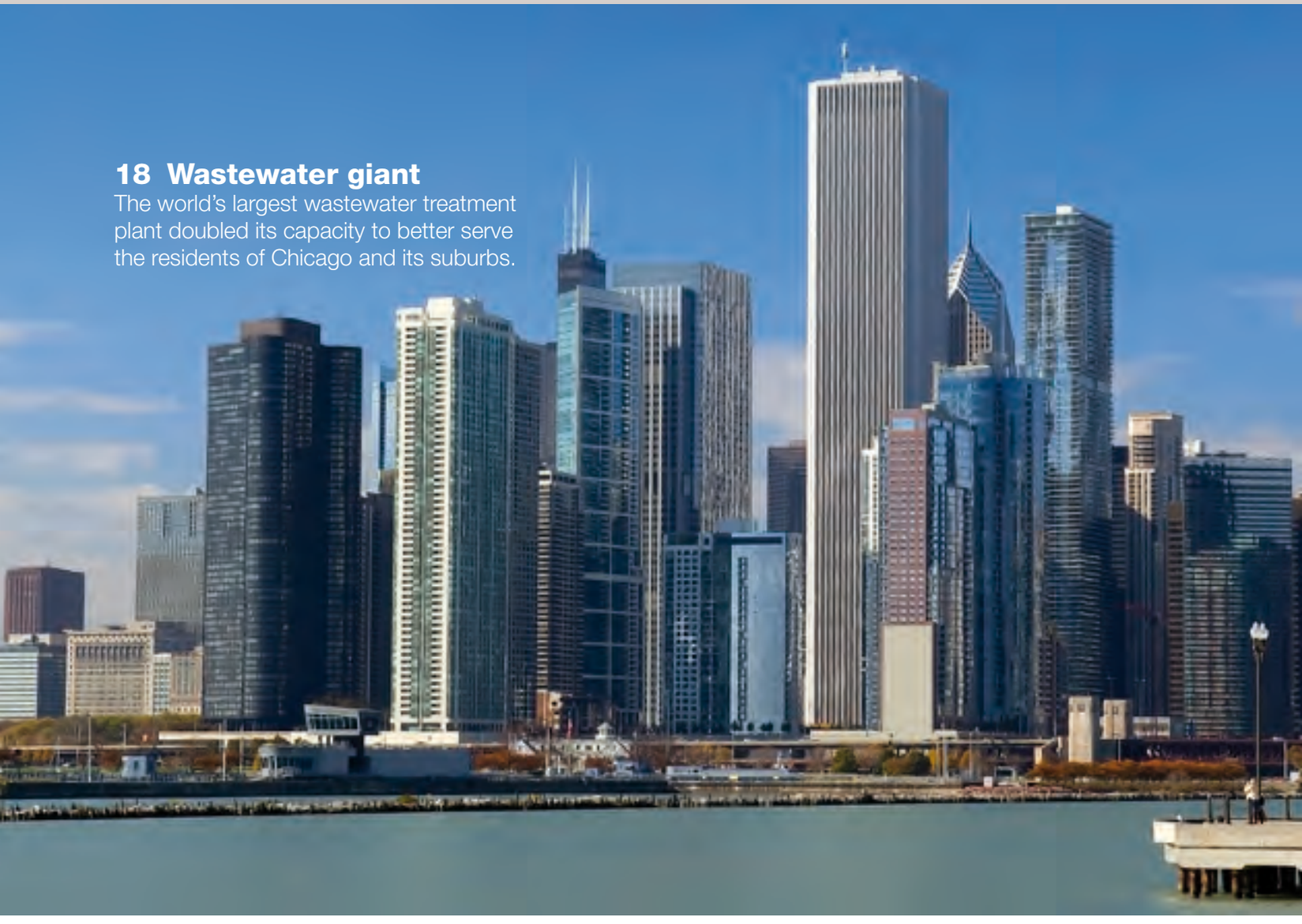

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Urgent challenges call for innovative solutions

editorial

A recent report by MIT Sloan Management Review and the Boston Consulting Group has found that 70 percent of companies have placed corporate sustainability permanently on the management agenda. This increased interest results partly from growing awareness about environmental matters and increased interest in being a "good corporate citizen", but primarily from a growing understanding that being sustainable contributes to long-term profitability and business success. "Doing good" has become good for business.

We have seen a significant increase in customer interest in our technologies as a way to reduce energy and CO_2 emissions and to clean and reuse water for different purposes. Alfa Laval's objective is to supply customers with products and solutions that can help boost their productivity and competitiveness while reducing their energy consumption and environmental impact.

One example is the Stickney Water Reclamation Plant, the world's largest water reclamation plant, situated in suburban Chicago. There Alfa Laval decanters transform some 5 billion litres of wastewater a day into clean water and agricultural products (see page 18).

TODAY WE ARE FACING fundamental challenges brought about by constantly increasing energy demands, harmful CO_2 emissions and large amounts of wastewater that need to be treated. These challenges are global and urgent, especially in the emerging economies, and will require investments in infrastructure and improvements in process optimization and productivity. Although many solutions are already in place, the need for innovation is obvious.

Our investments in research and development have put us on the cutting edge in these areas. We strive to be regularly involved in various pilot installations, and our efforts are being recognized. In 2011 Thomson Reuters named Alfa Laval one of the world's 100 most innovative companies.

RUNNING A BUSINESS in a more sustainable way requires continuous learning. At Alfa Laval we have made real progress over the past few years.

In this issue you can read about our energy-saving projects that between 2008 and 2011 resulted in savings of 10,000 MWh, approximately the energy consumption in the US for a 24-hour period. But we can still improve, and we look forward to helping our customers improve as well, so that together we can build a more sustainable tomorrow.

LARS RENSTRÖM
PRESIDENT AND CEO, ALFA LAVAL GROUP

District heating brilliance

In Austria, Alfa Laval has trained 150 service employees of Vienna's district heating department, Wien Energie, in the basics of gasketed plate heat exchangers.

Wien Energie is one of the largest district heating companies in Europe. Sixty-eight percent of its heat comes from the cogeneration of waste heat from municipal power plants and large industrial plants.

Environmentally friendly district heating conserves resources and releases about half as much CO2 per megawatt hour into the atmosphere as gas heating. Wien Energie operates an interconnected pipeline system for district heating that extends more than 1,100 kilometres.

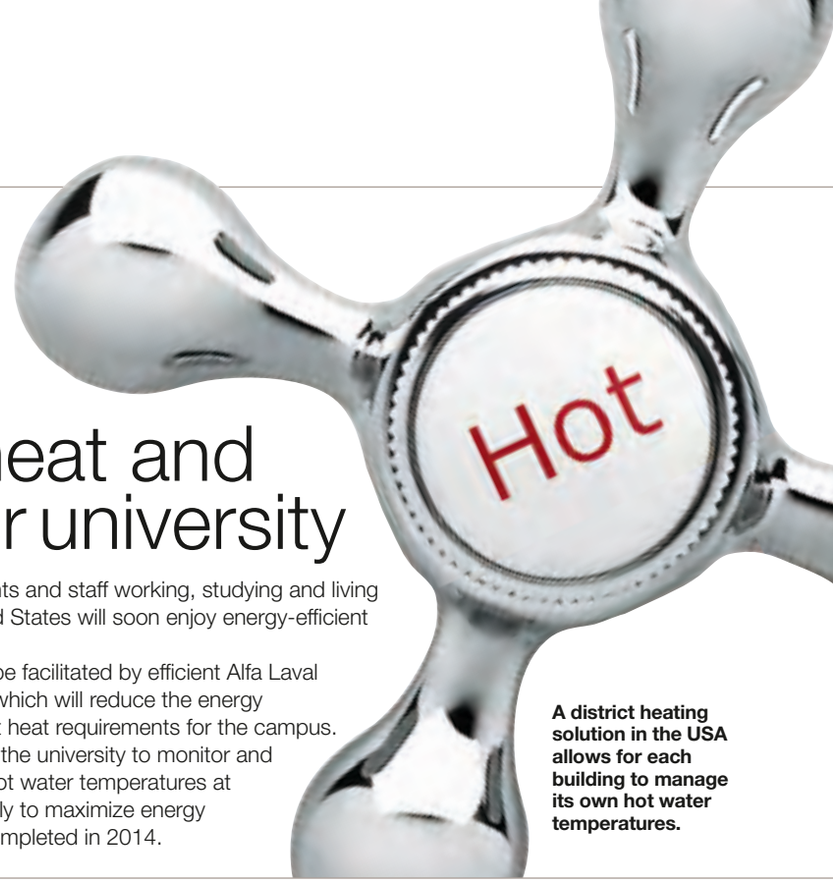
Appreciated CSR efforts

A leading supplier of ocean transport solutions was asked to pinpoint two of its largest and most crucial product suppliers in connection with a project to identify and document the Danish shipping industry's contribution to social and environmental progress.

J. Lauritzen identified Alfa Laval alongside ship paint supplier Jotun Norge, due in large part to its positive CSR examples. J. Lauritzen developed an appreciation for Alfa Laval's ongoing CSR efforts after being introduced to its programme and vision during a visit to Alfa Laval in Billingsstad, Norway.

Upcycling waste

In contrast to "recycling", which generally involves a conversion process to turn waste into something useful, "upcycling" refers to waste that is used directly, without any energy-demanding conversion process. One upcycler is African designer Hamed Ouattara, who builds furniture from used metal barrels that were previously used to store gasoline and cooking oil.



Green heat and water for university

More than 8,000 students and staff working, studying and living at a university in the United States will soon enjoy energy-efficient heat and hot tap water.

The district heating will be facilitated by efficient Alfa Laval heat exchanger systems, which will reduce the energy consumption of the district heat requirements for the campus.

The systems will enable the university to monitor and manage the climate and hot water temperatures at each building independently to maximize energy savings. Delivery will be completed in 2014.

A district heating solution in the USA allows for each building to manage its own hot water temperatures.

1 BILLION The number of people in the world who lack clean drinking water, according to the United Nations. Its goal is to cut that number in half by 2015.

40% is the projected increase in global power generation from hydro, solar, wind and other renewable sources over the next five years.
Source: International Energy Agency

A green celebration for 75

Alfa Laval employees in India recently celebrated the 75 years that Alfa Laval has been in operation in the country by planting saplings in a pledge for a greener earth.

More than 1,200 saplings were planted at Pune, Satara and Sarole, where Alfa Laval's manufacturing facilities in India are situated.

Alfa Laval India's management team joined more than 75 employees at the company's Dapodi facility for the environmental commitment.

"In the past 75 years, our business has grown steadily," says Jose Hernanz, Managing Director for Alfa Laval India. "Planting trees is a symbol of our belief in the future."

Oil workers off the Brazilian coast will soon enjoy freshwater made from seawater.

Maximizing uptime off Brazil

Freshwater generators installed on oil platforms off the Brazilian coast will convert seawater into freshwater for use as process and potable water, while diesel purifiers will help optimize uptime by controlling diesel oil quality for power generation. Alfa Laval will begin fulfilling the 85 MSEK order for the compact equipment in 2013, with finalization scheduled for 2015.

Mixer upgrade leads to easy savings

An international biotechnology company has optimized its existing batch production and is saving thousands of dollars daily simply by upgrading mixing capabilities in its tanks.

The company's bio-based end product requires continuous mixing in tanks ranging from 50 to 600 litres as the product flows to the final filling stage.

Alfa Laval discovered that valuable end product was being wasted because the company's existing bottom-mounted magnetic mixers required stopping while each batch still contained up to 20 percent of product in the bottom of the tank.

Six-inch magnetic mixers from Alfa Laval installed in 100-liter tanks immediately achieved close to 100 percent yield. By recovering 20 litres of additional mixed product per tank, the company began saving as much as USD 20,000 per batch per day — and even more in larger tanks.

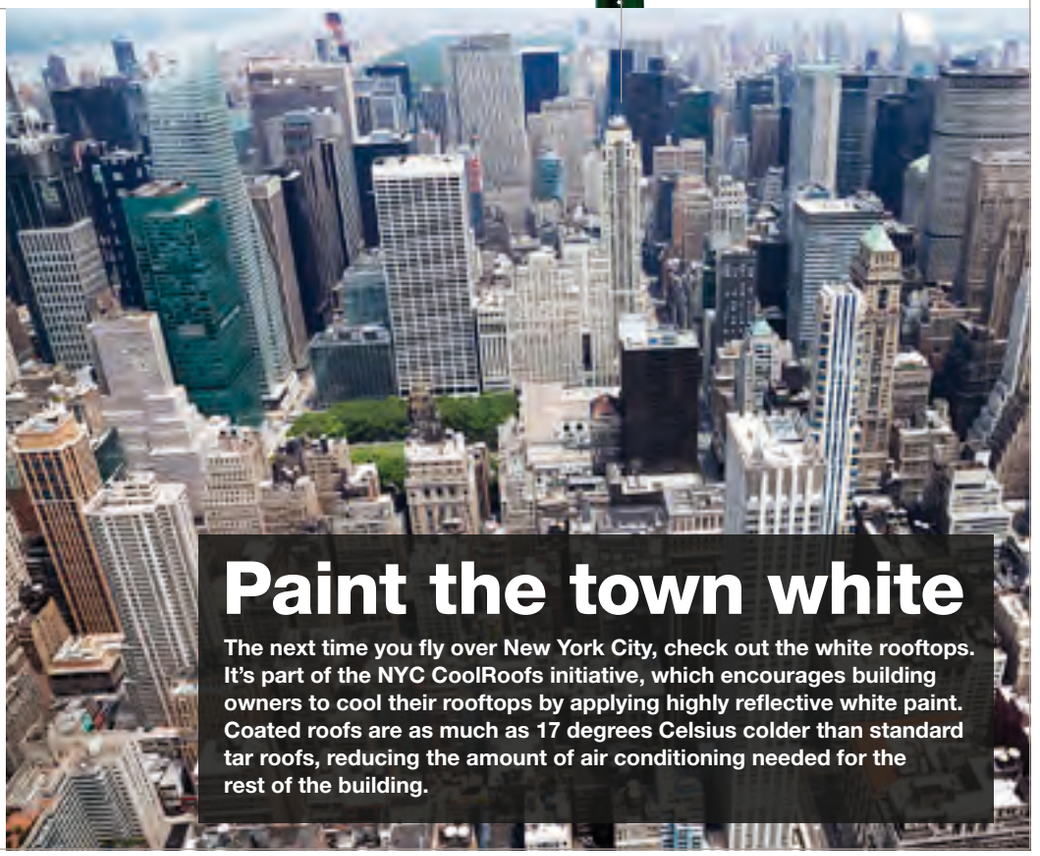
THOMSON REUTERS TOP100 GLOBAL INNOVATOR

Alfa Laval made exclusive list

Business data leader Thomson Reuters has included Alfa Laval in its list of the world's 100 most innovative companies. The exclusive list is determined through a combination of key performance indices related to innovation.

"Innovation is a means of growth and prosperity for companies and nations seeking to overcome sluggish economies and achieve competitive advantage," says David Brown, president of Thomson Reuters' Intellectual Property Solutions business.

Alfa Laval was named a Top 100 Global Innovator alongside five other Swedish companies and the world's global technology giants.



Paint the town white

The next time you fly over New York City, check out the white rooftops. It's part of the NYC CoolRoofs initiative, which encourages building owners to cool their rooftops by applying highly reflective white paint. Coated roofs are as much as 17 degrees Celsius colder than standard tar roofs, reducing the amount of air conditioning needed for the rest of the building.

SUSTAINABILITY AS A BUSINESS STRATEGY

Sustainability is now firmly on management agendas worldwide, according to a new report. Sustainable business practices are not only positive for the planet and its inhabitants, but they are also good for the bottom line.

TEXT: DAVID WILES

COMPANIES AROUND THE WORLD are slowly but surely coming round to the realization that sustainability is good for business. They are waking up to the fact that it pays to take a long-term perspective, anticipate the future and create stronger, healthier and more prosperous markets to sell into.

There has also been a realization – amongst Big Business as well as the activists and the protesters of the Occupy Wall Street movement – that a focus on profits in the short term contributed to the shaky global economic situation of the past five years. As Samuel J Dipiazza Jr, president of PricewaterhouseCoopers, has stated: "The current financial crisis is the result of short-term and unsustainable business models."

Sustainability is now firmly established in many boardrooms, partly as a response to consumer demand but also because of a growing awareness that being sustainable can contribute to long-term business success. A new report by *MIT Sloan Management Review*, in collaboration with the Boston Consulting Group, found that 70 percent of companies have placed sustainability permanently on their management agendas. More than two-thirds say their organization's commitment to sustainability has increased in the past year, and an even larger proportion say they plan to increase their commitment to sustainability. Two-thirds of those surveyed said that

“The potential of the corporate sector to contribute to sustainable development is greater than ever.”

VIKTOR NYLUND, UNICEF

"We are really seeing great improvements across industries and in all regions of the world."

KNUT HAANAES, BOSTON CONSULTING GROUP

sustainability is necessary to being competitive in today's marketplace, up from 55 percent the year before.

"I think companies believe in sustainability because they see positive outcomes from it," says Knut Haanaes, head of the Boston Consulting Group's global sustainability practice and co-author of the report. "Driving sustainability strategies is very much linked to being more efficient in your value chain, reducing waste, being more efficient in your use of resources, recycling and so on. So it is also about good management practices."

BO VIKTOR NYLUND, head of corporate social responsibility at UNICEF, says companies have tremendous potential to contribute to sustainable development. "Many companies are bigger than states in terms of their financial turnover and have massive financial resources at their disposal," he says. "If you look at today's financial situation, where government budgets are highly strained, the potential of the corporate sector to contribute to sustainable development is greater than ever."

Haanaes says the private sector has an important role in putting the planet on a more sustainable path because that is where the technical solutions that are needed will come from. "Companies are extremely powerful because the fundamental challenges we are facing will require enormous innovation and enormous improvements in productivity," he says. "And which organizations globally are able to do this? It's the companies. Sure, regulation is important, frameworks are important, but most of the solutions will actually come out of new business practices, new

innovations, new ways of addressing customer needs."

Interestingly, and contrary to what one might expect, the report found that many companies are actually increasing their commitment to sustainability initiatives despite the current economic uncertainty. "I think that is in part driven by uncertainty on the resource side," Haanaes says. "Resource and energy prices make companies look at ways of being more efficient. Another driver is that companies identify sustainability as a megatrend, something that it is worth addressing today because waiting until tomorrow might be more costly, and they might gain benefits by moving early."

TWO COMPANIES THAT HAVE FALLEN foul of sustainability campaigners and then learned their lessons and become CSR role models are Nike and Kimberly-Clark. Both have been subjected in the past to stinging criticism for their production methods – Nike for sweatshops and other human rights violations, and Kimberly-Clark for cutting down old-growth boreal forests. But then, in 2010, Nike was named by the Ethisphere Institute as one of the world's most ethical companies, and from 2005 to 2009 Kimberly-Clark was ranked first in the Dow Jones sustainability world index in the personal products category.

"This shows that companies are willing to change," says Haanaes. "Companies are good at adapting, at changing when change is necessary. And some of the companies that adapt the quickest are companies that are hit by crisis."

Nylund says that UNICEF sees children's rights as an essential investment in a sustainable future and that safeguarding these rights helps build the strong, well-educated communities that are vital for a stable and productive business environment. In March, UNICEF, together with the UN Global Compact and Save the Children, launched the Children's Rights and Business Principles to identify a range of actions that all businesses should take to respect children's rights.

NYLAND IS GENERALLY POSITIVE about the business community's response to the initiative. "But as with any organizational change process, there are people who really believe in the agenda and want to make it happen, and then there are people who primarily look at short-term gains and not really what is in the long-term interests of the business," he says. "What I hear from business is that it also takes time for them to do the convincing internally. It's not just about convincing one person, it's about a process within business as well."

Besides making their own operations and processes more sustainable, companies that are sustainable-minded can encourage others to get on board by choosing to do business with partners such as suppliers who themselves are active in corporate social responsibility, Nylund says.

"Supply chain issues are tremendously important," he says. "Large corporations can work with their business partners to introduce this agenda and not deal with companies that don't live up to their own high standards."

Haanaes says the study has revealed new evidence that companies are making a strong commitment to sustainable business practices and are investing time and money in strategies that address a business environment that is increasingly shaped by climate change, resource scarcity, regulatory uncertainty and economic volatility.

"If you look at most industrial companies, including Alfa Laval, and compare them with how they operated 30 – or even 10 – years ago, they have made huge strides," he says. "I think they will continue to do that. I don't foresee a day when every company is fully sustainable, but we are really seeing great improvements across industries and in all regions of the world." ■

43 %
is how much more efficient business processes are in companies that have strong sustainability programmes.
According to a study comparing companies with strong sustainability programmes with companies with poor ones.

40 %
is the weight Corporate Social Responsibility (CSR) has in a company's reputation.
According to the Reputation Institute's 2011 Pulse Survey.

88 %
of people in their 20s and 30s choose employers based on strong CSR values, and 86 % would consider leaving if a company's CSR values no longer met their expectations.
According to a survey of more than 100,000 employees at 230 workplaces.

5,500
and more companies around the world issued sustainability reports in 2011, up from about 800 a decade ago.

Engagement
The more a company actively pursues worthy environmental and social efforts, the more engaged its employees are.
According to a survey of more than 100,000 employees at 230 workplaces.

Refiner's formula for ENERGY EFFICIENCY

Petronas' Kerteh refinery in Malaysia has enhanced its energy efficiency by using Compabloc technology.

In its efforts to continually implement sustainable practices in its operations, Petronas has invested in cutting-edge energy-efficient technology.

TEXT: **JUSTIN HARPER** PHOTO: **STEFEN CHOW**

SPIRITS ARE HIGH at Petronas' Kerteh refinery on the east coast of Malaysia. The refinery celebrates its 30th anniversary this year. At the same time it is shifting to an all-year-round operation and implementing efforts to improve its energy efficiency.

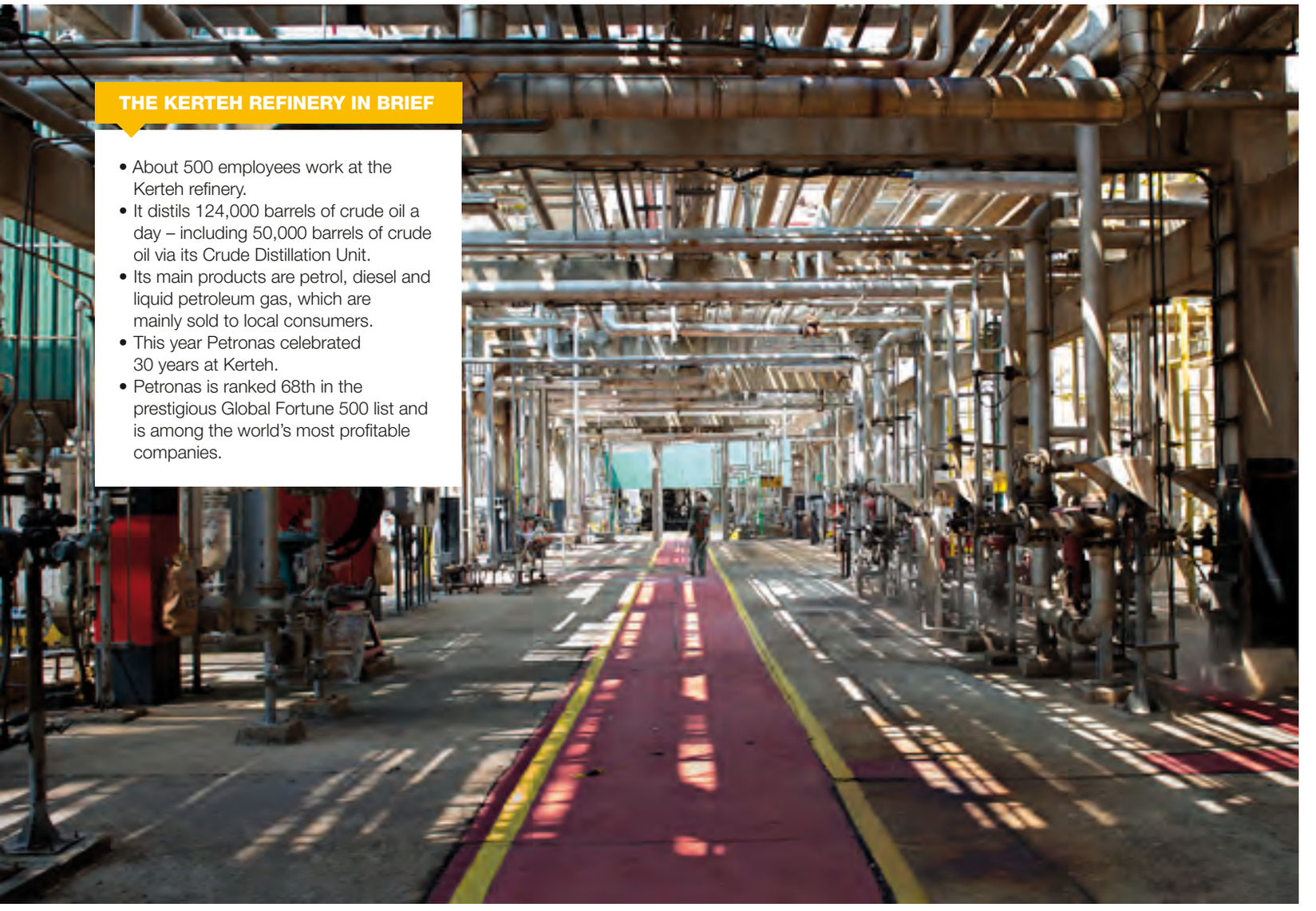
The first of two such projects was completed in November 2010 and will reduce the energy consumption in the Petronas Crude Distillation Unit (CDU) by almost 10 percent while reducing CO_2 emissions by 8,000 tonnes per year. This is very good news for the national oil and gas company, an industry where margins are critically important for business sustainability.

The second project is scheduled to turn the refinery into a 24/7 operation and is due to be completed by February 2013. When completed, this is expected to increase capacity by as much as 600,000 barrels of crude oil a year from 17.65 million to 18.25 million, while improving energy efficiency and reducing the CO_2 emissions of the CDU even further.

Both projects involve the use of Alfa Laval's compact welded plate heat exchangers, known as Compablocs. This equipment is designed to recover the maximum amount of heat produced in the refinery processes.

The advantages of Alfa Laval Compablocs are their small size, lower maintenance and better energy efficiency compared with traditional shell-and-tube (S&T) heat exchangers.

PROJECT ONE, which involved the installation of a Compabloc in the CDU via a design configuration, allowed the refinery to keep the original S&T on



THE KERTEH REFINERY IN BRIEF

- About 500 employees work at the Kerteh refinery.
- It distils 124,000 barrels of crude oil a day – including 50,000 barrels of crude oil via its Crude Distillation Unit.
- Its main products are petrol, diesel and liquid petroleum gas, which are mainly sold to local consumers.
- This year Petronas celebrated 30 years at Kerteh.
- Petronas is ranked 68th in the prestigious Global Fortune 500 list and is among the world's most profitable companies.

The Kerteh refinery has been awarded an ISO 14001 for environmental standards and an ISO 9002 for quality standards.

CEO Ahmad Hamizan Hasan says the goal is to run the refinery 365 days a year.

stand-by and achieved a payback period of less than a year.

Alfa Laval Compabloc heat exchanger technology was not the typical technology to use in such a critical refinery process, but based on the proven results of greater energy efficiency and technological reliability, the company decided to implement it at the refinery.

The Compabloc was delivered in August 2010 and commissioned in November the same year. The company has since recorded encouraging results. The energy costs of heating the crude oil in the CDU were 0.0576 gigajoules per barrel (GJ/bbl) before the Compabloc was installed, based on existing start-of-run figures. After the Compabloc was installed, this was brought down to 0.0525 GJ/bbl. This represents a 9.2 percent savings in total energy consumption per year. This translates into less fuel gas needed in the fired heater, something that will also reduce the CO_2 emissions by 8,000 tonnes per year.

COST SAVINGS ARE CRUCIAL at the Kerteh refinery, given that it is designed to refine the local Tapis oil, which is very expensive compared with other types of crude. Any cost savings will have a big impact on the bottom line.

Encik Khairul Emran Aziz Badli, the refinery's Head of Technical Services, says: "The energy savings are good and the commissioning was achieved within the targeted timelines."

While the cost savings is important, the Compabloc also contributed to the refinery's energy efficiency rating. This is measured according to the Solomon Energy Intensity Index (EII), an industry standard. The lower the score, the more energy-efficient you are. The Kerteh facility, which was already in the top quarter of the world's most energy-efficient refineries, cut its score by three points with the Compabloc technology.

Eva Andersson, Alfa Laval's regional manager for Southeast Asia, says: "Reducing the environmental footprint is on most refineries' agenda today, and the refineries in Southeast Asia are of course no exception."

DUE TO THE SUCCESS of Project One, Petronas decided to install another six Compablocs along the pre-heat train, which warms the oil before it reaches the crude distillation tower.

As part of its decision-making process, Petronas sent a team to a refinery in France that had commissioned two Compablocs in 2010.

The project engineering, procurement and construction

Due to their minimal space requirements, Compabloc heat exchangers can be added to the pre-heat train while still keeping existing S&Ts in stand-by.

At Kerteh there is an annual Energy Day to raise awareness among employees about saving energy.

The Kerteh refinery has now become more competitive, says Process Engineer Puan Raudhah Damanhuri.

"The Compabloc technology has contributed to our efforts to be as energy-efficient as possible."

EN AHMAD HAMIZAN HASAN

phase began in January this year and is due to be completed in February 2013. While this will further improve energy efficiency and reduce CO_2 emissions, the main objective was to allow the refinery to become a 365-day-a-year operation facility, thus avoiding plant shutdowns that would affect its efficiency. This is expected to boost production by 600,000 barrels a year.

One of the key advantages of Compabloc is that with its small space requirements, it can be installed alongside an existing the S&T system, which is bigger and bulkier. This means both systems can exists in a parallel configuration, keeping the old S&T in stand-by. When a Compablocs need to be cleaned, which is typically much less frequent than S&T, the refinery can switch to the old system to ensure that output is not disrupted.

TODAY, THE KERTEH REFINERY is normally closed 10 to 12 days a year for S&T maintenance. When the continuous operation goes live next year it will mark a major achievement for the CEO of Petronas' Kerteh refinery, En Ahmad Hamizan Hasan. He says: "When I joined in 2009, there were a few improvements I wanted to make. One of them was to make the plant run 365 days a year. With energy prices rising all the time, margins are constantly being squeezed."

A 365-day, 24/7 operation does not just equate to cost savings. It also reduces the risk of accidents happening, as these are more likely to occur during shutdowns.

During maintenance periods, contract workers unfamiliar with the refinery are often brought in to help with cleaning tasks while permanent staff complete their duties in an environment different than normal conditions. Accidents can be catastrophic, costing innocent lives and billions of dollars.

Working with an energy consultant, Petronas' Kerteh refinery conducted pinch analysis along the pre-heat train, looking at new configurations for its layout that could lead to even greater energy savings.

Technologist Puan Raudhah Damanhuri, who helped oversee Project One, says: "The advent of new technologies in the past five years allowed us to compete and be at par with world-class refineries."

Petronas has three refineries in Malaysia (two in Malacca along with Kerteh). Says Ahmad Hamizan: "The Compabloc technology has contributed to our efforts to be as energy-efficient as possible." ■

8,000 TONNES reduction in CO_2 emissions per year has been achieved, thanks to the Compabloc solution.

9.2 % is the expected reduction in energy use from replacing a shell-and-tube heat exchanger with the Alfa Laval Compabloc in the Crude Distillation Unit.

365 days per year operation will achieve cost savings and reduce the risk of accidents, which are more likely to occur during the shutdown stage.

GO LONG, GO FLNG

In South Korea, construction of the world's first floating liquefied natural gas plant is under way. When completed it will allow natural gas to be harvested in difficult-to-reach or otherwise constrained underwater locations and processed directly on site. Alfa Laval technology is part of the project.

TEXT: **RISTO PAKARINEN** ILLUSTRATION: **SHELL**

Natural gas has become the fastest-growing energy resource in the world. Although it is a fossil fuel, it is the cleanest-burning fossil fuel, and as such it is a cleaner alternative to oil – and especially to coal. Both coal and oil release higher levels of harmful emissions. In particular, coal produces twice as much carbon dioxide as natural gas, as well as much higher levels of nitrogen oxides (NOx), sulphur dioxide (SO_2) and ash particles that contribute to pollution.

But the richest natural gas fields can be under the sea floor and difficult to reach, which is why there have been plans for more than a decade to build a floating liquefied natural gas (FLNG) plant that processes the gas directly on site. The gas is cooled to minus 162° C, where it takes a liquid form, shrinking in volume by a factor of 600, allowing it to be shipped.

Alfa Laval is now a part of the first FLNG facility under construction, Shell's Prelude FLNG project which will be located off the coast of Australia, thanks to a recent agreement with the Technip Samsung Consortium to supply equipment to the facility.

Alfa Laval will deliver sea water filters, desalination units (which convert seawater to freshwater to be used for steam generation, process water and potable water), heat exchangers that use seawater to cool the cooling medium used in the vital cooling applications in the gas liquefaction process, and heat exchangers and separators for the gas treatment processes.

The FLNG facilities may also help decrease the potential environmental impact of operating a plant on land since they eliminate the need for pipelines and other infrastructure onshore.

The Prelude facility will measure 488 metres from bow to stern, six times the length of a Boeing 747. It will be stationed more than 200 kilometres offshore in Western Australia. ■

NATURAL GAS IN SHORT

- Natural gas is a combustible mixture of hydrocarbon gases, formed primarily of methane.
- It is considered the cleanest fossil fuel because it produces emissions much lower than those of other fossil fuels.
- Because of its environmental benefits, natural gas used for electricity generation has increased dramatically during the past 10 years.
- Natural gas, on an energy-equivalent basis, emits 50 % less CO_2 than coal and 30 % less CO_2 than oil, making it the best fossil fuel source available to reduce greenhouse gas emissions.
- Global gas demand is expected to increase by more than 50 % between 2010 and 2035.
- LNG is the fastest-growing component of the global natural gas market.

FLNG CHALLENGES

- The FLNG facility is roughly a quarter the size of a conventional LNG facility with the same production capacity.
- It must be able to operate and stay safely moored even in the most extreme weather conditions.
- The Prelude facility is designed to withstand the most powerful, category 5, tropical cyclones.

CHALLENGE Ammonia-polluted steam from African Explosives' factory was affecting local residents.

SOLUTION With well-known products in a new application Alfa Laval recovered the ammonia for reuse, cutting emissions to almost zero.

TEXT: **TOBY SELANDER/ERIC GOURLEY**
PHOTO: **TOBY SELANDER**

A successful team. Alfa Laval's Moses Modibela (left) with AEL's Alan Pikor (middle) and Dave Hill (right).

Pollution-free recipe

AFRICAN EXPLOSIVES LTD (AEL) is one of the largest commercial explosive producers in the world. AEL produces ammonium nitrate, the most common component in explosives, at its plant in Modderfontein, 20 kilometres northeast of the Johannesburg city centre.

As South Africa's largest metropolitan area developed outward, the plant's proximity to new residential communities eventually posed a problem.

White steam laden with ammonia was rising from the plant's stacks, polluting the air and accelerating over-fertilization. While the discharged ammonia was diluted with air and didn't exceed the government-imposed limits on human exposure, it was still an environmental concern for AEL.

TECHNICAL SERVICES MANAGER Alan Pikor knew the ammonia could be separated from the steam. He recalled an article he had read in Alfa Laval's *here* magazine about desalination in the Middle East, and he contacted the company.

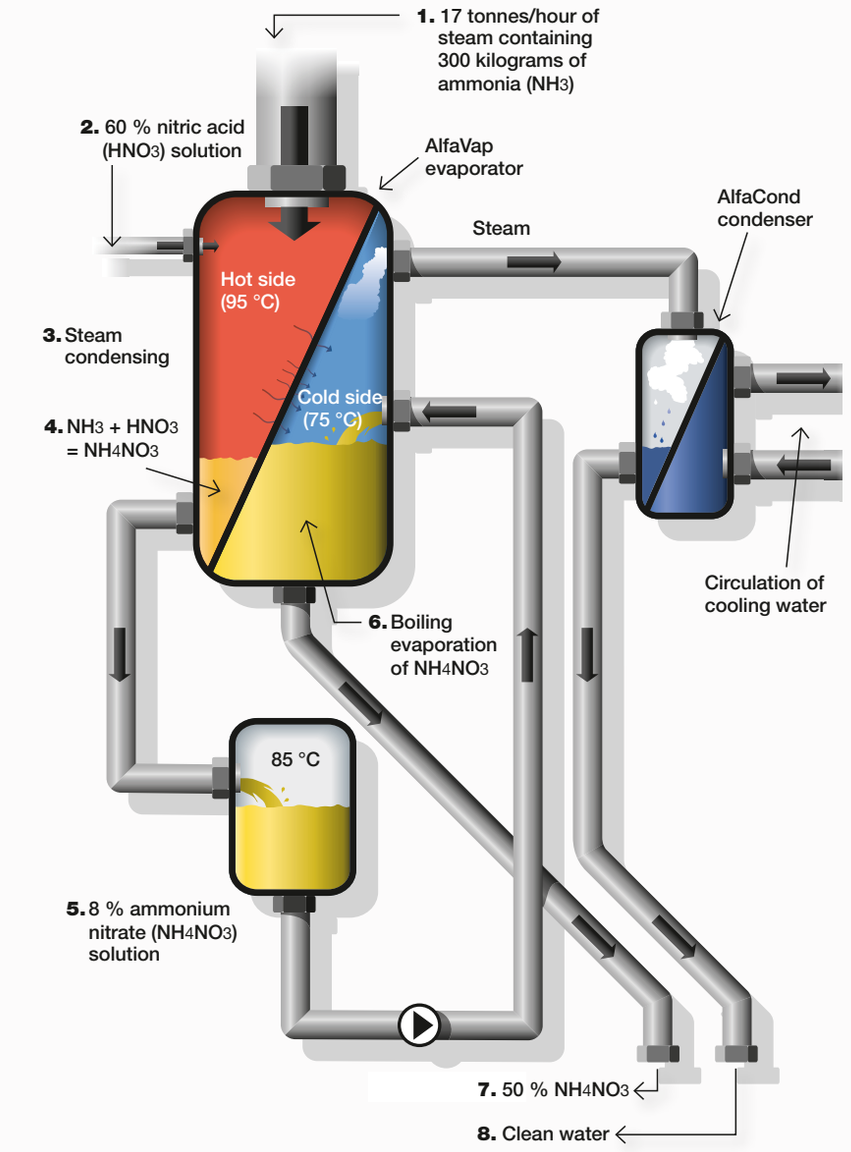
Within a day, Alfa Laval had suggested a unique solution using well-known products but in a completely new application – the plate evaporator AlfaVap and the plate condenser AlfaCond. After a few minor alterations and some additional equipment, the solution was soon ready for action.

The solution was designed to slash ammonia emissions from 200 tonnes per month to 10 kilograms per year, benefiting the environment and residents in the surrounding communities.

Since implementation in May 2009, AEL has recovered 3,217 tonnes of ammonia, using 11,860 tonnes of nitric acid in the process while producing 15,300 tonnes of ammonium nitrate solution. "The solution is running well," Pikor says. "It's become a critical part of our plant over the past few years and continues to pay for itself over time. The amount of ammonia we're recovering is more than we originally thought."

THE PROCESS CONTINUES to utilize minimal external energy by using recovered waste heat in the steam from the stacks.

THIS IS HOW IT WORKS



The concentration of ammonia in the air has been reduced to almost zero. Not only do neighbouring residents no longer see the steam or smell the ammonia emissions, but the former pollution is now converted into ammonium nitrate, saving AEL the cost of an additional 200 tonnes of ammonia monthly.

Pikor says the ammonia savings achieved since commissioning have amounted to more than 12 million rand (1.14 million euros).

"The cost savings have been an added bonus for the plant," he says. "The most important thing is that we're no longer polluting the atmosphere with ammonia. People were very surprised when we started coming up with figures about what we've recovered month by month. The environmental impact has been so positive." ■

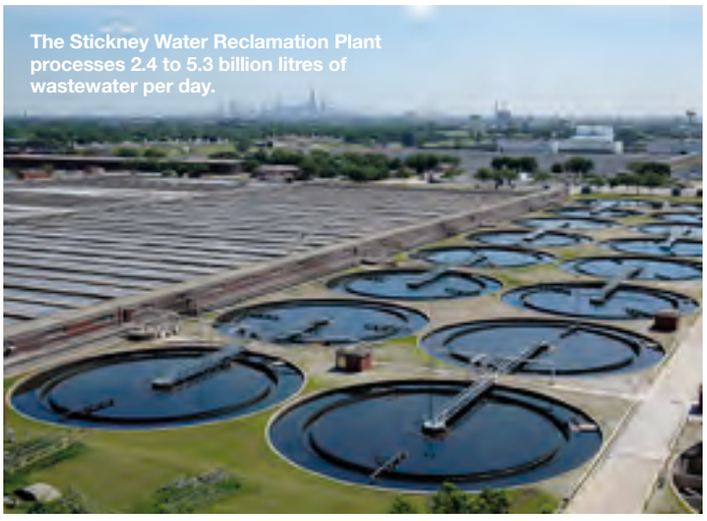
* An article about AEL was also published in 2009 in *here* No. 25.

From FILTHY to FRESH in CHICAGO

Every day urban areas release up to 250 million cubic metres of untreated wastewater into our planet's waterways. In Chicago, the world's largest water reclamation plant is cleaning up those statistics by using technology that transforms billions of litres of wastewater daily into clean water and agricultural by-products.

TEXT: **ERIKA GIMBEL** PHOTO: **GETTY IMAGES**

No need for a new building. Alfa Laval's decanters fit right into the plant's exisiting footprint.



The Stickney Water Reclamation Plant processes 2.4 to 5.3 billion litres of wastewater per day.

The new decanters from Alfa Laval have twice the throughput of the old ones.

THE STICKNEY WATER Reclamation Plant, situated in Chicago, a major metropolitan area in the heart of the American Midwest, has the distinction of being the largest water reclamation plant in the world. Built in the late 1920s, the plant processes 2.4 to 5.3 billion litres of wastewater daily for the central part of Chicago and 43 suburban communities, populated with some 2.5 million people.

It's a big job. Every time someone in that area uses a sink or flushes the toilet, that water goes through a complex cleaning process in order to protect the environment.

UNTREATED WASTEWATER IS a global environmental issue. Urban areas release about 150 to 250 million cubic metres of contaminated water per day into our planet's topsoil, rivers, lakes and oceans, according to a report from the United Nations Environment Programme, the UN Human Settlements Programme and the UN Secretary General's Advisory Board on Water and Sanitation, in partnership with the members of UN Water. This sewage causes disease, threatens food supplies and creates what are known as "dead zones" in the ocean.

In the United States, the federal government first made sewage treatment a priority in the 1940s, devoting dollars to build water treatment plants to serve the nation's growing population. Today, those treatment plants need continuous updating to keep up with the wastewater demands of the country's cities and towns.

THE CHICAGO PLANT SETS the standard by processing more water per day than any other wastewater plant on earth. When sewage enters the plant, it begins a 10-hour journey that rids it of more 90 percent of contaminants. Several sets of tanks separate heavier solids from lighter ones, and special protozoa are introduced to further separate the waste from the water. After the protozoa are removed (and reused for the next batch of wastewater), the clean water is channelled into the Mississippi river, eventually flowing into the Gulf of Mexico.

The solid waste spends a much longer time in the plant – up to 30 days. Alfa Laval developed two specialized decanters that double the plant's capacity to process the wastewater sludge into a biosolid called "cake" that is ideal for agriculture. The cake reintroduces rich nutrients into the soil and is used to turn barren areas into parks, golf courses and farms.

THE SUSTAINABLE SOLUTION at the Stickney Water Reclamation Plant may seem like a drop in the bucket compared with all the untreated wastewater in the world, but it's a drop in the right direction. ■

50 % SAVINGS
in power consumption

MORE THAN 90 %
of solids recovered

50 % LOWER
polymer consumption

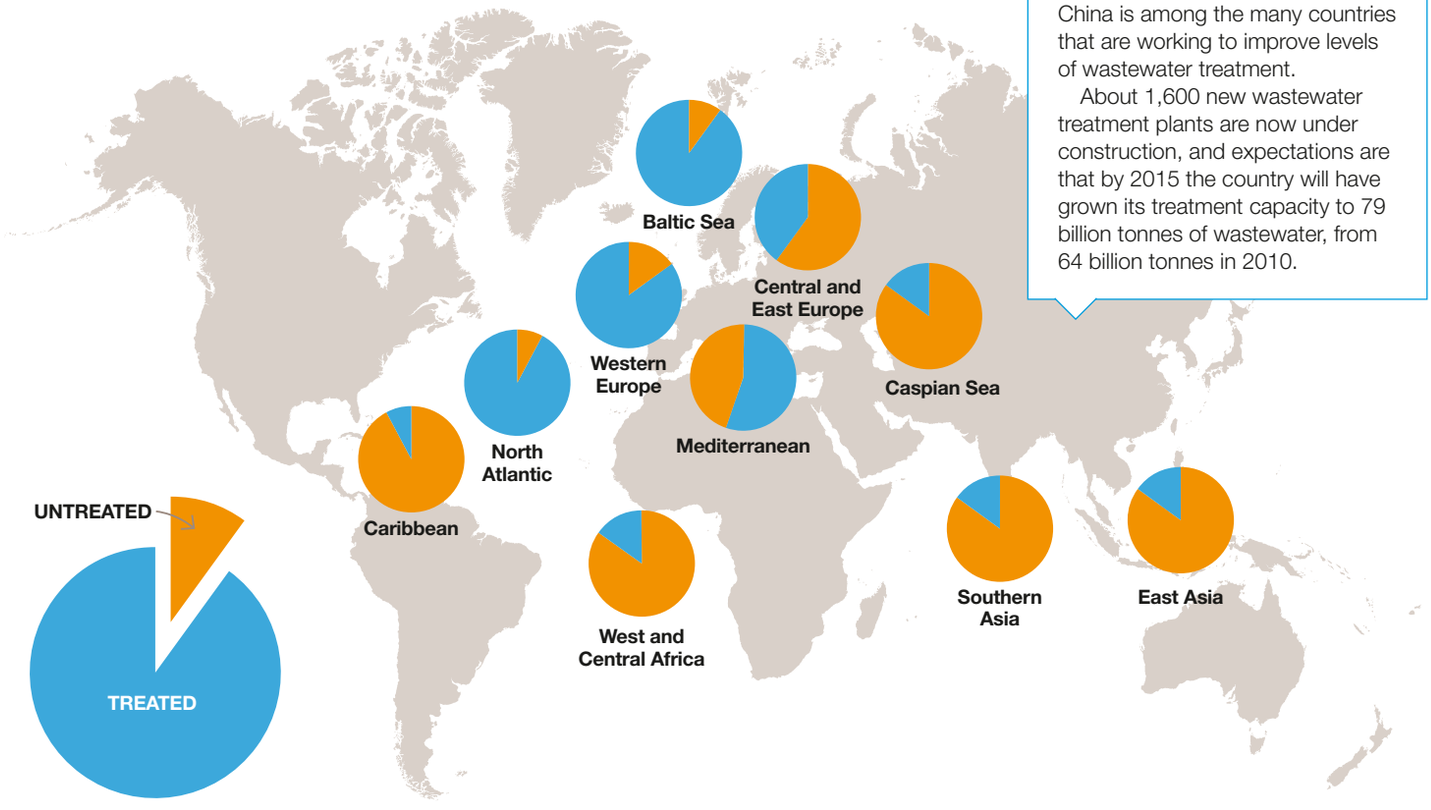
20 MILLION
US dollars in savings over 20 years

TWICE THE THROUGHPUT
of the old decanters

3 TIMES LONGER
lifetime, 20+ years compared with 5 to 7 years for an alternate proposed solution

A global challenge

Worldwide, many countries are working to improve levels of wastewater treatment.



PROGRESS IN CHINA

China is among the many countries that are working to improve levels of wastewater treatment.

About 1,600 new wastewater treatment plants are now under construction, and expectations are that by 2015 the country will have grown its treatment capacity to 79 billion tonnes of wastewater, from 64 billion tonnes in 2010.

Alfa Laval developed two specialized decanters for the Stickney Wastewater Reclamation Plant. Chris Fell, Market Unit Manager at Alfa Laval, describes the solution:

"We cut energy use in half"

Q: Why did the Chicago wastewater plant need a new solution to treat its sludge?
A: The digestion section of the plant, where our decanters will go, hadn't been updated in 25 years. They were actually going to build a new facility using a different thickening technology, but the centrifuges we presented fit right into the plant's existing footprint. Not having to construct a new building with all that infrastructure was a major time and cost savings right from the start.

Q: What were some of the challenges?
A: Their "mixed sludge" has a lot of heavy grit in it, and as we did some test runs, we knew we needed to create a custom solution with better efficiency. In the end, we developed a centrifuge that has twice the throughput and a higher efficiency than the old ones. We'll be able to use this technology for other wastewater plants with similar sludge types.

Q: What are the environmental advantages of the Alfa Laval solution?
A: The biggest impact is on energy use, which we cut in half. The old centrifuges ran some 1,500 to 1,700 litres of sludge per minute, but the Alfa Laval units have twice as much throughput.

Q: What are the cost savings?
A: The energy savings, increased throughput and the fact that the plant won't need a new building, combined with the 20-plus-year lifespan of the decanters, add up to about 20 million US dollars in savings over 20 years.

FROM WASTEWATER

Wastewater can be reused for a variety of purposes, depending on the degree of treatment. In fact, it can even be recycled into safe drinking water. *here* gives you a quick overview of how it is done.

TEXT: **ÅSA LOVELL**

Domestic, commercial and industrial wastewater enters a wastewater treatment plant.

1

PRIMARY TREATMENT consists of physical treatment of the wastewater. Mechanical screens or fat/oil and sand separators are often used as well as sometimes primary clarifiers in which solids are settled by gravity.

SECONDARY TREATMENT can be either chemical or biological. Most wastewater treatment plants work with a type of biological treatment. Depending on the design, biology can remove organics, nitrogen and even phosphorus from the soluble part of the wastewater.

2

The water is clean enough to discharge into waterways.

TERTIARY TREATMENT or polishing consists of very fine filters or systems that remove or kill any remaining pathogens or harmful substances. Tertiary treatment includes, for example, sand or active coal filters, UV treatment to kills bacteria and viruses, or membrane technology (micro filtration/ultra filtration).

Water may be reclaimed for a variety of non-drinking purposes, such as industrial processes or irrigation of public areas or crops.

SHADES OF WATER

Greywater – Grey refers to the non-sewage kind of residential or office-sourced water from sinks, showers and drinking faucets.

Blackwater – Black refers to water from toilets that is contaminated with sewage. It is also known as brownwater, foul water or sewage.

99.9 %
of wastewater is water

TO FRESHWATER

Now the water is clean enough to be used for sensitive industries such as pharmaceutical manufacturing and computer-chip washing. It can also be used as drinking water, although this rarely happens.

MULTI-BARRIER TREATMENT PROCESSES consist of steps to ensure sufficient reduction of soluble materials that need to be controlled (salts, metals, etc.). This is typically done by reverse osmosis or the use of ozone or hydrogen peroxide. Reverse osmosis works by applying pressure on a membrane so thin that most molecules larger than water do not cross it. Reverse osmosis can also be used in desalination processes.

3

4

THE PURIFIED WATER is added to groundwater or surface water reservoirs where it stays for an average of six months to be further purified by natural processes. Once it is drawn from the ground-water or reservoir, the recycled water goes through a standard water purification process.

The water is used as tap water or bottled as drinking water.

5

RECYCLE PIONEERS

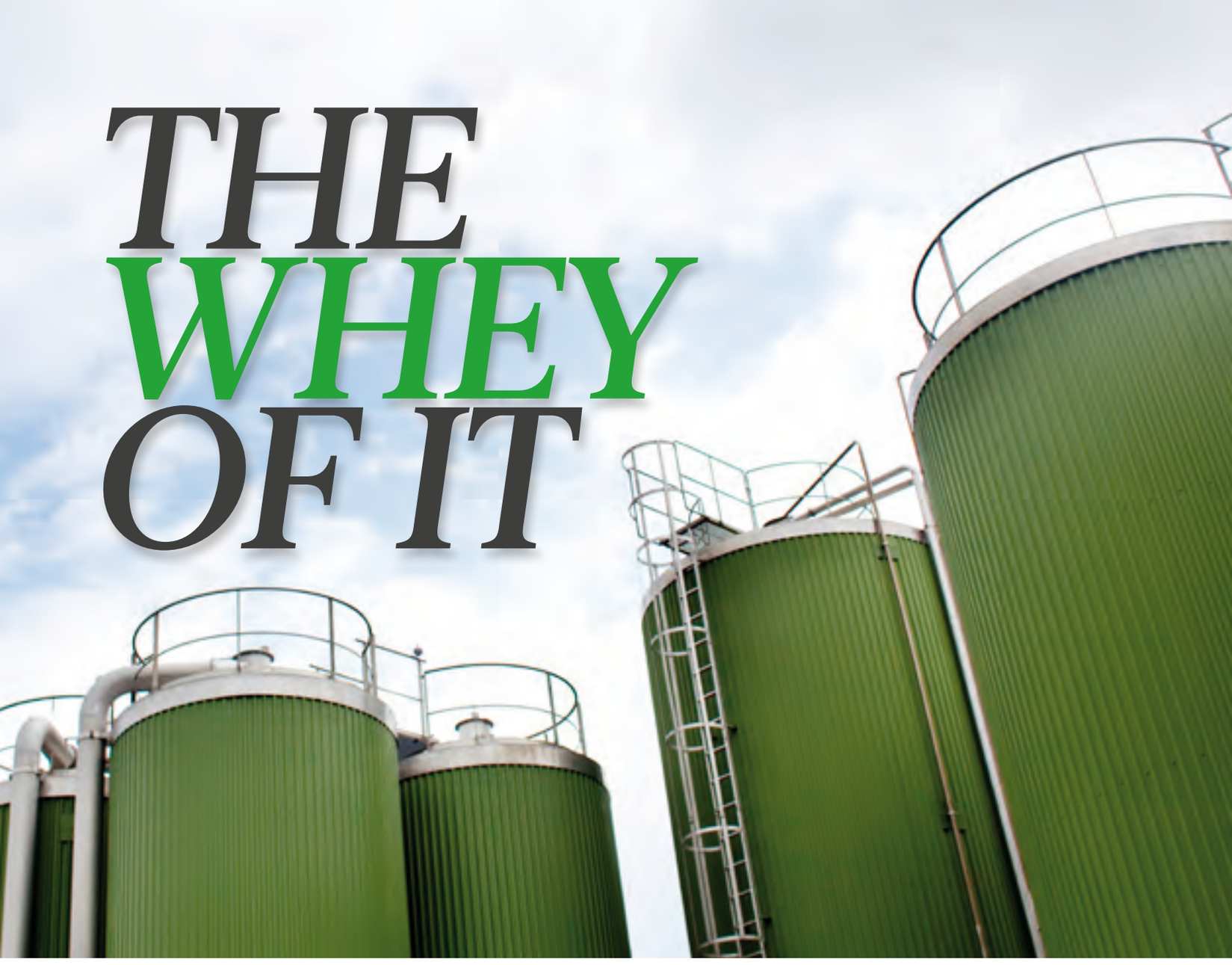
Several countries have already embraced wastewater reuse. This is how much they recycle:

Israel 70 %
Singapore 15 %
Australia 8 %
USA 5–6 %

2.5 %

of Singapore's daily drinking-water consumption in 2011 was NEWater – recycled drinking water purified by advanced membrane techniques.

THE WHEY OF IT



At its plant set amongst the rolling fields outside the small Danish town of Videbæk, dairy producer Arla is turning what was once regarded as waste into a highly refined food ingredient. It is just one of the environmental benefits Arla gets from using Alfa Laval membrane technology.

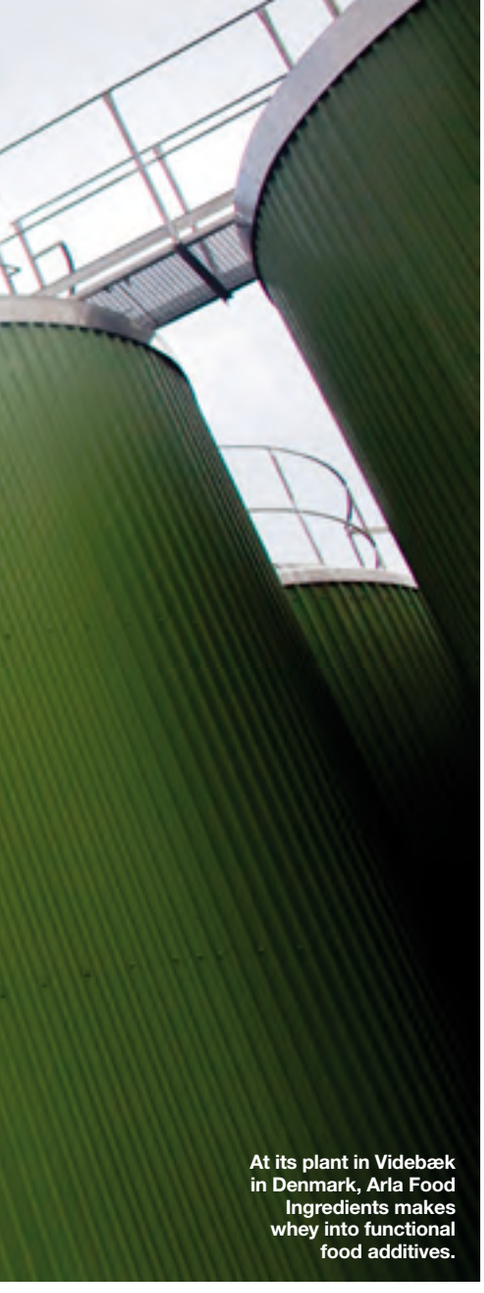
TEXT: **DAVID WILES** PHOTO: **ADAM HAGLUND**

EACH YEAR Scandinavian dairy giant Arla produces many billions of litres of whey as a by-product of its cheese-making process. A few decades ago this greenish liquid – which is 95 percent water and the remainder lactose and protein – was viewed as waste and would have been returned to the farmers to be used as cheap animal feed.

Thanks to membrane technology, this previously low-value waste product is instead refined by an Arla subsidiary, Arla Food Ingredients, into functional food additives that are proving to be highly profitable. Used by Arla in other applications, the membranes also have a number of environmental benefits, such as allowing dairies to reuse water in their processes and concentrating the whey before transport thus reducing the number of trucks on the road.

At Arla's Videbæk plant in Denmark, construction workers are busy on an extension to the site that will allow the company to expand by about a third its production of food ingredients made by filtering whey.

"The frustration is that we need more whey than our own dairies can supply," says Kristian Albertsen, director of R&D at Arla Food Ingredients, as he dodges between construction vehicles on the way to the company's research facility. "So we have set up joint ventures in



At its plant in Videbæk in Denmark, Arla Food Ingredients makes whey into functional food additives.

95 % water, 5 % lactose and protein.

Whey, a by-product of cheese making, was in the past viewed as waste.

Europe and in South America so we can get our hands on enough of the raw material."

Inside the facility new ingredients are being produced in pilot plants. Albertsen explains that over the past decades whey has gone from being waste to feed to food. "Now we are going to the next stage," he says, as he stands surrounded by kilometres of stainless steel pipes and the rich, slightly sweet smell of the whey that is gurgling through them. "By using ever more specialized membranes we are getting more value from the whey."

THE PRODUCTS ARLA FOOD INGREDIENTS makes from the residue of the filtering process today nourish newborn babies, the sick and the elderly. They also improve the consistency of ice cream and the moisture of cakes and give sports drinks the desired protein levels and a transparent appearance.

The ingredients come in the form of a white powder called whey protein. If you take 100 kilograms of whey, 95 kilograms is water and five kilograms is dry matter. "Of that five kilograms, 85 percent is milk sugar and 12 percent is protein; the rest is small amounts of fat and minerals," explains Albertsen. "We want to increase the protein content from that 12 percent to 90 percent, and in order to do that we use membrane filtration. That is where Alfa Laval and their colleagues come in."

Alfa Laval is one of the world's leading suppliers of industrial separation technologies. The company supplies a wide range of industries with separation equipment based on centrifugal and mechanical principles. But there are many processes in which the substances involved, such as whey, are too delicate to withstand this treatment, and that is where membrane filtration is used.

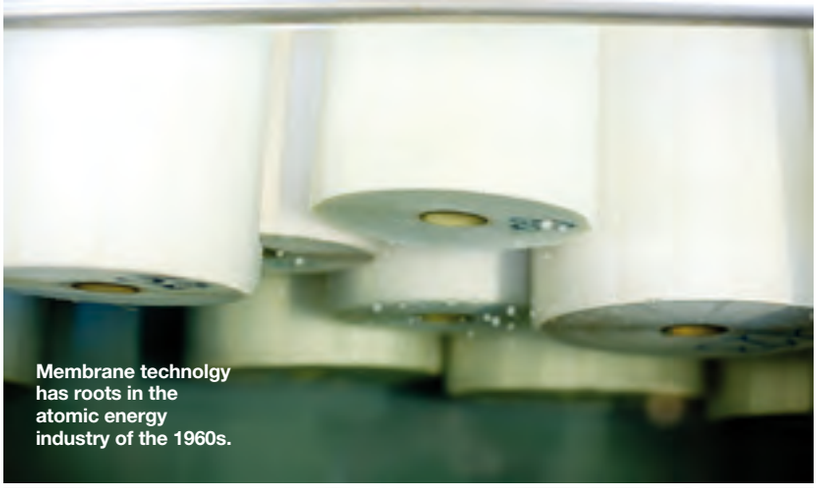
COMPARING THE BASIC PRINCIPLE with the way a coffee filter works, Albertsen explains that the whey is passed over the membrane, which is coiled like a roll of wallpaper about a metre long and placed inside a stainless steel tube. The surface of the membrane is covered with microscopic pores measured in angstroms (1x10-10 m). If you take an ultra-filtration membrane the size of this magazine page and blow it up to the size of Europe, then one pore would be the size of a football.

Membrane filtration separates out different components of the whey on the basis of the molecular size and shape of the micro-particles it contains. The better the filtration, the better the quality and value of the end product. "We can remove the components we don't want, such as sugar, some of the minerals and some of the fats, and then we get a protein content of up to 90 percent," says Albertsen.

"By using ever more specialized membranes we are getting more value from the whey."

KRISTIAN ALBERTSEN, ARLA FOOD INGREDIENTS

Kristian Albertsen, director of R&D at Arla Food Ingredients.


Membrane technolgy has roots in the atomic energy industry of the 1960s.


Alfa Laval's membranes are specially designed for different applications.

"We rely on good membrane technologies, and that is why we have teamed up with Alfa Laval."

4.8 BILLION
litres of low-value waste product are refined into 130,000 tonnes of high-value food ingredients.

ONE TRUCK
can transport the whey (compared to the 45 used earlier for the equivalent amount) because the whey is concentrated before transport.

1,500 TONNES
is the amount of water Arla is able to save per day by cleaning water with membranes and then reusing it.

Some ingredients may pass through as many as 20 membrane plants and are then heat-treated or homogenized and dried into powders before they are ready to be used for their nutritional or functional properties. "We rely on good membrane technologies, and that is why we have teamed up with Alfa Laval," he says. "There are a lot of parameters, such as performance, price and cost of cleaning, but on total evaluation Alfa Laval membranes are among the best."

ALFA LAVAL HAS BEEN SUPPLYING Arla Food Ingredients with membranes since the 1980s, but in 2011 the mutual business relations were taken to another level when the two companies entered into a development cooperation in which Arla Food Ingredients receives membranes custom-made to its specifications and Alfa Laval gets its latest membranes tested in real-life industrial situations.

"We got into a close dialogue with a membrane producer that can translate our needs and make a membrane specially designed for particular applications," says Albertsen.

Besides turning what was once waste into a highly refined product, Alfa Laval's membranes also provide Arla with environmental benefits that contribute to the group's sustainability goals, such as reducing water and energy consumption by 3 percent. At Arla plants, membranes are used to clean water used in assorted processes, reducing both the need for freshwater and the amount of waste generated. The matter left over after filtration can then be passed on to an energy company to be used as a feedstock for renewable biogas.

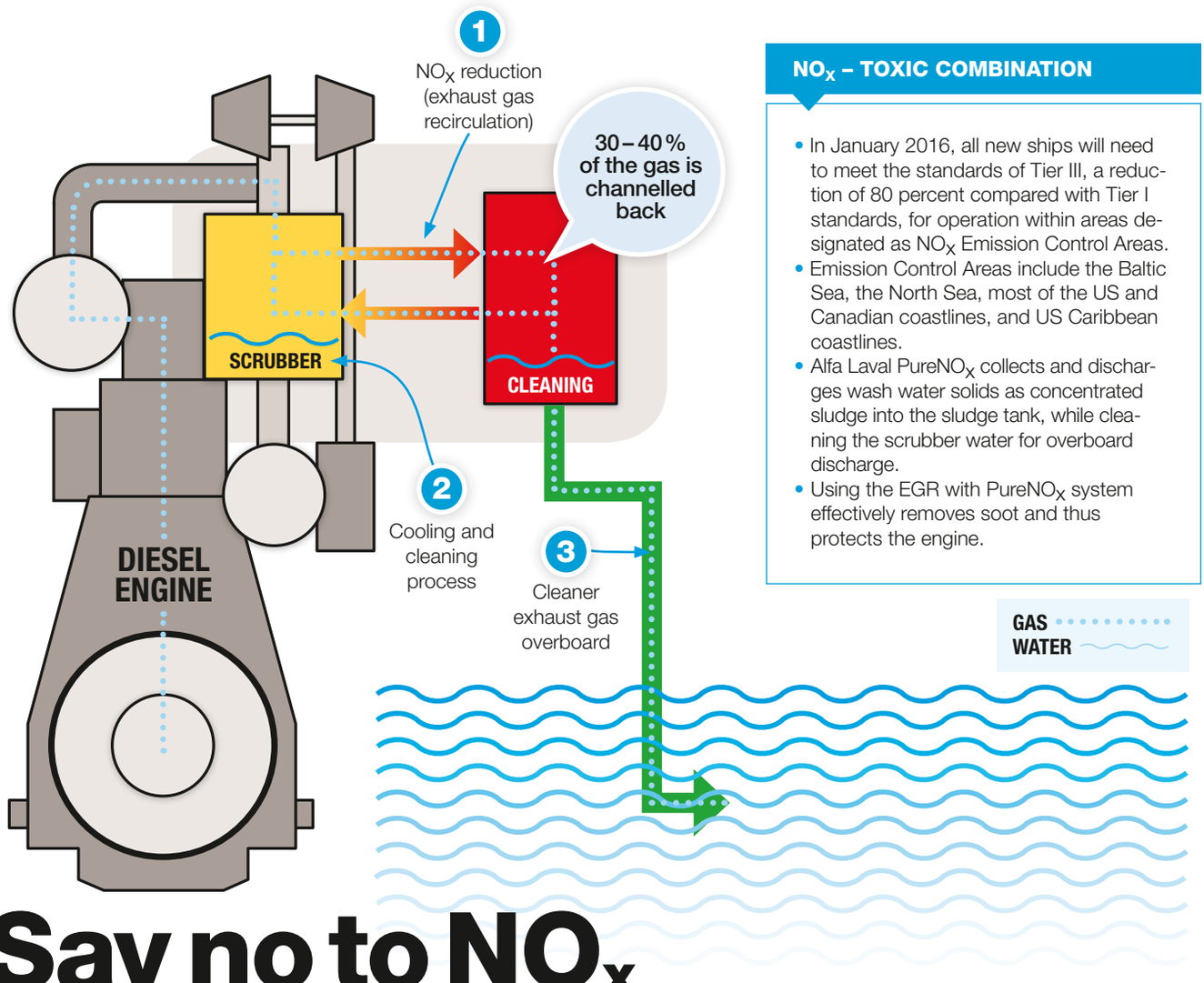
In addition, all of Arla's cheese factories use standard membranes for concentrating the whey prior to transport to Videbæk. "They concentrate the whey up 45 times before transporting it here," says Albertsen. "So instead of sending 45 trucks with whey from Sweden or Germany or elsewhere in Denmark, you only need one. And that of course has big environmental and cost benefits."

WHILE MANY DAIRIES ARE STRUGGLING to stay profitable, Arla and others like it, with their own ingredients business, are faring considerably better.

"Over the past couple of years [the ingredients business] has been an increasingly good business to be in, due to a continually increasing demand for dairy products and especially the dried products that can be transported over big distances," says Albertsen. "In future there will be greater demand for more specialized membranes to separate more proteins, fats or sugar types to meet market demands." ■

ARLA FOOD INGREDIENTS

- A fully owned subsidiary of Arla Foods
- Specialized in the development and application of functional and nutritional ingredients derived from natural milk whey
- Headquartered in Videbæk, Denmark, with advanced application centres in Denmark and Argentina
- 600 employees in 20 countries, of which 50 are in R&D in Videbæk
- Product applications include bakery, dairy, meat, ready meals, clinical nutrition, functional foods and sports nutrition.



NO_X – TOXIC COMBINATION

- In January 2016, all new ships will need to meet the standards of Tier III, a reduction of 80 percent compared with Tier I standards, for operation within areas designated as NO_X Emission Control Areas.
- Emission Control Areas include the Baltic Sea, the North Sea, most of the US and Canadian coastlines, and US Caribbean coastlines.
- Alfa Laval PureNO_X collects and discharges wash water solids as concentrated sludge into the sludge tank, while cleaning the scrubber water for overboard discharge.
- Using the EGR with PureNO_X system effectively removes soot and thus protects the engine.

Say no to NO_x

Shipping is one of the largest contributors of emissions of nitrogen oxides into the atmosphere, which is why in the late 1990s the International Maritime Organization set up emissions limits. Now even stricter limitations are on the horizon. TEXT: **RISTO PAKARINEN**

THE SHIPPING INDUSTRY IS facing tougher environmental legislation aimed at reducing the industry's negative impact on the environment. In addition to regulations concerning ballast and bilge water, the International Maritime Organization (IMO) is enforcing new limits for emissions of sulphur oxides (SO_x) and nitrogen oxides (NO_x) into the air.

In 2016, Tier III regulations on emissions of NO_X will go into effect, reducing emissions to 20 percent of the Tier I levels that the IMO defined in 1997.

The race to accommodate these new restrictions is on, with two competing technological solutions.

One uses a catalyst that, with the help of urea, breaks down NO_x into nitrogen and water. The other, which Alfa Laval is developing with MAN Diesel, the world's largest manufacturer of diesel engines for large cargo vessels, is exhaust gas recirculation, or EGR. It is a proven solution originally used in the reduction of emissions in trucks.

The EGR system includes a wet scrubber (wet gas cleaner) that is integrated into the engine, a cooler and water mist catcher, a blower, a control system and the Alfa Laval PureNO_X water treatment system.

THE ALFA LAVAL PURENOX water treatment system recirculates up to 40 percent of the exhaust gas into the charge air chamber, lowering the oxygen content in the cylinder and increasing the specific heat capacity. This reduces the combustion temperatures and suppresses the formation of NO_x emissions.

To prolong the service life of engine components, a wet scrubber circulates water to remove soot and SO_x from the recirculated exhaust gas. The PureNO_x effectively cleans scrubber wash water, removing impurities that may interfere with the process and fulfilling IMO water purity requirements to enable discharge into the sea.

Unlike SO_x emissions, NO_x emissions are not dependent on fuel quality. Instead it is the combustion process that affects the amount of NO_x emissions produced. The EGR system helps protect the engine and ensures optimal engine performance. It is also integrated with the engine (no catalysts are added), so it takes up little space onboard.

THE SOLUTION WILL MAKE its commercial debut later this year onboard a Maersk Line vessel with a two-stroke engine. Installation is scheduled for the autumn of 2012, with ship delivery in 2013. ■

Life-cycle assessment of new products is part of Alfa Laval's green agenda. The process not only reduces the company's environmental impact, but it also meets market demands and creates customer value.

Valuable assessments

ALL NEW PRODUCTS that Alfa Laval launches have one thing in common: They have the same or a lower life-cycle environmental impact than the products they replace. It's the result of working with life-cycle assessment as an integral part of the R&D process, which goes hand in hand with market expectations.

"When we look at our customers' future needs, they are pointing us in this direction," says Bjarne Sondergaard, manager for Product Centre Fluid Handling at Alfa Laval. "Most of them have internal targets of reducing their energy and water footprints and want to get the most out of their raw materials. So by following the demands we have from the market, we can actually meet the targets we have set for ourselves."

Alfa Laval uses ReCiPe methodology to make the assessments, which transforms the long list of life-cycle inventory results into a limited number of indicator scores.

SINCE STARTING WITH life cycle assessments in 2008, Alfa Laval has on average obtained a 20 percent environmental improvement of new products. The main improvements involve Alfa Laval using less material in the product design, making the products more energy efficient to operate and minimizing the need for cleaning, thereby reducing water consumption and the use of chemicals.

"In cases where our products perform the same duty with less energy, there is a clear benefit for the customer," says Sondergaard. "The same goes for the cleanability, which reduces water consumption and use of chemicals. Regarding the cut-down on material, there is also a direct value for the customers as they have to install the products, handle them and service them. The lighter they are, the easier they are to handle."

He says the product improvement possibilities vary with different product groups. For pumps and high-speed separators, for example, the main improvements concern minimizing the use of electrical power to run the products and the need for cleaning and use of chemicals, while the potential for plate heat exchangers lies mainly in reducing the amount of plate material used in the design.

CURRENTLY ALFA LAVAL launches 35 to 40 new and improved products each year, but there is always more to be done, Sondergaard explains. He uses the dairy industry as an example. "If we go back a few years, the dairy industry used five to 10 litres of water to produce one litre of milk," he says. "Now the target is to use less than a litre of water per litre of milk. We believe that in future the aim will be to use no more than 0.2 litres of water for each litre of milk. Our task is to continue improving our technology to meet such customer requirements." ■

ALFA LAVAL PRODUCTS FOR GREENER AGENDA

ALDEC G3 decanter

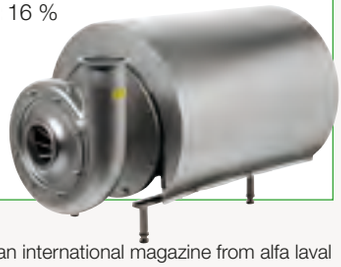
The ALDEC G3 was launched in 2010 as an alternative to ALDEC G2 range for sludge dewatering in municipal wastewater treatment plants.
Main improvement area: Reduction of energy consumption and improved capacity.
Reduction in energy footprint: 30-40 %
Capacity improvement: 10 %

CB112 brazed heat exchanger

The CB112 was launched in 2011, replacing the CB76 for applications such as HVAC or industrial heating/cooling, condensing, tap water, oil cooling, air dryer and solar heating.
Main improvement area: Less material used in the design.
Reduction in material: 30 %
Improvement in environmental impact: 28 %

LKH-85 centrifugal pump

The LKH-85 pump was launched in 2009 replacing the LKH-80 pump. The main applications for the LKH-85 are large filtration systems within the food industry.
Main improvement area: Higher efficiency and less material – the LKH-85 with a 110kW motor replaces two LKH-80 pumps with 75kW motors.
Reduction in energy footprint: 17 %
Improvement in environmental impact: 16 %



Higher and higher

SEOUL, KOREA, IS HOME to the Lotte World Tower, a 555-metre skyscraper due to be completed in 2015. It will be the third-tallest building in the world after Dubai's Burj Khalifa and the Shanghai Tower scheduled for completion in 2014. Lotte World Tower has a cone-shaped glass exterior inspired by Korean ceramics. Inside the building will be shops, offices, residences and a luxury hotel.

Eco-friendly technology and optimized energy are important goals for the Lotte Corporation. To that end the building will make use of a number of renewable technologies, including solar and geothermal power, as it aims for LEED Gold-level certification, a validation of the project's green features.

Some 2,080 solar modules will be installed on the building's glass exterior to generate electrical power. The solar modules are expected to cut back on carbon dioxide by 62 tonnes per year.

Alfa Laval is contributing to the building's energy efficiency with an innovative ice storage cooling system. The ice storage system will help the building maintain a comfortable indoor temperature year round.

Ice is accumulated, stored and thawed in a tank to be used when needed. A cooling source, usually a chiller, transfers the cold water from the ice to the building's internal cooling system through a plate heat exchanger. The ability to store ice means that a smaller chiller can be used. "As a result, the initial cost of cooling equipment can be reduced considerably," says ChangSun Han, ECF Sales Manager, Alfa Laval, Korea.

"Additionally, cooling energy can be purchased during the night or in off-peak hours." With electricity costing about 75 percent less at night, this amounts to substantial savings.

ALFA LAVAL HAS ALSO installed a heat pump system in the building to transfer geothermal energy and provide either heating or cooling, depending on the requirements. In this project, the building uses water from the Han River for the heat pump system, feeding it to the condenser for cooler temperatures in the summer and to the evaporator for warmer temperatures in the winter.

Using these geothermal and water-source heat pumps can reduce energy consumption by about 30 percent compared with existing systems. ■

TEXT: **CARI SIMMONS**

The eco-friendly Lotte World Tower is designed by Kohn Pedersen Fox Associates and Baum Architects, Engineers & Consultants Co.

Soft-hearted STEEL GIANT

In celebration of 50 years of business, Tata Steel created the Jubilee Park in the heart of Jamshedpur as a gift to its residents.

With society's overall need to become more sustainable, corporate social responsibility is an ever-stronger part of the global business landscape. India's Tata Steel has been leading the way for more than a century.

TEXT: **SIMON DE TREY-WHITE, ERIC GOURLEY**
PHOTO: **SIMON DE TREY-WHITE**

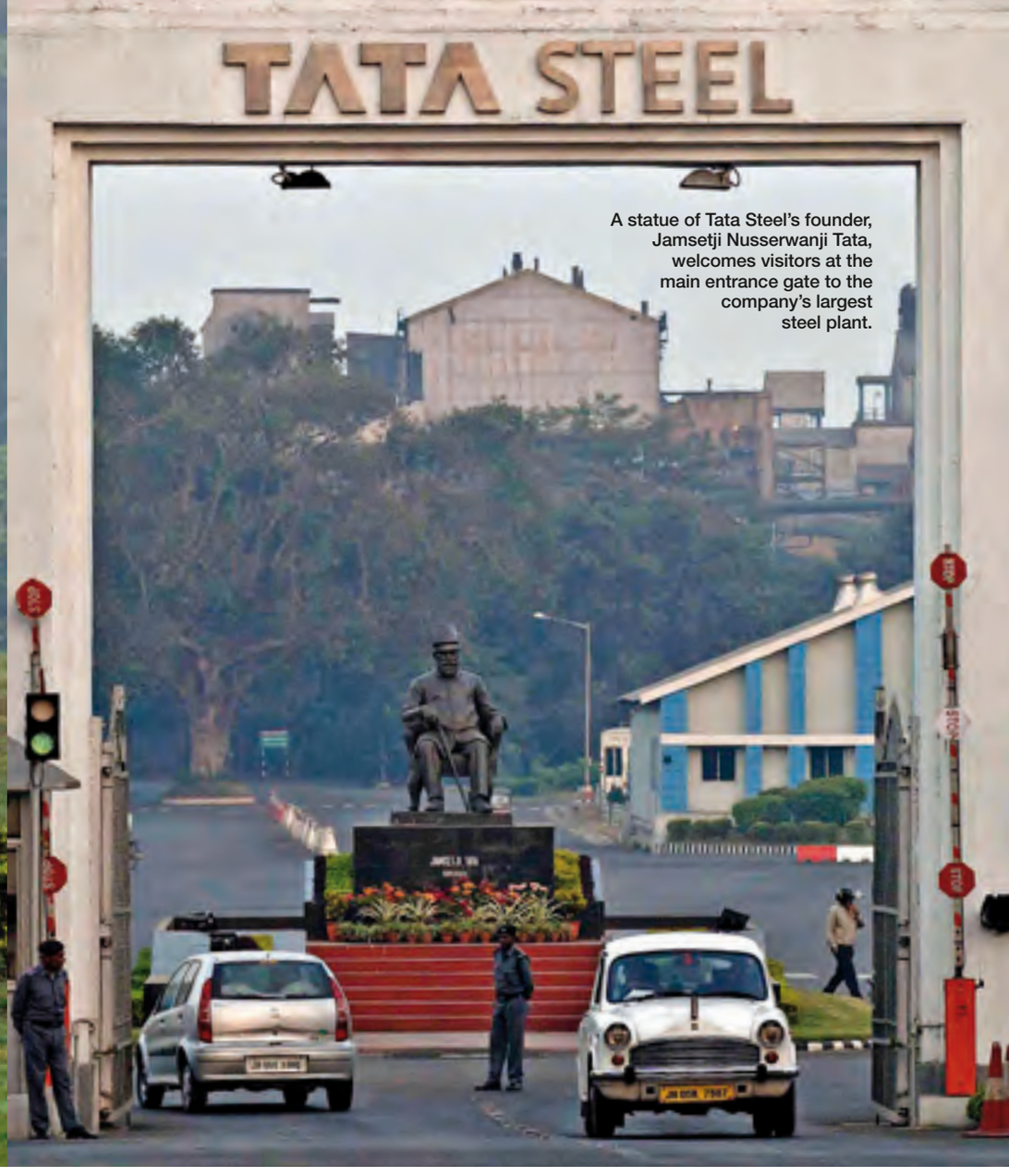
* An article about Tata Steel was also published in *here* No. 25, 2009.

CORPORATE SOCIAL responsibility, or CSR, has been a fundamental focus for Tata Steel since the company's start in 1907. A world-leading steel manufacturer and the flagship company of India's Tata Group, Tata Steel produces hot and cold rolled coils and sheets, galvanized sheets, tubes, wire rods, construction rebar and bearings at its plant outside Jamshedpur, in eastern India. Company founder Jamsetji Tata developed the city in tandem with the company as a place for the company's workers to live.

"Sustaining our communities is even more important to us today because it's part of the DNA of the company," says Biren Ramesh Bhuta, chief of Corporate Sustainability Services at Tata Steel. "Nobody knew what CSR and sustainable development were back in 1907. In many ways they're still buzzwords today, but Tata Steel and the Tata Group have been practising the concepts for more than 100 years now."

TATA EMPHASIZED employee welfare initiatives and the importance of creating a well-planned city, replete with areas earmarked for worship, sports and recreation. Though only a small fraction of the city's 1.3 million residents today are Tata Steel employees, the company still looks after the civic amenities of a major part of Jamshedpur. It remains India's only city to be managed by a private entity.

"Tata Steel provides all public services to the inhabitants – water and power distribution, roads, parks and gardens, health care and malls," Bhuta says. "All these things are managed by the corporation. It's the only place in



A statue of Tata Steel's founder, Jamsetji Nusserwanji Tata, welcomes visitors at the main entrance gate to the company's largest steel plant.

"It's incumbent on a corporation to ensure you minimize the impact of your industry and that your community benefits from your presence."

BIREN RAMESH BHUTA, TATA STEEL

the country where you can drink water straight from the tap. It's unique."

When more than 600 million people were without power during the July 2012 India blackout, Jamshedpur remained unaffected.

"We didn't even know, until we watched it on TV, that the entire north and east of India were in a blackout," Bhuta says. "Providing power, water and the other services is just part of our obligation as a company focused on sustaining its communities. It gives us a social licence to operate. Our CSR stance stems from a philosophical viewpoint that we need to do good for society.

"The community is a crucial stakeholder in our business, and we want to operate in a peaceful, congenial environment that is conducive to our growth," he continues. "We recognize that we leave a footprint on communities and on the environment. It's incumbent on us as a corporation to ensure we minimize the impact of our industry and that our community benefits from our presence."

ALFA LAVAL HAS OPERATED a local sales and service office in Jamshedpur since 1992, but its relationship with Tata Steel extends even further back. Today Alfa Laval provides tailor-made heat exchangers, centrifuges and service to Tata Steel's plant.

Alfa Laval was originally selected as the best supplier of the specialist equipment Tata Steel needed to meet its requirements, but the partnership has flourished over the years in large part due to shared values in terms of social responsibility.

"Apart from its core operations, what defines Tata Steel best is its sustainability quotient," says Amitava Bakshi, chief of Tata Steel's Procurement Division. "The company is constantly trying to align itself with the best practices in global standards. As such, Tata Steel encourages its vendors to have an equal standing in terms of employee welfare, commitment to the community, ethics and environment. Alfa Laval is one of our vendors, and Tata Steel is proud to be associated with such a committed company." ■

TATA STEEL is among the world's top 10 steelmakers, with more than 80,000 employees across five continents

Was named one of the 2012 "World's Most Ethical (WME) Companies" by Ethisphere Institute

Attained first SA8000 accreditation for improving global working conditions in 2005

Introduced the eight-hour work day in 1912 and maternity leave in 1920 – years before such concepts became law.

LOW-PRESSURE CLEANING

In July 2012 Alfdex, 50 percent owned by Alfa Laval, produced its one-millionth Alfdex oil mist separator. The separator cleans crankcase gases in heavy vehicles. Swedish truck manufacturer Scania has been using the Alfdex system in its trucks since 2005, when it first came out.

TEXT: **ÅSA LOVELL** PHOTO: **SIMON PAULIN**

FOUR QUESTIONS FOR HÅKAN PETERSEN, head of Lubrication System, Engine Development, at Scania.

How important is Alfdex to Scania?
"We were very much involved in the development of Alfdex system back in the early 2000s, working in close collaboration with engineers from Alfa Laval and Haldex, which later jointly formed the company Alfdex. Today the Alfdex oil mist separator is the most advanced technology for cleaning crankcase gases that we can offer our customers who want to comply with emission standards. Customer requirements differ depending on regulations and requirements, but on the European market Alfdex has more or less become standard equipment."

How is Alfdex better than other available solutions?
"Compared with filters, Alfdex is far superior. Filters have to be replaced and disposed of, while Alfdex lasts the lifetime of the engine without service or maintenance. With Alfdex we can also keep the crankcase pressure below the atmospheric pressure to minimize leakage and pressure inside the engine. With filter systems that are available on the market today, you always get high crankcase pressure."

In 2014 the new and tougher Euro 6 regulations will come into effect. How is Scania dealing with them?
"We have already launched our Scania Euro 6 standard, which is compliant with the new regulations, and Alfdex is part of that offering. Since Euro 6 regulates the total number of emissions from both exhaust gases and crankcase gases, we have not had to change the crankcase solution to comply with the new regulations."

When looking ahead, is the next-generation Alfdex a part of your agenda?
"Now that Scania Euro 6 is in place, we have to start working toward the next step, offering even cleaner engines and fewer emissions. Naturally, this includes reviewing our crankcase cleaning system. There are several ways to go, but the next-generation Alfdex is certainly one possibility. Even if we succeed in cleaning crankcase gases better, with a lower impact on the environment, we hope to see further improvements concerning simplicity and robustness, as Scania will grow in countries outside Europe where truck operations are tougher." ■

IMPROVED GENERATION

A new generation of Alfdex oil mist separators meets the increased demands from Euro 6 and extends beyond EPA 10. There are several improvements compared with the first generation of separators from Alfdex:

- It can handle up to three times as much blow-by gas, 50 to 600 litres a minute, depending on the version.
- The cleaned gas under normal driving conditions is close to 100 % oil-free, representing up to four times better cleaning.
- The separator is normally driven hydraulically by the engine lube oil system, but another option is an electric brushless motor with significantly lower energy consumption.

SUSTAINABILITY TO THE CORE

Reducing its own emissions and those of its customers, having zero tolerance for corruption, conducting business transparently and respecting workers' rights: Such business practices put Alfa Laval at the forefront of sustainable development. TEXT: **DAVID WILES** PHOTO: **ISTOCK PHOTO**

ALFA LAVAL HAS STRONG commitment to sustainable development both externally and internally. Through its products it helps industries improve their energy efficiency, reduce their emissions and reduce their use of natural resources, and in its own operations it works to consistently reduce its energy and chemical use and supports the rights of its workers.

Alfa Laval's business principles – Social, Business Integrity, Environment and Transparency – form the basis for its work on sustainability. First published in 2003 and presently under revision, the principles govern the company's approach to business within broader society.

"We want to be a company operating with strong ethical principles – a company where employees are proud to work and whose values extend throughout the supply chain," says David Ford, Head of Corporate Social Responsibility at Alfa Laval.

While Alfa Laval has made great strides in its sustainability efforts, Ford recognizes that it is never-ending work. "The more we work on it, the more humble we get," he says. "The more we understand, the more opportunities we find. But we know that we are making progress, not least because when I visit Alfa Laval sites around the world, colleagues come up to me and say that they have noticed a difference. For me that is just as valuable as the management metrics of tonnes of carbon dioxide per million working hours." ■

IMPROVEMENTS IN NUMBERS:

CHEMICAL USE

96%

Alfa Laval reduced its use of blacklisted chemicals (those with a high risk to health or the environment) with 96 % at its manufacturing sites from 2006 to 2011.

10 %

A change in Alfa Laval's company car policy continues to cut emissions. Average emission per car is down 10 % since 2006.

2007–2011

Energy efficiency at Alfa Laval production sites improved by more than 25 % in 2007–2011.

Alfa Laval's four business principles

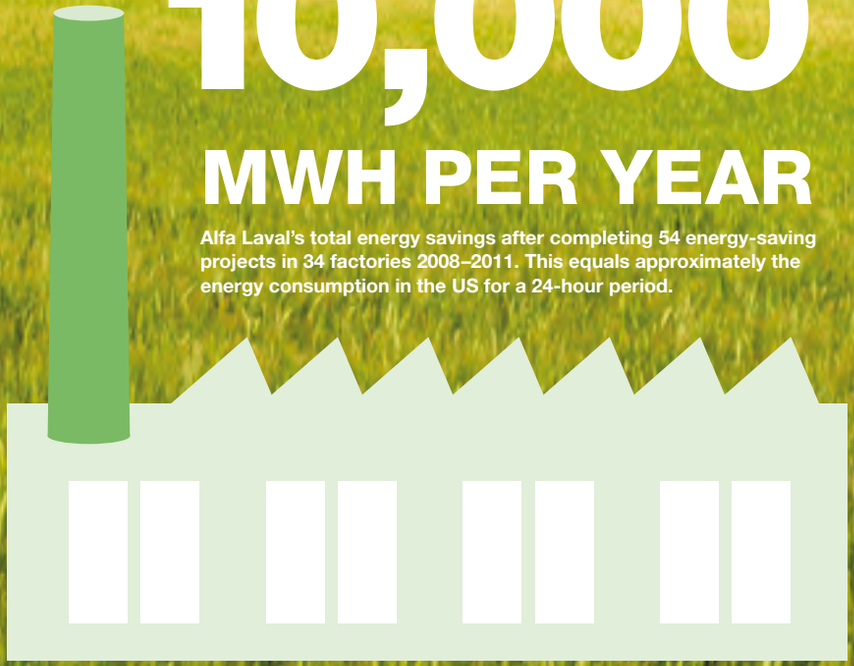
Alfa Laval´s business principles form the basis for the company's work on sustainability. They are based on the OECD's Guidelines for Multinational Enterprises, the UN Global Compactand the core International Labour Organization Conventions.

1 **SOCIAL: RESPECT FOR HUMAN RIGHTS IS FUNDAMENTAL**

2 **BUSINESS INTEGRITY: HIGH ETHICAL STANDARDS GUIDE OUR CONDUCT**

3 **TRANSPARENCY: THE COMPANY´S COMMITMENT TO OPEN DIALOGUE BUILDS TRUST**

4 **ENVIRONMENT: OPTIMIZING THE USE OF NATURAL RESOURCES IS ALFA LAVAL'S BUSINESS**

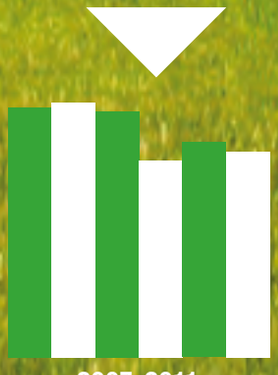


10,000

MWH PER YEAR

Alfa Laval's total energy savings after completing 54 energy-saving projects in 34 factories 2008–2011. This equals approximately the energy consumption in the US for a 24-hour period.

13 %



2007–2011

In 2011 Alfa Laval used 13 % less water in production processes in its current 34 factories (427,376 cubic metres) than it did in the 20 factories it had in 2006 (489,616 cubic metres).

Fruitful growth

By the middle of this century, the population of our planet will have increased by 50%, from more than 6 billion to nearly 10 billion people. A growing challenge is to provide nutritious food for everyone. Take India, for example – a fertile area larger than the entire Nordic region. Here, fruit and vegetables have traditionally been processed by hand. Now change is taking place on a huge scale. Modern plants are being built that will treat raw materials more efficiently. It's about heating, cooling, sterilising, extracting, transporting, separating and concentrating food products. These processes represent the very heart of Alfa Laval's know-how. Today only 2% of India's produce is treated in this way. In less than ten years, this figure will exceed 15%. Talk about growth.

ALFA LAVAL

www.alfalaval.com