

HERE



GAME CHANGER

Technology is helping the industry rewrite the rules of renewable energy

Bugs to burgers

Can insect farming close the world's growing protein gap?

Smart shipping

Marine connectivity can ease shippers' regulatory pains

For people and planet

At Alfa Laval, we are continually working to **DRIVE PROGRESS**. We do our best to anticipate the optimal path forward for our customers, our employees, and the environment.

Together, we **OPTIMIZE PROCESSES** and build seamless solutions that help our customers overcome their toughest challenges.

We work tirelessly to **MAKE THEIR SUCCESS OUR MISSION**. Working together, we can create responsible, sustainable growth that benefits both **PEOPLE AND THE PLANET**.

Making the world better, every day.



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FUTURE OUTLOOK
**THE OILFIELD
 OF THE FUTURE**

Unmanned, remote-controlled oil platforms are about to become reality, putting data at the heart of new service agreements.



HERE

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Keeping an eye on the goals

INNOVATION has been at the heart of Alfa Laval for more than a century. From Gustaf de Laval's original separator to the advanced maritime connectivity systems and heat transfer technologies of today, our products reflect this relentless drive to innovate.

One thing I've learned in my time at Alfa Laval is the vital role our customers play in pushing us to improve. You challenge us with new ideas and demands, that force us to think differently. Your curiosity fuels our curiosity; your passion fuels our passion.

Working together helps us better serve both you and the climate. Today, our businesses contribute to 15 out of 17 UN Sustainable Development Goals and service plays an increasingly important role in our offering. Nothing gives me more satisfaction than stories of how we support our customers exceed both their business and climate goals.

The stories that follow in this issue of *Here* are a testament to Alfa Laval's unique combination of service and innovation, as well as our commitment to the environment. They show how quality products supported by professional people and developed together with customers, can deliver responsible, sustainable growth.

TOM ERIXON
PRESIDENT AND CEO
ALFA LAVAL GROUP



PHOTO: JENNY LEYMAN

Alfa Laval has a unique role to play in helping our customers contribute to the realization of the UN Sustainable Development Goals (SDGs).



World leaders have pledged to reach the 17 SDGs by 2030. Doing so requires cross-sector collaboration between civil society, academia, and corporations. Alfa Laval's businesses contribute to the achievement of 15 of these SDGs. Find out how by visiting alfalaval.com/about-us/sustainability

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PHOTO: ALFA LAVAL

Alfa Laval is working with start-up Malta Inc. on an energy storage project. Adrienne Little is Malta's technical lead. Read more on page 35.

How do we grow tomatoes in the desert?

Learn more about how you can accelerate success for customers, people, and planet at alfalaval.com/careers.

Thanks to a solar-powered desalination plant from Alfa Laval, Sundrop Farms can now grow tomatoes in the hot and unforgiving climate in South Australia.

At Alfa Laval we're looking for curious minds eager to tackle some of the planet's most urgent challenges. People who thrive in a culture where they're able to make a difference. Who seek sustainable solutions that build bridges to the future. Together, we accelerate success for customers, people, and planet. Are you curious? Find out more at alfalaval.com/careers



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"I'm a firm believer in the saying that good brewers can't afford cheap equipment"
Kyle Wilson,
brewing expert

PHOTO: MARTIN ADOLFSSON

T H E R I S E

How marine connectivity

O F S M A R T

can ease shippers' regulatory burdens

S H I P P I N G

BY RICHARD ORANGE
PHOTOS ALFA LAVAL AND GETTY IMAGES



“The equipment readings are automatically checked for the location against Alfa Laval’s constantly updated regulatory cloud database.”

S

HORTLY AFTER MOORING in Taicang, a bustling port near Shanghai, a ship captain taps the Alfa Laval Touch Control panel and runs her eyes down the PureSOx Connect page. SOx from the funnel: green. PH, PAH, and turbidity: all green.

The ship is compliant with the port’s current regulations on sulphur emissions and water discharge. The equipment readings are automatically checked for the location against Alfa Laval’s constantly updated regulatory cloud database. Properly formatted compliance documents in Mandarin are ready for port officials.

When she glances at the equipment page, however, the captain notices several sprayers are coloured orange. Minutes later, there’s a call from Alfa Laval’s service division. An engineer wants to come on board. The system identified tell-tale patterns in data uploaded when she was





“Shippers’ main priority is shipping goods from A to B. They don’t want to be bothered with the operation of the scrubbers.”

Olaf Van Heerikhuizen

in Los Angeles. The parts were ordered and are now ready to fit.

In reality, marine solutions’ leader Alfa Laval’s PureSOx Connect system is not quite at this point yet. But for Olaf Van Heerikhuizen, Service Manager for Alfa Laval’s Gas Systems division, the scenario described above – or something like it – is a goal that’s well within reach.

A **S THE COSTS** of satellite links on the open sea and 4G connections near land continue to fall, ships, ship-owners, and their suppliers are investigating new ways to use constant connectivity to simplify compliance.

“The customers main priority is shipping goods from A to B. They don’t want to be bothered with the operation of the scrubbers. It’s too complicated with regards to the legislation,” Van Heerikhuizen says.

“So everything we can do to make their life easier reduces the risk of non-compliance. And that’s added value for the customer.”

Alfa Laval is currently in the early stages of launching PureSOx on eight customer vessels to check that the data sent back by the system matches actual conditions on the vessel. Starting from August 2019, the connect system is fitted as standard on all Alfa Laval scrubbers.

A looming 0.5 percent cap on sulphur in marine fuel that will be imposed worldwide from January 2020 will further complicate the intricate global patchwork of global emissions regulations, with five ‘special areas’ designated by the International →

“Everything we do to make shippers’ life easier reduces the risk of non-compliance, adding value for the customer.”

Olaf Van Heerikhuizen

Marine Organisation (IMO) and dozens of different regulatory areas in China.

Fines for being out of compliance can run into tens of thousands of euros and they are not even the biggest potential cost. When Rotterdam port officials recently caught a vessel with no scrubber and only high-sulphur fuel onboard, the vessel had to delay departure by several days, dispose of the non-compliant fuel, and bunker with compliant fuel.

“There you’re talking about serious money,” Van Heerikhuizen says. “If you look at the difference between compliant and non-compliant fuel and add in the charter rate for a vessel today, that ends up costing far more than the fine.”

Alfa Laval’s PureSOx system already collects more than 500 data points every 30 seconds (ten times the regulatory minimum), storing the data for 18 months on the Alfa Laval Remote Emission Monitor. What PureSOx Connect does is automatically load this data up to the Alfa Laval Data Cloud whenever the ship has a 4G or 3G connection, or over a more expensive satellite connection if data sharing is desired in open waters.

THE SYSTEM ALSO sends back the vessel’s location, and planned route, so that Alfa Laval can check the maximum pH and SOx allowed both where the ship is now and where it is going, and advise the crew to change settings on the scrubber to stay in compliance.

Van Heerikhuizen and the connectivity team have worked hard to present this data as simply as possible.

“If you look for example at the deterioration of the sprayer layers: it’s from

one to ten, and if you’re ten, its green and it’s really nice. And if you’re below five it turns to yellow and if you’re below three it turns to red, so you need to do something.”

Alfa Laval’s service engineers can already use the data to spot if sprayers in a scrubber are wearing down. What Van Heerikhuizen hopes is that as more operations data is collected from more customers, data analysis will allow other problems to be spotted in advance.

“If we can recognise certain patterns, we will actually be able start predicting what will happen, and we will be able to tell the customer what to do to prevent it from happening. That’s our ultimate goal,” he says.

LOOKING AHEAD, Van Heerikhuizen predicts the service division will focus less on selling spare parts and more on helping customers avoid having to buy them.

“And that’s of course a major shift because the old-fashioned way of running a service organisation is driven by selling spare parts.”

If there is an unexpected breakdown or issue, Alfa Laval’s service department will in many cases already have the data it needs to identify the problem. If the problem happens mid-ocean, the crew can switch on a satellite link so that Alfa Laval can receive data in real time.

“This will bring major added value, because we will no longer misinterpret the failure onboard the vessel and we will always be able to bring the right person with the right skills and the right spare parts.”

Since Alfa Laval supplied its first oil separator to the US Navy in 1917, the



company has built a broad marine portfolio with 17 product groups.

Today, three out of four ocean-going vessels have Alfa Laval equipment onboard, meaning SOx regulations aren’t the only compliance issue that can be made easier to manage through marine connectivity. There are also connect systems for the PureBallast ballast water treatment system, the PureBilge bilge water treatment system, and the PureNOx system.

“If we go to the next phase then we



Alfa Laval PureSOx

1. Scrubber
2. Seawater pumps

can actually link all these products together to get it all optimised,” says Van Heerikhuizen. “They’re already accessible from the cloud using the same portal, all of them. But the link between all the products is not there yet.”

When it is – and it won’t take long – that captain in Taicang will be able to look at a single screen monitoring real-time compliance across every conceivable emission.

When it’s all marked green, she’ll be good to go. ●

PureSOx statistics

- First launched in 2009
- Builds on more than 100 years of marine industry experience
- Removes more than 98% of SOx exhaust gas
- Reduces particulate matter (PM) by up to 80%
- Installed on more than 150 vessels
- Provides reliable compliance with MARPOL Annex VI

BY RICHARD ORANGE
PHOTO AKER BP

The oil field of the future

Reducing visits to unmanned oil platforms will put data at the heart of a new type of service agreement.

AT FIRST SIGHT, it is hard to recognise that it's supposed to be an offshore oil platform. A silvery, dome-shaped structure rises out of the ocean like an alien vessel from a sci-fi movie. Instead of riggers in hard hats, it's operated by executives in suits remotely from a screen.

Field of the Future is intended to provoke, says Stian Ødegaard, project manager for Unmanned Installations at Aker BP.

"It's a very futuristic vision. This was meant to get people to think differently about what an offshore platform could be, to trigger debates in the oil and gas industry, and to make us think outside of the box."

It probably won't look like a mushroom, he says. But the unmanned platform is already close to reality.

In January 2019 Aker BP transferred the control room for its Ivar Aasen platform to its offices in Trondheim, making it Norway's first remote-controlled manned offshore platform.

"We believe it's definitely possible," Ødegaard says of a truly unmanned →



A glimpse of the future?

The prospect of truly unmanned oil platforms involves not only looking at processes in a different way, but also reimagining what an oil platform might look like.





ILLUSTRATIONS: AKER BP

The mushroom, nature's "unsung hero", was an important design inspiration for Aker BP's Field of the Future concept. The result was autonomous offshore platforms combined with a land-based "digital twin" for monitoring and operations.

platform. "The question is how often are you going to need to be there."

In August last year, Aker BP signed a contract with Framo, Alfa Laval's business unit for pumps, which marked an important step on the way.

Under the 'data liberation contract', Aker BP will send data collected from pumps installed on its Ivar Aasen platform back to Framo in real time.

"We are sharing data from our ongoing operations – our assets – directly with Framo, so they can see what's going on with their pumps, and so give us a better feeling of when and where they really need to do maintenance," Ødegaard explains.

THE COMPANY'S software joint venture Cognite has been working to digitise the platform, bringing together all the data collected from pumps, flow sensors, heat and pressure sensors, maintenance records, and staff rotas, and developing algorithms to make sense of it all.

"It's collecting millions of data points every day," Ødegaard says. "What we are doing now is making this 'horizontal database', which is aggregating and taking all this data, contextualising them, and putting them into a unified state, so that you can build whatever type of application you like of top of it."

As Aker BP relies so heavily on suppliers like Framo, reducing the

"It's collecting millions of data points every day."

Stian Ødegaard

need to visit a future unmanned platform will require a new type of service agreement. Rather than being paid for carrying out maintenance and replacing parts when equipment breaks, suppliers will instead be paid a monthly fee if it doesn't.

"The whole idea is to ensure that they have the same incentive as us, which is uptime," Ødegaard says. "We need to revisit how we plan maintenance in totality."

Aker BP hopes that Framo will use cutting-edge 'big data' analysis to develop predictive tools that can indicate when repairs or maintenance are likely to be needed.

"Now we have regular maintenance intervals based on estimates and best practice, but it's not necessarily when we need to do something with the pumps," Ødegaard explains.

IF OTHER COMPANIES follow Aker BP's lead and share data with suppliers, companies like Framo will gain ever more detailed insights into their equipment. "It's maybe not the pump itself that goes down; it's maybe some

little electrical component that is the issue. But since you previously had someone there [on the platform] all the time, you could always go by and fix it. It doesn't necessarily mean that the pumps need to be changed," he says.

By helping its suppliers identify and eliminate such common faults, Aker BP hopes they will soon be able to sign contracts guaranteeing maintenance-free uptime.

"The question is, what type of artificial intelligence, predictive maintenance or analytics will you need to have to truly give you the comfort that you could say to me, 'yes, it can stand there for three years. I will monitor it and I will tell you when it needs something, but I can guarantee that it won't be more than every second year.'"

For now, the data sharing deal is exploratory, a first step on the way toward a new kind of contract. Framo and Aker BP have yet to thrash out what sort of performance indicators they will measure and what Framo would be liable for. But Ødegaard believes that when the new type of data-driven contract is finalised, it could bring big changes.

"What if all the owners of Framo's pumps were sending the same data back? They would not only have data from 15 pumps, but from hundreds of thousands. I think it will completely change the industry." ●

“I LOVE PROJECTS LIKE THIS”

“It really is about changing the world,” says **EMMA KARLSSON LINDBO**. “It’s as simple as that. Who wouldn’t want to change the world for the better? That would be a strange thing to not want to achieve.”

BY **DAVID LANDES** PHOTO **PETER WESTRUP**



BACK AT **ALFA LAVAL** after a four-year break, Emma Karlsson Lindbo now manages the company’s partnership with Malta Inc., a startup with a ground-breaking energy storage solution featuring Alfa Laval heat transfer technology.

“The world’s biggest challenge is climate change and greenhouse gases. It’s so rewarding to be involved with a project that could go part of the way to solving that problem,” she says.

“I love projects like this. They allow me to see the broader picture. That’s what drives me. I love trying to understand how things link together technically and commercially. And ideally, how they also connect to society.”

Emma also believes Alfa Laval’s way of working is moving in the right direction.

“The Malta project is driving us to work in a different, more flexible way. There are no obvious solutions to some of the challenges we’re facing making heat exchangers work with Malta’s tech. So, we have to be agile and iterative.”

She sees her work with Malta as the extension of a thread of innovation that’s been woven into the fabric of Alfa Laval’s corporate culture since its founding in 1883.

“The whole company sprung from one innovation from Gustaf de Laval: the separation of milk and cream.”

“Innovation has been in the company DNA ever since. But there’s been a change recently to broaden that in terms of business models. This fresh approach has the potential to make Alfa Laval even stronger.” ●

Read more about Malta Inc. on page 35.

EMMA KARLSSON LINDBO

Title: Technology Development Manager – Corporate Development

Location: Stockholm/Lund, Sweden

Tenure: 11 years with a four-year break

Background: Masters in chemical engineering and an MBA

Insect farming

From bugs to burgers

WITH GLOBAL DEMAND FOR PROTEIN ON THE RISE, INDUSTRIAL-SCALE INSECT FARMING COULD PLAY A CRITICAL ROLE IN HELPING CLOSE THE LOOMING PROTEIN GAP.

BY PAUL CONNOLLY
PHOTOS GETTY IMAGES

THE HUMAN POPULATION and meat consumption is growing at an unprecedented rate, while the available land for food production is shrinking. An estimated 85 percent of the Earth's potential agricultural ground is already secured for food production, but by 2050 humans are expected to number more than 9 billion, requiring a 50-percent increase in the delivery of high-quality protein. It doesn't take a mathematician to see those numbers don't add up in favour of the human race.

Current approaches to food production are simply inadequate to close this growing protein gap.

Two-thirds of all vegetable proteins farmed today are consumed by industrial-scale farming of livestock. Yet, meat production is inefficient – it requires on average four kilogrammes

of plant proteins to produce one kilogramme of meat protein.

And the massive amounts of soy and fishmeal required for animal feed are driving deforestation and the depletion of wild fish stocks.

The current arrangement is unsustainable. So, how do we feed the world in the years to come?

One possible solution that is creating a buzz is insects.

While many in the West may associate eating insects with scenes from the classic 1970s film *Papillon*, featuring Steve McQueen and Dustin Hoffman eating bugs to survive in prison, insects are already a protein source for feeding poultry and fish, and are considered delicacies in some parts of Africa and Asia.

However, insect farming is a relatively new idea and until recently most efforts were experimental and small-scale. →



“They extract and recombine the proteins from the food waste, and we reintroduce those proteins into the food life cycle as animal feed and fertilizer for crops.”

Andreas Aepli

This changed in 2017, with the establishment of Bühler Insect Technology Solutions (BITS), a joint venture between food technology specialist, Bühler, and leading insect processor Protix.

COMBINING PROTIX'S expertise in insect rearing with Bühler's experience in food and feed processing technology the goal is to develop insect rearing and feedstock processing on an industrial scale.

At the time Bühler was also looking for new partners to help scale up its operations, specifically through the provision of heat transfer and fluid separation technologies.

Alfa Laval had previously supplied Protix with processing technology and was also looking for ways to strengthen its offering in the growing market for insect processing.

According to BITS CEO Andreas Aepli, Alfa Laval is a clear leader in these technologies, but the decision to work together ultimately emerged from a common understanding.

“I think we saw immediately from the first day of working with them that we had a similar mindset. Both of our companies focus on long-term quality leadership and enjoy a similar reputation in the market, but we don't overlap on technology competence and thus complement each other's strengths,” says Aepli.

Sumit Pingle, Alfa Laval's Vice President Agro & Protein Systems, agrees.

“Basically, we had the same ambition,” he explains.

“The way we work and the way they work, we clicked very quickly: our team and their team, Andreas and myself. There was chemistry which made sense.”

Currently, the black soldier fly larvae is BITS' insect of choice, due to its hardiness and quick growth cycle (6–10 days before it is ready for harvest). Other alternatives being explored include mealworms, crickets, locusts, and the tsetse fly.

It's been clear to BITS from the start of their venture that the big wins for food security and the environment aren't in changing what people eat; it's in changing what animals eat – and that insects have a role to play.

“Some people are interested in insects as human food,” explains Aepli. “I think there is a business and that business will grow; however, the volumes are still too small to make a real impact on our food system.”

So, don't expect any BITS-brand bug burgers on supermarket shelves anytime soon.

Rather, the primary focus is on producing animal feed derived from insect farming, which is much more sustainable and efficient.

Generating one kilogramme of insect-based protein only requires two kilogramms of feed, while proteins made from cattle require 20kg of feed for the same result.

AND PRODUCING THAT kilogramme of insect-based protein requires a lot less space: only one square meter of non-farming land. So rather than devoting large fields to growing soybeans for animal feed, all you need is an area smaller than a parking spot. Thus industrial scale insect production also has the potential to free up vast areas of land currently set aside to grow crops for animal feed.

What's more, insects convert food waste into useable protein, creating a more sustainable food production cycle. Currently, 1.3 billion tonnes of food is wasted every year from agriculture through food production to retail and the consumer. But insects can convert this waste into a resource. Rather than throwing →

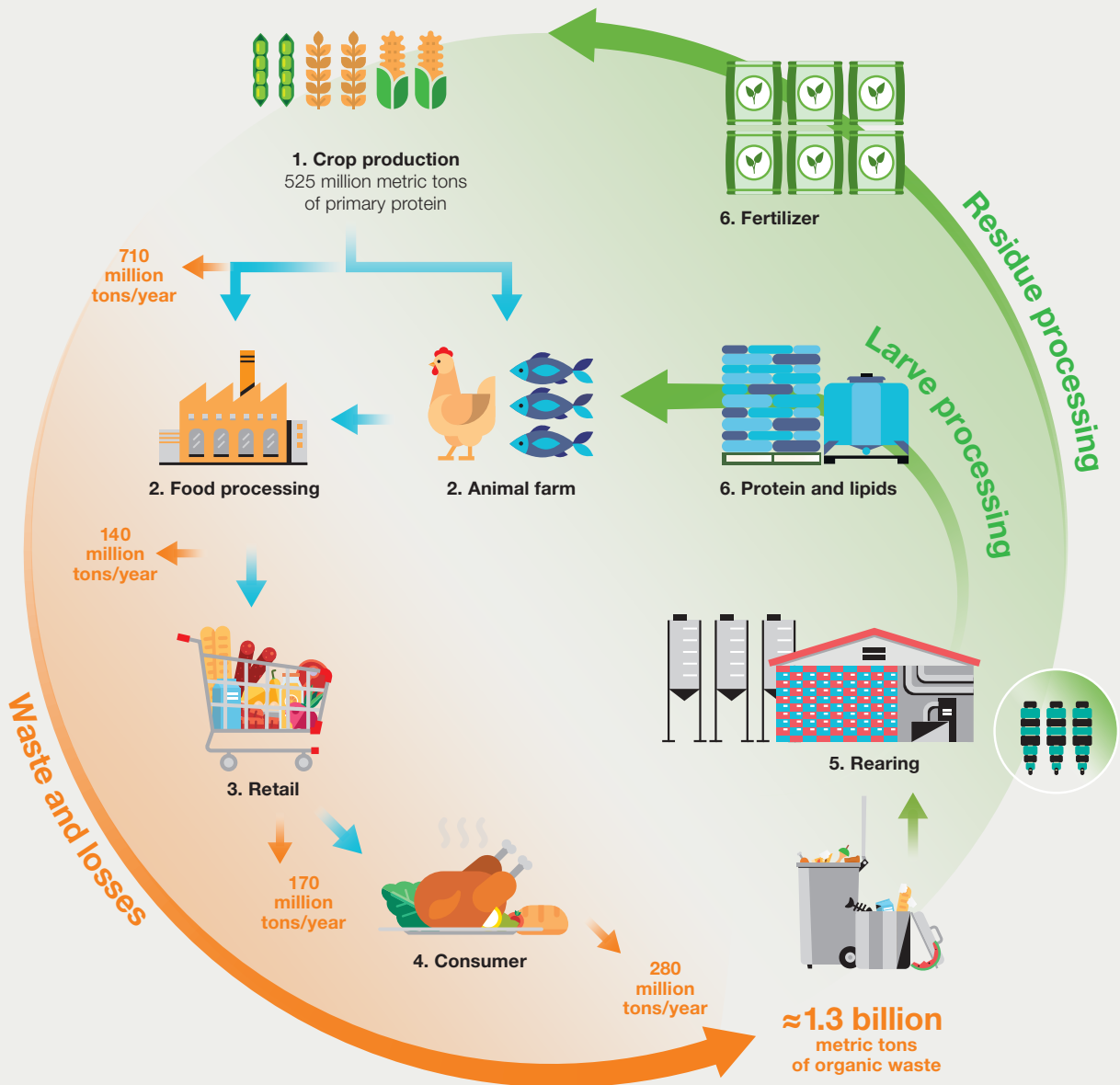
Black soldier fly

Known for its fast growth cycle and high-capacity for breaking down organic matter, the larvae of the black soldier fly (pictured) is currently the insect of choice for BITS' insect protein processing efforts.

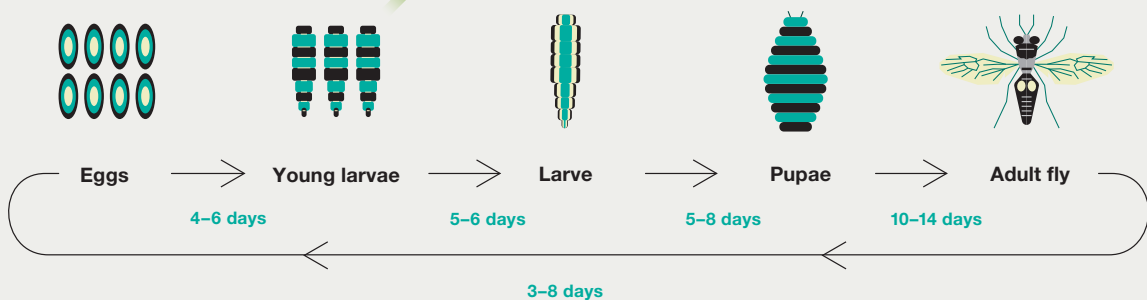


Insects and the circular economy

Insect farming contributes to the circular economy by converting food waste into a protein source for animal feed and fertilizer for crops.



Black soldier fly lifecycle





away or burning food waste, insects use it as a food source, recovering up to 70 percent of proteins.

“Insects basically upcycle that food,” explains Aepli. “They extract and recombine the proteins from the food waste, and we reintroduce those proteins into the food life cycle as animal feed or fertilizer for crops.”

BITS’ move to industrial insect processing has come with challenges. Standardisation is critical to consistent quality. Safe and efficient insect farming requires careful climate control and biologically secure environments – not easy to achieve at scale.

And, as Aepli points out, the different areas of production require different skillsets.

“They can’t usually be solved by a single partner or a single company by themselves. That’s one of the keys of the partnership between Bühler

Bug bites Insects have long been considered delicacies in parts of Asia and Africa. In recent years a number of restaurants in Europe have begun serving plates of insects to diners.

“Most people are interested in insects as human food. I think that’s a business and that business will grow, however the volumes are still too small.”

Andreas Aepli

and Alfa Laval because Alfa Laval has experience in parts of the process where we are not the experts,” he explains.

“To have somebody who’s truly proficient in that area helps us to make the solution better.”

The combination appears to be working; the first customer plant has been successfully operating since June in the Netherlands, and several more are under way.

BITS have also been working with Pingle’s team at Alfa Laval on tailored solutions for their customers, with further plant projects currently being engineered.

The prospects look good for this dynamic and innovative collaboration. It represents a quantum leap in insect processing that will have dramatic implications for both food security and the planet. ●

NEW ENERGY SAVINGS

Dimpled stainless-steel boosts flexibility in heat exchanger design.

IN DECEMBER 2018, Alfa Laval acquired a ground-breaking gas-to-liquid heat exchange technology featuring a revolutionary asymmetric “dimple” plate design. The new design is particularly well-suited for high-temperature gas applications like combined heat and power (CHP) systems and compressed air systems.

The new gas-to-liquid heat exchangers feature dimpled stainless-steel plates sealed with copper brazing and can withstand temperatures up to 1,400°C.

Dimpled heat exchange systems are 75 percent smaller and require up to 30 percent less energy than traditional systems. The technology also opens up completely new ways to reduce CO₂ emissions.



The new gas-to-liquid heat exchangers feature dimpled stainless-steel plates sealed with copper brazing and can withstand temperatures up to 1,400°C.

The new sulphur emission standards:

“It’s important to do your homework”

Alfa Laval’s marine fuels expert **DR. MARKUS HOFFMANN** explains what the new IMO sulfur emissions regulations mean for the marine industry.

BY **DAVID LANDES**
PHOTO **JOHAN KNOBE**

B

eing a member of the CIMAC working groups for fuels and lubricants, as well as a member of the ISO working group developing the ISO 8217 marine fuel standard, Dr. Hoffman is in a better position than most to answer questions about the new fuel standards and their impact on the marine industry.

Why is the marine industry so nervous about January 1, 2020?

– That’s the day that the global allowed maximum sulphur emissions for the marine industry will drop from 3.50 percent to 0.50 percent. This is a massive change for both refineries supplying the fuel and ship operators from one day to the next.





Asphaltenes explained:

Asphaltenes are molecular substances found in fuel oil made up of carbon, hydrogen, sulfur, nitrogen, and oxygen which often also include trace amounts of nickel, iron, or vanadium. Blending with paraffinic fuels can lead to the precipitation of asphaltenes, causing the formation of sludge and impacting fuel combustion.

MARKUS HOFFMANN

Title: Global Application Manager, Marine Fuel and Lube Treatment

Tenure: 18 months

Location: Tumba, Sweden

Background: >10 years of experience in the oil industry

Education: Ph.D. in Organic Chemistry from the University of Oxford

“This is a massive change for the industry from one day to the next.”

Markus Hoffmann

What are shipping companies most worried about?

– The new fuels aren’t officially available yet, so people don’t really know about their properties, which is causing a lot of concern about supply availability, pricing and handling with respect to compatibility and stability.

Why can compatibility be a problem?

– If you mix incompatible fuels, there is a big risk that asphaltenes can precipitate out, and these can then block your fuel line and cause engine blackout.

What other concerns does the industry have?

– Another issue relates to the viscosities and densities of these new fuels. Today we all use a relatively similar high-viscosity fuel. But starting in 2020, there will be a much wider range of fuels with different viscosities and densities. That change in properties will be more difficult to handle by the crew and will require a much more adaptive fuel line.

Is the industry ready?

– I think only very few are ready and many still hope to get some extra time, but the implementation of these new rules is going to happen as scheduled, so people have to think about how to handle these new fuels. That being said, I believe that we at Alfa Laval are ready for 2020 and equipped to help our customers meet those challenges.

What’s your advice to companies working to prepare for the transition?

– First, do your homework and test the new fuels as soon as possible. Plan enough time for tank cleaning and make sure you’re compliant before the end of 2019. Second, make sure your onboard equipment is able to handle the new range of fuel properties. Talk to our experts from Alfa Laval and get advice on operating separators, filters, boosters, and boilers post-2020. ●

THINKING DIFFERENT WITH THINKTOP

Meet Alfa Laval's next-generation valve control unit.

FOUR AND HALF seconds. It's enough time to make a big difference in water and chemical consumption for food and beverage producers.

A typical dairy or brewery houses hundreds of valve control units. And Alfa Laval's new ThinkTop cuts valve cleaning time from five seconds to half a second, reducing water consumption by up to 90 percent.

So imagine the impact if every valve in every brewery or dairy drastically reduced their use of water and chemicals. Not only would it save money, it also makes it easier for Alfa Laval customers in the food, beverage, and pharmaceutical industries to meet their own sustainability targets. Something to think about, indeed.

ThinkTop has a 360-degree status indicator.





Extending the greatness of grapes

BY **DAVID LANDES**
PHOTOS **GETTY IMAGES**

Wine may be the most famous product of Italy's sprawling vineyards, but the country is also a major producer of grapeseed oil, thanks largely to the Tampieri family, which has been producing this versatile extract for 90 years. →



Health in a bottle

Grapeseed oil has high levels of vitamin E and antioxidants and can be used as an alternative to olive oil. It's also a common additive in soaps and cosmetics.

RICH IN OLEIC and linoleic acids, as well as omega-6 fatty acids, grapeseed oil also has a high antioxidant content, containing higher levels of Vitamin E than olive oil. Grapeseed oil also helps control skin moisture and can aid in healing, making it a common additive in soaps and cosmetics.

Tampieri has been producing grapeseed oil since 1928 when Alfredo Tampieri began experimenting with extracting oil from grape seeds found among the waste products from nearby winemakers.

Today, Tampieri is considered a world leader in grapeseed oil production, churning out 10,000 tons every year. But grapeseed oil is only one of a wide range of products in Tampieri's vegetable oil product line, which now produces more than 250 million litres of oil annually.



Alfa Laval's deodorization columns have helped improve product quality and reduce energy use at Tampieri's production facility.

While Alfa Laval equipment has been present in Tampieri's flagship plant in Faenza for more than a decade, the relationship deepened in 2016 when Tampieri turned to Alfa Laval to supply a deodorization column when retrofitting one of its production, which has since helped boost the facility's production efficiency.

Deodorization plays a vital role in processing edible oils by removing odours, pigments and other substances to ensure a clean and odour-free product. Increasing the efficiency of the deodorization process not only results in a higher-quality product, but also brings about substantial energy savings.

Having now established itself as a partner in enhancing Tampieri's energy efficiency, Alfa Laval looks forward to contributing to family business's sustainability for at least the next 90 years. ●

WINNING THE BLUE SKY WAR

Trucks featuring a new twist on de Laval's original separator
can help China win its fight against air pollution.

BY **DAVID LANDES**
PHOTO **DUKAI**



M

MORE THAN a century after Gustaf de Laval's famed milk separator revolutionized the dairy industry in the 1880s, a new application of the same technology is playing a key role in China's efforts to meet ambitious climate targets.

Originally used to separate milk from cream, de Laval's centrifugal separation technology has stood the test of time, proving effective in a number of other applications such as brewing, microbiology, and water treatment.

The technology is now also found in millions of diesel engines, thanks to Alfdex crankcase separators, considered the industry standard for helping reduce harmful emissions from heavy trucks.

Founded in 2002 as a joint venture between Alfa Laval and Haldex, Alfdex is now co-owned in partnership with Concentric, which took over Haldex's share of Alfdex when it was spun off from Haldex in 2011.

Alfdex crankcases' rotating conical disc stacks separate oil and soot from dirty crankcase gases, helping optimise performance while also preventing dirty gases with harmful particles from being emitted into the atmosphere.

And reducing the amount of dirty



gases in the atmosphere has become a top priority in China, which is both the world's largest market for heavy trucks, and the planet's largest emitter of greenhouse gases, accounting for nearly 30 percent of global carbon emissions.

The country's air quality – especially in dense urban areas – has suffered, so in July 2018 the government launched a new three-year action

War on Pollution

Residents in China's large cities have taken various measures to minimise their exposure to harmful particles in the air they breathe. Now the government has also stepped in with a new three-year action plan for tackling the country's emissions problem.



PHOTO: TAO ZHANG/GETTY IMAGES

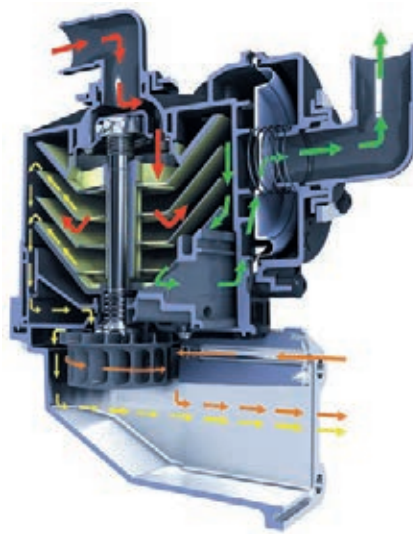
China is the world's largest market for heavy trucks, and also emits the most greenhouse gases.

plan for “Winning the Blue Sky War” by tackling the country’s emissions problem and improving air quality.

Reducing emissions from diesel-fuelled heavy trucks is one of many measures spelled out in the action plan, which aims to cut harmful sulphur and nitrogen emissions by at least 15 percent from 2015 levels. New regulations that take effect on July 1, 2019 are expected to result in the

Centrifugal separation

The centrifugal separator was the technology on which Alfa Laval was originally founded in 1883. After first revolutionizing the dairy industry by separating cream from milk, the technology was introduced to the marine industry in 1917 to separate oil from water. By 1945, centrifugal separators were used in dozens of industries and in scientific research. Since then, Alfa Laval separator technology have been developed even further to separate particles and liquid droplets from gas and can now be found in millions of diesel truck engines around the world. And now the technology is set to play an important role in fighting air pollution China.



replacement of roughly one million heavy trucks that fail to comply with the higher standards.

While some trucks with Alfdex separators can already be found on China’s roads, that number is expected to increase rapidly to meet a growing demand for cleaner diesel engines. And doing so will put de Laval’s original innovation on the frontline of China’s blue sky war. ●

“It’s been a super exciting ride”

A chemical engineer with an interest in marketing, **TOM MANELIUS** arrived at Alfa Laval more than 20 years ago after applying for what he calls “the perfect job”.

BY **DAVID LANDES**
PHOTO **JOHAN KNOBE**

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FOR THE PAST two years, Tom Manelius has played a leading role in Alfa Laval’s digitalization drive, spearheading the development of *Explore*, a new online tool that makes it easier for customers to determine if centrifugal separators are right for them.

“I love finding and designing new business areas,” he explains. “It really makes me happy to get requests about new processes and co-develop solutions with customers.”

When potential customers visit the *Explore* website, they can enter data related to a particular process and receive expert guidance from Alfa Laval about how to carry tests to get separability data. Putting previously internal processes online allows potential customers to connect with Alfa Laval on their own terms whenever and wherever they want.

“*Explore* is a big step that positions us differently, by allowing us to invite the customer into the decision-making process and empowering them to do more,” he explains.

The breakthrough moment that led to *Explore* came in early 2017 when Tom came across passages in a business book about “long-tail” business

TOM MANELIUS

Title: Business Development Manager, Energy Separation

Location: Lund, Sweden

Tenure: 20+ years

Background: process engineer, process safety with an interest in marketing, MSc in chemical engineering, and has experience in oil and gas industry

strategies, which involve using new distribution channels like the internet to sell low volumes of scarce items to more customers.

Tom saw a connection to ongoing digitalization discussions at Alfa Laval which also focused on using digital tools to engage with customers in new ways and make the sales process more efficient.

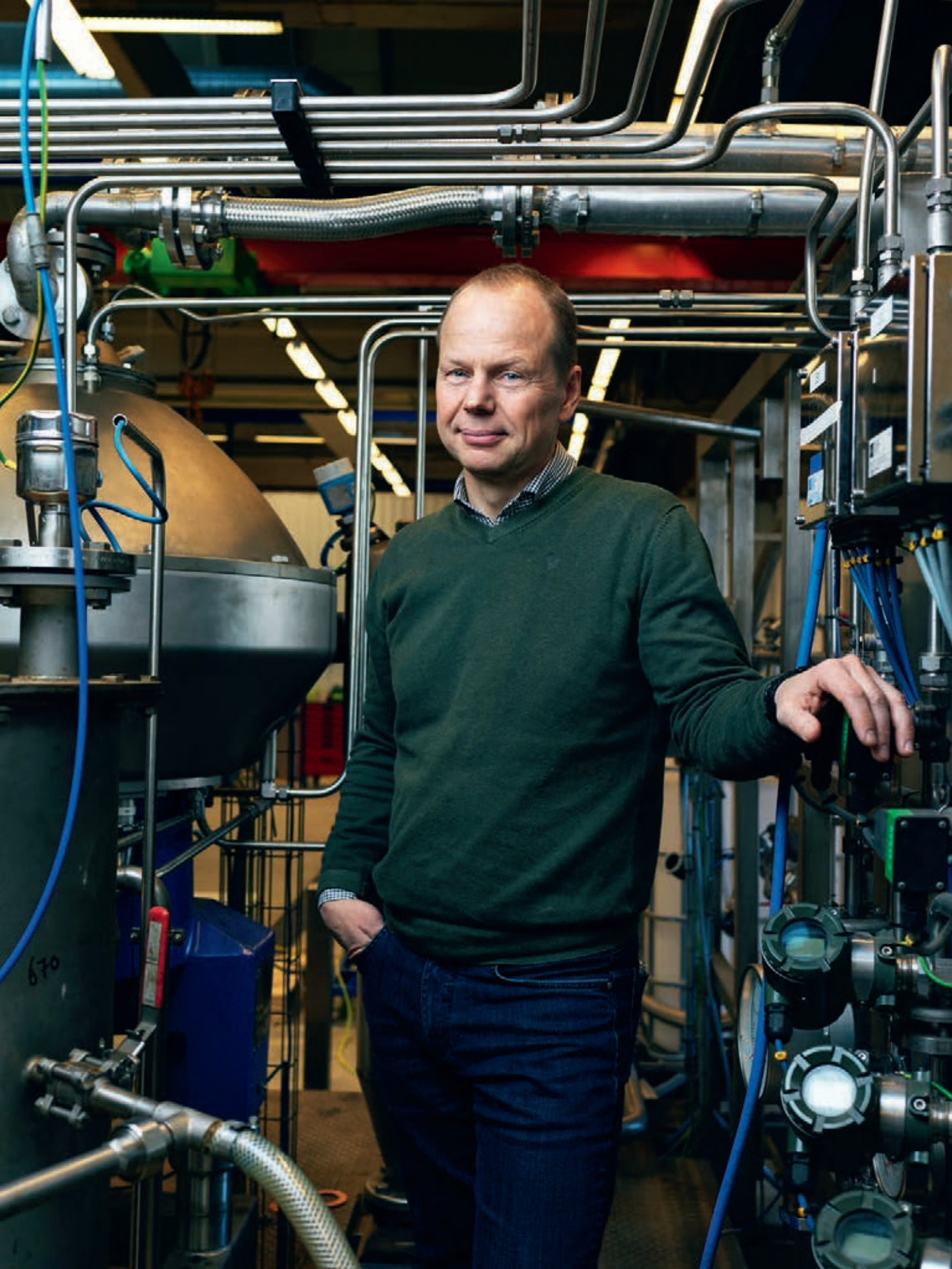
“Digitalization and involving the customers more makes it easy to manage a long-tail business,” he explains. “That was the mental shift: being more transparent toward the customer about what we do and how they can do the same work together with us.”

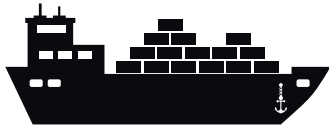
Developing *Explore* has embodied what Tom has enjoyed most about working at Alfa Laval.

“It’s been a super exciting ride. I feel really fortunate to have first promoted the idea and then been a part of the actual development and launch,” he explains.

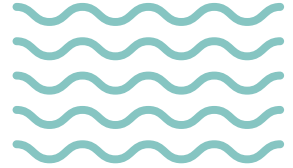
“Now I get to implement *Explore* into our business. It’s pretty special to have been along for the entire journey.” ●

See the digital Explore tool for yourself by visiting explore.alfalaval.com





“With a remarkable can-do attitude, Alfa Laval is well-positioned for the upcoming trends.”
Frost & Sullivan



Industry recognition

Star treatment

Alfa Laval wins ‘2019 Global Company of the Year’ award for its ballast water treatment.

BY **DAVID LANDES**
ILLUSTRATION **KJELL THORSSON**

ALFA LAVAL HAS BEEN named 2019 Global Company of the Year in the ballast water treatment system (BWTS) market.

Awarded annually by the Frost & Sullivan consultancy, the award recognizes “companies that are true industry leaders, delivering best practices in growth, innovation, and leadership”.

The consultancy cited Alfa Laval’s long experience as a leading marine supplier, and in particular PureBallast, the world’s first commercially available chemical-free ballast water treatment system, developed jointly by Alfa Laval and Wallenius Water and based on Wallenius Water technology.

“Through exceptional product quality and commitment to innovation, Alfa Laval

exceeds [industry and customer] challenges while creating best-in-class customer value,” Frost & Sullivan writes.

Ships’ release of untreated ballast water poses a significant challenge, prompting new regulations that have pushed ship owners and operators to update their ballast water treatment systems.

First introduced in 2006, PureBallast is now in its third generation, maintaining full compliance with USCG and IMO requirements to prevent ships’ ballast water from transporting organisms that can threaten marine ecosystems.

In addition to recognizing Alfa Laval’s market leading product, Frost & Sullivan also praised the company for its ability to anticipate industry trends and continually meet customers’ needs. ●



THE NEW POWER COUPLE

A revolutionary new energy storage solution could solve one of the biggest challenges facing renewable energy. Alfa Laval is supplying technology and acting as an investor, demonstrating a new, more flexible approach to staying at the cutting edge.

BY **PAUL CONNOLLY**
PHOTOS **MALTA INC** AND **DAMIEN MALONEY**

“The analogy I like to use is that the Malta system is like a giant refrigerator.”

Adrienne Little

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THE ANNOUNCEMENT late last year of a \$26 million, Series A funding round for new start-up Malta Inc. garnered plenty of attention for a number of reasons.

The first was the start-up’s background, a two-year incubation at X (formerly Google X), Alphabet’s mysterious Moonshot Factory, from which the company was spun out and independently incorporated.

The second headline-grabbing factor was the profile of the investors: the funding round was led by Breakthrough Energy Ventures, a \$1 billion fund led by Bill Gates and supported by the likes of Jeff Bezos, Michael Bloomberg, Jack Ma, and Richard Branson. →



Adrienne Little
(pictured right)
is Malta's Heat
Exchanger
Technical Lead.



FINALLY, MALTA INC. is being watched carefully for its tech, which has the potential to revolutionize the future of grid-scale energy storage. The system can draw electricity from the grid in times of plenty and store it for hours or days, waiting until a time of high demand before releasing the power back to the grid.

This could solve numerous challenges to the mainstream adoption of renewable energy, including intermittency and the cost of investment in transmission and distribution infrastructure. “In a sense, this is a puzzle piece that can fit anywhere,” says Adrienne Little, thermodynamics specialist and Malta’s heat exchanger technical lead.

A vital ingredient of that puzzle piece is heat transfer technology supplied by Alfa Laval.

As both an investor and a partner in the project, Alfa Laval lends more than expertise and financial backing. “It was really important for us,” says Malta CEO Ramya Swaminathan, “to identify the partner, the investor, the party that carries the credibility in the market, so that people outside – customers – would look at the product and say, ‘Oh, your heat exchanger’s going to be Alfa Laval? We feel better already.’”

WITH RAPID HUMAN population growth, ongoing industrialization in some of the most populous regions of the world, increasing urbanization and growing demand from new technologies and industries – such as block-chain and electric cars – energy supply is one of the most pressing problems of the 21st century.

Fossil-based energy production will not satisfy energy needs, nor are these methods sustainable. Regardless of political or environmental ideology, renewable energy will play a major role in the future energy mix.

As Swaminathan says, “For the first time ever, renewables are cheaper than fossil-intensive electricity sources, so it doesn’t really matter if one believes in climate change or sustainability. The economics of (electricity) generation are driving increased renewable penetration.”

With that penetration, though, new challenges arise. Wind and solar energy, for example, can’t fully replace traditional →



PHOTO: DAMIEN MALONEY



“Our strength is building the bridge from idea to proven concept. We’ve gotten good at pushing forward things people think are crazy to the point of feasible product prototype.”

Astro Teller describes X in 2016

Astro Teller, the “Captain of Moonshots” at Alphabet’s X idea factory.

Read more on:
x.company/news-from-x

“You really just can’t find a better party than Alfa Laval.”

Ramya Swaminathan

energy sources, because they don’t produce power when the sun isn’t shining or the air is still.

The solution to this problem of intermittency is energy storage, lots of it. To fully replace carbon-based fuels, we need the capacity to store large amounts of energy to cover the periods in which wind or solar power are not available.

The best answer so far has been lithium-ion batteries. However, these are made from materials that are in short supply, and which over time will become as difficult to find as the fossil fuels they are helping to replace. The rarity of these materials makes the batteries expensive, limiting their viability as a global solution. In addition, lithium-ion batteries must be disposed of carefully and, as of now, the challenge of large-scale battery recycling remains unsolved.

Another problem is found in current grid architecture. Typically, fossil-heavy generation is located near major loads, but the engagement of renewable generation has seen energy coming online in an intermittent way, far away from load. This makes transmission and distribution of energy to high-consuming sites costly and difficult.

IN 2017, **STANFORD** Professor and Nobel laureate, Robert Laughlin, published a paper confirming an idea he originally posited in 2012: that electricity could be stored as thermal energy and dispatched to the grid as needed.

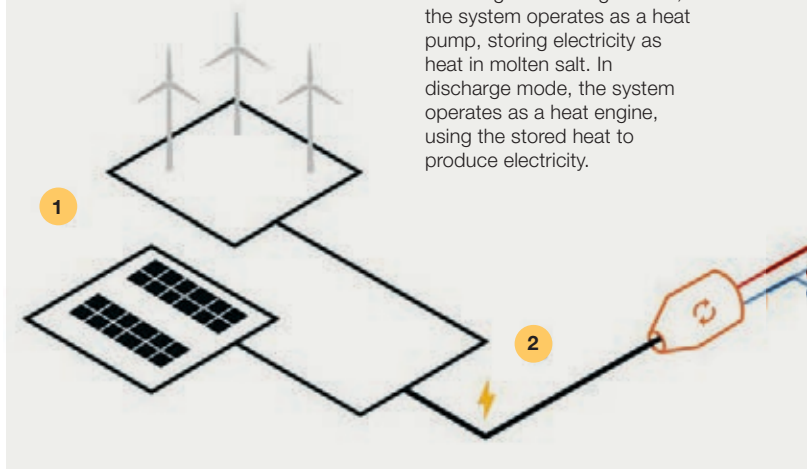
“The analogy I like to use is that the Malta system is like a giant refrigerator,” says Little, “because what does a fridge do? It uses electricity to makes the inside of a fridge cold while it makes the back of the fridge hot.”

Malta’s system does a very similar thing: it uses electricity from the grid to produce hot and cold. A heat pump extracts heat from an anti-freeze-like solution, dropping its temperature to -65°C . At the same time, heat is added to the molten salt, heating it to 565°C .

The hot and cold are stored at these temperatures until the grid calls for electricity again. At such time the temperature difference is converted back to electrical energy with a heat engine, similar in function to a steam turbine power plant.

HOW DOES THE MALTA SYSTEM WORK?

The Malta energy storage system takes electricity, converts and stores that electricity as heat, and then converts it back to electricity to be redistributed on the electric grid. In charge mode, the system operates as a heat pump, storing electricity as heat in molten salt. In discharge mode, the system operates as a heat engine, using the stored heat to produce electricity.



Ramya Swaminathan, Malta’s CEO, has a strong drive to influence the world for the better.

Adrienne Little hopes to solve challenges to the mainstream adoption of renewable energy.

1. Collects

Energy is gathered from wind, solar, or fossil generators on the grid as electrical energy and sent to Malta's energy storage system.

2. Converts

The electricity drives a heat pump, which converts electrical energy into thermal energy by creating a temperature difference.

3. Stores

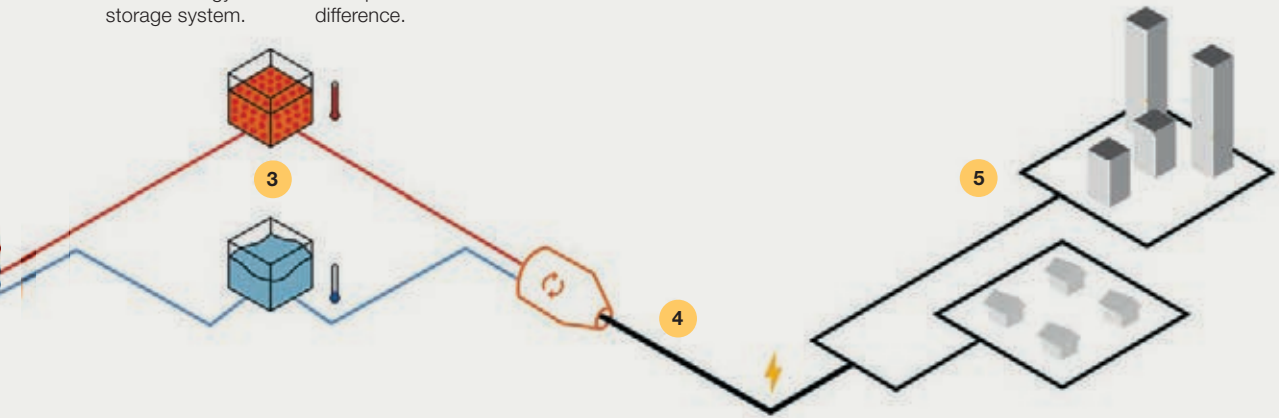
The heat is then stored in molten salt, while the cold is stored in a chilled liquid.

4. Reconverts

The temperature difference is converted back to electrical energy with a heat engine.

5. Distributes

Electricity is sent back to the grid when it is needed.



Using heat pumps is not as efficient as lithium-ion batteries – a bit more than half of the energy fed into Malta's system is recovered – but this is offset by significant economic benefits.

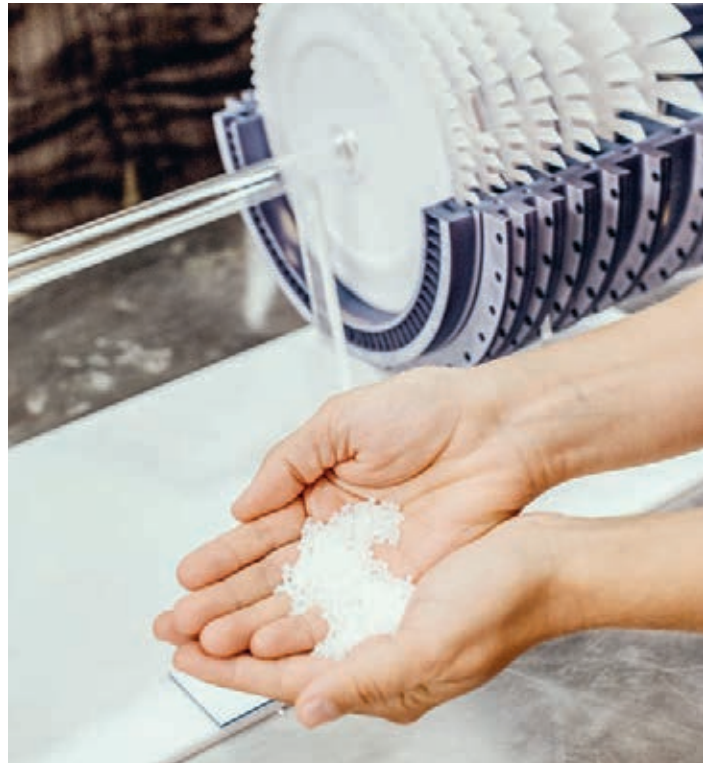
BECAUSE THE MALTA system uses fundamentally low-cost materials like salt, steel, and air, the cost of the physical system is low enough to make it a compelling solution for the most critical large-scale energy storage needs. By Laughlin's calculations a heat pump system could cost as little as \$12.70 per kWh. Malta's aim is to make that price even lower.

And, unlike alternative storage solutions like hydroelectric pumped storage (requiring large elevation changes) or compressed air energy storage (requiring caves), Malta plants can be installed almost anywhere.

Malta's current aim is to build a pilot facility that can supply 10MW of electricity for up to 10 hours with a footprint of less than 2,500 square metres – roughly equivalent to half a football pitch.

Comparatively low material costs and the ability to install the Malta system at optimal locations on the grid make it an accessible and versatile solution. It will enable greater penetration of renewable energy production and permit more efficient storage and distribution of power across the grid. This in turn means making better use of current transmission systems and potentially reducing the costs of infrastructure investment required over time.

In addition, production capacity and land usage do not increase proportionately →



Like a refrigerator

Malta's system uses electricity from the grid to produce hot and cold. A heat pump extracts heat from an anti-freeze-like solution, dropping its temperature to -65°C. At the same time, heat is added to the molten salt, heating it to 565°C.

“It has the potential to open up the company and potentially make it even better.”

Emma Karlsson Lindbo

as plant size scales up, promising higher efficiencies with greater investment.

Critical to the success of Malta’s electricity processing capability is effective heat transfer, for which Alfa Laval is the clear industry leader.

Alfa Laval started speaking to the Malta team while the project was still at X. What began as preliminary design of heat exchangers that satisfied Malta’s unique needs became a sustained interest in developing the specific Malta system.

“If you look at the different challenges we’ve seen in the project, making a successful Malta system both in terms of performance and efficiency is really gated by what is done with the heat exchangers,” says Malta’s Swaminathan.

“Who do we want involved in the design and the costing of the heat exchangers? You really just can’t find a better party than Alfa Laval to do that.”

Alfa Laval’s deep expertise and respected brand is instantly known when Malta mentions the company in meetings with customers.

“It conveys to them the seriousness and the practicality of the solution,” she adds.

“From the very beginning it was incredibly important to us that we have people that have worked with heat exchangers for decades and decades. Because it’s not just the core technology itself, it’s also the know-how, the maintenance, the manufacturing. It’s the whole ecosystem that you have to bring together to make these complex, large, high-performance units in a real system.”

ONE OF THE PIVOTAL people at Alfa Laval in helping Malta bring everything together when it comes to heat exchangers is Technology Development Manager Emma Karlsson Lindbo. As project lead for the Malta partnership, she has played a key role in how the Alfa Laval-Malta partnership has evolved. She calls the approach to developing and commercializing the process a “practical and pragmatic” blend of innovation and refinement.

She sees the Malta project as symbolic of a recent change at Alfa Laval to broaden its approach to innovation when it comes to business models and partnerships.



PHOTO: PETER WESTRUP





Emma Karlsson Lindbo is Technology Development Manager at Alfa Laval. She helps Malta bring everything together when it comes to heat exchangers.

“It has the potential to open up the company and potentially make it even stronger,” she adds.

Indeed, Alfa Laval’s relationship with Malta is unique. While the company has traditionally sought to develop emerging technologies by acquiring start-ups outright, in this case they have chosen to act as a partner and investor.

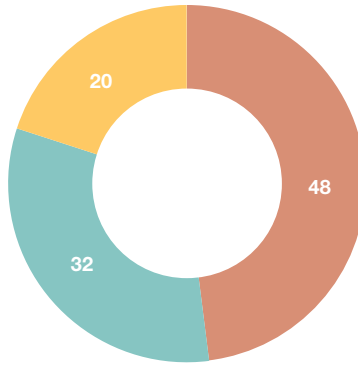
This reflects the investor interest that Malta has enjoyed since its inception and is a testament to the project’s potential.

From X’s 2015 purchase of the rights to pursue this technology, through two years of stringent evaluation in the incubator, to a funding round led by the famously selective Breakthrough Energy Ventures, Malta has passed every test.

What is the key to this early success? Answers can certainly be found in the technology itself and how well-timed it is for the current market, but to fully understand Malta’s promise one needs to look beyond tech.

There is a genuine opportunity here to influence the world for the better. And the people on the ground are driven by this.

Reflecting on the team at Malta, CEO Swaminathan says, “I would wager that every single person here at Malta feels the same way: you have to be driven to find this exciting and adrenaline pumping in a way, but on a daily basis, you have to feel connected to its mission.” ●



Heating and cooling account for 48% of final energy use, transport for 32% and electricity for 20% in the world.

SOURCE: REN21
RENEWABLES GLOBAL STATUS REPORT

KEY SUPPLY TRENDS OECD



+12%

2016-2017
Renewables +12% (+148 TWh)



-1,5%

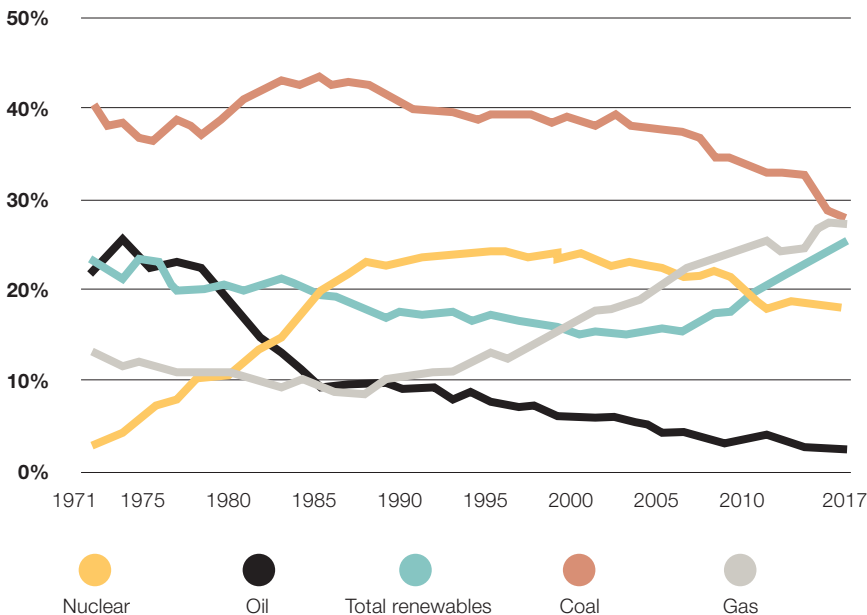
2016-2017
Fossil fuel -1,5% (-97 TWh)

SOURCE: IEA WORLD ENERGY BALANCES: OVERVIEW (2018 EDITION)

RENEWABLE GROWTH

The renewable energy portion of the energy mix is growing. As of 2016, renewable energy accounted for an estimated 18.2% of global total final energy consumption, according to the Renewables Global Status Report, published by REN21. The year 2017 was another record-breaking one for renewable energy, characterised by the largest ever increase in renewable power capacity, falling costs, increases in investment and advances in enabling technologies.

OECD ELECTRICITY GENERATION MIX 1971-2016



SOURCE: IEA WORLD ENERGY BALANCES: OVERVIEW (2018 EDITION)

'A new approach for a new era'

ALEX SYED, *Alfa Laval's Vice President for Corporate Development*, explains how Malta exemplifies the company's new approach to M&A.

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What is Alfa Laval's traditional approach to acquisitions?

– Historically, we've acquired companies to supplement our organic growth. It can be a technology we're interested in or a product in the same industry. Basically, we try to find good businesses and make them better.

How has that changed and why?

– The new strategy we put in place at the end of 2016 opened up the envelope a little bit to include cases like Malta that aren't quite fully developed, profitable businesses, but nevertheless have an interesting, promising technology.

This shift is driven largely by two big trends that are affecting our business: sustainability and digitalization. The challenge with these trends is that until you get involved, you don't really know where things are going. So, you have to throw yourself in even if an acquisition isn't feasible.

What made Malta an attractive investment?

– Traditional acquisition is a game of financial returns, but the motivation with Malta is



"We try to find good businesses and make them better."

Alex Syed

different. This is to help us get in the marketplace and start working with the people who know this stuff. We could have continued just being a joint development partner for heat exchangers, but we believed this business could be worth investing in, so we took a small stake. The development work we will undertake will also, we believe, have sign off benefits in other applications demanding advanced heat exchange technology.

Of course, in terms of the financial returns, it's not easy to see when the money's coming back with this type of deal. But now we're on the board and have a vested interest. And we're learning a lot along the way; we're building a network, getting to understand the market, and that's invaluable. ●

OTHER ALFA LAVAL PARTNERSHIPS:

Product	Partner	Form
Alfdex	Concentric	Joint Venture
PureBallast	Wallenius Water	Partnership
PureSOx	Aalborg Industries	Acquisition

Game changer

*This could solve numerous challenges to the mainstream adoption of **RENEWABLE ENERGY**, including intermittency and the cost of investment in transmission and distribution infrastructure. “In a sense, this is a puzzle piece that can fit anywhere,” says **ADRIENNE LITTLE**, thermodynamics specialist and Malta’s heat exchanger technical lead.*



Wind energy



Hydropower energy



Biomass energy



Geothermal energy



Solar energy

A BIOBASED FUTURE

Realizing the potential of renewable feedstocks.

MOVING FROM petroleum-based chemicals and plastics to biobased products made from renewable feedstocks such as plant waste, microalgae, and bacteria has the potential to drastically reduce our carbon footprint.

Alfa Laval is one of nine partners in an EU-funded project led by BASF aimed at developing cost and energy-efficient technologies for biobased feedstock production, including water purification, biomaterial removal, and product-recovery.

Efficient removal of microbial cells is critical for sustainable biobased chemicals production, and Alfa Laval's separators used in the processes can reduce energy use by 40 percent. Their gentle acceleration also results in minimal cell lysis, making separation more efficient and increasing yields.

With support from Alfa Laval's advanced separation technology, the project has produced valuable insights that bring commercially viable, large-scale biobased manufacturing one step closer.



PHOTO: © J. A. KRAULIS / RADIUS IMAGES

Algae ranges from single-celled microalgae to multicellular organisms such as kelp, which can grow up to 65 metres in length.

Digging deep to heat Dutch greenhouses

Geothermal energy is expected to play an important role in helping meet climate targets.

BY DAVID LANDES

ILLUSTRATION GRAHAM SAMUELS

THE NETHERLANDS is the world's second-largest food exporter by value, and the country's 9,000 hectares of greenhouses are a big reason why. But keeping those greenhouses the right temperature requires lots of energy, so developing alternative energy sources is a top priority in the country's efforts to meet its ambitious climate targets.

The Dutch government has pledged to be free of natural gas by 2030 and reduce CO₂-equivalent emissions by 49 percent compared to 1990 levels. The greenhouse sector is already taking steps toward using renewable energy, with several geothermal energy plants coming online in recent years.

Geothermal heating works by pumping up warm water from deep inside the earth (usually 1,000 to 5,000 metres deep). The warm water can then be used to heat greenhouses,

reducing the need for natural gas and other fossil fuels.

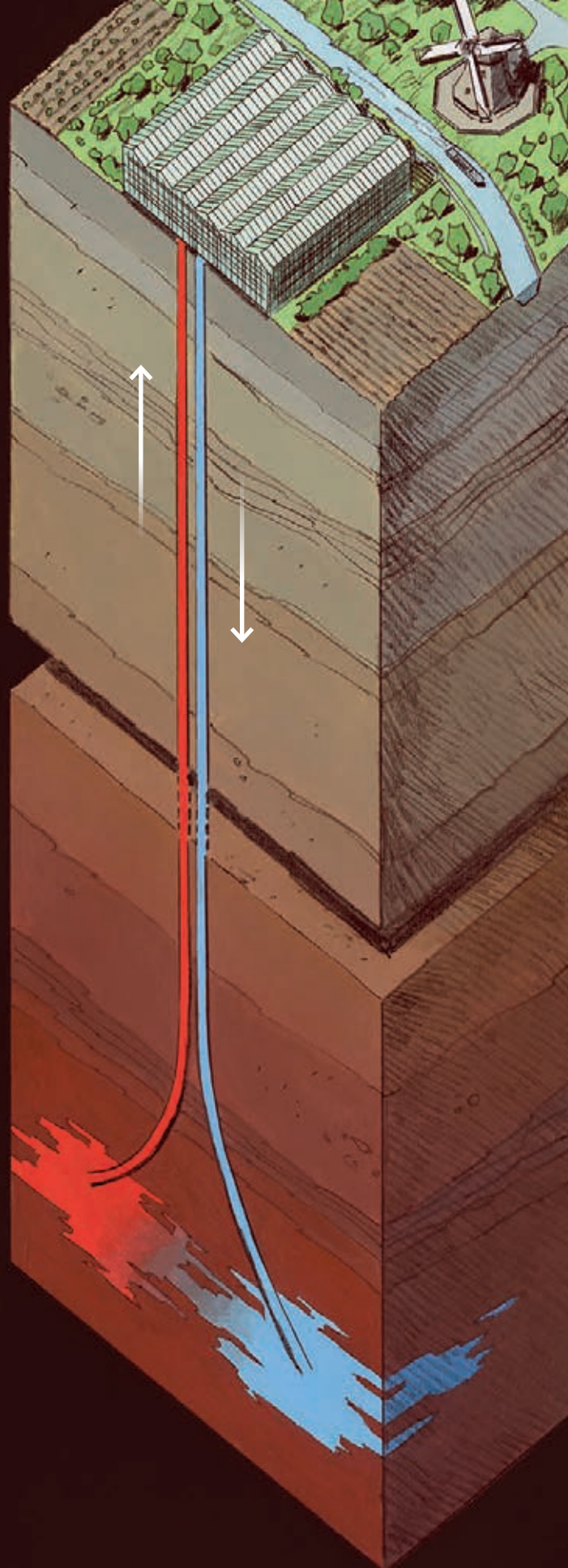
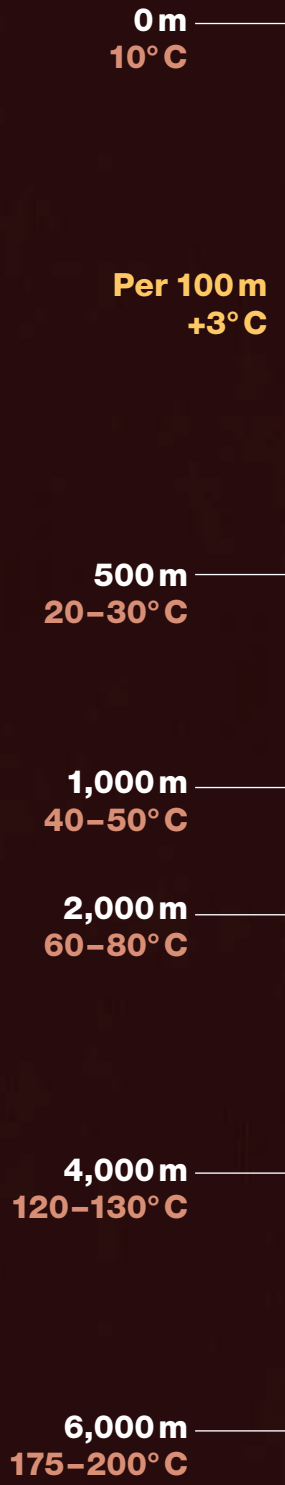
Heat exchangers play a key role in harnessing the benefits of geothermal energy, ensuring efficient heat transfer between the warm water coming up from the ground and the cooler water that has been used to heat greenhouses or other buildings.

In 2017, Alfa Laval launched a new geothermal-optimised heat exchanger design as part of a pilot project, which has since resulted three other plants being retrofitted with the Alfa Laval solution. Two new plants featuring the Alfa Laval design are also in the pipeline.

And with current plans calling for the building of an estimated 175 geothermal installations by 2030, chances are Alfa Laval heat exchangers will have a central role in reducing energy use and emissions from Dutch greenhouses for many years to come. ●

Deep heat

Geothermal heating works by extracting the heat from underground water sources. The further underground the water, the hotter it usually is. In the Netherlands, geothermal heat plants pump warm water up from depths of at least 500 metres. After the water has been used, the cooler water is returned to the ground.



Brewers on three continents discuss

The world on tap



The changing tastes of beer

How do brewers around the world keep up with changing consumer trends and adjust to local tastes? *Here* speaks with brewers on three continents about navigating the beer industry's sudsy waters.

BY RICHARD ORANGE
PHOTO MARTIN ADOLFSSON

B

EEER IS EVERYWHERE, but it doesn't always taste the same, and knowing what beers will sell when and where isn't always easy to predict: when Guinness was invented in the British Isles, for instance, it was meant for chilly winter evenings. But more of it is now drunk in sweltering Nigeria than even in Ireland.

But with one in six beers drunk globally coming from a tank using Alfa Laval equipment, the company is in a better position than most to understand.

Here magazine sat down with three Alfa Laval customers – Kyle Wilson from New York's Brooklyn Brewery, Yuichi Nakamura from Asahi in Japan, and Giuseppe Mele from Heineken in →





Previous page:

Kyle Wilson says the differences in taste preferences are too dynamic to pin down, but he thinks they relate to culture, climate, and history.

DID YOU KNOW...

- Beer is the third-most popular drink on Earth, after water and tea.
- Zythology is the scientific name for the study of beer and brewing, including how specific ingredients affect the brewing process.
- Yeast can only survive alcohol concentrations of 14 percent to 18 percent.
- After Danish scientist Niels Bohr won the Nobel Prize in 1922, the Carlsberg brewery provided him a continuous supply of beer piped directly to his house.
- In 13th century Norway, it wasn't uncommon for people to baptize their children with beer.
- In Japan, cans of beer feature writing in braille so blind people don't confuse them with non-alcoholic drinks
- The world's oldest continuously operating brewery is at the Weihenstephan Abbey in Bavaria, Germany, where monks started brewing beer in 1040 AD.

Expanding taste

Nakamura says Asahi is thankful to craft brewers for expanding beer culture among the Japanese.

Italy – to talk about how they are negotiating current trends.

“Tastes differ pretty dramatically for us, because our market is so widespread,” says Wilson, who is Director of Brewery Projects and Development at Brooklyn Brewery. “We’re sending beers to markets that are much less familiar than our home market in the US.”

With beer sales in long-term decline in Europe and Japan, and flat in North America, global brewers have been looking to growth markets, such as Asia, South America, and sub-Saharan Africa, and healthier sub-sections of the market, such as craft and non-alcoholic beer.

Brooklyn now exports a bigger share of its production than any comparable mid-sized craft brewer. Wilson says the differences in taste preferences are too dynamic to pin down, but he thinks they relate to culture, climate, and (as in the case of Nigeria) history.

“In warmer climates they tend not to support big barrel-aged barley wines,” he points out. “In places like Brazil they’re just not going to drink as much porter as a place that has a cold winter climate.”

THE OTHER DIFFERENCE is how far a country is on what Wilson calls “the craft beer trajectory”.

“In some of these markets, they’re just moving into their craft beer renaissance, whereas in the US we’re far along on that journey, so we’ve gone through certain styles and we’re onto progressive things like sour beers, and really bitter IPAs.”

Although traditionally a wine drinking country, Italy is one of the few countries in Europe where beer consumption is on the up, with the craft sector more than doubling its share to 10 percent of all sales. This has pushed Heineken to launch a ‘special beers’ category, with Birra Moretti recently launching IPA Moretti “a beer that harks back to the IPA tradition”.

For Mele, Director of Heineken’s Comun Nuovo brewery near Bergamo in northern Italy,



PHOTO: IRWIN WONG



“The taste produced by each brewery must be the same taste, the same flavour.”

Yuichi Nakamura

the launch demonstrates the flexibility of his giant plant.

“With this new launch, despite being the largest brewery in Italy, Comun Nuovo has once again proved capable of responding to market changes in an agile and versatile way and confirming itself as a centre of innovation, even on niche products.”

Heineken has also developed Le Regionali, a line of beers designed to capture Italians’ regional loyalties, with five varieties reflecting five regions of the country.

Mele has also focused on meeting Italians’ environmental concerns, four years ago launching Baffo D’Oro, which is made using electricity generated by solar panels on the brewery roof.

In Japan, craft beer and microbreweries have been around since industry liberalisation in the 1990s. Asahi set up its own craft brewery, Tokyo Sumidagawa Brewing, back in 1995 and its Ibaraki microbrewery in 2017. Nakamura, manager of the company’s Production Technology Center at Asahi Suita Brewery, says Asahi is “thankful” to craft brewers for “expanding beer culture among the Japanese”.

But he believes that the two waves of craft beer, first in the 1990s and more recently over the last decade, have taken the market as far as it will go.

“I think the market for the craft beer boom is saturated now. The total market share for craft beer is less than one percent in Japan, and I don’t think it will ever exceed one percent.” he says.

DRINKING BEER without food is frowned upon in the local culture, which means beer that complements Japanese food will always dominate, he believes, safeguarding a place for clean, light lagers such as Asahi’s big seller Super Dry.

“The taste produced by each brewery must be the same taste, the same flavour,” says Nakamura. “If guys and ladies go from one part of Japan to another part of Japan, the taste must be the same.”

This does not mean Asahi does not →

“Tastes differ pretty dramatically for us, because our market is so widespread.”

Kyle Wilson

experiment. The company has invested heavily in flavoured beers, one of the fastest-growing niches globally, with 12 percent average annual growth between 1999 and 2017, according to GlobalData.

“We are producing a cherry tasting beer, which we advertised as being suitable to drink with meat, like wine,” Nakamura says. “We used to produce a chocolate beer, which we advertised as being suitable to drink with chocolate: a special craft chocolate.”

AND THEN THERE are the heavily flavoured seasonal beers, released for spring, summer, autumn, and winter. Asahi has also experimented with colourless brews, including the now discontinued Asahi Clear Craft, an extremely light transparent drink that was classified as a ‘happoshu’ rather than a beer because of its low malt content.

This meant it was taxed at a lower rate, making it cheaper.

These happoshu and seasonable beers would be frowned upon by the purists at Brooklyn Brewery. But the US company has been also been creating beers that don’t fit traditional categories.

“At this point a lot of brewers have exhausted all the classic craft beer styles of the past, so fewer brewers are focusing on style guidelines and there’s more experimentation,” Wilson says of the US premium sector.

He points to the sour and hazy IPA categories, and experiments with the wild *Brettanomyces* yeasts and *Lactobacillus* bacteria that have long given Belgian lambic beer its sour taste.

According to Wilson, Alfa Laval equipment is crucial to his company’s experimental approach.

“We purchased a customised heat exchanger skid system that was an important contributor to the growth in capacity of this new sour beer we’ve been developing,” he says.

The equipment, designed to take as little space as possible in the company’s cramped Williamsburg brewery, has increased capacity by 30 percent.

More generally, he says, having equipment that

can be relied on means the company can spend more time experimenting and refining its beers.

“I’m a firm believer in the saying that good brewers can’t afford cheap equipment,” he says.

In Japan, alcohol-free “beer-flavoured beverages” began to gain traction more than a decade ago.

“There was a mandate from the government to make employees more healthy,” explains John Kyle Dorton, Alfa Laval’s Vice President for Brewery Systems, who worked in Japan from 2004 and 2009.

“It set a rule that if employees didn’t meet certain health criteria, their health insurance premiums would increase. That incentivised a lot of employees to eat and drink more healthily, and that’s when a lot of these non-alcoholic drinks really took off.”

Rather than removing alcohol from beer as part of the brewing process, alcohol-free beer-flavoured beverages are produced like soft drinks, with special flavouring added to give them a beer-like taste.

Launched in 2012, Asahi Dry Zero continues to be a leader among alcohol-free beer-flavoured beverages in Japan, but so far no Japanese brewers have started producing a non-alcoholic beer.

According to Dorton, developing non-alcoholic brews isn’t as straightforward as one might think. It can take years of trial and error to get the taste right.

“If you take a standard beer and strip the alcohol out and try to drink it, you will be disappointed with the result,” he says.

“You need to take a different beer, a special beer, and they have to be really careful doing it, because they are launching these products with their main brand, so the product has to match.”

THE DOUBLE-DIGIT growth seen by craft beer in the US over the past decade looks to be levelling off with consumption rising just five percent in 2017, according to the US Brewers Association.

PHOTO: HEINEKEN



But Wilson says that the company's increasing reliance on the international market won't change its development process.

Indeed, for all his interest in global tastes, he maintains that Brooklyn's new products always have their origins in the tastes, interests and preferences of the company's skilled brewers.

"All of our development and research and the interesting things that we're working on come from our internal dialogue on what we want to drink, and once we come up with a beer that satisfies our internal criteria, we think of how it can be applied elsewhere," he says.

"I think that's a pretty good core principle for craft brewing in general." ●

"With this new launch, despite being the largest brewery in Italy, Comun Nuovo has once again proved capable of responding to market changes."

Giuseppe Mele

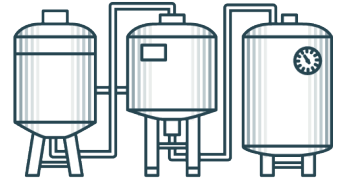
Renewable energy

Mele says Heineken in Italy is focused on environmental improvements such as using electricity generated by solar panels on the brewery roof and using GO-certified renewable energy.

19,000

BREWERIES WORLDWIDE

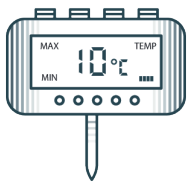
ACCORDING TO A SURVEY, the total number of breweries worldwide has surpassed 19,000, representing 209 countries and territories surveyed. The UK has the most breweries per capita: 25 per one million people.



Lager still rules. In spite of the growing interest in craft beer, ales and weissbier, lager is still the king of the pub. All the 10 best-selling beer brands in the world are lagers, pilsner-type beers.



The first custom coaster was manufactured by the printing company Friedrich Horn of Buckau, Germany, with a variety of illustrations, jokes, and phrases printed on them.



The cool fermentation

Over 90 percent of the beer produced globally is made using the cool fermentation method, at 10 °C (50 °F). The innovation originates from Bavaria during the Middle Ages, when brewers discovered how to store ("lager") their beers in cold alpine caves. These types of beer are termed lager, as opposed to ales that are fermented at warm temperatures between 15 and 20 °C (59 and 68 °F).

Top ten lager



1. Snow (China), global volume market share: 5.4%	2. Tsingtao (China), global volume market share: 2.8%	3. Bud Light (US), global volume market share: 2.5%	4. Budweiser (US), global volume market share: 2.3%	5. Skol lager (UK, Canada, Sweden, Belgium), global volume market share: 2.1%
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6. Yanjing (China), global volume market share: 1.9%	7. Heineken (Netherlands), global volume market share: 1.5%	8. Harbin (China), global volume market share: 1.5%	9. Brahma (Brazil), global volume market share: 1.5%	10. Coors Light (US), global volume market share: 1.3%
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ILLUSTRATION: KJELL THORSSON

Labels are illustrations, not accurate design.



CZECHS DRINK
a pint every 35 hours.

WITH 143 LITRES per person, almost 40 litres more than the second country, the Czech Republic tops the world list of beer consumption per capita.



90% of the breweries are craft breweries.

THE RECENT surge in craft beer production continues. A survey found that there now are more than 17,000 craft breweries worldwide. Of those, 86 percent are in the US and Europe.

While there's certainly a visual element to consider with beer glassware, it can make a difference in your enjoyment of the brew as well. Here's a list of some different types of beer – and their preferred glassware.

<p>Type of beer: double stout</p> <p>Characteristics: velvety smooth beer with dry, burnt flavours and cocoa and coffee notes.</p> <p>Example: Shepherd Neame Double Stout</p> <p>Preferred glass: A tulip glass</p>	<p>Type of beer: weissbier</p> <p>Characteristics: low hop bitterness and relatively high carbonation.</p> <p>Example: Erdinger</p> <p>Preferred glass: A Weizen glass</p>	<p>Type of beer: English bitter</p> <p>Characteristics: British style of pale ale, hoppy in character.</p> <p>Example: Fuller's India Pale Ale</p> <p>Preferred glass: A mug (or stein)</p>	<p>Type of beer: tripel</p> <p>Characteristics: heavy, predominantly blond beer with a strong taste of malts and/or hop bitters.</p> <p>Example: Westmalle Tripel</p> <p>Preferred glass: A goblet (or chalice)</p>	<p>Type of beer: pilsner</p> <p>Characteristics: crisp in flavor (German pilsner); darker with more bitterness (Czech pilsners).</p> <p>Example: Pilsner Urquell</p> <p>Preferred glass: A pilsner glass</p>
<p>Type of beer: Belgian dark ale</p> <p>Characteristics: relatively strong alcohol and malt presence balanced out by yeast and spice.</p> <p>Example: Leffe Brune</p> <p>Preferred glass: A snifter</p>	<p>Type of beer: bière brut, bière de Champagne</p> <p>Characteristics: delicate, high in alcohol, and highly carbonated.</p> <p>Example: Malheur bière brut</p> <p>Preferred glass: A flute</p>	<p>Type of beer: gueuze</p> <p>Characteristics: dry, cider-like, musty, sour and "barnyard-like".</p> <p>Example: Oude Geuze Boon</p> <p>Preferred glass: A stange</p>	<p>Type of beer: brown ale</p> <p>Characteristics: strong and malty (northeastern England); darker, sweeter (southern England); drier (North America)</p> <p>Example: Newcastle Brown Ale</p> <p>Preferred glass: A pint glass</p>	<p>Type of beer: saison</p> <p>Characteristics: pale ale that is highly carbonated, fruity and spicy.</p> <p>Example: Saison Dupont Vieille Provision</p> <p>Preferred glass: An oversized wine glass</p>



6,000
years ago

The oldest evidence of beer making dates back 6,000 years, with an ancient clay vessel from the Sumerian culture found in modern day Iran containing traces of beerstone, or calcium oxalate. How did it taste? Probably very "smokey", as the malted barley was dried over open fire. And how did it look? Most certainly very turbid, and red or black in colour.



The basic ingredients of beer are water; a starch source, such as malted barley, able to be fermented; a brewer's yeast to produce the fermentation; and a flavouring, such as hops, to offset the sweetness of the malt.

SOURCES:
SYSTEMBOLAGET
ALLTECH
FACTRETRIEVER
PASTE MAGAZINE
BUSINESS INSIDER
THE TELEGRAPH
COASTER FACTORY



Technology in action:

The power of data

HONEYWELL UOP, A GLOBAL LEADER IN DESIGNING REFINERIES AND PETROCHEMICAL PLANTS, HAS INVITED ALFA LAVAL INTO ITS REVOLUTIONARY CLOUD-BASED CONNECTED PLANT PROGRAMME, MARKING A NEW PHASE IN THE TWO COMPANIES' 30-YEAR RELATIONSHIP.

BY DAVID LANDES

PHOTOS HONEYWELL AND GETTY IMAGES



OIL AND GAS refining is a high-stakes, high-pressure business that also demands a high level of operational precision.

Material flows must be monitored and analysed; reaction temperatures must be carefully calibrated; prices are constantly shifting, as are a myriad of other variables that can affect plant performance and profits.

“As conditions change over time, the optimal way of running these plants changes,” explains Christophe Romatier of Honeywell UOP, one of the leading process licensors in the downstream oil and gas industry. “It’s very hard for operators to anticipate how they should adjust as conditions are constantly changing more or less in real time.”

– Bearing these challenges in mind, Honeywell UOP in 2016 launched the Connected Plant programme, a customisable, connected service that streams and analyses real-time data from various assets, providing customers with a far more accurate, detailed, and constantly updated picture of their operations.

“The Connected Plant is a way to drive improvements in the operational outcomes of our customers,” says Romatier. “Running trainings and sending in consultants is simply not enough anymore. Connectivity through the cloud provides access to expert knowledge much faster.”

And considering Alfa Laval’s Packinox heat exchangers have been specified in Honeywell UOP plant designs for more than 30 years, inviting Alfa Laval to join the programme was a natural step in the companies’ long-standing relationship.

“This is an expansion of an already very strong and mature relationship,” explains Romatier. “Alfa Laval and



“Previously when problems arose, we only had access to backward-looking data. Now we can continuously analyze data and help identify potential problems before they emerge.”

Thierry Sourp



Using the cloud

The connected service streams and analyzes real-time data from various assets, providing a far more accurate picture of operations.

performance, adding Packinox to the Connected Plant programme will also bring important benefits when it comes to equipment maintenance.

Failure to detect a slight anomaly or see a critical trend in time can have a direct and significant impact on profits. Thus, refiners are always on the lookout for services and equipment that keep their facilities running at peak performance, which is a driving force behind Honeywell UOP's Connected Plant initiative.

Ever since the September 2018 announcement of Alfa Laval's addition to the Connected Plant programme, a dedicated team of engineers has been hard at work integrating Packinox data flows into the tool's analytics infrastructure.

"The difficult work is defining the logic that tells you whether a variation is something normal or a signal that there is an issue. That's what takes time," explains Thierry Sourp, Managing Director of Alfa Laval Packinox.

HONEYWELL UOP is planning to have the first Packinox-enabled Connected Plant online by the summer of 2019,

at which point plant operators can benefit from the predictive maintenance capabilities that come with the transition from a slow, occasional, manual process to one that is automated, continuous and in real time.

"Previously when problems arose, we only had access to backward-looking data. Now we can continuously analyse data and help identify potential problems before they emerge," says Sourp.

And staying ahead of potential problems is crucial considering shutting down can cost refiners up →

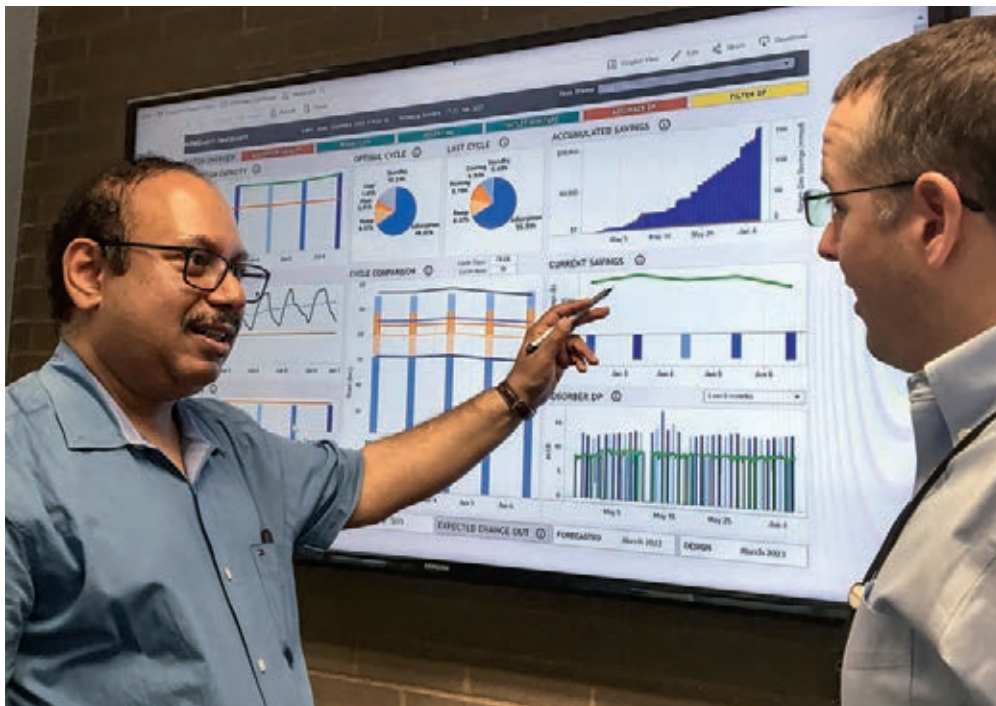
Packinox have a great deal of very well-recognized expertise that's respected in industry. The ability to pull them in as a partner adds a lot of value for our customers."

Today, Packinox heat exchangers can be found on more than half of the roughly 600 refineries operating around the world. They play a central role in the production of high-octane motor fuels and aromatics, ensuring that crude distillation, catalytic

reforming, and waste heat recovery take place as efficiently as possible.

"Packinox is specialized equipment that performs very well, and the addition of Alfa Laval's expertise helps refiners operate that equipment even more efficiently," says Romatier. "Connecting them allows us to operate as close to the edge as possible to get the maximum performance while still staying reliable."

In addition to optimizing process



Launching soon
 After data flows have been integrated, the first Packinox-enabled Connected Plant is expected to come online by the summer of 2019.

“Alfa Laval and Packinox have a great deal of very well-recognised expertise that’s respected in industry.”
Christophe Romatier

around €1 million per day. Adding in the time required for a refinery to cool before maintenance as well as the time needed to ramp up to full capacity, any plant shutdown translates into a minimum of €5 million in lost revenues.

“It’s critical to avoid unplanned shutdowns as they have a real and immediate impact on the bottom line,” he says.

Even planned maintenance needs to be carefully scheduled in order to minimise costly downtime, and insights from the Connected Plant programme can make a difference.

“Trend analysis allows us to give customers advance notice about what they need to do during their next shutdown or even if they should consider planning an earlier shutdown to plan maintenance accordingly,” adds Sourp.

In addition to operational efficiencies, adding Packinox heat exchangers

to the Connected Plant also gives Alfa Laval a new tool to help customers operate their equipment in a sustainable manner.

“There’s a lot of talk these days about programmed obsolescence, but in this case, we’re doing the opposite. We want to make sure our compact heat exchangers operate in a way that will maximise equipment lifespan,” says Sourp.

While it’s too early to say how many Packinox heat exchangers will be linked to the Connected Plant initiative in the coming year, Honeywell UOP’s Romatier looks forward to having Alfa Laval involved in a data-driven cycle of learning that can benefit both companies as well as customers.

“Alfa Laval is now part of this equation,” he explains. “We see this as a close collaboration and as opportunities arise, we can together find ways for our joint customers to improve their outcomes.”●

What is programmed obsolescence?

Programmed obsolescence, also known as planned obsolescence, refers to a policy of purposefully limiting a product’s life to accelerate replacement purchases. While the concept originated with the 1920s auto industry, today programmed obsolescence is often used in reference to the tech industry with companies being accused of issuing software updates that impair the performance of older models. In 2015, France passed a law outlawing the practice.

DID YOU KNOW?

...researchers in Antarctica have running water, thanks to Alfa Laval?

Below:

A researcher walks next to his tent during a snowstorm with strong winds in Antarctica.

A PLATE HEAT EXCHANGER from Alfa Laval at Antarctica's Scott Base keeps drinking water from freezing even when temperatures dip below -50°C . This ensures the many scientists stationed at Scott Base can pursue their important climate research.

Alfa Laval equipment excels in extreme conditions that challenge performance and where uptime is crucial. From ice-filled Arctic waters where skimmers clean up after oil spills, to the "roof of the world" in Lhasa, Tibet where high-altitude heat exchangers help lower heating system energy consumption by up to 15 percent.



PHOTO: EDSON VANDERHA, GETTY IMAGES

指挥平台





Striving to do better

Who says being one of China's largest oil refiners means having to abandon ambitious environmental goals?

BY DAVID LANDES PHOTO HENGLI/PENGWEI SUN

Previous page:

Inside the cavernous control room at Hengli's refinery on Changxing Island. Hengli estimates that Alfa Laval's plate heat exchangers can cut fuel consumption by 30 percent.

“Our goal is to maintain standards higher than the environmental protection regulations of the Chinese government.”

Yanzhi Wu

IN LESS THAN a quarter of a century, China's Hengli Group has grown from a single textile factory into a petrochemical giant with more than 80,000 employees and revenues of €48 billion.

In early 2019, the group reached another milestone when crude oil started flowing into a new €9.8 billion oil refinery located on Changxing Island, 120 kilometers northwest of Dalian Port on the northeast coast of China.

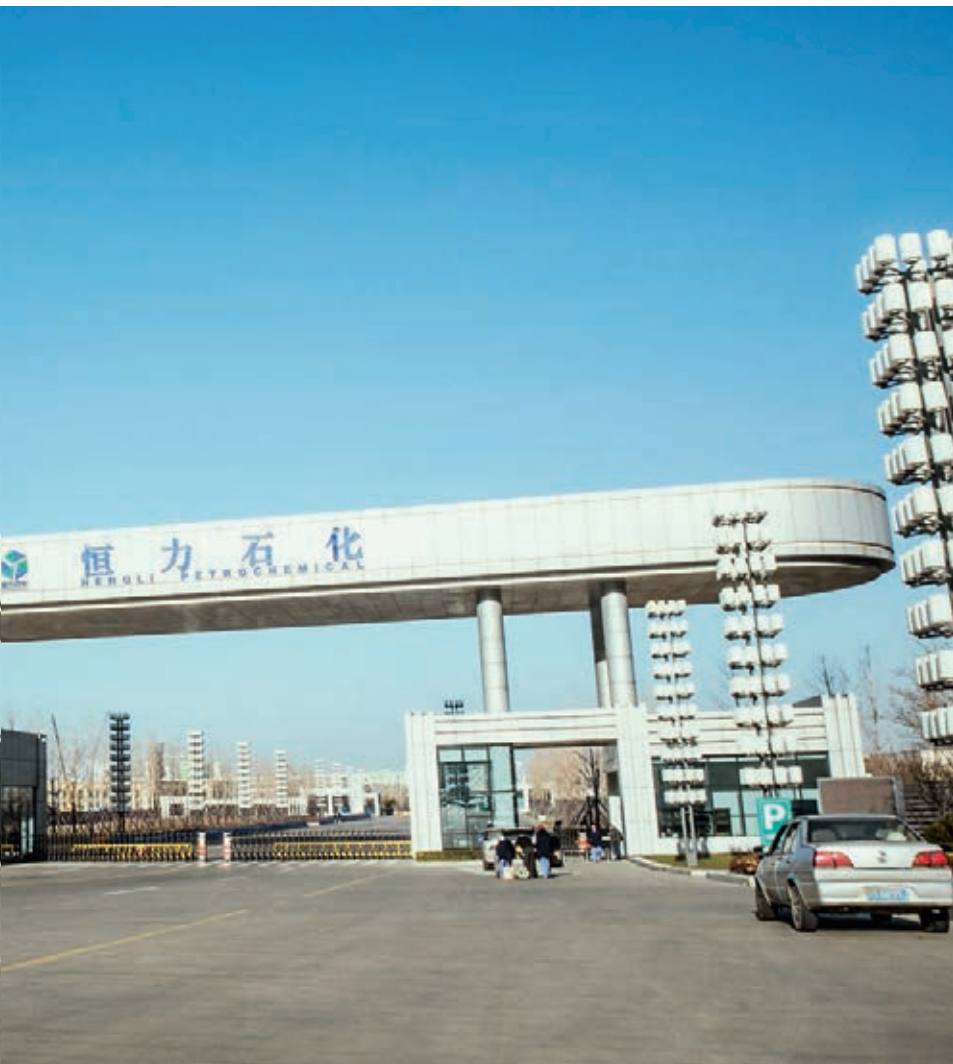
With a refining capacity of 400,000 barrels of crude oil per day, the sprawling facility makes Hengli one of China's largest oil refiners.

Gazing out over the jungle of towers and tanks on the island where Hengli has had operations since 2012, it's easy to miss that the company is considered an environmental role model.

“Our goal is to maintain standards higher than the environmental protection regulations of the Chinese government,” explains Yanzhi Wu, Hengli's Purchasing Division Manager. “We strive to do better. We want to develop and grow in a sustainable manner.”

Founded in 1994 when entrepreneur Jianhua Chen bought a bankrupt textile factory, Hengli opened its first polyester production facility in 2004. After the company started developing petrochemical operations, it didn't take long for the group to become





Left clockwise:

Hengli's sprawling facility on China's northeast coast makes it one of the country's largest oil refiners.

Yanzhi Wu, Purchasing Division Manager, Hengli Group.

Belinda Lau, Alfa Laval China's Business Unit Manager for heat exchangers in Process Industry, Energy Division.

one of the world's largest producers of purified terephthalic acid (PTA), the precursor to polyester.

Despite its rapid growth, Hengli remains dedicated to maintaining high environmental standards, making huge investments to reduce energy use and emissions in an admittedly resource-intensive sector.

C HANGXING ISLAND features an innovative embedded wastewater treatment system recognised by the International Water Association for its environmental benefits. Hengli has also participated in United Nations-organised trainings to help improve sustainability in China's textile industry.

Ever since 2003, when Hengli first installed Alfa Laval heat exchangers in its production facility, Alfa Laval has been a trusted partner in helping Hengli achieve its sustainability ambitions.

"We have a fruitful relationship and our cooperation is ongoing," adds Wu. "Alfa Laval's equipment will always be a part of Hengli's development."

Belinda Lau, Alfa Laval China's Business Unit Manager for heat exchangers in Process Industry, Energy Division explains: "Hengli is a company that wants to be at the forefront of what they do. They invest in the latest technology and want →



“Hengli wants to stay ahead of the industry in protecting the environment. This aligns well with Alfa Laval.”
Belinda Lau

to stay ahead of the industry when it comes to protecting the environment.”

“This aligns well with Alfa Laval and our desire to play an important role for customers in meeting their own sustainability targets,”

A **24-YEAR VETERAN** of Alfa Laval, Lau has been working with Hengli since the first plant project and has witnessed the evolution of the Alfa Laval-Hengli partnership first hand.

“We built up a lot of trust over the years. It’s a very long-term process,” she adds. “They have confidence in our product quality and design knowledge. But it’s not all about the product itself. It’s also how we adapt the design and configuration to meet the process conditions for a particular application.”

Alfa Laval’s proven performance and responsiveness when it came to implementing climate-friendly solutions made the company a natural choice for Hengli when it sought ways to optimise heat transfer and recovery at their recently opened refinery.

With energy costs accounting for about 30 percent of the refinery’s overall operating costs, measures that reduce energy expenditures can have a huge effect on profitability. No less important are the potential reductions in CO₂ emissions due to lower fuel needs.

Alfa Laval therefore suggested Hengli install welded plate heat exchangers, which are more compact

and efficient than traditional shell and tube exchangers. The welded plate heat exchangers made it possible for Hengli to design the refinery to use different process streams to preheat the incoming crude to the highest possible temperature before entering the distillation process in a very compact space. “Using the process streams to achieve the highest possible temperature means crude is heated free of charge, without fuel cost and reducing emissions,” Lau explains.

While it’s too early to calculate exactly how much Alfa Laval’s heat exchangers may reduce costs and emissions at the refinery, Hengli’s own feasibility study estimated that switching to Alfa Laval’s plate heat exchangers would cut fuel consumption at the facility by 30 percent.

The intensified cooperation between Alfa Laval and Hengli in conjunction with the refinery project exemplifies what Lau characterizes as a true “win-win partnership” whereby both companies challenge the other to think differently and do better. On the one hand, Alfa Laval has pushed Hengli to consider new heat exchangers. At the same time, Hengli has pushed Alfa Laval to offer a stronger product portfolio and provide even better service.

“We help them to meet their goals for energy efficiency and emissions, and they push us to have a stronger product portfolio and know how,” she explains. “It’s good for us to be working with them. It forces us both to improve.” ●

Right from top:

The refining capacity of Hengli Group’s facility at Changxing Island is a massive 400,000 barrels of crude oil per day.

A look at atmospheric overhead vapour exchangers in the crude oil distillation unit.

Heavy vacuum gas oil (HVGO) exchangers also play a role in crude oil distillation.

3 STEPS FOR PETROCHEMICAL CUSTOMERS TO IMPROVE EFFICIENCY AND REDUCE EMISSIONS

- 1. Find opportunities** to improve heat recovery by considering high-efficiency plate type heat transfer technologies.
- 2. Consider spiral** heat exchangers to increase operational efficiency by minimizing fouling.
- 3. Involve vendors** of high-efficiency heat exchangers before the process design is fixed to get an optimal process design.



Alfa Laval: where the action is

FROM THE 1889 *Exposition universelle* in Paris to the upcoming Expo 2020 in Dubai, Alfa Laval has been present at major gatherings of people and technology around the world for more than a century.

In Paris, separators featuring the newly patented Alfa-discs took centre stage. Alfa Laval was also a part of the 1904 World's Fair in St. Louis in the United States, which attracted exhibitors from more than 60 countries.

More recently, Alfa Laval has also involved with major events in Asia such as the 2010 World Expo in Shanghai, where Alfa Laval was an official partner to the Swedish pavilion, and the 2008 Olympics in Beijing. And we'll again be where the action is when the world's gaze turns to the Middle East in the years ahead at Expo 2020 in Dubai and the 2022 FIFA World Cup football tournament in Qatar.



PHOTO: STADSMUSEET

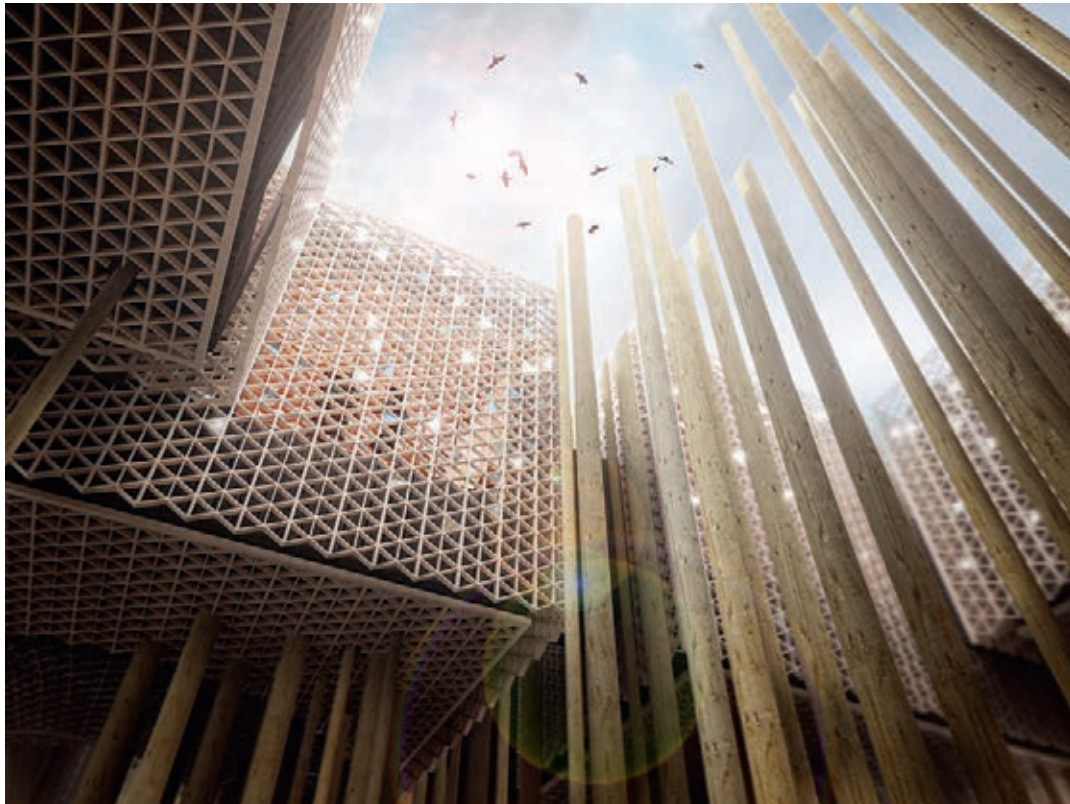



PHOTO: ALESSANDRO RIPELLINO ARCHITETTO

Above:

The AB Separator display at the Palais des Machines in Paris in 1889 was meant to resemble a large separator.

Left:

The design of the Swedish pavilion at Expo 2020 in Dubai is inspired by "The Forest", combining Nordic woodland with Islamic geometric patterns.



Coming up in *Here*...

We meet Caroline Gjertsen and her colleagues at the Framo Innovation Center to learn more about their work developing the pumping technology of tomorrow.

NO. 38

NEXT ISSUE

People power

Amid all the talk of innovation, digitalization, and artificial intelligence it can be easy to forget the most important driver in everything we do at Alfa Laval: people. In the next issue of *Here*, we'll shine a light on some of the people who make up our most important asset: the curious minds that work to make our world better, every day.



Using the world's watts more wisely



50,000,000,000 watts. That's the power needed for two billion light bulbs to bring light to our world. In comparison, it's also the total power that industries around the world are saving thanks to Alfa Laval's yearly installations of new heat exchangers. Talk about alternative energy use!

These are the facts: today enormous amounts of energy are lost in industrial processes, mainly in the form of waste heat. But there is an easy way to address this. By using our high-technology heat exchangers, the energy efficiency of these processes can be increased by up to 50 percent. This amounts to a reduced global energy requirement of 50 GW. As a bonus, emissions of carbon dioxide are also reduced by about 150 million tons every year – the same amount that

30 million cars emit into the atmosphere annually. It's all about contributing to a cleaner environment.

Pure performance. Alfa Laval strives to help our customers optimize their processes. Whether energy and chemical, marine and transportation, or food and beverage – Alfa Laval works tirelessly across a range of industries to find the optimal path forward.

We offer our expertise, technical support, and service to customers in more than 100 countries. And they continually challenge us with new ideas and inspire us with their passion. Working together, we can create responsible, sustainable growth, giving both people and the planet a brighter life.



www.alfalaval.com