

# Leaf

Customer  
magazine

■ Issue 9

One  
degree  
better

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## Warmth comes from the heart

Oilon is a family company with 60 years of history

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## Continued success in China for Oilon

Oilon is in high demand in China due to strict emission control norms.

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## Heat pumps help to reduce emissions

Companies using heat pumps need fewer emission permits.

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## Editorial



**Tero Tulokas**  
CEO



*Environmental responsibility is at the heart of our strategy.*

*With our products and services, we help customers strengthen their environmental responsibility."*

The COVID-19 crisis, which started in 2020, has transformed and will continue to shift the foundations of business everywhere. With fewer opportunities to meet face to face, companies who have built trust and can continue to serve have an edge. Responsibility is valued more than ever. In these difficult times, our approach to doing business has proven its worth, enabling us to keep serving our customers throughout the crisis.

The main focus of this magazine is responsibility. Oilon has been a forerunner in responsibility throughout the company's six decades of history. In 60 years, Oilon has grown from a two-man garage firm into a global forerunner in environmental technology. Today, our responsibility is summed up in our environmental and corporate responsibility policy, which is divided into financial, social, and environmental responsibility. Environmental responsibility is at the heart of our strategy. With our products and services, we help customers strengthen their environmental responsibility. An example of this is the use of Oilon heat pump technology for utilizing waste heat from a Chinese renewable electricity battery farm for district heating, a groundbreaking effort and the first such project in the world. In recent years, there has been a major positive shift in companies' and the society's attitudes towards environmental responsibility. Earlier, companies would invest

only if there was money to be gained or when forced to do so; these days, investments in emission reduction are often voluntary.

Skilled and motivated personnel are our most important asset and the foundation of profitable business. We are proud to be able to offer meaningful work with an international scope. Oilon has a very low employee turnover, with the longest careers exceeding 50 years in length.

In addition to offering greener solutions, we aim to actively reduce our own environmental loads. We are committed to reducing the emissions from our own operations in accordance with the 1.5 °C temperature goal stipulated by the Paris agreement. The bulk of our facilities already utilize ground source heating, we use solar power to power our production, and all the electricity used at our plants in Finland has been renewable since 2020.

As a third-generation family business, we want to preserve nature and enable a future worth living for future generations. Combined with clean combustion technology, heat pumps provide crucial solutions for low-carbon energy production. This is our challenge to you: work with us towards a more sustainable future!

# The green transition is good news – also for Oilon

***The energy revolution is rapidly changing the environment we live in. Governments, businesses, and industrial operators around the world are working towards minimizing emissions from fossil fuels and finding new carbon-neutral solutions for energy production. This development has a strong impact on our operations and is reflected in our company look.***

In recent years, global objectives and actions associated with the fight against climate change have shaken companies to their core. Energy plays such an important role in our society that it is the companies operating in the energy sector who face the greatest pressure to enact changes. To gain control of global warming, we need to find new ways of producing and consuming energy. Carbon dioxide and nitrogen dioxide emissions are especially harmful and need to be reduced to a minimum. Oilon's customers are driven towards this goal by their

own ambition and governmental steering, such as emission permit rates.

## **Oilon provides solutions for climate change**

Oilon plays a key role in solving the clean energy puzzle. Already today, Oilon offers advanced energy technology which

When comparing the old logo with the new, you'll soon notice that this is not a revolution, but an evolution – there are a lot of things that are good and worth preserving in the Oilon culture. To highlight the new strategic focus on low-emission energy technology, the red flame in the existing logo has transformed into a green leaf.



promotes sustainable development by reducing emissions in an effective, measurable way. Published in 2022, the Oilon's revised strategy places the focus of the company's R&D and overall business on technologies that support the fight against climate change.

Oilon is one of the leading combustion technology companies in the world with a proven track record of developing extremely low-emission combustion solutions. In addition, Oilon burners are compatible with low-carbon or renewable alternatives to traditional fuels, such as different liquids and gases.

In recent years, Oilon has invested heavily in developing new heat pump technologies. One such investment was the purchase of a new production plant in Kokkola, Finland. This move quadrupled the company's production capacity for large heat pumps. With their huge conversion potential, industrial heat pumps are one of the most promising alternatives for converting energy production to an emission-free form. For example, Oilon's heat pumps allow industrial operators to utilize waste

heat from their own processes or tap into renewable energy sources. As an additional benefit, using heat pumps will typically result in substantial savings in heating or cooling costs.

### **New strategy, new look**

In many markets, Oilon is known for high-quality and innovative burner products. As the new company strategy emphasizes responsibility, Oilon will allocate more resources to heat pump sales and to promoting awareness of the company's heat pump solutions. This means that in 2022, there will be changes in the Oilon look as well as our overall approach to marketing communications. As an example of this approach, we are releasing the new Oilon logo as part of this article.



# Ahead of the curve in the green transition

AUTHOR JUSSI LAITINEN | IMAGES SAMI REIVINEN | TRANSLATION MIKAEL JENU

***“The climate crisis and the energy revolution challenge both the energy technology sector and companies in general to improve their own business. Oilon stands at the forefront of this change.”***

Our climate is changing, and with it, the rules and principles of business. Legislators, investors, and consumers demand companies to go green, and using big words is no longer enough.

In some companies, this transition causes concerns, and in others, it is seen as an opportunity. Then there are the pio-

neers, such as Oilon, who are willing to stand at the forefront of the change. The company, which celebrated its 60th anniversary in spring 2021, has invested in sustainable development for decades.



By 2030, Oilon intends to reduce their CO<sub>2</sub> emissions by 46 per cent. In 2019, 100 kW of solar panels were installed on the roof of Oilon's factory in Lahti, Finland. In the company's plant in China, a similarly-sized plant has been reducing emissions for over 5 years.

*"A good example is the nitrogen oxides in burners. We've managed to reduce NO<sub>x</sub> emissions by 80–90 per cent in ten years,"* says Oilon's CEO **Tero Tulokas** with a hint of pride in his voice. After all, nitrogen oxides are among the most harmful atmospheric emissions from energy production.

This quantum leap in emission reduction was made possible by digital twins. These are exact virtual models that allow Oilon's experts to improve product performance at a fast pace, as fewer physical prototypes are required for testing. Virtual twins are also used for burner and heat pump monitoring and optimization.

Extending the range of compatible fuels has been another key focus in product development. Currently, Oilon burners can fire practically any of the known biofuels.

*"Biogases, bio-oils, ethanol, methanol – we can use any liquid and gaseous fuel available",* Tulokas says. One of the fuels on the list is green hydrogen, which is believed to have huge potential.

### **One million tonnes of CO<sub>2</sub> eliminated**

When calculating carbon dioxide emissions for energy production, the biggest factor is fuel choice. However, there is another effective way of improving emission levels: increasing the burners' adjustment range.

*“The smaller the part load at which the burner can operate, the fewer fuel-hungry boiler starts and stops there are,”* Tulokas explains. For instance, being able to continue firing at 10% load instead of 25% makes a massive difference. Increasing the burner’s control range can decrease fuel consumption by more than 10 per cent.

Another way to reduce fuel consumption is to reduce residual oxygen content in flue gas, resulting in reduced CO<sub>2</sub> emissions. The smaller the residual oxygen content after combustion, the less energy is wasted. Thanks to intensive research and development, Oilon has managed to achieve increasingly lower residual oxygen levels.

In Oilon burners, combustion is managed by an automated system which optimizes the ratio between fuel and oxygen.

The reduction in CO<sub>2</sub> emissions experienced by Oilon’s burner customers is often dramatic.

*“When an energy company from Beijing switched from coal to natural gas and Oilon burners, the company’s CO<sub>2</sub> emissions were reduced by around one million tonnes per year. This corresponds to around 10 per cent of Finland’s transport emissions,”* Tulokas says.

## Energy companies embrace heat pumps

In international scenarios, heat pumps have been identified as one of the primary solutions for reducing greenhouse gas emissions. For example, the International Energy Agency believes that by 2045, as much as half of the energy required for building heating should be covered by heat pumps. This is due to climate goals – after all, heat pumps are very efficient in utilizing renewable thermal energy from sources such as soil and outdoor air.

*“For years now, Oilon has invested heavily in heat pump product development. We can already reach temperatures of 120–130 °C, an interesting proposition especially for industrial customers,”* Tulokas says.

One of the focal points in heat pump research is the coefficient of performance, COP. It conveys how efficiently the heat pump transforms electricity into energy.

*“When producing heating and cooling at the same time, we can produce up to 10 kilowatts of energy per one kilowatt of electricity,”* Tulokas says. In ground source cooling, the COP can be as high as 20–30.

In industrial applications, Oilon heat pumps are typically used

for recycling energy. What this means in practice is that waste energy from one machine or process is recovered and reused elsewhere with a good COP.

Oilon has a wide variety of customers around the world. Data centers, wastewater treatment plants, dairies, food processing plants, and chemical industry operators all use Oilon heat pumps.

Companies operating in the energy sector are especially interested in carbon-neutral heat production. One reason for this is emissions trading, which encourages companies to switch away from fossil energy sources. The Finnish energy company Fortum is a good example. The company has procured Oilon heat pumps which will replace coal-based heating in Espoo.

If the entire 11-MW scope of the project is completed, the system will replace around 92 gigawatt hours of coal energy. This corresponds to 31,000 tonnes of CO<sub>2</sub> per year or removing 14,500 cars from Finnish roads.

## Walking the talk

For several years, Oilon has worked actively towards reducing the company’s own carbon footprint. Ground source heating is used where possible, factory roofs are now peppered with solar panels, and there have been energy system upgrades at Oilon properties.

In the fall of 2021, Oilon joined the Science Based Targets initiative (SBTi), one of the most influential climate initiatives for the private sector. Members commit to reducing emissions from their own operations in line with the Paris Agreement’s goals.

Oilon has pledged that by 2030, the company will reduce both their direct and indirect greenhouse gas emissions by least 46 per cent from the 2019 levels. At the current rate, this goal will be reached ahead of time.

*“Nearly 3,000 pioneering companies have joined the initiative. This is an excellent way to promote both internal climate goals and exercise corporate responsibility,”* Tulokas says.

Even though environmental responsibility is a key part of Oilon’s business DNA, it is equally important to develop our economical and social responsibility. “A three-legged stool will always be more stable,” Tulokas sums up.



## **Climate goals push nations and communities towards carbon neutrality**

- From the start of 2022, The EU green taxonomy will specify the criteria for classifying funding and investment activities based on their environmental impact. Already today, banks are more willing to provide funding for climate-positive projects.

- Finland has pledged to reach carbon neutrality by 2035.
- The EU aims to reach carbon neutrality by 2050. In 2030, mission levels should be 55% lower than in 1990.

# Warmth comes from the heart

*Oilon, a pioneer in clean energy technology, is gearing up for rapid growth. A human approach brings meaning to life and work, say the leaders of the family business.*

AUTHOR JUSSI LAITINEN | IMAGES SAMI REIVINEN | TRANSLATION ROBERT BROOKS





Mikael and Celia Svensk are the third generation at Oilon. Päivi Leiwo's children became Oilon Board members in 2020.

Hard work and love. Everyone deserves a job they like or even love. The success of Oilon is based on this simple philosophy, says **Päivi Leiwo**, Vice Chairman of the Board.

"I'm serious. Life's ups and downs have made me realise that a loving attitude is the only thing that matters in the end. I learned this from my mother."

Päivi Leiwo was ten when her family acquired Oilon in its entirety. Ever since she has closely followed the family business.

According to Päivi, love is the basis for building not only personal wellbeing but also the wellbeing of the entire work community. It has a great deal to do with corporate social responsibility and ethics. Päivi believes that it is important to be a part of creating that kind of organisational culture and, indeed, that kind of world.

### A face is a competitive advantage

In the space of 60 years, Oilon has risen from a two-man start-up in a garage to become a global trailblazer in clean energy technology with 380 employees on four continents. The group's turnover in 2021 was approximately 70 million euros. Oilon's combustion technology and heat pumps are known as some of the most advanced in the world. Over one million of their burners have been sold.

Within Oilon it has become apparent that a family business is more appealing in the customers' eyes than a faceless giant company or one working in the shadow of venture capitalists. Many of Oilon's customers are also family businesses.

"We work on an extremely long basis. We do not optimise our operations for the next quarter rather we think much further ahead," says **Kjell Forsén**, a new member of the Oilon team.

Forsén joined Oilon as Chairman of the Board in Autumn 2020. Previously, he worked for many years as CEO at Vaisala, another family business.

Kjell Forsén is new to Oilon – he has been Chairman of the Board at Oilon since October 2020. In this new role he follows his wife, Päivi Leiwo, who inherited the role of Chairman of the Board from her father, Ossi, in 2009. Päivi is now Vice Chairman of the Board. She has worked in the family business since she was 25 years old.

Let's open up these Oilon family connections now for the reader. The father-figure of the company, **Ossi Leiwo**, joined Oilon straight away in 1961. He rose to the position of CEO in 1974, and Oilon became a family company in the same year.

Ossi guided the company as CEO for 23 years and as Chairman of the Board for 35 years. After Ossi's retirement in 2009,



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*Hard work and love. Everyone deserves a job they like or even love. The success of Oilon is based on this simple philosophy."*

his daughter, Päivi, became Chairman of the Board. She led the board until 2020 when her husband, Kjell, took over.

The third generation is also involved: Päivi's children, **Mikael** and **Celia** Svensk are new members of the board at Oilon. They are already familiar with the operations of the family business and have completed internships at Oilon premises abroad. Mikael and Celia are both students.

Mikael and Celia are the third generation at Oilon. Päivi Leivo's children became Oilon Board members in 2020.

"A family business is a wonderful thing. It's a joy and an honour to pass on this kind of cultural heritage to one's children," Päivi says.

Päivi got her first job at Oilon as a 14-year-old during winter holidays from school. She has worked full time at the company since she was 25.

Outsiders are always interested in how decision-making works when the majority of the board are members of the same family.

"We are always of the same opinion. I know it sounds unbelievable, but decisions are made in great harmony."

## This is how you keep a customer for 20 years

An uncompromising customer-oriented approach is emblematic of Oilon. In practice, it means that the customer's requirements are understood in detail and their issues are quickly fixed.

"The difference between competitors is usually the decisive factor here: who gets the job done and who throws in the towel. The most loyal customers are those for whom we find the best solutions," Kjell says.

Combustion technology and heat pump projects are usually complicated. In those cases the customer, sales, and production teams have to speak exactly the same language.

"It's sometimes scary to think: have we really done absolutely everything possible to solve the customer's problem," Päivi says.

Clearly a lot has been done well. The 20-year customer relationships, for example, in India, China, Denmark, Russia and Singapore speak to that. They continue to this day.

The customer-oriented approach is under the magnifying glass also on CEO, **Tero Tulokas'** desk. He is currently leading a project to develop customer experience.

"We monitor many things: how easily can we be found, how quickly do we respond, what is the quality of the responses, how long do we spend at the customer's premises, and so on. The data are collected systematically and are compared with our objectives."

Tero has a particularly good background for developing customer experience: he was himself previously an Oilon customer. Before joining Oilon in 2008, he worked as the CEO of Hamina Energy where he bought burners for district heating plants from Oilon. Tero worked on these projects overseeing the work, and therefore became familiar with both the technology and how the equipment works.

"I was part of the team that commissioned the first Oilon burner back when I was 7 years old. My dad was in charge of the building services in the armed forces, and I went with him. The dual burner in question was installed in the garrison's heating installation. It is still in use," Tero says.

## During difficult years we invest in development

Another ace up our sleeve is without doubt product development. This is thanks to Ossi who was responsible for the technology in the early days of the company. Long-term CEO, Eero Pekkola (1997–2017), who followed Ossi, also focused heavily on product development. It is no coincidence that the current CEO also works as the head of product development.

During the past year of COVID-19, Oilon increased its product development budget by over 10 percent, even though the pandemic increased costs and there were challenges with sales.

"Oilon has always worked on the principle that even during difficult times we invest in developing our products. Making savings in that area would be like sawing the branch you are sitting on," Tero says.

Product development is important also during good years. Even though the classic Oilon Junior designed for small houses sold exceptionally well in its time, Ossi saw that it wouldn't last forever. That's why it's important to have a finger in many different pies.

As of 2022, Oilon's portfolio includes hundreds of burners whose power output ranges from 10 kilowatts to over 90 megawatts. The scale of industrial heat pumps reaches from 100 kilowatts to as much as 50 megawatt systems. Their delivery includes automation and control systems.

In addition, Oilon produces ground source heat pumps and their accompanying storage tanks and ventilation technology designed for real estate properties. Altogether the components and spare parts make up over 10,000 stock items. Oilon has factories in Finland, USA, Russia, and China. The company also services its own products.

At the moment, product development is focused on reducing emissions.

"The emissions goals and regulations of our customers are being tightened all the time. The world needs cleantech and we have to be along for that ride. This is a large part of Oilon's added value," Kjell says.



Oilon's CEO Tero Tulokas.

Thanks to product development, Oilon's heat pumps can magically produce 100-degree district heating from sub-zero air. There are not many who can match that.

### Climate change can be stopped

Climate warming is a megatrend that has increased the demand for Oilon's technology around the globe. Coal is being replaced by natural gas, and new advanced gas burners are needed. Sales of burners increases the need to minimise particles, nitrogen oxides and other local air pollutants. The biggest growth in burners is expected in the Low-NOx range.

The goals of states and energy companies to reduce carbon dioxide emissions is fuelling the demand for large heat pumps. For example, high-temperature heat pumps connected to district heating directly reduce the amount of coal needed. Industrial plants are looking for sensible solutions for heating and cooling, and thus reducing their carbon footprint.

"Hopefully, societies will wake up and start to slow climate warming. The solutions are within reach if we decide to take them into use. Vehicle emissions could easily be more than halved if top speeds and road speed limits were reduced. Together, technology and regulations could work wonders." Tero says.

The climate theme is also familiar to him from discussions with his own teenaged children. Dad has to think carefully about what he says.

"When I was young, I was worried about acid rain. That problem was solved. When confronted with big challenges we need positivity and optimism. That's an important message

for youngsters."

### Strong growth in industrial heat pumps

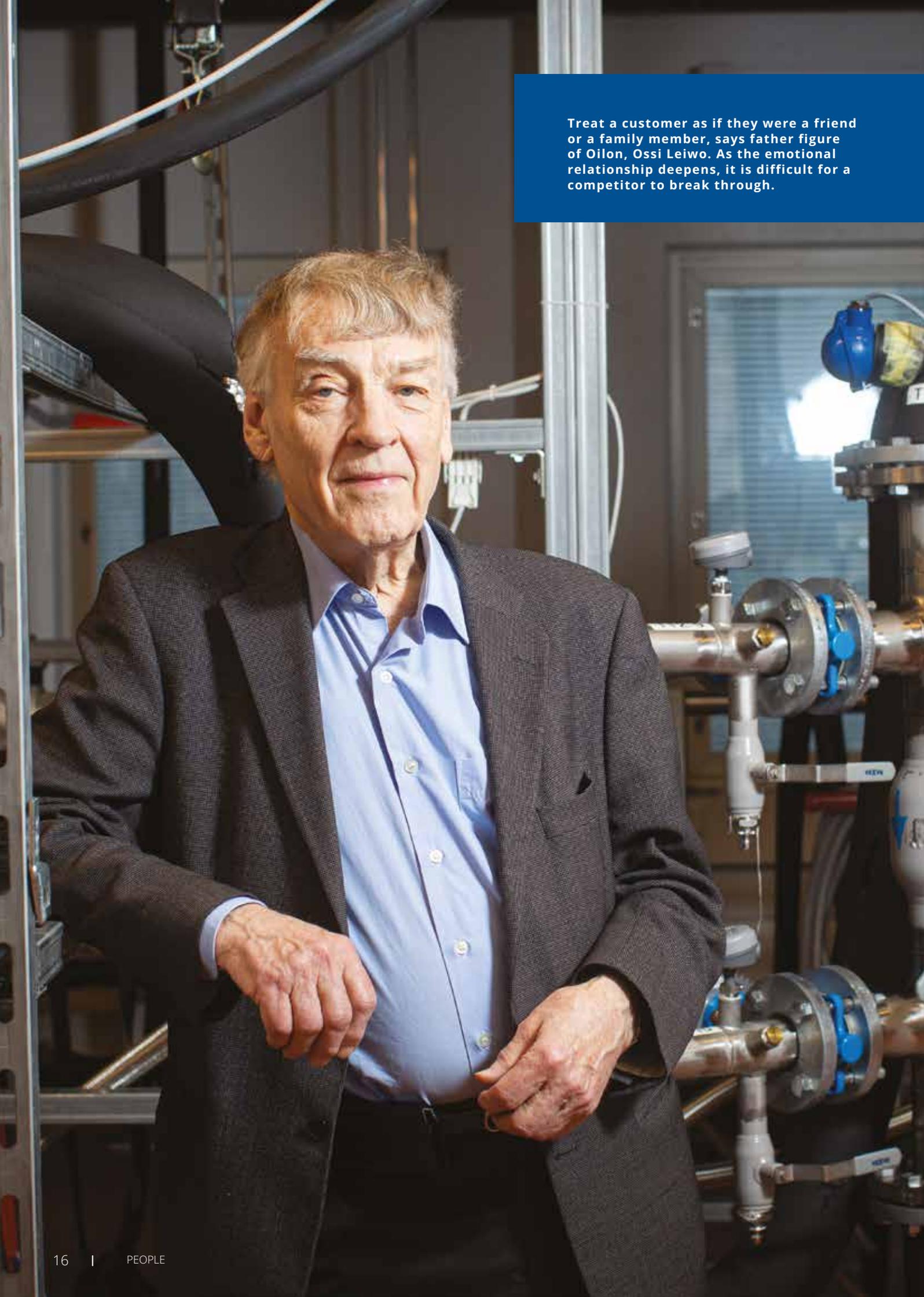
Growth has always been a part of Oilon's story, and that trend continues. Over the past two years, industrial heat pump sales have grown faster than the market. New production facilities in Kokkola, Finland enable further growth.

A good example of this new type of demand is a project in northeast China announced in February 2021. Oilon will deliver eight ChillHeat heat pumps to China's largest battery park in the city of Dalian. The battery park stores electricity, which helps wind energy integration into the Liaoning province's grid. Oilon's heat pumps capture the waste heat produced by the batteries and transfer it to the district heating network.

"This is a great project and speaks of the benefits of heat pumps in many industrial processes. Of course, it is also fantastic to be part of a project increasing renewable energy in China," Tero says.

China is almost like a second home to Oilon. They have been selling burners there for 30 years, and its factory has operated in the city of Wuxi for 20 years. Oilon's burners have cleaned chiefly the air in the capital city, Beijing.

Oilon is now establishing a strong foothold in the large heat pump market in China. There are also signs of growth in Central Europe and North America.



Treat a customer as if they were a friend or a family member, says father figure of Oilon, Ossi Leiwo. As the emotional relationship deepens, it is difficult for a competitor to break through.

# From a garage to a global pioneer

***A good business story should always start in a garage in the suburbs. Oilon was founded in 1961 when Urho Lehto and Jorma Manssila, both from Helsinki, noticed a gap in the heavy fuel oil burner market. Their first office was in a garage in Maunula, Helsinki. Ossi Leiwo soon joined them as a funder and technical expert. The company moved to the city of Lahti where the Board and product development department can still be found.***

AUTHOR JUSSI LAITINEN | IMAGES JUHO PAAVOLA | TRANSLATION ROBERT BROOKS

Ossi is known as the father figure of Oilon. He ran the family business for 35 years and retired in 2009. The 87-year-old Ossi still closely follows Oilon's business operations.

But let's go back to the 60s for a moment:

"In those days, yards in Lahti were full of piles of firewood. Slowly the firewood disappeared as oil replaced wood as a form of heating," Ossi remembers.

Oilon took a firm hold of this development. First, Oilon imported burners to Finland from Denmark, amongst other places. However, they didn't work sufficiently well, so Ossi wanted to start to produce the burners himself. The company CEO, Urho Lehto took care of marketing.

"We were a great double act. My job was to run the company and make sure that the equipment worked. Urho was the gifted showman," Ossi says.

Soon Oilon started to sell light oil burners, which quickly became the engine of growth.

"At first, we tried importing them. Same thing: they didn't work, so we started to produce them ourselves. Necessity is the mother of invention," Ossi says.

## **The customer is your friend**

The first oil burners we exported to the Soviet Union in 1965. Next came Sweden, Denmark, Norway and Germany. Ossi didn't let success get to him, however. He realised early on

that the oil era wouldn't last forever. Oil burners were soon joined by gas burners and later heat pumps.

"I became interested in heat pumps already during the oil crisis when the price of oil went sky high. This was in 1979."

The company has come a long way from the garage. Many things have changed along the way, but respect for the customer has remained.

"A good customer relationship is reminiscent of a friendship or even family. Trust is the basis for everything, just like buying a used car. When trust and an emotional relationship are established, it is incredibly difficult for a competitor to break through that."

Climate emission reduction objectives guarantee the demand for clean energy technology. Oilon is clearly part of the solution: its burners and heat pumps reduce carbon dioxide emissions by millions of tonnes every year.

When Oilon was founded, no-one knew about climate change. It was believed that nature cleansed itself. Nowadays, Ossi Leiwo is extremely worried about the state of the climate.

"Earth Overshoot Day gets earlier every year. Nowadays, it is already in August. It feels good that Oilon offers solutions for climate challenges and that the emissions can be reduced to such an extent that no-one has to drastically reduce their quality of life."

What about the future of Oilon?

"Thankfully, that's someone else's problem."



# Local focus fosters global reach

***What do the city of Wuxi in China, Thomasville in Georgia, United States, and Kokkola in Finland have in common? They each are home to an Oilon factory. In each of these locations, Oilon products – industrial heat pumps and chillers, domestic heat pumps, burners and combustion systems – are made to the same unified standards, ensuring the high quality Oilon is known for.***

Oilon is a family-owned global energy and environmental technology company renowned not only for advanced R&D but also high quality, which is something customers around the world can depend on. The Oilon group operates a total of six production plants around the globe, each managed centrally from the company headquarters in Lahti, Finland.

“While our factories in different parts of the world ensure that we can respond to local market needs, our strong group-level steering ensures uniform quality and uniform processes everywhere in the world,” says the group’s Production Director **Sakari Kokkonen**.

Additionally, group-level steering keeps the company’s organization efficient.

“As data moves more freely in globally unified systems, it is easier to handle day-to-day activities and manage the continuous development of our operations,” Kokkonen says.

While it is important to make sure that that Oilon’s core values are followed equally regardless of the market, it is important to understand that in some cases, achieving a true global reach requires local presence and awareness. One of the benefits of local presence is that it allows companies to respond to customer needs as effectively as possible.

“Having production capabilities around the world allows us to quickly respond to specific demand in each market. This keeps the quality, price, and availability of our products at a good level,” Kokkonen says.

Another factor that requires solid local awareness and presence is understanding the local regulatory landscape.

“Oilon is an international manufacturer with the necessary certificates for all major markets,” says the group’s Sales and Marketing Director **Sami Pekkola**.

Pekkola goes on to tell how many of the company’s competitors operate only in a single market, while Oilon deliberately responds to the requirements and challenges of the wider market.



“In the marine industry, for example, there are twenty or so different standards, and we have certification for most of them. In the US market, in turn, we need to be compliant with UL\* requirements”, Pekkola says.





Meeting all of these standards has been a long journey. “When all the planning, engineering, testing, and the approval process itself is considered, it took us a couple of years to receive the UL approval,” Pekkola says.

Once the certificates were in place, Oilon still had to find customers for their products. Oilon has never been one to find the easiest way out.

“If our home country had a large internal market like the one enjoyed by our German competitors, we could naturally focus on that alone. As a Finnish company, we had to pretty much immediately head out into the world,” reminisces Pekkola, who has some personal experience in the matter. Even though Sami’s years in China are now behind him, his work still takes him around the world.

“Serving customers with a global scope is a big investment, but then again, it has also really boosted us and our products forwards. The local requirements in different markets have chal-

lenged us to constantly refine our products and make them more versatile. Now we can proudly say that we are one of the top players, for example, among industrial heat pump manufacturers,” Pekkola says, smiling.

And this is what Oilon is known as: a leader and a pioneer. The latest co-operative agreement for industrial heat pumps was concluded with one of the big names in the industry, Trane Technologies. Trane has agreed to expand their portfolio with an Oilon-developed family of industrial heat pumps. The units will be produced in Oilon’s new production plant in Kokkola, Finland, which has been in operation since November 2021.

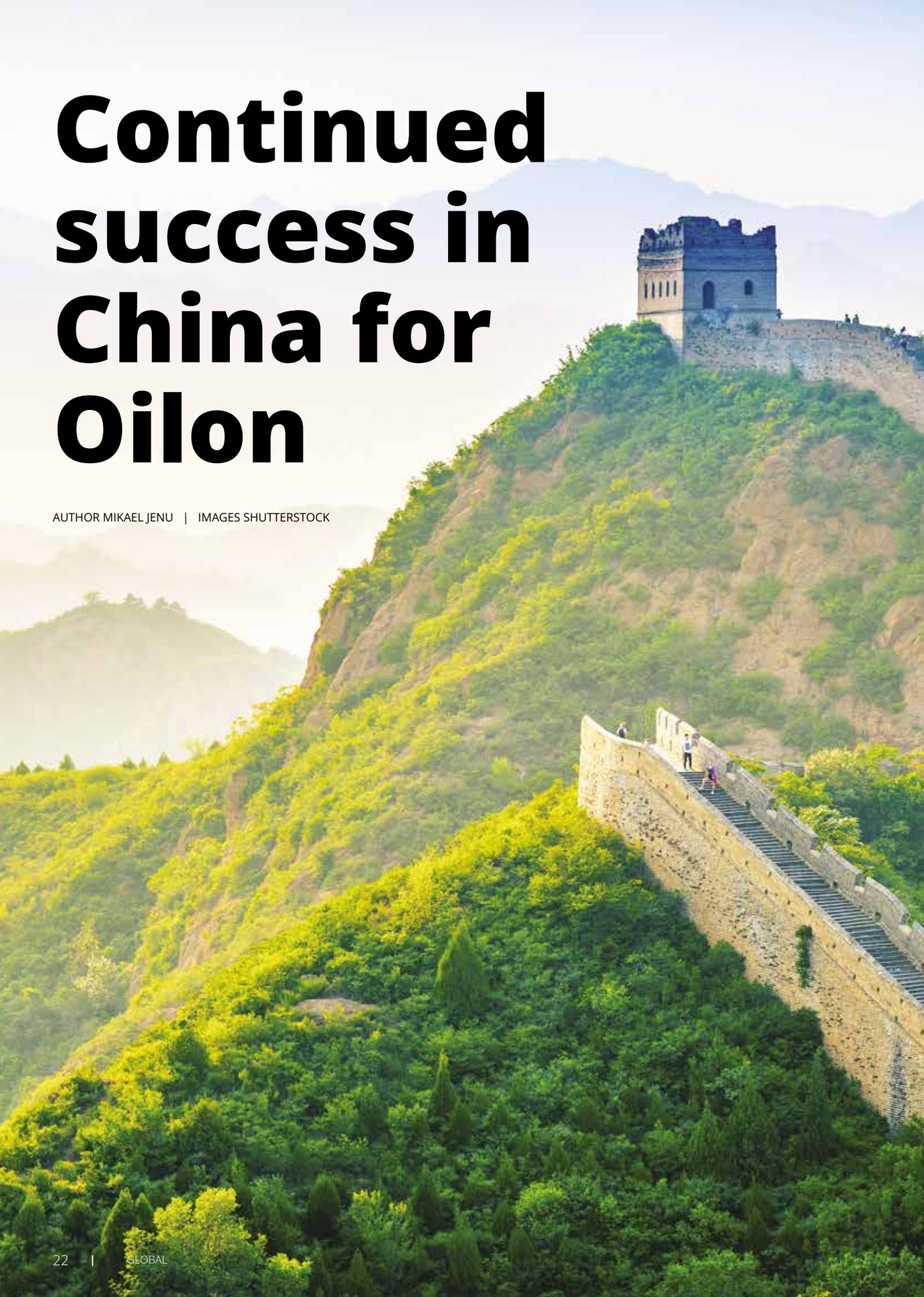
“Oilon has been an industry pioneer in developing environmentally friendly technologies. The new co-operative contract is a well-deserved price for our long-term efforts and for listening and responding to different market needs,” Pekkola says

*\*The UL marking is a safety and quality label for products used in the North-American market. The marking is issued by Underwriters Laboratories Inc., a testing and certification body operating in North America.*



# Continued success in China for Oilon

AUTHOR MIKAEL JENU | IMAGES SHUTTERSTOCK



China has the strictest and the most ambitious emission targets in the world. This doesn't mean that less energy is needed in China or other industrialized countries, quite the opposite. Industrial activities and energy production are undergoing a revolution, and emission requirements will continue to become more stringent.

Oilon completed their first burner sales in China in mid-90s. The company made their first forays into the market with Finnish-made burners, but it didn't take the company longer than till 2002 to open their own factory in China. A robust dealer and service network was built around the factory. Today, the network covers the entire country.

The Chinese energy revolution has its roots in Beijing with China's largest district heating company, Beijing District Heating Group. The company provides heating for the city's 19.6 million inhabitants. They are also responsible for ensuring the safety of energy production and distribution by keeping the equipment stable and in good working condition. At the first stage, the company switched over from coal to natural gas and, more recently, to Low NO<sub>x</sub> solutions – burners with exceptionally low nitrogen oxide emissions.

“Combustion technology is increasingly being supplemented with new clean and renewable energy forms.” The benefits of this transition are starting to be felt not only in Beijing but also in other major cities and everywhere in China.

“Traditionally, burners have been the go-to Oilon product in China. These days, however, industrial heat pumps have also become an increasingly popular article,” says **Ville Pekkola**, General Manager, Oilon China.

Strict emission requirements have created a lot of pressure in the Chinese market, resulting in very rapid development in combustion technology. Already in 2014, the Chinese Boiler Association recognized Oilon as the best foreign brand in the industry. Oilon's latest Ultra Low NO<sub>x</sub> burners can already reach emission levels lower than 9 ppm (18 mg/Nm<sup>3</sup>).

In 2016, as part of the latest five-year plan, the Chinese government launched an initiative for atmospheric emission prevention and monitoring with even more stringent requirements. Beijing District Heating Group was quick to respond to the new policy. That same year, the company installed the latest Oilon ACE burners in the Wangjing Lantian district heating

plant, the first company in the world to do so. The company achieved emission levels lower than 15 ppm NO<sub>x</sub> (30 mg/Nm<sup>3</sup>), which is close to the most stringent boiler emission requirements in the world.

The result of years of development, Oilon ACE is a robust Low NO<sub>x</sub> burner with extensive flame adjustment possibilities. ACE burners can be used in hot water and steam boilers, hot air generators as well as different process heating applications. Thus far, Oilon has delivered around 1,400 ACE burners to the Chinese market. Of these burners, more than 100 were delivered to Beijing District Heating Group. ACE burners are used extensively in district heating plants in Northern, North-Western and North-Eastern China, especially in the Beijing–Tianjin–Hebei region. The burner model has received recognition especially for its modern appearance, steady operation, and, naturally, its extremely low NO<sub>x</sub> emissions.

Industrial production is another field where reducing NO<sub>x</sub> emission is becoming an increasingly important goal. To reach extremely low NO<sub>x</sub> emissions, ACE burners utilize various advanced technologies, such as combustion air and fuel staging as well as internal and external flue gas recirculation.

“Oilon has a solid footing in the Chinese market, and currently, we're expecting strong growth especially in heat pump sales. Oilon's Low NO<sub>x</sub> combustion technology is well known and highly respected in China, as we offer top-of-the line technology that results in substantial emission reduction,” Pekkola says.

The latest combustion technology needs to be supplemented with other solutions that increase process efficiency. It is essential to get the most out of the heat produced. Historically, it has been notoriously difficult to utilize waste heat from industrial processes. For instance, the temperatures in cooling circuits tend to be too low for direct use, which means that the bulk of the excess heat has been evaporated to the atmosphere. With modern heat pumps, this waste heat can be used in different applications, such as district heating.

“Our job is to help plants switch over to cleaner energy solutions and, in the future, to renewable sources of energy. It is likely that heat pumps will play a more prominent role in the future, as they are essential in achieving China's ambitious emission targets,” Pekkola continues.





# Oilon to deliver industrial heat pumps to the largest battery farm in China

OILON'S EQUIPMENT WILL COOL DOWN THE BATTERY FARM'S BATTERIES AND FEED THE WASTE HEAT TO THE LOCAL DISTRICT HEATING NETWORK.

AUTHOR JUSSI LAITINEN | IMAGES OILON | TRANSLATION MIKAEL JENU

Oilon will deliver industrial heat pumps to a battery farm located in the city of Dalian in North-Eastern China. Once complete, the battery farm will serve as a large store for electricity. Construction is currently underway, with an expected completion date of 2022. The equipment supplied by Oilon will cool down the farm's batteries and transfer their waste heat to the city's district heating network.

"It's exciting to participate in a huge project like this, especially as it will cut down on the local CO2 emissions and help integrate more renewable energy into the power grid. We expect strong growth in China and in the international heat pump market," says **Ville Pekkola**, General Manager, Oilon China.



The Dalian battery farm will help integrate more wind energy into the Liaoning province power grid. The battery farm will be completed in 2022. The image shows Oilon China's technical expert Yuan Hanling, Oilon China's General Manager Ville Pekkola, and Gong Jiyu, General Manager, Dalian Hengliu Energy Storage Power Station.

Once completed, the battery farm will be the largest one in China and one of the largest in the world. The farm's capacity will be 200 megawatts and storage capacity 800 megawatt hours. It will act as a highly responsive operating reserve for the rapidly increasing number of wind turbines in the region. In practical terms, the batteries will feed electricity to the grid when there is no wind. Thanks to the flexibility provided by the batteries, more wind turbines can be integrated into the power grid.

Furthermore, the battery farm will reduce the peak capacity required within the Dalian region by around 8 per cent. Traditionally, this peak capacity has been produced using fossil fuels, which means that using batteries is an effective way of reducing carbon dioxide emissions.

Oilon will provide Dalian Henliu Energy Storage Power Station Company Ltd. with a system that includes eight Oilon Chill-Heat high-temperature heat pumps installed in containers. The system will provide cooling for the farm's vanadium flow batteries. At the same time, the heat pumps will produce district heating, which will be sold to Dalian Thermal Group, a local district heating company.

This delivery is set to follow the first stage of construction, where Oilon was selected as the equipment supplier based on a variety of tests. The two key criteria for the contract were heat pump performance and reliability. When used for combined heating and cooling, the system will have a coefficient of performance (COP<sub>tot</sub>) of 10.

Oilon's high temperature heat pumps are used in a wide range of different facilities and applications around the world. Thanks to their ability to produce temperatures up to 120 °C, they are well suited for district heating.

"The largest battery farm in China is a good example of the Chinese government's goal of achieving carbon neutrality in 2060. The amount of highly variable wind and solar power is increasing rapidly within the Chinese power grid. Battery farms will provide much-needed flexibility. For China, power storage is the key to quickly increasing the nation's clean energy production. Similar battery farms will be eventually required everywhere. This represents massive potential in the heat pump market", Pekkola says.

The battery farm consists of large vanadium redox flow batteries. The batteries store electricity by utilizing ion reactions within an electrolyte solution that flows inside tanks. Compared to lithium ion batteries, vanadium batteries are fire safe and have a longer useful life. The batteries can withstand more than 20,000 recharge cycles without loss of capacity, and they can be charged and discharged at the same time. In recent years, vanadium batteries have become increasingly popular in grid-connected battery farms around the world. The Dalian battery farm is a national demonstration project approved by the Chinese government. Its purpose is to test the use of vanadium flow batteries in power grids.



# Continued growth and success for Oilon in the Americas

***North and South America are two extremely different markets with one thing in common: huge potential for growth. In the north, there is a lot of mature industry and ambition, and, in the south, growing food markets and lots of space for innovative business.***

AUTHOR MIKAEL JENU | IMAGES SHUTTERSTOCK

Many companies have been attracted to North America by its well-developed industry and uniform market. Oilon saw their opportunity already in the 90s, and would soon start burner deliveries to the USA. There is plenty of room for growth: in the United States alone, there are thousands of boilers currently in need of a burner replacement. Furthermore, U.S. companies have never shied away from investments – instead, even large-scale overhauls are typically completed in one go.

In South America, Oilon's burner sales span decades. The company's Brazil sales office has been in operation since 2012. As Oilon burners are widely used across South America, spare part sales are a key part of the company's operations in Brazil. Currently, one of the most interesting sectors is the food industry. Industry operators need not only burners but also reliable and energy-efficient refrigeration solutions. Already today, there is promising growth in heat pump sales.



## Growing sales require bigger facilities

Oilon's U.S. factory opened its doors in 2014. Located in Thomasville, Georgia, the facility serves customers in the United States, Canada, and across South America.

The company's sales are growing rapidly in the USA, and so is the company's U.S. team. In 2021, Oilon USA relocated to a new facility, doubling the floorspace to 6,000 sq. m. The old factory had become cramped: Storage and dispatch had been a bottleneck for a long time, and there wasn't enough room for customer training.

The new facility will allow Oilon to keep pace with development and shorten the time from order to delivery. New boilers have also been purchased to speed up burner testing.

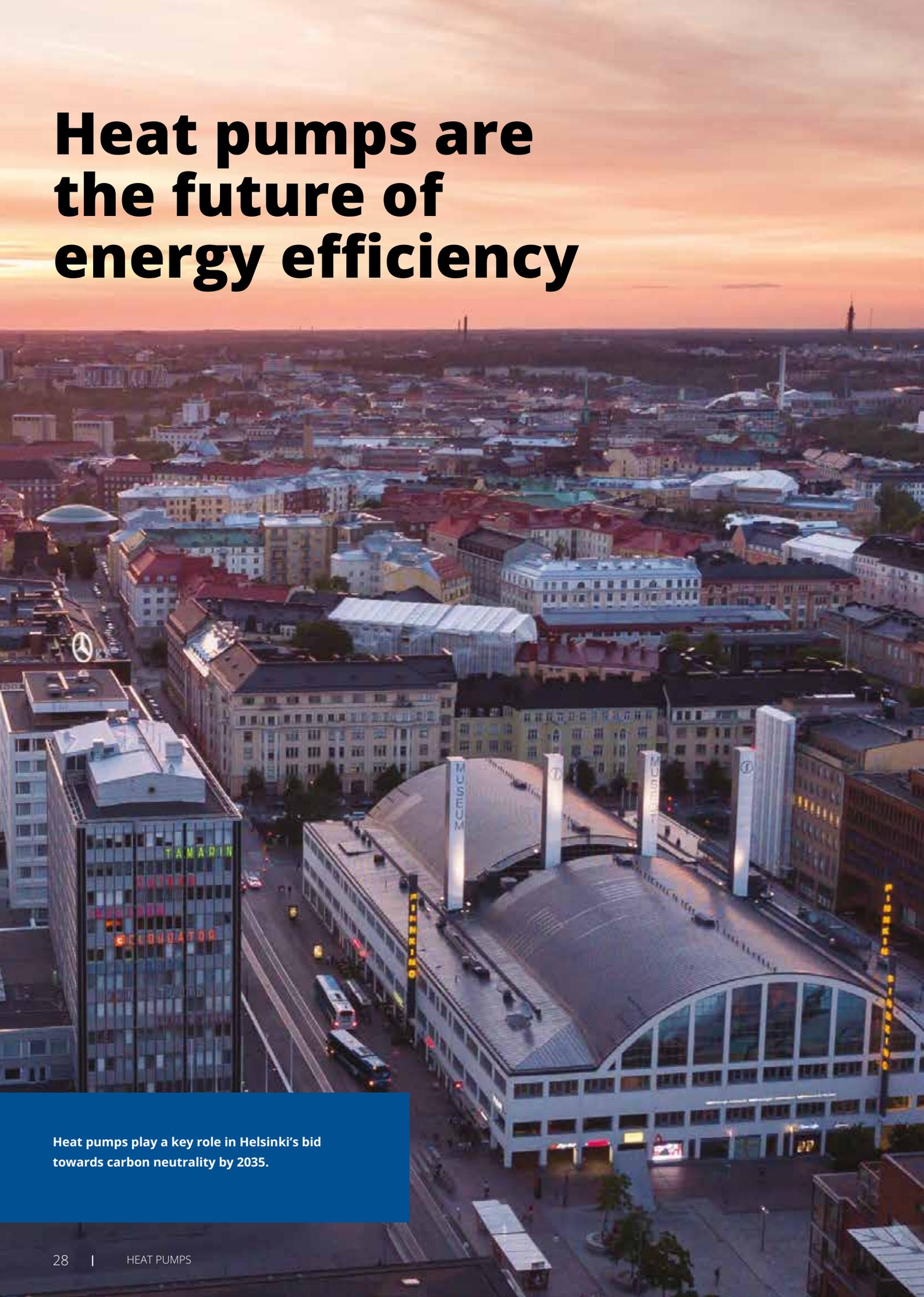
The company's latest move in North America was the introduction of industrial heat pumps, a product family Oilon has had in its global portfolio for years already. The UL and CSA approval process for the heat pumps is currently underway, with an expected completion in 2023.

The company's U.S. business is managed by Oilon Group's Sales and Marketing Director **Sami Pekkola**.

"We offer a full range of environmentally friendly and energy-efficient solutions, reliable commissioning services, maintenance and servicing as well as training for our customers in North, Middle, and South America," Pekkola says happily. "To support our sales in the Americas, we have hired a lot of new staff to the USA, Canada, and Mexico."



# Heat pumps are the future of energy efficiency

An aerial photograph of Helsinki, Finland, taken at sunset. The sky is a mix of orange, pink, and light blue. The city below is densely packed with buildings of various architectural styles, including many with red-tiled roofs. In the foreground, a large, modern building with a curved glass facade and a prominent arched entrance is visible. To its left, a tall, dark building has 'TAMARIN' and 'ELEVATOR' written on its facade. The overall scene is a mix of old and new urban architecture.

Heat pumps play a key role in Helsinki's bid towards carbon neutrality by 2035.

***In the future, heat pumps will take care of space heating. This is an opinion shared by many industry specialists and voiced by Helen Oy's CEO Juha-Pekka Weckström in a recent interview. Oilon has worked hard for nearly two decades to turn this vision into reality and now, the time is close at hand.***

AUTHOR AND IMAGES JOUKO LAMPILA | TRANSLATION MIKAEL JENU

When talking about heat pumps, the image that often comes to mind is an air-to-air heat pump sticking out of the wall of a house. Another alternative is a ground source heat pump that extracts energy from a borehole to provide heating for a single-family home. This article won't discuss either of these. Today's topic is large industrial heat pumps and heat pump systems which provide heat for industrial processes and district heating or provide heating and cooling for large buildings and properties. These solutions have a central role in the Oilon Group strategy.

### **From something pieced together into an industrial product**

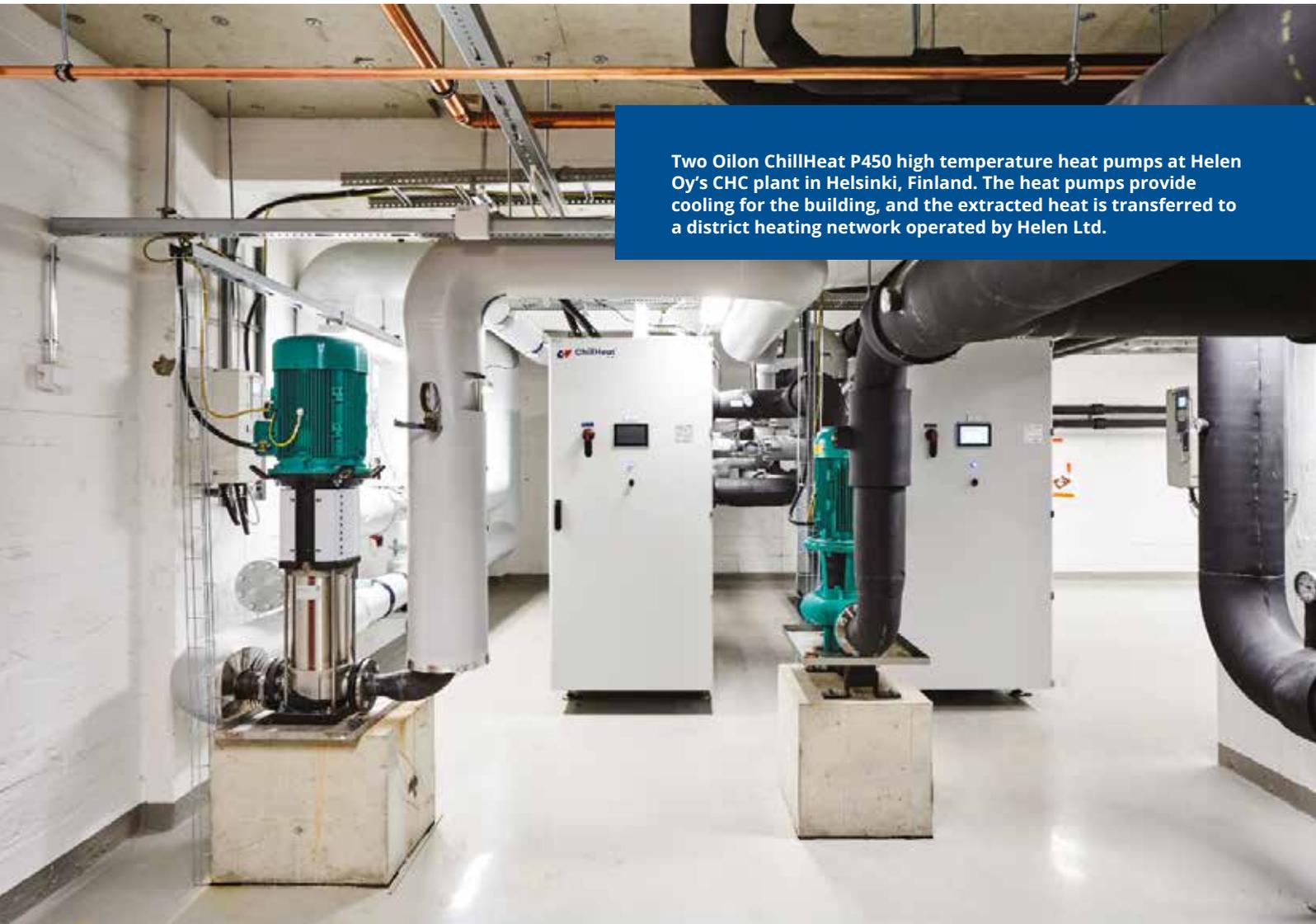
The story begins in the 2000s with Scancool, a refrigeration contractor providing services for refrigeration plants. The people in the company noticed how much waste heat these

plants produced and started developing technology for extracting and using this waste heat. This was something no one had really done before. Oilon had already seen where the energy industry was heading and had started the pioneering work for utilizing heat pumps. Large industrial-scale heat pumps quickly found their way into Oilon's strategy, and soon, Scancool became part of the company.

Early on, only small numbers of heat pumps were made. Each unit was a "project machine" tailored to a specific purpose. The components were selected case-specifically, which meant that large-scale production wasn't feasible. The upside for these projects was that they provided experience of different solutions and understanding of industrial processes, such as which temperatures could be utilized, the temperature levels required, and the variation in loads. This experience would serve as capital for the future.



**Martti Kukkola is responsible for industrial heat pump market development at Oilon.**



Two Oilon ChillHeat P450 high temperature heat pumps at Helen Oy's CHC plant in Helsinki, Finland. The heat pumps provide cooling for the building, and the extracted heat is transferred to a district heating network operated by Helen Ltd.

Oilon has a long tradition in machinery manufacturing, and manufacturers want to make products, not individually tailored machines. Encouraged by their early experiences, Oilon started to invest heavily in product development, production quality, and productized solutions.

Before a product is launched for sale, it will undergo extensive testing that will ensure its operability and performance. If testing reveals a weak link such as an incorrectly sized component, the component will be replaced in the machine being tested and in all future machines of that model series. Only products ready for their intended purpose will be offered for sale. As there is no such thing as a perfect product, quality improvement is a continuous process which results in new and improved products.

### Industrial heat pumps are a proven and accepted solution

"In recent years, industrial heat pump sales have grown rapidly," says **Martti Kukkola**, Oilon's chief business officer for heat pumps and chillers. "Recently, our annual sales figures

have nearly doubled, and we have just quadrupled our production floorspace and capacity." The company's industrial heat pumps are produced in Kokkola, Finland. Exports account for two thirds of the sales.

"Our main markets are Northern Europe, Great Britain, and China. The Central and Eastern European markets are showing good growth, and we have gained good traction in South America, for example."

According to Kukkola, Finnish customers play a key role in the company's success. As an example he mentions an air-to-water heat pump system that is currently being built for Fortum. Once complete, the Verno plant will produce district heating and cooling for the city of Espoo in Finland. With a capacity of 11 MW, it will be the largest of its kind in the country and will help Fortum replace some of its coal-based energy production. The project's 1.3-megawatt pilot phase is already complete.

"Oilon has long-standing co-operation with all significant energy companies in Finland," Kukkola continues. "Right now, many companies stand to gain a lot from combined heating

and cooling (CHC), which means using a single machine to produce both heating or cooling at the same time.” Traditionally, large buildings have been chilled with water chillers, and the waste heat has been simply dumped into the atmosphere. A CHC machine will not only provide cooling but also transfer the extracted heat to a district heating network or the building’s hot water system.

“All heat pumps give out heat in one place and cool down another area, this is just how heat pumps work. In CHC solutions, we simply put both the heating and cooling provided into good use. For Helen Oy, we have completed around 20 CHC projects and several are underway, just to give an example.”

## **Oilon offers an extensive range of industrial heat pumps**

Oilon’s range of industrial heat pumps can be divided into three product groups based on their compressor technology. Each group consists of several machines with different capacities.

The Oilon ChillHeat RE product family utilizes scroll compressors. Each unit is equipped with 2–4 compressors, and the available capacity range is 100–1,000 kW. The units are especially suited for producing flow temperatures up to +65 °C from a cold, around 0 °C input stream.

The eight ChillHeat P series heat pump models have 1–6 piston compressors. The available capacity ranges from 30 to 1,000 kW. P series machines are set apart by their ability to reach extremely high temperature output levels, all the way up to +120 °C. The units have a good coefficient of performance even at partial load, and they offer a wide capacity range.

Similarly to the RE and P series units discussed earlier, the 100–1,000 kW ChillHeat S heat pumps are housed in an enclosure. The heat pump housing is never wider than 911 mm, allowing units to be brought in to their installation site through normal doorways.

In addition to these units that have a housing, the S series includes larger models all the way up to the 5 MW capacity range. S series heat pumps utilize screw compressors, and they are well suited for high-capacity applications with a maximum flow temperature of around +85 °C. These machines allow operators to utilize industrial waste heat on a large scale.

## **How big is big enough?**

“It’s been wonderful to witness the increasing demand for high-capacity heat pump systems first hand,” Kukkola says. “Most of the projects we’ve reviewed have been in the 200-megawatt range. However, there was this 20-MW project in Germany where the request of quotation specified that each heat pump must have a capacity of at least 10 MW. It

baffles my mind why the capacity of a single heat pump would matter.

“What does matter is the COP, maintenance costs, space requirements, partial capacity range, redundancy, delivery time, and contract price. When these factors are ranked, what difference does it make if the system has two or 20 heat pumps? In big projects, this is something we have to discuss time and again. Sadly, often the projects have been at such an advanced stage that the customer hasn’t dared to question the pump-specific capacity requirement.”

According to Kukkola, a large heat pump is not necessarily a more economical solution. As a large heat pump is always a specialty product, things like spare parts can be expensive. In either case, the customer will need to commit to a single supplier. A combination of smaller heat pumps will always have a wider capacity range than a single large one. The space requirements are typically not that different either, especially in terms of volume.

## **System expertise and extensive control capabilities**

One of Oilon’s strengths in the heat pump business is the company’s knowledge of different systems. This gives Oilon the ability to connect several heat pumps, often of different types, into an economical and optimized system that operates at the required temperature level and with the required capacity. In some cases, the entire system has been built into an insulated container that can be delivered on site with a truck, enabling rapid turnkey installation.

The key to designing complex systems of several heat pumps – “trains” as they are referred to within the company – is Oilon Selection Tool (OST). The internally-developed software tool allows engineers to examine how different combinations of heat pump models operate when connected in series and in parallel. The tool allows engineers to simulate the system’s operation accurately with different settings: at different inlet and flow temperatures for the hot and cold side and at different load points. For example, an S series heat pump produces heat at a high capacity and a medium temperature. The temperature can be boosted by P series heat pumps, which provide higher temperatures and expand the system’s operating range.

Oilon ChillHeat heat pump systems can reach capacities of 50 MW or more. Regardless of the size, the customer needs to provide only a single inlet and outlet connection point; what lies between those points is a solution engineered by Oilon and built by the company with an Oilon-authorized installation partner.

For managing individual heat pumps and extensive heat pump systems, Oilon has developed the Oilon Global Monitoring (OGM) system. In this system, heat pumps are connected to a data network and send their operating data to the cloud. Users can quickly view information about potential problems,

and engineers can utilize historical data for remote servicing. Customers can create reports covering device utilization, energy output, and the cost savings generated.

### Top three uses for industrial heat pumps

Based on Oilon's experiences, there are three major applications for industrial heat pumps, each with slightly different requirements. The applications are heating and cooling for large buildings and properties, utilizing industrial waste heat and generating process heat, and producing district heating and cooling.

During summer months, large buildings require cooling. The recovered heat can be used to heat up the domestic hot water used in the building. In winter, the same system can be used to recover heat from the building's exhaust air and return it to the building's heating system. These applications don't require especially high temperatures and the required capacity is usually in hundreds of kilowatts, which means that RE series heat pumps suit this purpose well. RE heat pumps can easily produce temperatures over +60 °C even from a cold inlet stream.

Industrial waste heat can be utilized effectively with S series heat pumps. If the application requires especially high flow temperatures, P series heat pumps can be used either alone or connected in series with S series models. In solutions where only one heat pump can be used, the heat pump must be able to operate at both high and very low loads. P series heat pumps have a wide capacity and temperature range, S series models operate in a narrower range.

Producing district heating and cooling with heat pumps is becoming increasingly popular. District heating typically needs a big "boost", which means that a high increase in temperature is required. P series heat pumps fit the bill exactly, especially in small-scale plants. These types of projects tend to involve a CHC solution. In large-scale projects that require a lot of capacity, a combination of S series and P series heat pumps can be used.

### Heat pumps and the future of energy efficiency

"Heat pumps are one of the best solutions for utilizing renewable energy in the future," Kukkola says. "In Europe, building heating and cooling accounts for half of all energy consumed; in Finland, heating alone accounts for a quarter." The lion's share of this heating energy is produced using some type of combustion. To achieve carbon neutrality, we will need to substantially reduce combustion and utilize renewable energy sources.

Temperatures in renewable energy sources, such as the soil and air, tend to be low. With a heat pump, these low temperatures can be boosted economically to the relatively high level required by heating.

Additionally, heat pumps can be used to recycle energy. When a building needs cooling, heat is generated for use elsewhere. If there is any heat in wash water or sewage, the excess heat can be extracted and utilized. In industrial operations, the range of potential applications is massive.

"We've got to remember that electricity plays an ever-increasing role in our society," Kukkola continues. "In many cases, electricity is the cheapest form of energy available, and heat pumps deliver many times over the energy they consume. It is easy and economical to store heat.

"Where we stand now is only the beginning! We're about to enter a very busy and interesting decade – the decade of heat pumps." Industrial heat pumps are central to the Oilon strategy, and the business is about to expand by an order of magnitude.





# Oilon and LeaseGreen – a partnership that lasts

OILON AND LEASEGREEN DEVELOP PRODUCTS AND SOLUTIONS TOGETHER FOR LARGE AND COMPLICATED PROJECTS.

AUTHOR TUJJA BRAX | TRANSLATION MIKAEL JENU | LEASEGREEN

LeaseGreen is a Finnish company specializing in improving the energy efficiency of large properties. The company offers a comprehensive service package which includes technical and economical analysis, turnkey modernization of building systems, and AI-driven building performance optimization. LeaseGreen's services reduce a building's energy consumption and CO2 emissions by 10–60 per cent. The company is known in the industry as a trailblazer in innovative solutions and a workplace for nice engineers.

“We chose Oilon as a partner because they have a wide product range for large and complicated projects and the will to develop products and solutions together,” says LeaseGreen's CEO **Jonni Ahonen**.

“Thanks to our long-standing co-operation with Oilon, our customers can be sure to get both a reliable system and both companies' extensive heat pump know-how at their disposal,” Ahonen continues.

For LeaseGreen, working with a domestic supplier is not an aim in itself, but the years have shown the value of a partner with production facilities and an R&D team close at hand.

“Oilon is quick to react to problems, which is important to us,” Ahonen says. “Sometimes there are challenges in heat pump commissioning, but Oilon responds to queries quickly, which makes everything go smoothly. After commissioning, the heat pumps have worked exactly like high-quality products should,” Ahonen continues.

“LeaseGreen is an energy efficiency specialist. For our shared customers, this means big savings, increased property value and, naturally, successful projects completed together. It's a pleasure to work with the LeaseGreen team, because they handle things with exceptional professionalism,” says **Petri Virta**, Oilon's export director for ground source heat pumps.

# Heat pumps help to reduce emissions

HEAT PUMPS GENERATE SAVINGS BY REDUCING THE NEED TO BUY INCREASINGLY EXPENSIVE EMISSION PERMITS.

AUTHOR AND IMAGES JOUKO LAMPILA | TRANSLATION MIKAEL JENU

In the 2015 Paris Climate Change Conference, a binding global climate agreement was reached. The goal of is to limit the rise in average global temperature to well below 2 °C. Additionally, the parties pledged to endeavor to take measures that will limit global warming to under 1.5 °C.

The world's carbon sinks capture more CO<sub>2</sub> than release it into the atmosphere. The biggest natural carbon sinks are the soil as well as forests and oceans. They are estimated to lock up 9.5–11 gigatonnes of CO<sub>2</sub> annually. In 2019, when converted to CO<sub>2</sub>, the world's total greenhouse gas emissions amounted to 50 gigatonnes.

Finland has pledge to reach carbon neutrality by 2035, EU by 2050, and China by 2060. These are ambitious goals. This means that we can release only as much CO<sub>2</sub> to the atmosphere as our carbon sinks take up. After 2035, Finland should already start to capture more carbon than the country releases. To reach zero emissions, nations and companies worldwide must work towards recovering the entire world's greenhouse gas emissions.

This goal can be reached only through wide-ranging changes in living, transportation, energy production, industry, and consumption. Companies, municipalities, and ordinary people are already taking action at their own initiative. Technological development is making low-emission solutions increasingly competitive. This is also one of the most important goals for Oilon's product development.

## Emissions trading

Emissions trading is an EU-wide scheme where CO<sub>2</sub>-generating plants have the obligation to own a number of emission permits for each unit of emissions they produce. These emission permits are allocated to operators either free of charge or through auctions. Operators can trade emission permits with one another at their own discretion within the EU carbon market.

The purpose of emissions trading is to keep the greenhouse gas emissions from industrial and energy-producing plants as well as aviation within the European Economic Area within limits specified for the entire European Union's emissions trading sector.

The emissions trading scheme covers more than 40 per cent of the EU's greenhouse gas emissions, and, in Finland, slightly less than half.

Plants covered by the emissions trading scheme must hold a greenhouse gas emissions permit issued by a competent authority. The permit comes with monitoring and reporting obligations, such as the obligation to annually report the number of emissions permits that corresponds to the plant's emissions for the previous calendar year. One emission permit is equal to one tonne of CO<sub>2</sub>. The scheme covers large industrial facilities, plants with a total nominal heat capacity greater than 20 MW, and internal aviation within the EEA. In Finland,

on top of that, the system includes 20 MW and smaller district heating plants.

## **Emissions permit prices at an all-time high**

Emission permits are a major cost for companies. The more expensive emissions permits are, the more effectively they steer companies towards low-emission production. In Finland, for example, higher emission permit prices have considerably increased the cost of using peat as a fuel. This price increase has the same effect as if the tax rate on peat had multiplied.

In the EU, the emissions trading scheme was introduced in 2005. After this, there has been great fluctuation in permit prices. The initial price was near 30 euros. For some time, the price was at zero and in 2010, it equalized to around EUR 5. Recently, emission permit prices have increased dramatically to between 60 and almost 100 euros (per tonne).

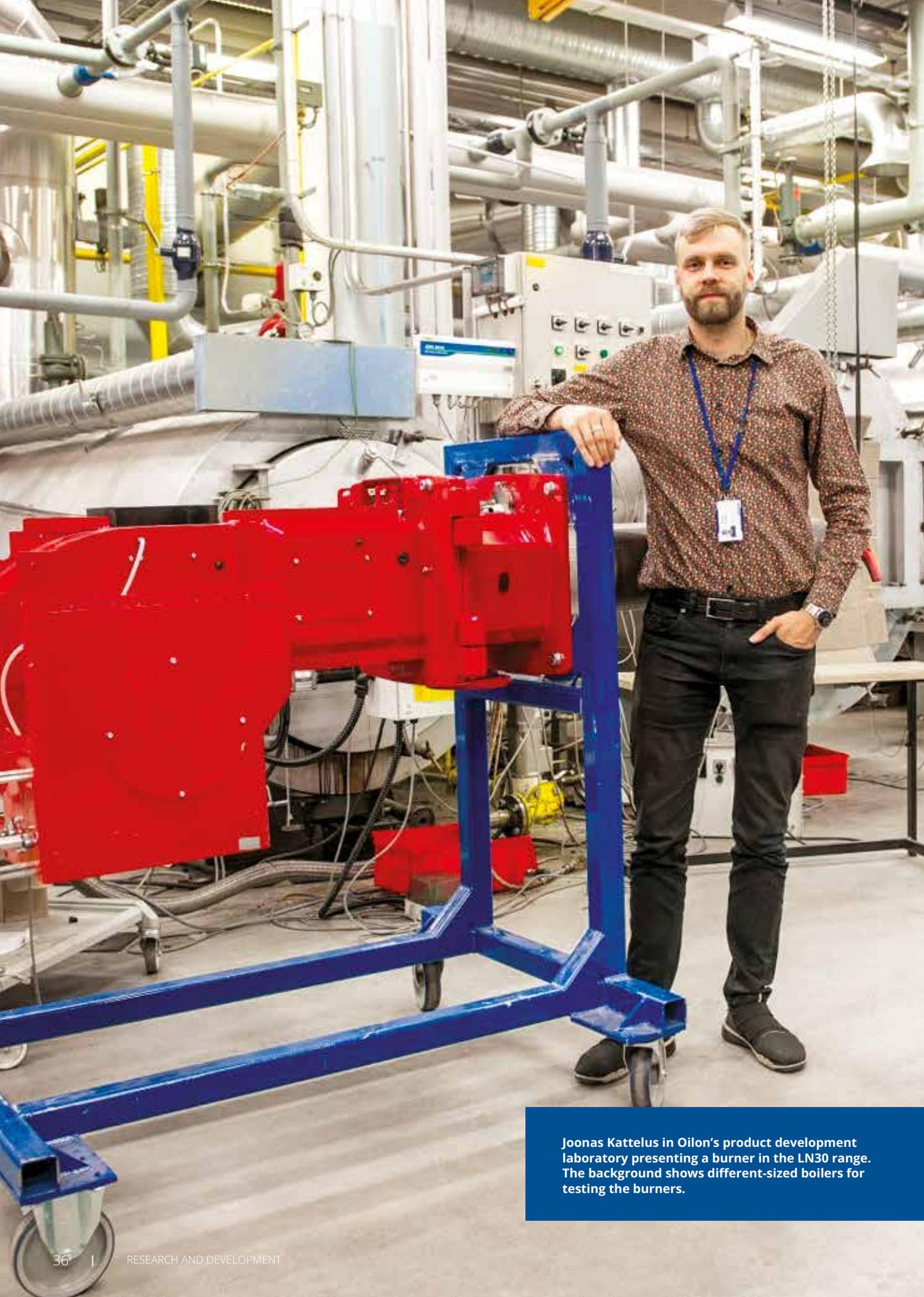
## **Heat pumps – the peak of modern climate solutions**

Achieving carbon neutrality requires many different solutions, and heat pumps play a significant role in this. Industrial heat pumps have a multitude of applications in industrial production. They are well-suited for district heating and cooling, and they work well in large properties. They allow companies to recycle energy or alternatively tap into an increasing number of renewable energy sources. Industrial heat pumps have a high capacity and a high temperature output, and they are well-suited for applications that require accurate capacity control and a wide operating range.

Naturally, there are technical and economical limitations to where heat pumps can be used. Each case must be analyzed separately. To achieve the goal of carbon neutrality, we must also utilize low-carbon fuels and other renewable alternatives, such as hydrogen.

The amount of low-emission or emission-free energy needed is huge. In light of climate goals, fossil-based energy sources are still used too often. Oilon's innovations and R&D are, and will continue to be, a major factor in achieving emission-free and low-emission energy production.

Oilon has completed heat pump projects for a wide range of different use cases, and the technology advances in leaps and bounds. As a solution, heat pumps have matured. The use of large, energy-efficient heat pumps is becoming commonplace, even though widespread adoption is still several years ahead. Heat pumps have a wide range of applications. In the future, they will be a big help in reducing emissions.



Joonas Kattelus in Oilon's product development laboratory presenting a burner in the LN30 range. The background shows different-sized boilers for testing the burners.

# CFD modeling helps develop the best natural gas burners in the world

*Computational fluid dynamics, CFD in short, is primarily used for numerical modeling of gas and liquid flows. CFD enables Oilon's experts to simulate different processes, such as a burner's operation far ahead of creating a physical prototype. This speeds up development, reduces costs, and results in a better product overall.*

AUTHOR AND IMAGES JOUKO LAMPILA | TRANSLATION MIKAEL JENU

Nations around the globe are increasingly reducing their NO<sub>x</sub> emissions. This requires continuous advances in combustion and boiler technology, but there is also another factor to consider: which fuel to use. Oilon has made developing Low-NO<sub>x</sub> combustion technology a priority. Another focus area are alternative fuels that meet the criteria for sustainable development. In recent years, the company's efforts have focused especially on low-NO<sub>x</sub> solutions for natural gas. Let's take a look at one example.

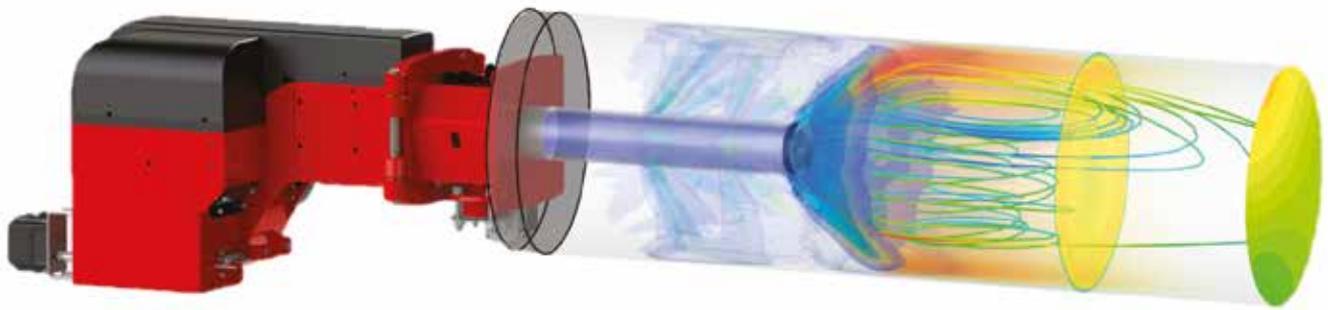
## LN30 Ultra low NO<sub>x</sub> - a new family of burners

"This is where the magic happens, in the combustion head," says **Joonas Kattelus**, Oilon's chief technology officer. "We have recently introduced a new Monoblock product family, the LN30. When firing natural gas in these burners, we can achieve the record-breaking Ultra Low NO<sub>x</sub> level, below 2.5 ppm (5 mg/Nm<sup>3</sup>). These are premix burners with a long, tubular combustion head. The smallest member in the family has a maximum capacity of 900 kW (3.4 MMBtu/h) and the largest, 4.9 MW (18.6 MMBtu/h). These are industrial burners and oc-

cupy the lower-to-average capacity position in the Oilon product portfolio.

"There have been other premix burners on the market for years already. However, what we are now offering is considerably better than any previous models. For example, let's compare our new solution to premix mesh burner technology where the fuel-air mixture is homogenized as much as possible by feeding it into the furnace through a tight mesh. Our LN30 burners have no mesh; instead, we use a long tube with nozzles at one end for feeding the fuel and air into the furnace for combustion."

Kattelus explains that a mesh-based burner requires extremely clean combustion air, as otherwise impurities would clog up the mesh in the combustion head. In practice, effective filtration is a must, and the filter itself would require frequent cleaning. This technology cannot be used in dusty environments. The burners in the LN30 series have no filter; no filter is required, as there are no small openings prone to clogging.



## Low NO<sub>x</sub> emissions at low residual oxygen levels

“One significant new characteristic of the LN30 series is its reduced residual oxygen (O<sub>2</sub>) level,” Kattelus continues. “In traditional premix burners, the 9-ppm NO<sub>x</sub> limit can be achieved only with a 7–8% residual oxygen level. With these burners, we can achieve this with an O<sub>2</sub> level as low as 4–6%. At 6–8% O<sub>2</sub>, we can go as low as 5 ppm. Naturally, our goal was to get the residual oxygen level as low as possible, as this improves efficiency.”

“We were able to fine-tune our premix very close to perfection, resulting in a major boost in performance. The mixing process was developed entirely with CFD. By selecting the right shape for the combustion head and the nozzles, and with proper nozzle placement, we managed to keep the flame extremely compact. The flame fits well even in a smaller furnace.”

Kattelus elaborates that a perfect premix will also reduce the

risk of CO formation. Typically, when NO<sub>x</sub> levels go down, CO levels go up. With a perfect premix, all CO is consumed and the problem is avoided.

Another benefit of a long combustion head is that it promotes internal flue gas recirculation (IFGR) in the front section of the furnace. In this process, inert flue gas is mixed into the fuel–air mixture. This cools down the flame, reducing the formation of thermal NO<sub>x</sub> compounds and enabling the use of a lower O<sub>2</sub> content in the flue gas.

“Traditionally, flue gas mixing has been achieved using external flue gas recirculation (FGR), where flue gas is fed into the furnace from the outside. However, external FGR has limitations that can be problematic for some customers in certain situations.”

According to Kattelus, Oilon has verified its new burner family’s delivery reliability and performance with extensive laboratory testing. The products have also been UL-certified. The

burner equipment for the first field case in the United States have been commissioned, and more deliveries are currently underway. Oilon has delivered LN30 products to other markets for some years already, with good results.

Oilon has patents pending for the new technology in Europe and China. The technology is already patented in the USA.

### **CFD modeling is the key to excellent engineering and development**

For nearly 15 years, Oilon has utilized CFD calculation in burner engineering and development. Today, CFD is one of the main development tools used at Oilon. In the early years, CFD calculations took a long time to process and tended to deliver inaccurate results, which meant that the tool was relegated to a supportive role. However, as processing power increased, computational models matured and the company's know-how expanded, CFD became more viable, and has now served several years as the company's primary development tool.

"Today, we develop the combustion technology used in our products largely using CFD simulation. Typically, the values we get are pretty much exactly the same as those we measure from the actual physical prototype," Kattelus says. "We used to make several prototypes during burner development, and testing each a long time. Now, thanks to CFD, we get better results faster and with fewer costs, even in a landscape rife with increasingly stringent requirements. On one hand, the boiler industry tends to keep furnace dimensions as small as possible to reduce costs, and on the other, legislation aims to reduce emission levels. There is a conflict between these two, as a smaller furnace will increase NO<sub>x</sub> emissions."

"Naturally, both boiler performance and the amount of NO<sub>x</sub> emissions depend on both parts of the sum: the burner and the furnace. Emission levels depend on several parameters, but the main rule is that improving the transmission of heat from the flame to the furnace will always reduce NO<sub>x</sub> emissions. There are many ways to improve this, such as optimizing furnace dimensions, furnace corrugation, and minimizing the use of refractory. CFD modeling allows us to work with boiler manufacturers to ensure the best possible result."

### **Unique CFD know-how and an excellent laboratory**

Over the years, Oilon has acquired an extensive experience and a unique know-how in utilizing CFD modeling. This expertise is supported by excellent laboratory facilities in the company's product development center. These two form a combination that is hard to beat: measurements from the laboratory are used to develop CFD models, which, in turn, are verified and further tested in the laboratory. According to Kattelus, the company has the world's most advanced natural gas combustion models, especially when it comes to emission modeling.





**NO<sub>x</sub> emission reduction project  
in a 10-MW steam boiler**

*Customer: SSAB Europe Oy,*

*Hämeenlinna, Finland*

*Burners: Oilon ACE GT-8A, 8 MW per burner,  
two burners per boiler*

# Increasingly stringent environmental regulation requires burner modernization

***Many industrial and power plants and processes are subject to extremely stringent NO<sub>x</sub> emission requirements that can be impossible to meet with aging burners and combustion systems. If the boiler and other equipment is in good working order, swapping out the old burner is a smart and economical solution.***

TEXT TUJJA BRAX, MIKAEL JENU | IMAGES OILON | TRANSLATION MIKAEL JENU

Burner modernization extends the life of boiler assemblies, reduces emissions, and, in many cases, results in considerable savings in fuel costs. There are a lot of aging combustion systems around the world, which means that a rapidly-increasing number of companies are initiating modernization projects.

The scope of these projects varies – modernization may involve the boiler system's burners, automation, valve gear as well as filtering, pumping, and preheating units. The bill can add up quickly, which means that the final solution must stand the test of time and account for new emission requirements,

operational safety norms, and other regulatory changes in the future. Perhaps the most important example is the regulation of nitrous oxygen (NO<sub>x</sub> compound) emissions.

## Oilon ACE

Oilon ACE burners utilize extensive internal flue gas recirculation (IFGR) which reduces nitrogen oxide output to a fraction of a traditional burner's emission levels. The burner family's capacity range is 3,000–90,000 kW, and the burners come equipped with a modern automation system for control, remote monitoring, and support functions.

Oilon ACE is a perfect solution for burner modernization projects. The burners work especially well in water tube boilers. An ACE upgrade typically results in a considerable reduction in emissions without having to install a bulky and costly flue gas recirculation (FGR) system. Typically, the burners have met the emission requirements with room to spare, making them a lasting solution as emission requirements continue to tighten. In Europe, Oilon has completed modernization projects with several leading partners.

The proven Oilon ACE burners have been joined by Oilon ACE 2. The new ACE burners feature a redesigned combustion head that makes them a better fit for fire tube boilers. With light fuel oil, the burners can achieve emission levels under 200 mg/Nm<sup>3</sup>. Oilon has patents pending for the new burners in China, the USA, and Europe.

## An SSAB steelworks in Finland modernizes their burners

When SSAB Europe's steelworks in Hämeenlinna could no longer get spare parts for their aging burners, it was clear that the plant's burner equipment had to be updated. According to SSAB Europe's service engineer **Teemu Ryhänen**, the second argument for modernization was that NO<sub>x</sub> emission requirements were becoming increasingly stringent.

"We selected Oilon's Low NO<sub>x</sub> burners thanks to their low emissions and the potential to reduce emissions even further," Ryhänen says. "Our first burner modernization project is already complete, and the second one will follow later. Our co-operation with Oilon has been smooth in both projects, and everything has gone as agreed. We're very happy with the Oilon burners," Ryhänen continues.



### NO<sub>x</sub> emission reduction project in a 58 MW hot water boiler – Budapest, Hungary

*Customer: Ganz Danubius Hungaro Steel Kft.*

*Burners: Oilon ACE GT-16A,*

*16.5 MW per burner, four burners per boiler.*

*The burners are located at the bottom of the boiler.*





Oilon ACE burner that fires 100% hydrogen.

# Hydrogen plays a key role in the green transition

*To combat climate change, we need new ways of producing energy. Hydrogen has attracted perhaps the most widespread interest as a potential replacement for fossil fuels. Oilon's experience in hydrogen combustion spans more than three decades.*

AUTHOR KAI SORSA | IMAGES OILON | TRANSLATION MIKAEL JENU

Hydrogen may be the most abundant element in the universe, but on Earth, it doesn't exist on its own freely. There are many ways to produce hydrogen. It can be derived from fossil fuels or produced through electrolysis: by splitting water molecules with electricity. Additionally, hydrogen is produced as a by-product of chemical processes. More than 95% of the hydrogen currently produced is derived from fossil fuels, and the rest from water with electricity through electrolysis. Producing hydrogen through electrolysis has an efficiency of around 60–70%. If the converted hydrogen needs to be transformed back to electricity e.g. through combustion, the round-trip efficiency of the process is only around 30%. Consequently, hydrogen is not an efficient alternative for using electricity directly.

Due to its environmentally friendly nature, hydrogen produced with renewable electricity is referred to as green hydrogen. The amount of green hydrogen we will need in the future is enormous. To illustrate, the amount of renewable electricity required to produce enough green hydrogen to cover the current production of fossil hydrogen alone surpasses EU's annual electricity consumption. This would mean 4,000 TWh or around 160,000 new major 6 MW wind farms. A good starting point, to be sure.

In the fight against climate change, we need to use all the tools at our disposal. Everywhere around the world, there are major initiatives on large-scale green hydrogen production. The European Commission estimates that in the next three decades, European governments will invest a total of EUR 470 billion into renewable hydrogen.

In the green transition, hydrogen is seen to have great potential as a form of energy storage that would even out production spikes in renewable energy production. In practical terms, this would mean producing hydrogen with surplus electricity generated by decentralized solar plants and wind farms. This hydrogen would act as storage for the energy produced.

## Hydrogen combustion – special considerations and applications

“Oilon has more than 30 years of experience in firing fuels that contain hydrogen. We offer several hydrogen-compatible burner models,” says Oilon's Chief Technology Officer **Joonas Kattelus**.

Oilon's entire range of burners for gaseous fuels is well suited for firing mixtures with up to 20% hydrogen content without

modification. If hydrogen content is increased to 20–70 per cent, a nozzle structure specifically designed for the purpose must be used. At higher levels (70–100%) and when there is variation in the fuel's hydrogen content, a comprehensive solution designed for hydrogen combustion is usually required.

Compared to natural gas, 100% hydrogen has a lower density and energy content per unit of volume. Pure hydrogen is extremely flammable, and it burns very intensely with a hot flame. Hydrogen needs to be fed into the flame zone in a way that prevents damage to the burner's nozzles and structures. It is also important that the fuel stream and its flow rate is appropriately aligned and controlled. There are some other limitations, such as that premix burner solutions are unsuitable for firing 100% hydrogen. As hydrogen is extremely flammable, safety is an absolute priority. All gas pipes must be equipped for purging the lines with non-combustible gas. The most common solution is to use nitrogen to flush hydrogen out of the pipes when the burner is switched off.

## Hydrogen as a fuel

“Oilon has designed and delivered hundreds of burners for different hydrogen mixtures across the globe. Hydrogen content varies from a few per cent all the way to 100 per cent. Over the years, we have accumulated extensive expertise in the field. Thanks to this, we are well equipped to utilize hydrogen in burner combustion,” Kattelus says.

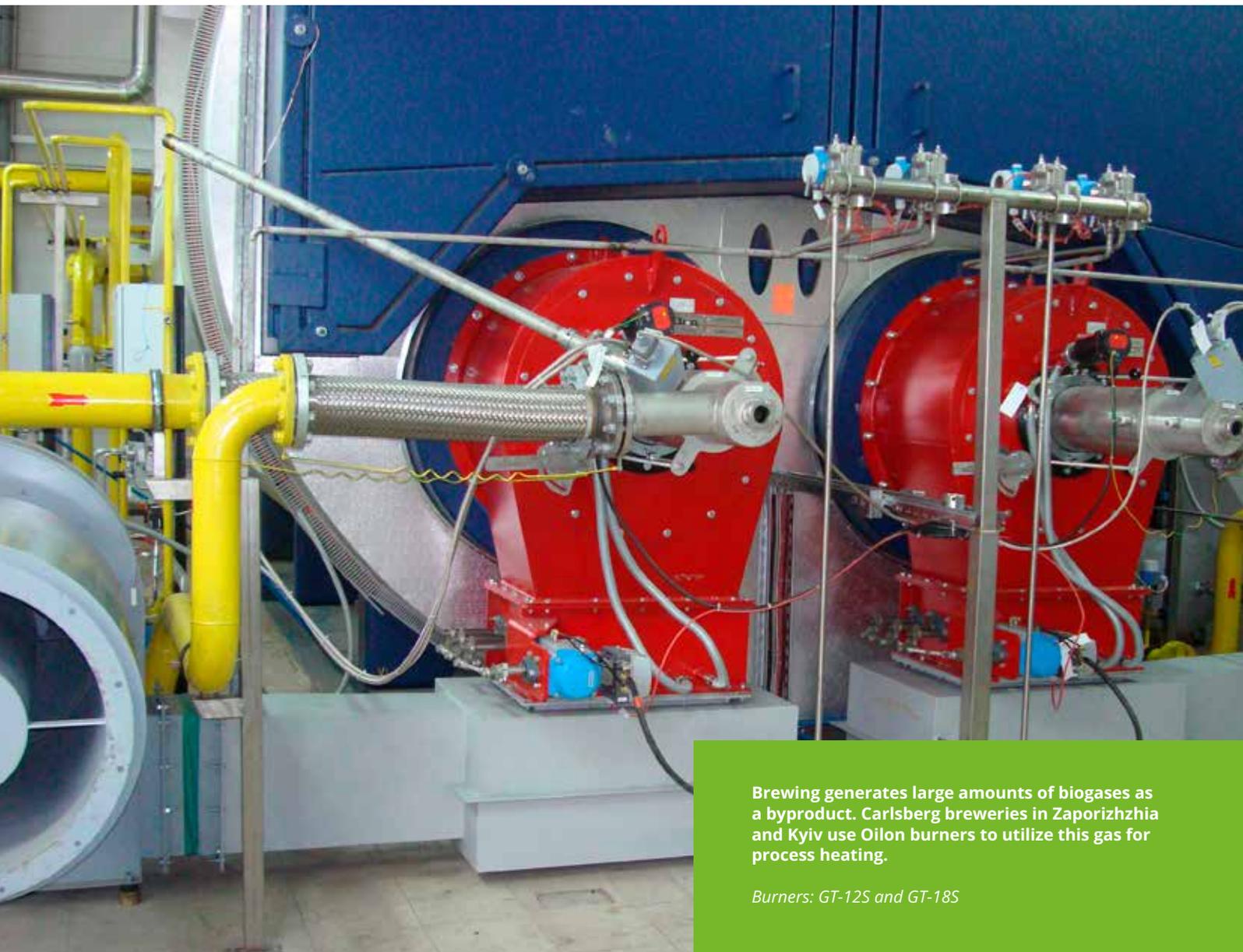
A typical use case for hydrogen combustion is the metal industry with its extremely high production temperatures. Another sector that uses hydrogen as an energy source is the chemical industry, where hydrogen is produced as a byproduct. For oil refineries, Oilon has delivered several projects where the fuel used is refinery gas. The chemical composition of refinery gases tends to vary greatly, which means there are large fluctuations in hydrogen content.

In steel production, coke oven gas (COG) generated as part of the process and blast furnace gas (BFG) are commonly used as a source of energy. COG has a high hydrogen content, while BFG's hydrogen content is lower. Some of the COG and BFG projects Oilon has completed have involved extremely strict emission requirements. Additionally, Oilon has extensive experience in town gas combustion. Depending on the production process, the hydrogen content of the fuel can vary greatly, the highest levels being 70 per cent.

# Sustainable fuels – Oilon solutions for a better future

*In the dialogue on renewable energy, the concepts that come up most often are solar power, wind power, hydro-electric power, and ground-source heating. However, there are many applications where biofuels are an unbeatable solution.*

TEXT TUJJA BRAX, MIKAEL JENU | IMAGES OILON | TRANSLATION MIKAEL JENU



Brewing generates large amounts of biogases as a byproduct. Carlsberg breweries in Zaporizhzhia and Kyiv use Oilon burners to utilize this gas for process heating.

*Burners: GT-12S and GT-18S*

Currently, fossil fuels have a tremendously strong position in the energy sector, while the trend for the next decades is clearly shifting towards sustainable solutions. Oilon's product development stands at the forefront of utilizing renewable energy solutions.

Examples of sustainable fuels include biogases, bio-oils, and pyrolysis oils produced from biomass. As such, there is nothing new about using renewable fuels. At pulp mills, for example, the black liquor produced as a byproduct of the pulping process has been used for decades to produce heat and electricity.

Pyrolysis oil is a liquid substance created through dry distillation of organic material. When made of biomass, it is called either bio-oil or wood oil depending on the raw material. Typical sources of pyrolysis oil include wood, bark, straws as well as rice and grain chaff.

Pyrolysis oils are a challenging fuel. They have a high acidity and water content, and their viscosity and other physical properties tend to be unstable. Additionally, many pyrolysis oils have a high content of solids, requiring special solutions for combustion.

"Oilon has a long experience in firing different pyrolysis oils and the necessary competence to select the best materials and the best combustion technology for the purpose. For example, when using these fuels, selecting the right fuel pump is critical. Many bio-oils have a low heating value, and we consider each site's and application's characteristics to determine the right combustion technology solution for the site," says Chief Business Officer **Tapio Murtonen**.

Additionally, there are renewable oils whose properties are nearly identical with fossil oils. Hydrotreated vegetable oil (HVO), for example, is a type of high-quality renewable diesel that has the same high heating value as light fuel oil. However, an HVO flame emits different wavelengths of light than a fossil

oil flame, which means that it is important to select the right flame detector for the flame. Oilon has performed extensive research on HVO combustion in their own product development laboratory. Thanks to extensive testing, Oilon has now the competence for selecting and adjusting flame detectors and other burner components for different fuels.

Renewable oils are becoming more widely available. As combustion technology allows companies to create and promote sustainable energy solutions, an increasing number of oil companies are bringing new renewable liquid fuels to the market alongside their traditional products.

Biogases are another fuel with massive potential. Biogas can be produced from all organic matter, the most important sources being waste, crop residue, and wood. Additionally, biogas is generated as a byproduct of agriculture and processes such as wastewater treatment. As a fuel, biogas is excellent: it has a good heating value and low particulate emissions. Refined biogas is completely free of heavy metals.

Biogas is produced from waste and field residues through anaerobic digestion. Organic matter, such as municipal bio-waste, manure, or straws, is placed in an oxygen-free environment. Bacteria break up the matter, releasing methane and, in most cases, byproducts that are suitable for use as fertilizer. In other words, both the energy and the nutrients can be recovered and returned to circulation.

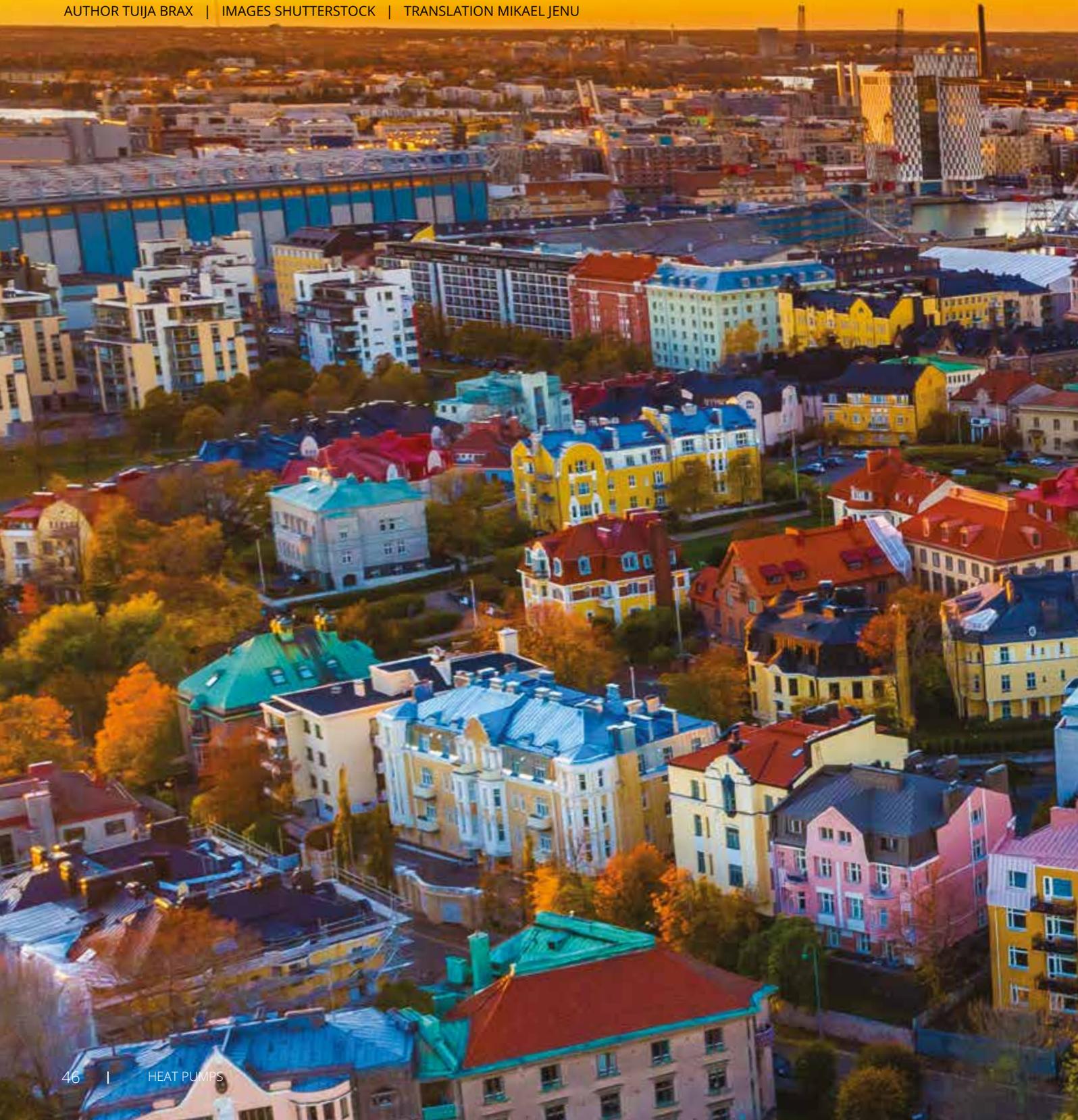
Wood-based biogas is typically produced through gasification. Woodchips, forest residues, and other materials are heated up at a high pressure in a low-oxygen environment, releasing gas from the material. This gas can be further refined into a fuel that was nearly the same composition as natural gas. Naturally, compared to other biofuels, this type of biogas is relatively easy to adopt.

Whatever the energy source may be, Oilon's professional sales team makes it easy for customers to select an energy-efficient burner and sustainable solution for their needs.

# More than 50,000 ground source heat pumps installed

HEAT PUMPS ARE AN ENVIRONMENTALLY FRIENDLY, ECONOMICAL, AND EFFICIENT WAY TO IMPROVE LIVING COMFORT.

AUTHOR TUJJA BRAX | IMAGES SHUTTERSTOCK | TRANSLATION MIKAEL JENU





Ground source heating is an environmentally friendly and economical way to improve living comfort year round. Heat pumps provide heating in the winter and can provide cooling in the summer. The popularity of ground source heating is based on its low operating costs, convenience, and small environmental footprint.

## **Oilon is a major Finnish ground source heat pump manufacturer**

Our heat pumps represent holistic, environmentally friendly thinking across all seasons. A ground source heat pump works by extracting thermal energy from the ground. This energy is then used to heat your home and provide hot water.

As the sun heats up the earth, solar energy is stored in the ground. A ground source heat pump can utilize renewable solar energy stored in soil, bedrock, or even a body of water. A ground source heating system will typically reduce a property's heating costs by 65–75 per cent.

Oilon ground source heat pumps are produced and sold under two Finnish brands, Oilon and Lämpöässä, both bearing the Key Flag symbol awarded for Finnish-made products. Our long-standing experience and expertise serve as a foundation for extensive Finnish heat pump know-how, which has allowed the company to create new model series. Oilon's product development and testing represent the best in the business.

## **Quality through workmanship**

Oilon's ground source heat pumps are manufactured in the company's upgraded heat pump factory in Lapua, Finland. High product quality is ensured through long-term product development and by testing each unit carefully at the factory. Based on our extensive experience and thanks to our wide product range, we can help our customers select an optimal ground source technology for every need. Our professional dealer network covers the entire Finland, and Oilon exports a significant number of ground source heating products to European countries every year.

Oilon and Lämpöässä heat pumps are developed for the Nordic climate. This requires exceptional understanding of the harsh requirements set by different seasons on both heating and cooling. Our decades-long experience and more than 50,000 climate-friendly heat pumps installed guarantee that what you get from us is a safe and reliable heating solution and an optimal solution for your need. Oilon and Lämpöässä heat pumps can be used both in new houses and renovated homes as well as large properties.

Our goal is to help our customers reduce their environmental load. By listening to the wishes and needs of our customers and by developing reliable heat pumps, we have achieved a new level of convenience and climate-friendliness in heating.



Saija Hakonen is the CEO of Suomen Kiinteistölämpö Oy.

# Local presence is a key value for our customer

TEXT TUJJA BRAX, MIKAEL JENU | IMAGES SAIJA HAKONEN | TRANSLATION MIKAEL JENU

Suomen Kiinteistölämpö Oy's recipe for success is a combination of wanting to be best company in the business and having a reasonably-sized organization. Since 2014, the company has installed hundreds of Oilon heat pumps in Finnish homes, apartment buildings, and industrial properties under the leadership of CEO **Saija Hakonen**. In recent years, the company's focus has started to shift from single-family homes to heating solutions for large properties.

Hakonen used to serve as a software engineer in IT, but eventually decided to join the HVAC company owned by her husband, Jarkko. This is how Suomen Kiinteistölämpö was born. Today, the company serves customers with seven employees and a large number of subcontractors. The organization is just the right size to be agile, allowing the team to respond to varying customer needs. There is no lack of ambition in the company, which ensures their position a forerunner in developing innovative solutions and turning them into reality.

Local presence is a key value for Suomen Kiinteistölämpö. From the company's standpoint, Oilon is an easy and reliable alternative.

"It's quick and easy to get heat pumps and parts to the customer site, which means that our backs are always covered and everything is much simpler. We can have a clear conscience when giving out promises such as warranties, as we have good knowledge of the company's product, production, and operation," Hakonen says.

Suomen Kiinteistölämpö and Oilon have been partners for more than 10 years. Co-operation between the companies is tight. For example, the partners develop products together based on customer needs. The companies' long shared

history and intimate understanding of each other's business makes product development easier. Additionally, problems can be solved quickly, and the partners are able to provide excellent support both to customers and each other.

"We've received excellent technical support from Oilon, and their sales support really shines. Oilon's share of our co-operation works really well," Hakonen continues. "Of course, communication can be challenging at times, but luckily we always know who to turn to, so things get done quickly."

Hakonen feels that the best thing about her work is continuous development.

"It's great to think up new strategies in a sector like this. Our partnership with Oilon goes even deeper – for example, we forward customer leads to each other," Hakonen says.

**Petri Virta**, Oilon group's export director for ground source heat pumps, praises Suomen Kiinteistölämpö's growth and willingness to engage in co-operation. When both partners are willing to work out solutions together, customer satisfaction is improved.

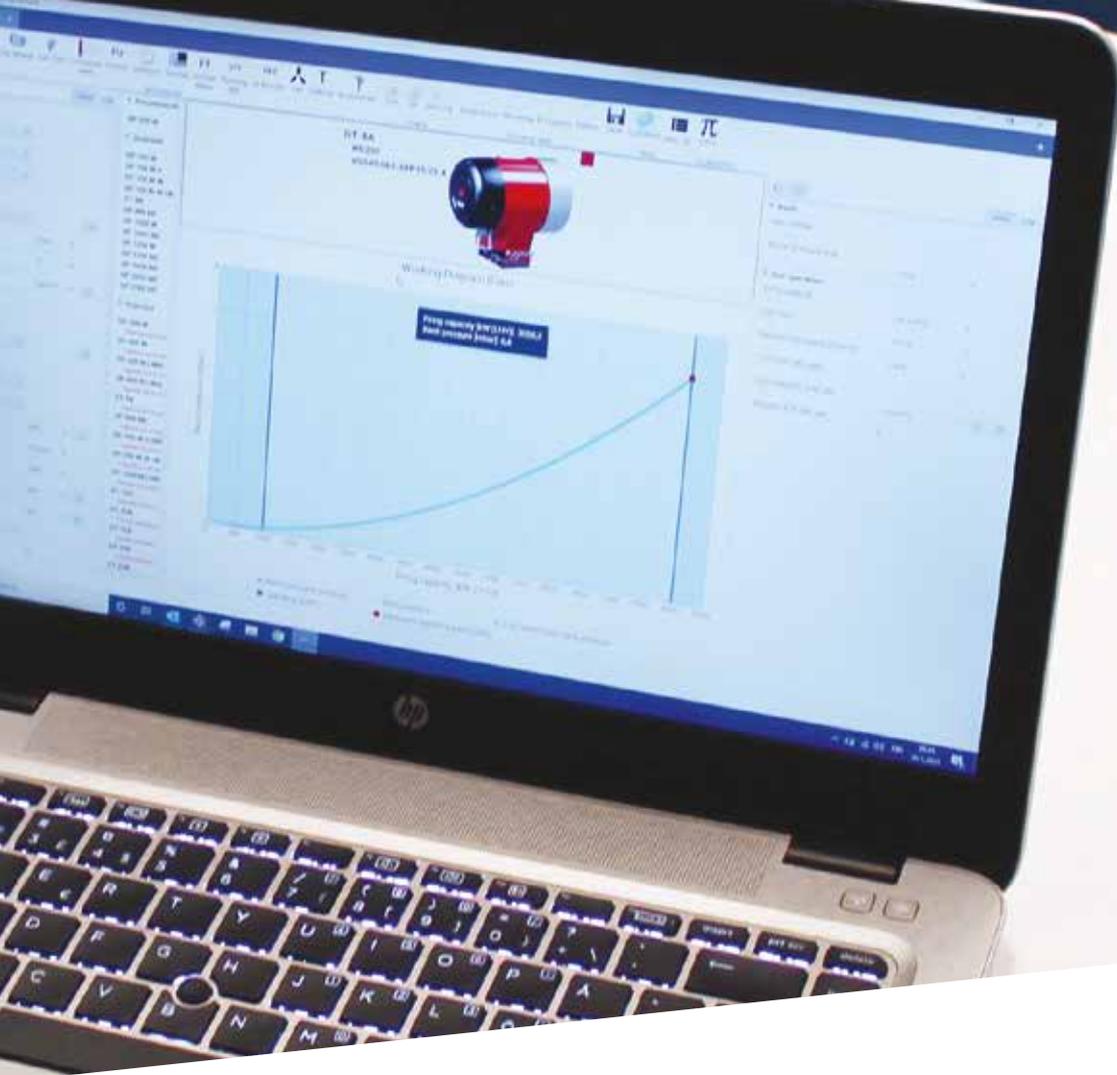
"It has been wonderful to take part in developing Suomen Kiinteistölämpö's ground source heating business, which has grown beautifully over the years. Suomen Kiinteistölämpö has grown from a company installing ground source heat pumps in single-family homes to a specialist in comprehensive solutions for large buildings and building complexes. The company's growth story is second to none. It's always a pleasure to work with an agile company, as this way, the end customer gets the best possible service," Virta concludes.



# Find the best solution for your heating and cooling needs with Oilon Selection Tool

*Be it for an industrial location requiring high heating or cooling capacity or a heating solution for a single-family home, Oilon Selection Tools will help you with optimal equipment sizing.*

TEXT TUJJA BRAX, MIKAEL JENU | IMAGES OILON | TRANSLATION MIKAEL JENU



Oilon Selection Tool (OST) makes it easy and simple to select products and accessories from Oilon's extensive selection of burners and heat pumps.

The application is intended primarily for helping dealers and engineering agencies with product selection and sizing.

With our user-friendly software, you can select several products for quick comparison and perform advanced system calculations. The tool allows you to view extensive product information and calculation results and create detailed technical specifications.

### **Clear visual presentation and a printable summary with power consumption data**

An optimally-sized product performs efficiently and generates the greatest possible cost and energy savings. The application shows the building's energy consumption, the heat pump's performance, and the capacity produced as a clear graphic, making it easy to compare different products. Users can print out a clear and well-structured summary for customers to review, showing the data used for sizing and an estimate of the solution's power consumption.

### **The most energy-efficient solution for demanding, high-capacity applications**

Oilon Selection Tool helps users select the most energy-efficient solution for industrial processes or large properties that require a high heating or cooling capacity. The application makes it easy to compare different units' heating and cooling capacities, power consumption, coefficient of performance (COP), turndown ratio, and other relevant details, such as their monthly power consumption.

### **Contact our sales team to start using Oilon Selection Tool**

Oilon Selection Tool can be used without a license in trial mode. To access the full capabilities of the tool, contact your Oilon representative for a license.

Download Oilon Selection Tool for Windows, Mac, or Linux from the Oilon website, address: [www.oilon.com](http://www.oilon.com).

# Digital solutions are an essential part of product development

*Having the right information in the right place increases operational efficiency and saves energy and money.*

TEXT TUJJA BRAX, MIKAEL JENU | IMAGES OILON | TRANSLATION MIKAEL JENU

## Stakeholder co-operation is a key part of Oilon R&D

In a rapidly-changing world, product development is indispensable. It allows companies to improve business profitability, ensure future growth, and enhance competitiveness. Oilon R&D steers the company towards wider know-how, improved technological capability, and better products – towards the best possible sustainable energy technology.

The goal of product development is to manage and improve new and existing products and our core competence through inventions and innovations. We are constantly mapping out development needs from various sources. Our efforts focus on customer needs, new technologies, and research as well as market and regulatory requirements.

The key areas in our product development are energy efficiency, the environment, usability, product appearance as well as production and maintenance considerations. Our R&D activities are handled by Oilon Technology Oy, a firm within the Oilon group.

Oilon products are developed in close co-operation with experts from different stakeholder groups. A big part of our development process is computer-assisted simulation and digital twin modeling, which allows our specialists to optimize the properties of products and systems before extensive prototyping and testing. With these methods, we can optimize our products and create the best possible service solutions.

The bulk of our experimental work takes place in our product development center in Lahti, Finland, and at separate test stations in our production plants. These facilities are equipped with precise measurement systems for verifying product properties, such as the heating or cooling provided as well as other properties such as emissions, power consumption, and noise and vibration levels. Factory testing is a major contributor to product development, as each product delivered to a customer undergoes a strict inspection and test process at the factory.

An important part of our R&D is the development of digital solutions: digital tools, IoT systems, automation, and user-friendly user interfaces. The majority of our digital development is handled in house by our own experts. A good example is Oilon Selection Tool, which allows users to set up a correctly-sized overall system already at the planning stage. The application covers Oilon's entire range of burner, industrial heat pump, and ground source heat pump products.

## IoT solutions provide remote monitoring and management capabilities

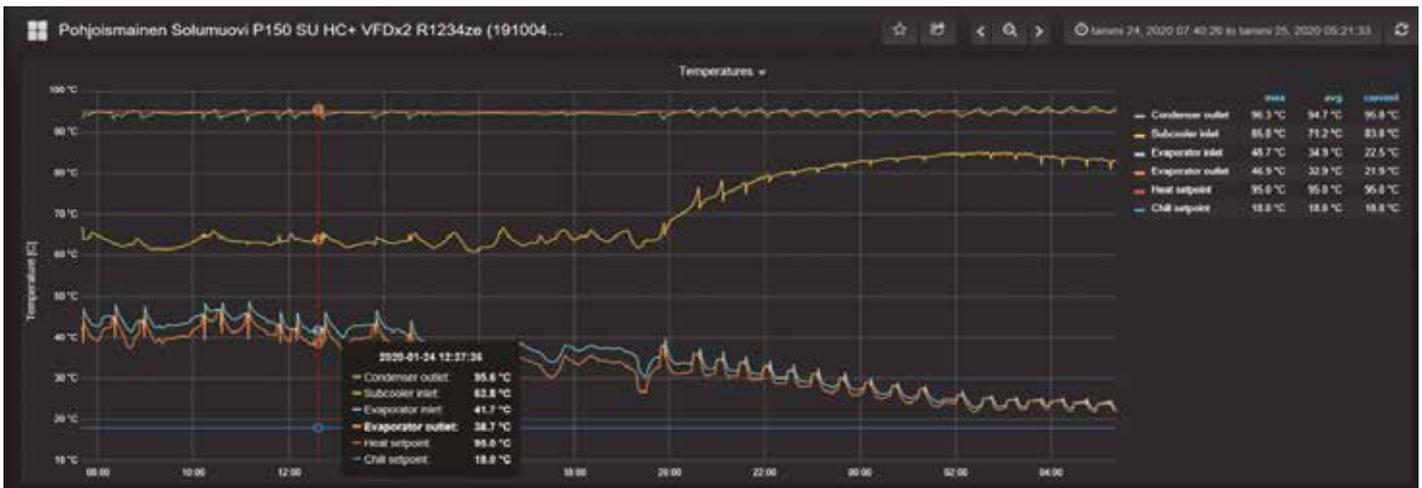
For years now, IoT-based solutions have been a key area in Oilon's product development. Already today, the majority of heat pumps delivered by Oilon are IoT-enabled. Our customers have the option to monitor and manage devices over a remote connection and generate reports covering device utilization, energy output, and the cost savings generated. We are currently working on similar systems for burners as well as AI-based solutions that would automatically assess equipment performance, supporting both optimization and preventive maintenance.

## What are IoT, OGM, and OST?

IoT, or, Internet of Things, refers to automatic data transfer and remote control of devices over the internet.

OGM, or, Oilon Global Monitor, is a service that allows users to monitor and manage heating and cooling equipment and systems connected to a data network through the cloud.

OST, or, Oilon selection Tool, is a calculation application that allows users to select an optimal product and its accessories from Oilon's extensive selection of burners and heat pumps.



# The Oilon Global Monitor service monitors system operation

Oilon Global Monitor (OGM) is an IoT service intended for performance optimization and smart monitoring of equipment condition. Advanced reporting and real-time monitoring support preventive maintenance, improving the reliability and performance of Oilon products.

## Better energy efficiency and lower emissions

Poorly-functioning devices are easy to identify, making it easy to diagnose the cause of performance drops and determine how to fix the problem.

## Better overview of operational data

When the right people get the right information in real time, it is easier to make the right decisions.

## Smooth service and lower maintenance costs

In preventive maintenance, maintenance schedules are no longer based on historical data; instead, maintenance needs are determined based on data analysis and smart indicators.

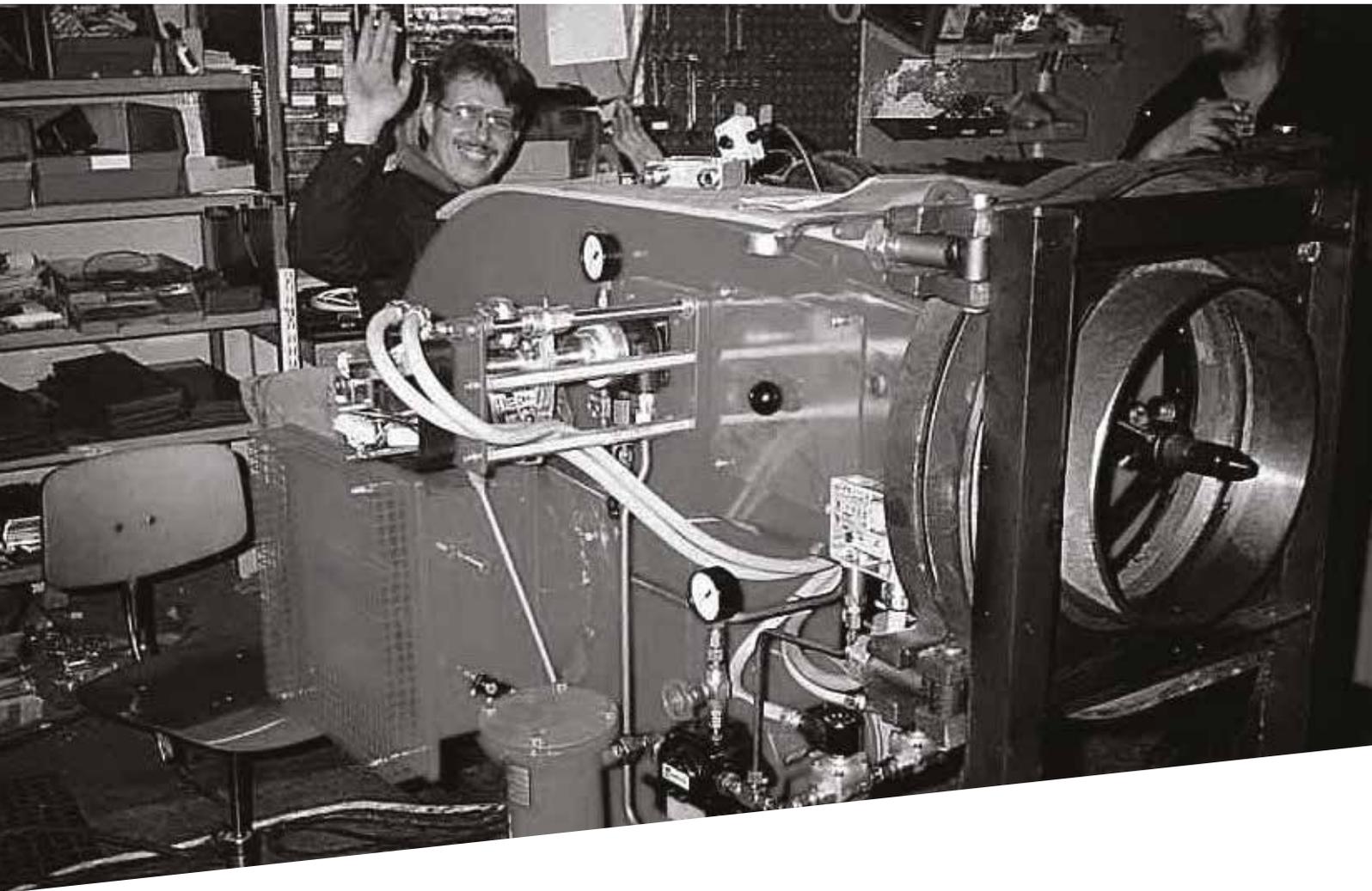


## Fewer outages

Analyzed data and smart indicators protect against unplanned outages. Indicators allow users to identify problems immediately after there is a performance drop, allowing the problem to be solved quickly and minimizing potential downtime.

Appropriate data analysis provides real-time information about the product's true quality and provides suggestions to improve performance.

"OGM, OST, and IoT are at the heart of Oilon research and development," says **Juha Aaltola**, Oilon's R&D director for heat pumps.



# Harri Puputti – 47 happy years at Oilon

AUTHOR TUJJA BRAX | HARRI PUPUTTI | TRANSLATION MIKAEL JENU

“There was a job ad in Etelä-Suomen Sanomat [a local newspaper]. Oilon was looking for two electricians. I was invited to a job interview at Oilon the next Wednesday. Back then, I had no idea what Oilon was. This was my second job, and I started working for Oilon on September 5, 1973. I was young at the time, only 17 years old. When I entered through the gates, there was no way to know that I would spend 47 happy years with Oilon,” **Harri Puputti** says.

Early on, Harri’s work involved installing electrical components in burners, mostly in the Junior range. For a number of years,

he worked at the assembly department putting burners together, until equipment testing became the primary focus of his job. The development of testing stations and test procedures was continuous work, and continued until 2000. Active co-operation with Mechanical Engineering, Electrical Engineering, and Documentation would continue all the way to the end of Harri’s career.

“In those times, you learned by doing. What made the work interesting was that no two days were the same. My working days were really varied and challenging,” Puputti remembers.

Gradually, Puputti's work tasks started to change, as he voiced his desire to try out other jobs. From 2002 onwards, he was part of the development effort that helped Oilon establish a new factory in China. In China, Puputti provided work orientation.

"I visited China at least 25 times, sometimes several times a year. The visits lasted for several weeks. I spent half of my worktime in China, and the rest of my time was split between development work and work orientation at the Lahti factory," Puputti says.

"It was my first flight when I first traveled to China on business. I think the flight route took me from Helsinki to Frankfurt in Germany and from there, to Beijing. It lasted at least eight hours. The flight from Beijing to Shanghai took two hours. The last leg of the trip was with a car from Shanghai to Wuxi, and it lasted three hours. Soon after that, they opened a direct flight route from Finland to Shanghai, which made it easier to travel," Puputti says.

"My language skills really helped me when working abroad. In China, everyone spoke extremely simple English, which I could easily follow," Puputti continues.

When reminiscing his time in China, Puputti says that one of the things he noticed was how clean the country was. In the early days, there were huge amounts of bicycles everywhere. The last times Puputti visited China, the bicycles had been replaced by electric cars and electric mopeds. In two decades, air quality had also improved massively.



**The first Oilon burners to roll out of the Oilon China factory doors were made in the early 2000s. The image shows Harri's closest colleagues. Facing the image are Frank Zhao and Johnson Chen.**



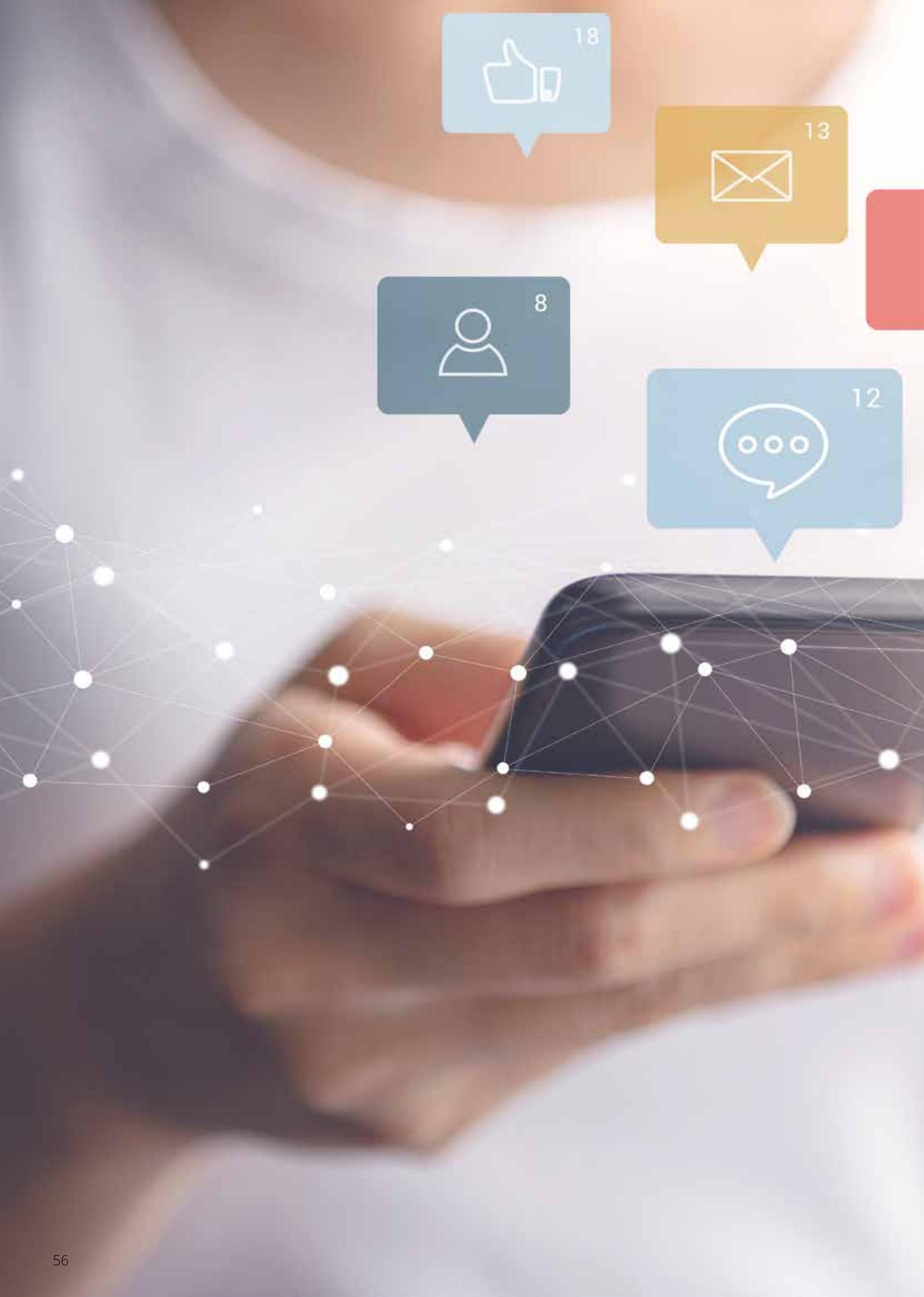
"Oilon has a good standing in China. We had no problems with permits or getting things up and running – after all, Oilon is engaged in responsible and groundbreaking work towards climate conservation," Puputti continues.

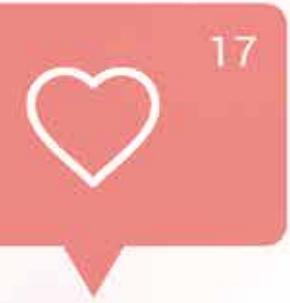
"Now that I've retired, I could still visit China. I would go visit my old workplaces and meet my old buddies. If I had stayed with Oilon, I would've probably traveled to the United States as well, but this experience eluded me. That's a job for my successors," Puputti says, smiling.

"Now that I'm retired, I can focus on the hobbies for which I didn't have time during my career." Puputti has great plans for home maintenance, playing music, taking the summer theater stage, traveling, and learning languages.

For this story, Harri visited Oilon. When he arrived, he was happy and laughing, and many former colleagues stopped by to exchange a few words with him. After the tour, Harri left happily to continue his retirement and the interesting projects waiting at home.

**Harri and Harri's successors, Johnson Chen and Petri Hännikäinen**





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# Oilon worldwide



# Oilon in brief

We create a cleaner world by developing and manufacturing efficient and low emission energy, heating, and cooling solutions for industry, property, and energy company use.

We are an international energy and environmental technology company with a long tradition and facilities in Finland, China, the United States, Canada, Germany, and Brazil.

We are strongly committed to research and product development. The focus areas of the research and development are on improving energy efficiency, decreasing emission levels, and developing new solutions using renewable energy sources.



 Oilon site

 Oilon dealer



## ChillHeat industrial heat pumps and water chillers

Capacity range: 60–5,000 kW



## Burners for liquid and gaseous fuels

Capacity range: 12–90,000 kW



## Ground source heat pumps

Capacity range: 4–96 kW

Oilon Group Oy  
P.O.Box 5, FI-15801 LAHTI, Finland  
Tel.: +358 3 85 761  
Fax: +358 3 857 6239  
Email: [info@oilon.com](mailto:info@oilon.com)

**oilon**