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Vaisala in Brief

Vaisala is a global leader in environmental and industrial measurement. Building on 80 years of experience, Vaisala contributes to a better quality of life by providing a comprehensive range of innovative observation and measurement products and services for chosen weather-related and industrial markets. Headquartered in Finland, Vaisala employs approximately 1,600 professionals worldwide and is listed on the Nasdaq Helsinki stock exchange.

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Measuring the Way to the Future

In the first issue of Vaisala News in 1959, Professor **Vilho Väisälä** – the founder and father of Vaisala – spoke of Vaisala's customer service and increasing global reach. On September 20th, 2017 Vaisala opened a regional office in Nairobi, Kenya, proving that Vaisala's reach is indeed truly global. We are happy to serve our customers in all regions from urban areas to remote locations, from the ground to the highest airport in the world – and beyond.

In August 2017, Vaisala's personnel in the U.S. turned to the skies, as the United States enjoyed its first total solar eclipse in 99 years. They launched multiple radiosondes in the air to gather information during the eclipse, illustrating Vaisala's expertise in atmospheric observations and versatility of the radiosonde that started it all in 1936.

In addition to staying true to its roots, Vaisala has set its gaze firmly on the future, driving innovations that help base decisions on accurate information. Vaisala aims to lead the march towards a better world, embracing global trends such as urbanization, resource efficiency, sustainability as well as well-being and health. The interplay of heritage and future can be seen in the articles throughout this issue.

Vaisala's wide-ranging product offering sets the foundation for a better tomorrow in various ways. We have taken steps to lead the wind energy industry to the future with remote sensors that enable making the most of renewable energy. We provide reliable temperature measurements that save lives by protecting donated organs. We measure air quality indoors and outdoors, helping improve peo-



ple's well-being both when they work in offices during the day and commute home in the evening.

The meaningfulness and importance of what Vaisala does and produces is evident both to customers and our own employees. Vaisala converts scientific breakthroughs to products that improve people's lives, mitigate risk and even save human life. We can look back and truly say that we have stayed on the path carved by professor Väisälä, serving customers all over the world.

Kjell Forsén
President and CEO



Transforming the Way We Measure Wind

Why Vaisala's Advanced Remote Sensor, the Triton Wind Profiler, Could Be a Game Changer

Wind energy is a constantly evolving industry. Dramatic growth in turbine technology over the past two decades is one of the most visible signs of this evolution. Turbine hub heights in the 1990's were a mere 10–30 meters, whereas today they commonly exceed 100 meters. At the same time wind developers and operators have continually pushed into more challenging locations, such as those in cold climates, complex topography, or far from the grid and other infrastructure.

To understand the operating environment at a wind project and predict the amount of energy it will produce, it is essential to gather direct measurements at the site. Within the wind industry, tall meteorological towers (or met towers), equipped

with anemometers and other sensors at turbine hub heights, have normally filled this role. However, building tall towers has become a greater and greater challenge given the much higher heights of today's turbines and the difficulties posed by

remote and extreme environments. Over the past few years, developers and owners have looked to innovative wind measurement technologies, such as remote sensing, to better overcome these challenges.

Benefits of Remote Sensors

Ground-based remote sensors that use Sonic Detection and Ranging (SoDAR) and Light Detection and Ranging (LiDAR) technology provide rich datasets of wind measurements at hub height and across the entire turbine blade sweep. Since they are also mobile and easily deployed, they have become a widely-used supplement and alternative to tall met towers for developers looking to reduce the costs, logistics, and permitting challenges related to towers.

Vaisala manufactures, installs, and maintains the wind industry's leading remote sensor, known as the Triton Wind Profiler, which uses SoDAR technology to measure

wind conditions at heights up to 200 meters. The system has been deployed at more than 3,700 locations in 45 countries and has collected over 20 million hours of data since its market introduction in 2008 – and for a good reason.

The Triton has very low power requirements, making it ideal for remote locations without access to onsite power, and it is generally completely self-powered by onboard solar panels. It is also a rugged and reliable device that has survived hurricane force winds and performed well in extreme temperatures, including powering through two winters north of the Arctic Circle. Its dependability is a leading advantage over other remote sensors, with fleet-wide median uptime of 99.93% over nearly a decade of operation.

Customers around the world have become strong advocates for the Triton due to its ease of use, cost-effectiveness, and performance. Enterprising wind developers and operators are using it to reduce their budgets and accelerate their project pipelines in a range of applications. For example, it is used in early site evaluation, validation of nearby met tower data, diagnosis of turbine performance issues, and measurements at multiple locations across a site to understand spatial variability. The benefits of Triton for all of these applications have been demonstrated in numerous success stories with companies from around the globe including: La Compagnie du Vent / Engie Group, Windlab, PEC Energia, EverPower, Sequoia Energy, and Puhuri Oy.

Winning Over the Industry

Despite the popularity of the system with customers, the financial community has been fairly conservative in its approach to remote sensing. For this reason, restrictions have been placed on how data collected from these systems can be used for various wind development and operations practices. For example, the industry has been slow to

Wind Development in the Arctic. Visit the Vaisala YouTube channel to watch our new video showing how we are helping Puhuri Oy bring clean energy to Finland using the Triton Wind Profiler.



accept remote sensing data in the due diligence process which helps a pre-construction wind project secure financing.

With science at our core, Vaisala has been very active in demonstrating the accuracy of the Triton. In fact, it is the most validated remote sensing device on the market with numerous third-party validation studies carried out both by clients and respected independent research organizations. We also conducted the largest-ever remote sensing comparison study in the industry, demonstrating that in actual field use across 30 geographically distributed sites, the Triton delivers the same accuracy as a Class One anemometer.

While the challenge of widespread, global acceptance remains, the industry is sending positive signals of taking steps forward. For example, the IECRE, an international authority that sets guidelines for common renewable energy applications and operations, recently released a new standard that allows the inclusion of remote sensing in power performance testing. These tests are typically part of warranty compensation cases between a wind project owner and a turbine manufacturer. While remote sensors must still be used with a short met tower in this application, given the highly sensitive nature of the procedure, the new change is a strong vote of confidence in the technology.

Winds of Change

Vaisala continues to push forward with validation and research efforts

to demonstrate the precision of Triton's measurements. Our customers use the device, because it helps them gain a more accurate picture of wind behavior and it has a lower cost of ownership to install, operate, maintain, and re-locate again and again at new project locations.

We stand firm in our commitment to this effort, because we believe the convenience and cost savings offered by the technology bring tremendous benefits to the industry and allow it to build better projects faster and operate them more efficiently. We also believe that remote sensing has the potential to replace the status quo approach of using met towers to measure the wind. This change would represent a major transformation within the wind industry akin to the shift from landlines to cellular phones within the telecommunications sector.

To support this change, we will release a report on the use of remote sensing technology within the field of wind energy in the coming months. The report will contain the history of the technology, primary use cases and benefits, key validation efforts, and a commentary from key players across the industry including: financial advisors, investors, consultants, developers, and operators.

Stay tuned for the release of our report to see what changes the coming years will bring for remote sensing technology and the wider global wind industry.

Observations From the Great American Eclipse

Vaisala employees in the United States seized the opportunity to launch radiosondes during the eclipse in August 2017.

The United States experienced an exciting event on August 21, 2017 – a total solar eclipse that was visible within a narrow, 75-mile (120 km) band (Figure 1) that crossed the continental U.S. from Oregon to South Carolina coasts. Depending on your location, the experience took place at different times of day. For an hour and 15 minutes, onlookers gazed as the moon gradually covered the sun. Watching an eclipse is a reminder of how bright the sun is, and why you should never look at the sun, or a partial solar eclipse, without special filtered glasses.

Those who ventured into the narrow band of totality, experienced an amazing show. For up to two minutes, day turned to night, as the moon completely covered the sun. This was the first total solar eclipse to cross the country in 99 years. Scientists, astronomy enthusiasts, and curious onlookers were able to see stars and planets in the middle of the day and even conduct research on the corona, an area of plasma surrounding the sun that is nearly 1,000,000 degrees Celsius (1,800,000 degrees Fahrenheit).



Figure 1. Path of the Great American Eclipse, courtesy of NASA.

As Vaisala is a company with a deep science background, there was understandably a lot of excitement leading up to the solar eclipse. Many Vaisala employees from all of our U.S. offices took the opportunity to safely view the eclipse, either from the office or by venturing to a better vantage point. Many of our staff took part in collecting atmospheric data to perform studies about how the solar eclipse affected atmospheric parameters – from the road surface to the stratosphere. On the day of the eclipse, a total of nine RS41-SG radiosondes were launched from three locations in the U.S., and atmospheric data were measured and collected from the AWS520, RWS200, and solar weather stations from weather garden at the office in Louisville, Colorado.

Vaisala staff collected a great deal of data, and a preliminary analysis is shared. First, we will look at a review of the surface data collected from Vaisala's Road Weather Station RWS200 – a location where the eclipse peaked with 93.1% of

the sun obscured – followed by atmospheric soundings near Boise, Idaho where the eclipse peaked with 99.6% of the sun obscured. Additional analysis will take place in the coming months, with plans to share the in-depth results of this unique measurement study at future American Meteorological Society conferences.

Surface Weather Data

Vaisala's Road Weather Station RWS200 measures road surface temperature, atmospheric temperatures at 2 meters, and barometric pressure, among other variables. During a solar eclipse, as the moon's shadow passes between the sun and the earth, the amount of solar radiation reaching the earth decreases, and consequently temperatures will decrease. Other studies that have been completed during solar eclipses have found that atmospheric pressure also changes during the eclipse. Figures 3 and 4 show data collected from the

RWS200 station at our weather park on the day of the eclipse (Figures 2–3).

During the eclipse, both road surface and atmospheric temperatures decreased by nearly 2.8 degrees Celsius (5 degrees Fahrenheit) as a result of the reduction in solar radiation reaching the surface. Perhaps the biggest change in the atmosphere during the eclipse was the decrease of nearly 5 hPa in atmospheric pressure from before the eclipse began, reaching a minimum near the end of the eclipse. In the hours after the eclipse, both the temperature and pressure increased rapidly.

Atmospheric Soundings

Radiosondes were launched by Vaisala personnel located near the path of totality in Boise, Idaho and at the offices in Louisville, Colorado and Woburn, Massachusetts. Three radiosondes were released from each site: one before the eclipse began, one just prior to the peak of the eclipse, and one after the eclipse. The purpose of these launches was to examine how the temperature, humidity, and wind profiles changed during the course of the day. Figures 5–7 show the soundings plotted from the radiosonde data from the balloon launch site near Boise (Figures 4–6).

These figures are known as atmospheric soundings, and they display changes in the temperature (red line), dewpoint temperature (green line), and winds (black barbs) through the atmosphere. The vertical axis is the atmospheric pressure, measured in hectopascals (hPa) or millibars (mb). During a typical day, temperatures close to the surface warm up, as the sun's radiation heats the ground. The warming can be seen in the figures, as the temperature line between 900 and 800 mb moves to the right in each profile. The changes in this area of the three profiles, measured on the day of the eclipse, are subtle and will be the focus of a more detailed analysis, to be presented at a future conference of the American Meteorological Society.

Figure 2. Meteogram showing road surface temperature, air temperature, and barometric pressure at the Vaisala Louisville Office on August 21, 2017. The black box denotes the time of the eclipse, and the green line denotes the time of maximum eclipse. Temperature scale is the left vertical axis, pressure scale is the right vertical axis.

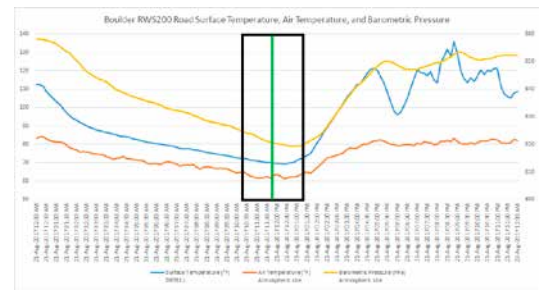


Figure 3. Meteogram showing road surface temperature, air temperature, and barometric pressure at the Vaisala Louisville Office between 10am and 3pm Mountain Daylight Time on August 21, 2017. The black box denotes the time of the eclipse, and the green line denotes the time of maximum eclipse. Temperature scale is the left vertical axis, pressure scale is the right vertical axis.

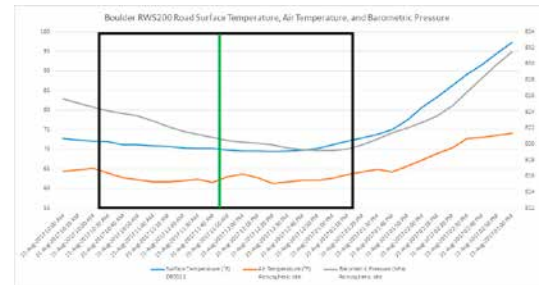


Figure 4. Atmospheric sounding from near Boise, Idaho 2 hours before the eclipse started.

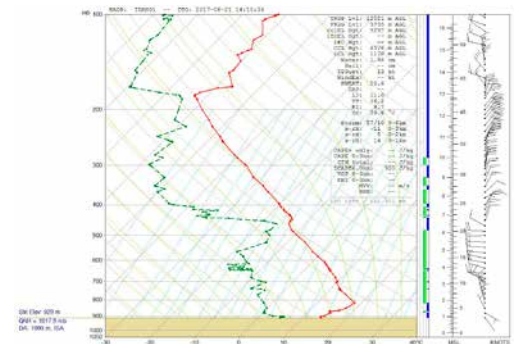


Figure 5. Atmospheric sounding from near Boise, Idaho 30 minutes before the eclipse peaked.

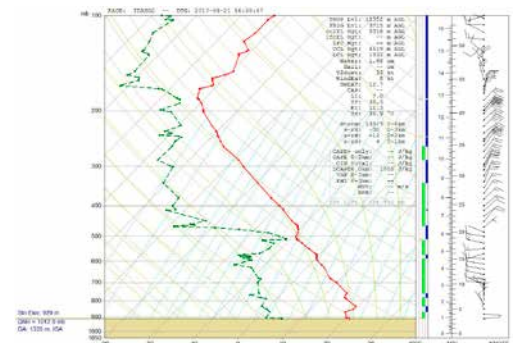
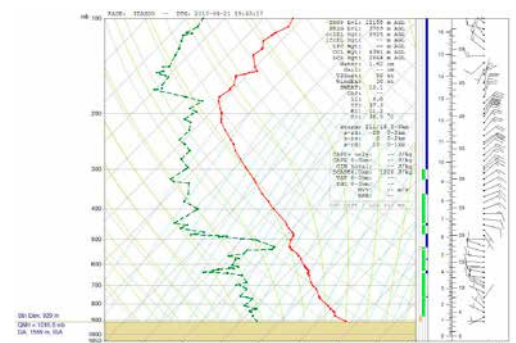


Figure 6. Atmospheric sounding from near Boise, Idaho 1 hour after the eclipse ended.



Life-or-Death Air Quality

Erkki Järvinen, Vaisala

Academy Professor Markku Kulmala, Atmospheric Sciences,
University of Helsinki, Finland

An American health fanatic, an office worker in China, and a civil servant in London are all equally interested in air quality, even if for slightly different reasons. In the Western world, the amount of air pollution is usually at better levels, but people are becoming more aware of the health hazards posed by pollution gases and particulate matter in the air. In more polluted areas, on the other hand, air quality has a more direct impact on everyday life.

Millions of Unnecessary Deaths

The effect bad air quality has on health and mortality constitutes the most worrying aspect. In 2014, the World Health Organization (WHO) reported that around 7 million people died as a result of air pollution exposure in 2012. This amounts to one in eight of total global deaths. Research from last year, led by researchers at the University of British Columbia and the Health Effects Institute, puts the number of premature deaths at more than 5.5 million in 2013.

In 2013, about 93 percent of deaths and nonfatal illnesses attributed to air pollution worldwide occurred in developing countries, where 90 percent of the population was exposed to dangerous levels of air pollution. However, developed countries, with more advanced technology and infrastructure, are not immune to problems

either. Major cities like London, Paris and Madrid have their days of extremely high air pollution levels.

Drain on the Economy

The health problems and premature deaths caused by air pollution incur a considerable cost. The treatment of diseases related to poor air quality, like lung cancer, heart disease, and chronic bronchitis, drain resources. The resulting loss of productive labour reduces also incomes, slowing down growth and development as well.

The study by the World Bank and Institute for Health Metrics and Evaluation (IHME) found that premature deaths due to air pollution cost the global economy about \$225 billion in lost labour income in 2013. Worldwide, the amount was \$5.11 trillion in welfare losses – about the size of the gross domestic product of India, Canada, and Mexico combined.

Productivity can also be stunted in agriculture, with air pollution cutting crop yields and changing conditions in the natural environment. Air pollution affects businesses relying on tourism, and it has a direct impact on the use of solar power.

Governments are trying to improve air quality through the use of cleaner fuels and more efficient vehicles, but in emerging countries, in particular, the transformation will take time.

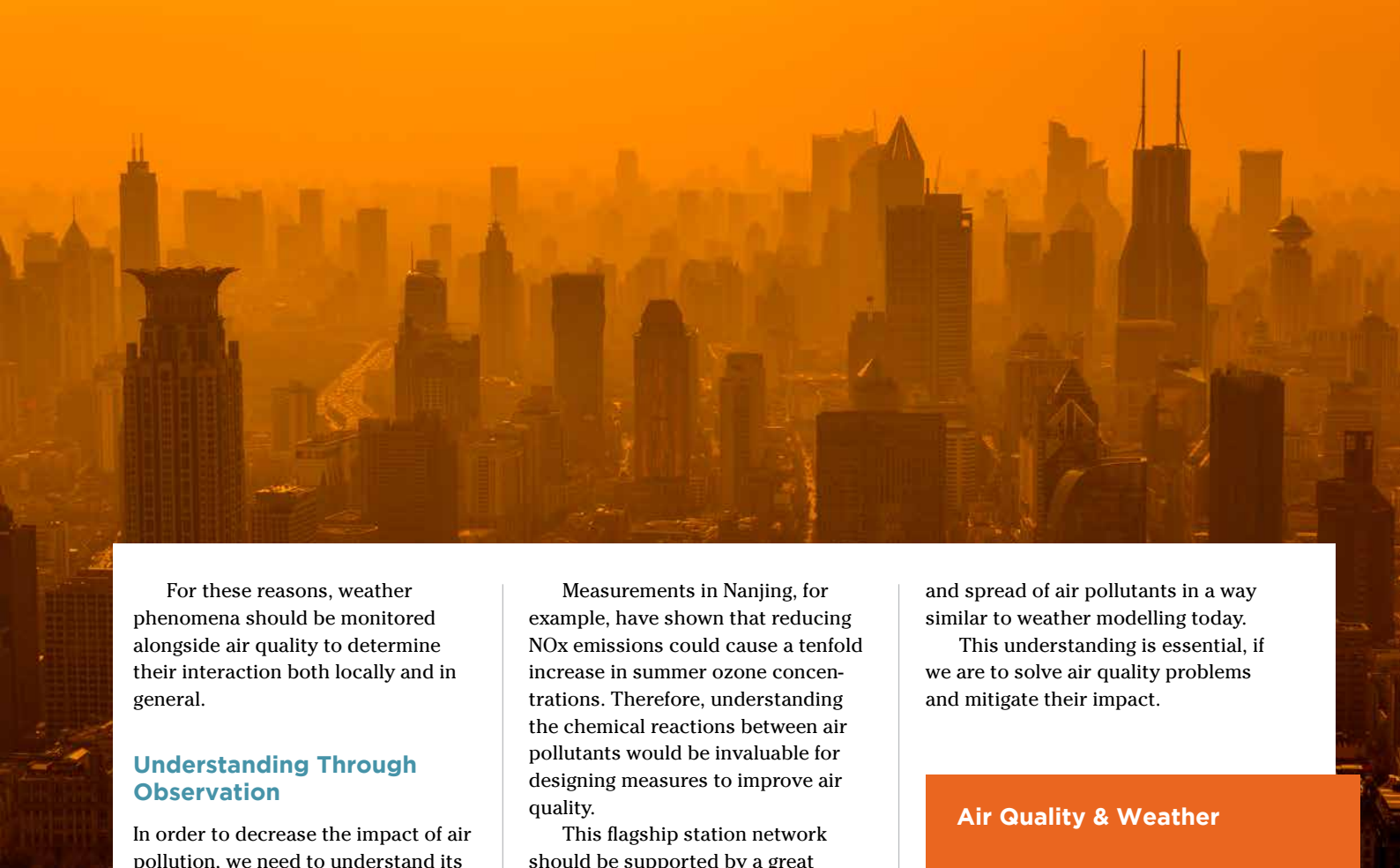
Weather Affects Air Quality and Vice Versa

It is widely known that weather affects air quality. Rain, for instance, can wash away air pollutants and thus improve air quality momentarily. Wind can either bring in pollutants or remove them, depending on their source and its location.

The lesser known fact is that air quality influences weather considerably as well. Air pollutants are mostly created and spread in the planetary boundary layer whose height varies depending on location, season, time of day, weather – and pollutants. The thinner the boundary layer is, the higher the concentration of pollutants, which intensifies their impact.

Usually, the air near the ground is warmer than the air above it, heated both directly and indirectly by solar radiation: radiation heats the Earth's surface, which again heats the air above. However, high concentrations of pollutants reflect some of the sun's radiation, which cools the ground and hence the air near it.

This phenomenon creates a warmer or inversion layer that suppresses convection between different layers, trapping the pollutants in the boundary layer and raising their concentration. The enhanced pollution can even lead to rains moving to other locations or not occurring at all, having a major impact on agriculture.



For these reasons, weather phenomena should be monitored alongside air quality to determine their interaction both locally and in general.

Understanding Through Observation

In order to decrease the impact of air pollution, we need to understand its components and their interactions better. To gain understanding, we need to measure the atmosphere.

In today's world, air quality is monitored using stations that measure about 10–20 parameters and cost a few hundred thousand dollars. A megacity may have a few dozen of these stations scattered around its area; a smaller city might have two or three.

These stations are good for providing information on the long term, but their monitoring is far too limited to give a good picture of the atmosphere. Moreover, they are so far apart that they cannot provide local air quality information, even though pollution in cities is highly local and made worse by traffic, weather phenomena and buildings.

In an ideal world, there would be a network of 1,000 accurate and versatile 'flagship' stations around the world, monitoring as many as 1,000 different parameters from the most common air pollutants to trace gas concentrations and fluxes as well as particle composition and optics. The measurements would provide data towards understanding the chemistry and physics in the atmosphere.

Measurements in Nanjing, for example, have shown that reducing NO_x emissions could cause a tenfold increase in summer ozone concentrations. Therefore, understanding the chemical reactions between air pollutants would be invaluable for designing measures to improve air quality.

This flagship station network should be supported by a great number of smaller units that could provide information locally and thus help find the real hotspots, making it possible to warn residents of air quality problems and take measures to mitigate the situation.

Naturally, the smaller units do not need to be as sophisticated or accurate as the flagship measurement stations; their power lies in their numbers and locality. They can be employed to complement the current air quality observation stations even now.

Support for Decision-Making

When a network of air quality observation stations is dense enough, it can provide relevant information for decision-makers. Even now, data on local conditions could be used to redirect traffic, temporarily close down polluting manufacturing plants located upwind, or switch from coal power to other sources of electricity.

In the long term, observations help in achieving a more thorough understanding of the atmosphere and the interplay between weather and air pollution. The observations could be used to model the presence

and spread of air pollutants in a way similar to weather modelling today.

This understanding is essential, if we are to solve air quality problems and mitigate their impact.

Air Quality & Weather

Vaisala provides a broad range of technologies and products for air quality and weather monitoring, including weather stations, wind sensors and Lidar ceilometers for boundary layer profiling.

The latest addition to Vaisala's offering is the Air Quality Transmitter that is a cost effective solution for monitoring conditions locally. The transmitters measure up to four of most common gaseous pollutants, such as nitrogen oxides, sulphur dioxide, carbon monoxide, hydrogen sulphide, and ozone, as well as particles (PM_{2.5} and PM₁₀).

Quick and easy to install and maintain, the Air Quality Transmitters are well suited for extensive and dense air quality monitoring networks, and can be connected seamlessly to Vaisala Weather Transmitter products.

First Ever Vaisala Supplier Awards Granted for 6 Best Performers

For the first time ever, Vaisala organized Supplier Days, gathering over 38 of its key suppliers in Helsinki. The two-day event focused on involving suppliers further in Vaisala's operations, business and R&D. The event culminated in awarding the best performing suppliers in six categories. The Sustainable Business Award was received by the electronics manufacturer Enics, with which Vaisala has cooperated regarding suppliers' sustainability KPI development.

The aim of the Vaisala Supplier Days is to tighten co-operation between Vaisala and its key suppliers. "Sharing our strategies with and opening up business models to suppliers improves co-operation, as suppliers are more aware of our customers' businesses and needs," says **Tuukka Farin**, Head of Sourcing at Vaisala. Suppliers have solid knowledge in their various competence areas, and thus Vaisala, its suppliers and – in the end – its customers benefit from co-operation early on, for example in developing new products.

On the first day of the event, the suppliers had an opportunity to visit Vaisala production and participate in product trainings conducted by product managers. The second day contained several workshops,

where people from Vaisala businesses and the key people from the suppliers discussed new and current ways of working, learning from each other.

Six Awarded for Excellent Performance

On the second day of the event, the first ever Vaisala Supplier of the Year Award was granted to five suppliers based on their outstanding performance. The top five was selected out of a total of 500 international suppliers. The award is the highest honor Vaisala can bestow upon a supplier. The recipients in 2017 have performed well in one or several of the following six categories: Sustainable Business, Quality, Technological Development, Customer Service,



Vesa Pylvänäinen, EVP Operations and Supply Chain at Vaisala, on stage speaking about Vaisala Production System.

Delivery or providing a service to Vaisala.

"The selected suppliers help us in many ways to deliver customers' customized order from Finland to Fiji in three days, without end-product inventories", says **Vesa Pylvänäinen**, EVP for Operations at Vaisala. "It is great to see how committed our suppliers are to do long-term development together with us. It keeps us on the top also in the future", Pylvänäinen comments.

Sustainable Business Award Recognizes Value-Based Operation

"To us at Vaisala, striving to become net positive is a vision that means doing business in a way that puts more back into society, the

THE 2017 VAISALA SUPPLIER OF THE YEAR WINNERS ARE:

Sustainable Business: Enics

Enics develops the sustainable supply chain with Vaisala, serving as a pilot company in the development of Vaisala's sustainable supplier KPI's.

Quality: Plastoco Oy

In the course of one year, Plastoco, the supplier of plastic parts and molds, has undergone significant quality improvements by investing in people as well as software and hardware, thus guaranteeing the good quality of its products.

Delivery: Sorv-Elektro Oy

The electronics supplier Sorv-Elektro was awarded for its strong delivery performance (OTD 98% in 2017). In 2017, Vaisala received over 2,500 deliveries.

Customer Service: Darekon Oy

The electronics and compilation company Darekon merited recognition for good customer service thanks to its very fast response time as well as flexibility and adaptability to Vaisala's needs. Proactive approach to risk management has produced solutions.

Technology: Enics

The electronics manufacturer Enics actively scans new ways of implementing different technologies. Fast delivery of prototypes as well as manufacturability feedback regarding Vaisala's new product introductions have provided excellent support for Vaisala's Product Development.

Services: DHL Express

With over independent 47,000 shipments, DHL Express transports Vaisala's products to over 150 countries every year. DHL Express develops its operations together with Vaisala in order to make sure that customers get their customized products even in three days within placing the order.

environment and the global economy than it takes out – having a bigger handprint than footprint,” says Vaisala's CEO **Kjell Forsén**. “Since the performance of the whole supply chain is crucial when it comes to responsibility, we want to encourage our suppliers towards that goal too.”

The 2017 Supplier of the Year Award in the Sustainable Business category was granted to the electronics manufacturer Enics for its excellent performance in developing sustainable supply chain. Enics participates actively in the development of Vaisala's sustainable supplier KPI's as one of the pilot companies.

The Supplier of the Year award-ees were chosen by a global team of Vaisala's specialists in Sourcing, Purchasing, Logistics, Quality, Manufacturing and R&D.



Informal chats between Vaisala's and the suppliers' representatives were an important part of the event. In the front Maiju Karila (on the left) and Kati Ikonen from Vaisala Sourcing.

Re-thinking Organizational Savings through HVAC

Good Indoor Air Quality Leads to Good Decisions

Energy efficiency has been the focal spot of advanced ventilation control. Now it's time to take a look at the flipside of the coin, indoor air quality. Insufficient ventilation causes human-produced carbon dioxide to build up indoors, decreasing employee well-being and productivity substantially. With accurate carbon dioxide measurement, both energy efficiency and employee well-being can be achieved simultaneously.

According to the U.S. Environmental Protection Agency, heating, ventilation and air conditioning (HVAC) systems represent around 42% of the total energy costs of an average office building. This percentage depends on the climate where the building is located, but all in all, the HVAC system makes up a significant portion of the energy costs of an office building (Figure 1).

Green building initiatives, like the U.S. Green Building Council's LEED v4, British BREEAM and Australian Energy Rating all encourage com-

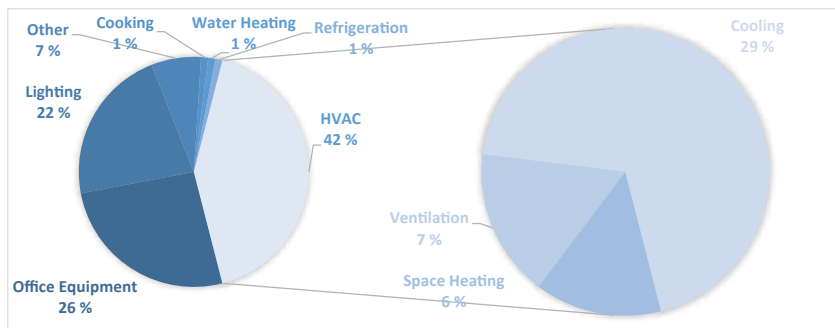


Figure 1. Typical energy costs of an office building.



mercial constructors and building operators to reduce their impact on environment by increasing their energy efficiency. Especially LEED v4 stresses the importance of precise ventilation automation control using accurate sensors. Also the ASHRAE Green Standard 189. (USA) and the European standard EN 13779 recommend using Demand Controlled Ventilation (DCV) primarily to reduce energy usage while promoting healthy indoor air.

Demand Controlled Ventilation is proven to have a huge

impact on HVAC systems' energy efficiency. The U.S. Department of Energy conducted a research on energy savings and economics of advanced control strategies for HVAC in 2011. The research concluded that Demand Controlled Ventilation contributes to the biggest energy savings in HVAC in small office buildings, strip malls, stand-alone retails and supermarkets compared to other advanced automated ventilation strategies. Average cost savings of using DCV were calculated to be 38% for all

commercial building types, which is a very significant number. The amount depends on the climate, of course; DCV is most efficient in cold climates, and coupling it with multi-speed fan control will bring more benefits also in hot climates.

Carbon Dioxide Level as an Indicator of Indoor Air Quality

DCV functions by controlling ventilation according to the amount

»»»

of people in a space. The aim is to provide good indoor air quality to the occupants with energy efficient ventilation.

How is good indoor air defined? The European EN standard 13779: 2007 states: "Indoor air quality can be categorized by CO₂ concentration." This notion sets the foundations to operate DCV by measuring CO₂ and controlling ventilation accordingly. The standard sets the normal expectation for indoor CO₂ level at 400–600 ppm, which is slightly above the normal levels in outdoor air (400 ppm). The modern ventilation systems are built around this supposition to ensure good enough indoor air quality while remaining energy efficient.

In reality, this applies mostly to modern offices with modern ventilation systems. Field studies show that regular office conditions have a 1,500 ppm concentration of CO₂, which may seem a very high level, but the regulatory limit considered safe for people is even higher: 5,000 ppm of carbon dioxide over an 8-hour period.

Recent studies challenge what was previously considered to be good indoor air quality. A study conducted by the National Institute of Environmental Health Sciences (NIEHS) in 2015 focused on the effects indoor air quality has on employees' cognitive abilities. The extensive study setting simulated office conditions and compared conventional offices to WWF Green and Green+⁽¹⁾ offices. Cognitive scores in crisis response, information usage and strategy, among other variables, were evaluated on the test subjects. The study showed dramatic results (Figure 2).

The results of the NIEHS study show how cognitive skills are decreased by the increase of carbon dioxide in indoor air. This finding shows that for example strategic skills are decreased only to 20% in indoor air with a 1,400 ppm concentration of carbon dioxide compared to the normal outdoor level of 400

ppm. Some of the more mechanical skills, like information seeking and task orientation, were not affected much. However, cognitive skills that require more advanced application of information, like crisis response, information usage and strategy, are affected the most. The study shows clearly that handling more advanced tasks becomes much more difficult when the indoor carbon dioxide levels rise.

When comparing good indoor air quality of 800–1,000 ppm of CO₂ to the normal level of 1,500 ppm in office buildings, it's easy to see why indoor air quality is an emerging topic. Accurate measurement of indoor air and better ventilation are vital to cognitive abilities of people working in offices.

When taking a look at the typical operating costs of an office building, we can see that energy costs stand only at 1% and rental at 9% of the

overall costs, whereas employee costs stand at 90% (Figure 3). So is it relevant to minimize the energy costs with strict HVAC control? Even at the expense of employees' well-being? And even when a too high concentration of CO₂ indoors has a major impact on the cognitive skills and productivity of the employees?

Better Productivity Through Employee Well-Being

Now that we know how carbon dioxide really affects people, what does this mean on a company-wide level? Let's take a closer look at the three cognitive abilities affected the most by carbon dioxide concentration: crisis response, information usage and strategy. Firstly, a decrease in the ability to manage crisis response leads to mistakes and maybe even to dangerous situations. Secondly, decreased ability to use

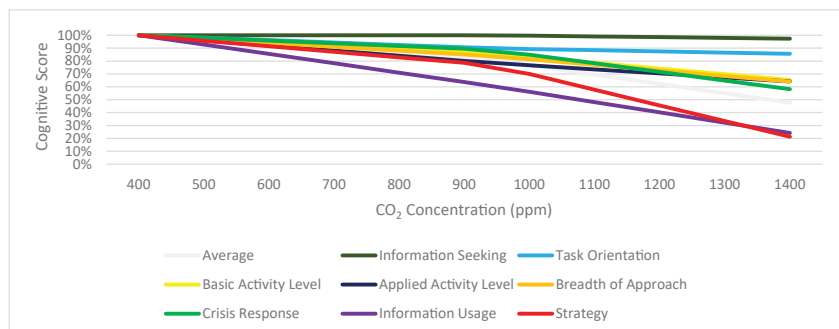


Figure 2. Impact of changes in CO₂ levels on employees' cognitive abilities.

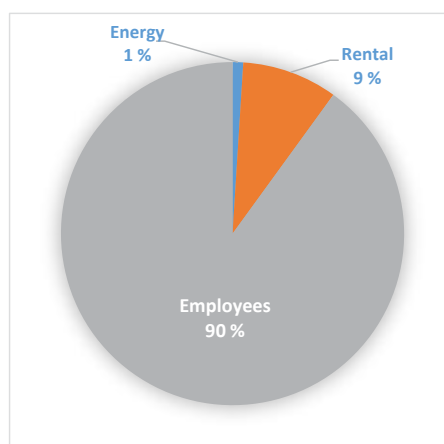


Figure 3. Typical operational costs of an office building.

information has a negative impact on employee learning and productivity. Thirdly, decreased ability in strategy may lead to belated or poor decisions. In the long run, continuous insufficient ventilation may lead to many problems regarding employee well-being and increased costs, both directly and indirectly (Figure 4).

Many of these effects are difficult to quantify. For example, lowered employee learning has far-reaching disadvantages and effects in Human Resources. Also, bad and late decisions can have consequences within organizations that are impossible to evaluate in direct costs, not to mention the possible consequences of mistakes and potentially dangerous situations.

Productivity, on the other hand, can be measured. Studies indicate that better indoor air and ventilation have a positive impact on productivity. The Continental Automated Buildings Association (CABA) conducted a comparison between better buildings and other employee strategies, like workplace health programs and bonuses. With a meta-study of 500 different studies, they found out that better buildings increase productivity by 2–10%. The Federation of European Heating, Ventilation and Air Conditioning (REHVA) state that decreased ventilation lowers productivity – typing speed, for example – by 10%. The U.S. Green Building Council commenced a meta-study in 2003 and concluded that delivery

of fresh air and reduced levels of pollutants improve productivity by 11%. Furthermore, according to the analysis of the Carnegie Mellon University, better ventilation improves productivity by 3–18%.

To sum it up, the productivity gains of better ventilation range between 2% and 18%, with many studies revolving around 10%. How does this finding affect costs? Assuming that an average employee costs 50,000€ a year for a company, the cost benefits of better ventilation are 1,000–9,000€ per year per person, with productivity gains of 2–18%. The annual cost savings for companies with 100 employees are 100,000–900,000€. Companies with over 1,000 employees reach savings worth millions of euros, even with the most careful estimates. And these numbers are only the cost savings in measurable productivity.

Coming back to the typical operating costs of an office building, where employee costs stand at 90%, whilst energy represents 1% of the total costs, it is easy to understand the importance of ensuring good indoor air quality over unnecessarily strict energy management. The magnitude of the difference between energy and employee costs is definitely immense. Of course, energy efficiency is as important as before, but when optimizing the HVAC systems, occupants' well-being needs to be considered even more carefully.

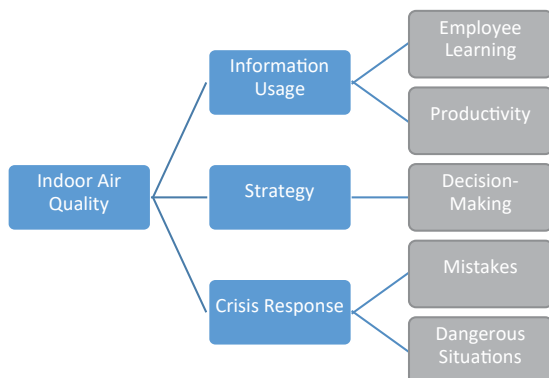


Figure 4. Continuous insufficient ventilation may have negative effects on employee well-being and increase costs.



Ventilation Control Today and Tomorrow

To achieve both energy efficiency and good indoor air simultaneously, accurate measurement is the key. As people's cognitive skills are affected even when the CO₂ concentration changes only by 100 ppm, the CO₂ measurement sensors must be accurate at all times, even in spaces occupied 24/7.

The energy efficiency of a ventilation system is most affected by the measurement sensor when the system relies on measuring CO₂ levels based on occupancy. Vaisala's sensors stay accurate throughout the years, ensuring correct measurement, efficient energy usage and fresh air for the people also in the long run.

As the impact of indoor air quality on employees' well-being is one of the emerging issues, Vaisala aims to serve the customers in the best possible way in that area as well. At Vaisala, we believe that energy efficiency will remain important in building automation also in the future, along with the developments of smart buildings and smart cities. The focus will shift more towards people's health and well-being through ensuring indoor air quality.

⁽¹⁾ <https://www.fi/en/green-office/>

Culturing Cells in Japan with Vaisala's HMD110

Japanese industrial manufacturer giant Kawasaki chose Vaisala Humidity and Temperature Transmitter HMD110 for its automatic cell culturing process.

Following the revision of the Pharmaceutical Affairs Act in 2014, regenerative medicine using stem cells and induced pluripotent stem cells (iPSC) has become an increasingly promising field. However, there are still some challenges in terms of regulation, quality control, and upscaling.

Cell culture and quality tests often require complicated manual work. In culture processes and quality tests, the reduction of human error, streamlined processes and high reproducibility without dependence on human intervention are basic requirements.

To overcome these challenges, Japanese industrial manufacturing giant Kawasaki Heavy Industries Ltd.

initiated a development project for an automated cell culture system to be used in the drug discovery and regenerative medicine field. The system was named AUTO CULTURE™, and it aimed to enable safe and efficient cell culture process, which contributes to efficient practices in regenerative medicine.

Automating Manual Work

In the delicate cell culture process, the development is usually advanced manually at the initial clinical stage. However, as the phase progresses, production needs to be scaled up in a cost-effective manner. If the chosen manual method is changed at the early clinical stage, challenges with approvals in end-product quality could arise. Kawasaki's AUTO CULTURE™ was developed based on an automation concept that resembles the manual cell culture process as accurately as possible. As a result, the cell culture process, that used to be manual, can now be automated, leading to high

reproducibility and increased convenience for staff.

Firstly, Kawasaki's automated innovation was adopted in their Research and Cell Quality Testing units. The next stage is to facilitate the clinical use of cultured cells. In order to do that, compliance with GCTP (Good Gene, Cellular and Tissue Based Products Manufacturing Practice) and GMP (Good Manufacturing Practice) is needed. The prevention of both contamination and errors is an essential element of compliance.

Bio-Decontamination with Vaporized Hydrogen Peroxide

AUTO CULTURE™ cell culture systems were equipped with an automatic vaporized hydrogen peroxide bio-decontamination function to prevent cross-contamination during the treatment of multiple specimens as well as contamination when inserting samples. To guard the bio-decontamination process

Kawasaki Heavy Industries Ltd. is a Japanese industrial manufacturer giant. Together with about 100 group companies in Japan and overseas, it oversees the formation of a "technology corporate group". The technological capabilities, polished over a one hundred year old history, send diverse products forth into wide-ranging fields that go beyond land, sea, and air, extending from the ocean depths to space. Kawasaki manufactures motorcycles, aerospace equipment, rolling stock, ships and a range of industrial products, among others.

 **Kawasaki**
Powering your potential



with hydrogen peroxide, Kawasaki tested the Vaisala Humidity and Temperature Transmitter HMD110, fitted with a catalytic HUMICAP 180V sensor.

Hydrogen peroxide bio-decontamination can be divided into three phases: spraying, retention, and aeration. The Vaisala HUMICAP 180V Humidity and Temperature Transmitter HMD110 is used for humidity measurement in these processes. In many types of bio-decontamination equipment, humidity measurement before spraying is an important parameter to ensure even **spraying** of hydrogen peroxide. Hydrogen peroxide cannot be sprayed evenly in a high-humidity environment because it condenses immediately.

In the spraying phase, vaporized hydrogen peroxide is injected into the chamber to achieve correct conditions for decontamination. During the transition from the spraying phase to the **retention** phase, Kawasaki measures humidity in order to determine the amount of hydrogen peroxide present in the chamber after spraying.

In the **aeration** phase, the hydrogen peroxide is removed and humidity decreases. At this stage, the concentration of residual hydrogen peroxide is measured using a hydrogen peroxide measurement sensor. In the automatic bio-decontamination process, the sterilization status is validated using a biological indicator.

Humidity measurement acts as an important parameter in the process.

Unparalleled Qualities

Humidity measurement using vaporized hydrogen peroxide is essential in the automatic bio-decontamination process. However, humidity sensors have traditionally faced challenges such as drift caused by corrosion that occurs as a result of repeated long-term exposure to hydrogen peroxide. Kawasaki searched for a reliable hygrometer with high resistance to vaporized hydrogen peroxide. Another important requirement for the humidity sensor was system maintenance frequency, as the humidity sensor needed to be used continuously at least for a year.

Kawasaki chose the Vaisala HUMICAP 180V Humidity and Temperature Transmitter HMD110 to be incorporated to their AUTO CULTURE™ systems due to its unparalleled qualities. The HMD110 did not only perform excellently in the testing phase, convincing with its durability and reliability, but it also had additional benefits such as being easy to replace and good availability of spare units for periodic maintenance.

Vaisala's HMD110 is a durable solution for automated bio-decontamination using vaporized hydrogen peroxide in this Kawasaki's automated cell culture application.

Vaisala's broad product portfolio continues to cater for versatile customer needs that vary case-by-case. Several factors can influence the choice of the best method for bio-decontamination: for example, material compatibility, efficacy of the process, desired level of bio-burden reduction and health and safety concerns. Vaporized hydrogen peroxide is used extensively in the bio-decontamination processes, as it destroys even the most resistant micro-organisms yet readily breaks down in water vapor and oxygen.

The need for bio-decontamination and sterilization increases all over the world. To respond to the growing need, Vaisala launched recently its new HPP272 probe to measure humidity, temperature and hydrogen peroxide accurately and consistently. Regarding humidity measurements, HPP272 measures both relative saturation and relative humidity, which indicates the humidity percentage derived from water vapor and H₂O₂ vapor together. Thus it reliably reveals when bio-decontaminated air starts to condense. The probe is suitable for several types of bio-decontamination processes where it is necessary to measure other parameters in addition to humidity. The new 3-in-1 measurement probe uses the new Vaisala PEROXCAP® sensor and is based on company's HUMICAP® sensor technology for the measurement of relative humidity.



Measuring humidity is important in automatic bio-decontamination processes that use vaporized hydrogen peroxide. The hygrometer has to have high resistance to vaporized hydrogen peroxide due to its corrosive nature. Vaisala HUMICAP 180V Humidity and Temperature Transmitter HMD110 was the ideal solution for Kawasaki Heavy Industries in this specific application.

Measuring Weather at the Highest Airport in the World



Located well over 4 km above sea level, Daocheng Yading Airport in China constitutes the highest civil airport in the world. With Vaisala's high-quality equipment, Daocheng Yading manages to measure the weather conditions despite the challenges posed by its altitude and low temperatures.

Daocheng Yading Airport serves Daocheng County in the Garzê Tibetan Autonomous Prefecture of Sichuan Province in China. It sits 4,411 meters above sea level and has a runway that totals 4,200 meters in length. As such, it is the world's highest civil airport.

Due to the complex geographical environment and harsh climate, the aircraft performance in Daocheng Yading is greatly limited. For this reason, it is particularly important to measure the airport's outline weather parameters, such as wind, pressure, temperature and humidity, as well

Daocheng Yading Airport is a civil airport in Garzê Tibetan Autonomous Prefecture. It is located at Haizi Mountain, 50 km away from the north of Daocheng County. Situated 4,411 meters above sea level, it is the highest civil airport in the world.

Since opening in 2013, the airport has greatly improved the tourist traffic conditions in the southwest of Garzê Prefecture, serving nearly 400,000 people from six counties in the southern part of the prefecture as well as the neighboring cities and counties in Tibet and Yunnan. It has opened a window to the outside world and promoted regional economic development.

as specialized aviaional indicators like Runway Visual Range (RVR) and present weather conditions.

Demanding Heights

The high altitude of Daocheng Yading is the biggest challenge affecting the airport's operations. In addition to the extreme weather conditions and the complex geographical environment, that is common for all highland airports, the altitude of 4,411 meters renders it unprecedentedly difficult for aircrafts to approach and land on the airport.

In order to help Daocheng Yading battle the challenges posed by its high location, Vaisala has offered a complete meteorological monitoring solution, Vaisala AviMet® Automated Weather Observing System (AWOS), based on the particular needs of the airport. The Vaisala AviMet® AWOS provides meteorological data to the air traffic controllers and pilots as well as meteorological forecasters and observers, for example.

Extreme weather can cause challenges on the windy, high plateau that Daocheng Yading is located on. To measure RVR, Daocheng Yading uses Vaisala's FS11 Visibility Sensors and FS11P Present Weather Sensor, providing information on prevailing weather phenomena at the airport to secure safe take-off and landing.

When operating in high altitudes, also the winds can be stronger than

nearer to the ground, making it crucial to measure their strength and impact on airport operations. The design of the sensors ensures protection against all windblown particles, such as sand: thus the particles will not distract the measurement in the windy conditions. Additionally, Daocheng Yading uses Vaisala's Ultrasonic Wind Speed Sensor WMT702 for accurate wind measurements.

Clouds can be relatively close to the ground when operating in high altitudes, affecting take-off and landing. Vaisala's Ceilometer CL31 measures the height of clouds and cloud coverage, being able to detect three cloud layers simultaneously – also during precipitation. CL31 hosts excellent detection of low cloud layers starting at a height of virtually zero.

In great heights, air density and pressure decrease. The thinner the air is, the lower the engine performance of the aircraft is as well, creating the need for Daocheng Yading's exceptionally long runway: 4,200 meters ensures a safe take-off. The Digital Barometer PTB330, with Vaisala BAROCAP® technology and three independent transducers for optimal redundancy and measurement quality control, enables the airport to measure atmospheric pressure accurately. Moreover, Vaisala's AWOS software ensures QNH and QFE readings that are calculated to fit especially high altitudes, like that of Daocheng Yading.

Challenging Cold

Due to the heights and resulting low temperatures, Daocheng Yading has a long frost period and the climate is cold. The harsh environment sets also its own requirements for the meteorological observation system at the airport. The equipment has to be able to adapt to the climate, provide stable, accurate measurements and resist the cold, characterized by enormous differences in temperature between day and night.

Vaisala's products are known for performing in demanding and varying climates from the tropic to the arctic. The Visibility Sensors used at Daocheng Yading are equipped with high-power heaters that prevent the effects of cold climate as well as the accumulation of snow on the sensors. Vaisala's wind sensor is likewise equipped with heating power.

The customer has been very happy with Vaisala's solution to battle the demanding and cold climate, as stated by the Meteorological Department of Daocheng Yading: "After the system was set up, Vaisala's observation system has provided us with stable data, and it has adapted well to the climate." The ability of Vaisala's equipment to provide accurate data, perform reliably and withstand demanding conditions have made it the ideal solution in the great heights of Daocheng Yading.

The Optimus Experience

Vaisala Optimus™ DGA Monitor for Transformers is one of the newcomers that joined Vaisala offering this year. In addition to being reliable with no false alarms and durable due to high-quality components, it is additionally easy to install. We went to meet our engineers to get a first-hand account of how easy it actually is and hear how the journey has been so far.

In the deep end of the production line, we have four important hosts waiting for us. We are happy to introduce Product Area Manager **Pasi Iisakkala**, Product Manager **Teemu Hanninen** and Mechanical Engineer **Riku Rantala** – and of course the star, Vaisala Optimus™ OPT100 DGA Monitor for Transformers, which is also known as Optimus among friends.

Safe, Smooth and Simple

The safe and easy installation of Optimus starts with the design. The instrument consists of two separate units. The lower and smaller is the lifeline of Optimus, the power unit. The bigger measurement unit above is the brains and can be easily and safely installed, since there is no danger from electricity.

There are a few ways to install Optimus. “You can either bolt it to a wall on the side of a transformer, or on the ground,” summarizes Teemu. When Optimus is in place, the oil pipes from the transformer need to be arranged to lead in and out of Optimus, guiding the oil samples through the measurement unit.

In most cases, when Vaisala personnel have entered the installation

site, customers have already done the pre-installation. “All our customers have been amazed of how easy it is to set up the instrument with the help of our manual, and the feedback has been solely positive. As the product is still new, we just want to be there to ensure that everything goes smoothly, listening to the customer needs and also learning ourselves about the possible challenges along the way,” says Pasi.

Optimus vents its pipes and itself which is a differentiating factor, simplifying and speeding up the installation process. Once the customer has

the product all set up and ready, it is just a matter of commissioning and calibration.

The interface guides the user through the commissioning program by providing instructions in each step before Optimus starts the measurements. First results are available after a few hours, and final accuracy is achieved after two days, once the calibration is complete. Optimus takes samples continuously approximately once per hour, and the results can be monitored through Vaisala’s user-friendly interface: all you need is a PC and a browser.

The installation takes about a few hours, overall. “The feedback we have gotten concerning the installation has been nothing but positive. When we get on-site to finalize the installation, customers’ reactions have been along the lines ‘was that it’,” concludes Pasi.

With the Customer, for the Customer

Although the product is extremely easy to install, Vaisala personnel plans to accompany customers during the installation also in the





near future. “Optimus is so easy to install that our customers are well capable of putting it up themselves. Nonetheless, it is still early days and we have moved forward with a customer-focus from the beginning, so we still want to help them in the installations, learning how they wish to work with the instrument and improving their installation experience,” explains Teemu.

Going customer first, the OPT100 is a model of new agile and iterative product development, where the product is boldly taken to the market while being developed further based on the experiences and feedback. “We have learnt a lot ourselves during the R&D phase as well as the installations. Now that Optimus has customers all over the world, covering almost every continent, we have gathered information from varying situations and environments,” tells Teemu.

So what kind of environments have our engineers faced? Cities are common locations for transformers

but also a hydroelectric power plant outside of a city in South America counts among Optimus’ sites. So far the coldest installation location has been Northern Finland, and California and South Africa count among the hottest. Optimus itself doesn’t mind – it has demonstrated its reliability in versatile conditions.

Overall, the whole process has proved to be a prime example of the power of collaboration, as Pasi exemplifies: “The Optimus™ OPT100 DGA Monitor is a product of exceptional co-operation not only cross-organizationally in Vaisala but also internationally together with customers.” The agile collaboration and pilots with customers have borne fruits as well; many have been so happy with the product that they have ordered more Optimus monitors.



Lifesharing Safeguards Donated Tissues and Organs with Reliable Temperature Monitoring and Alarming

Lifesharing Safeguards Donated Tissues and Organs with Reliable Temperature Monitoring and Alarming

Founded in 1973, Lifesharing is a nonprofit organ procurement organization (OPO) partnered with UC San Diego Medical Center. In 2016, organ donations to Lifesharing saved 363 lives, setting a new annual record for the organization. In the same year, Lifesharing recovered tissue from 471 donors. This tissue represented treatment potential for up to 24,000 people. Since its inception, Lifesharing has saved over 7,000 lives through recovered organs and helped thousands more through donated tissue.

Accurate Monitoring Is a Life-Saver

Tissue Operations Director **Harry Celestin** has been with Lifesharing for almost two decades. During that time, he has used Vaisala's viewLinc system to monitor and alarm storage chambers and processing areas. Freezers and refrigerators store donated tissue, research organs as well as chemical agents used as perfusion and sterilization media for cell preservation. In the years he has used the viewLinc system, he has seen it safeguard invaluable materials that would have otherwise been lost.

"There was one time that viewLinc sent an alarm in the middle of the night. One of the freezers seemed to be hitting a temperature threshold," said Celestin. "We acknowledged the alarm in viewLinc, and then waited a short time to see if the refrigerator would reset. It didn't, and we spent the entire night transferring materials to other freezers. In that instance, the system saved thousands, perhaps tens of thousands, organ perfu-

sion agents that would have been destroyed."

It was later determined that a sensor in the fridge had been covered with ice. The refrigerator's mechanism for stopping condensation had malfunctioned. Although not a catastrophic equipment failure, left unattended the temperature excursion would have been enough to destroy some or all of the refrigerated materials.

Records for Regulations

Along with alarming, viewLinc maintains temperature records for regulatory purposes. "Our temperature records are always available to present on short notice," said Celestin. "We are inspected and audited at



“Not only has the reliable alarming of the [viewLinc] system saved thousands in materials, but the simplicity of the system makes facilities expansion simple and easy.”

- Harry Celestin, Director Tissue Operations

the federal and state levels, and our partners expect our records to be continuous and secure. My reports are emailed to me automatically every week by viewLinc, so it's easy to stay on top of conditions and feel ready for an inspection.”

Lifesharing is federally designated, licensed, certified and accredited by multiple agencies and organizations, including the FDA, the State of California Department of Public Health, the Joint Commission, the Association of American Tissue Banks, the Association of Organ Procurement Organizations, and others. Regulation and accreditation is crucial to ensuring the quality of tissues and organs. The Department of Health and Human Services (DHHS) monitors Lifesharing, while the Organ Procurement and Transplant Network (OPTN) provides oversight and guidelines. Lifesharing is also a member of the United Network for Organ Sharing (UNOS) and accredited by the Association of Organ Procurement Organizations (AOPO) which provides additional guidelines for all national OPOs.

Simple Use Makes Simple Operations

Recently Lifesharing moved their facility, increasing the number of fridges, freezers and processing areas. After 17 years at one location, they transferred to a new building designed especially for their growing

operations. During the move, they kept all the data loggers monitoring storage chambers in place. “The Vaisala loggers made things simple,” said Celestin. “I have associates in other organizations, and changing locations can be a real logistical juggle in terms of temperature records. We were happy to keep our data loggers logging and our temperature records continuous.”

In 2017, 119,053 people in the United States are awaiting organ donation. There is hope, because donations are on the rise and have been for decades, with organ transplants having increased by

nearly 20% in the last five years.

The technology of procurement and transplantation is improving thanks to research and increasing education about donation.

“I especially appreciate Vaisala’s field support,” said Celestin. “We have them do our calibrations regularly, and they take very good care of us. Organ donation saves lives, so it means a lot when our vendors support us. Not only has the reliable alarming of the viewLinc system saved thousands in materials, but the simplicity of the system makes facilities expansion simple and easy.”



Lifesharing was founded in 1973 to support UC San Diego Medical Center’s regional burn center and pioneering kidney transplant program. Lifesharing is committed to the life-saving and life-enhancing efforts of transplantation. It strives to be the leader in organ and tissue donation through education, collaboration, and the provision of quality service.



Giant Leap into Working Life

Giant Leap is Vaisala's internship program for students studying their 3+ year in a university or polytechnic. Each year, Vaisala handpicks exciting business challenges for the Giant Leapers to manage.

Giant Leap has proven to be an excellent way to recruit talented young professionals to Vaisala. Currently we have more than 40 former Giant Leap interns working at Vaisala in diverse positions and teams, for example in Product Development, Operations, Marketing and Finance. Jukka-Pekka and Niina share their stories about their paths at Vaisala.

Jukka-Pekka Took the Giant Leap

Jukka-Pekka Piirainen joined Vaisala in 2015 as a part of the Giant Leap program, and like many of the former Giant Leap interns, Jukka-Pekka has stayed onboard.

At the time of the internship, Jukka-Pekka had just finished his fifth year in the Industrial Engineering and Management program at the Tampere University of Technology: "As my studies were drawing to a close, I felt that it was time to look for a truly challenging and interesting summer job to test myself and develop professionally. Giant Leap provided me with experience on managing a project of my own and a comprehensive view to the cross-functional collaboration between Vaisala and its suppliers," tells Jukka-Pekka.

A Great Experience

The summer at Vaisala lived up to Jukka-Pekka's expectations, even

exceeding them: "It was incredibly rewarding to take up the challenge since the projects are genuinely considered important in the company. Vaisala has proven to be an employer whose values I can share, a workplace where my work is appreciated, and a company that can make a global difference through innovation."

After his Giant Leap summer, Jukka-Pekka was able to utilize the experience in his thesis: "My thesis built on the lessons learned and included developing systematic practices for Early Supplier Involvement in Vaisala."

Future in Vaisala

Nowadays Jukka-Pekka works as Sourcing Project Manager in Vaisala's Helsinki office. He participates in new product development projects as a sourcing representative, and one of his key responsibilities is to drive and facilitate Early Supplier Involvement in practice.



"Both Giant Leap and my master's thesis prepared me for the job well. Having participated in Vaisala's mentoring program and several trainings, I have been pleased with Vaisala's opportunities for personal development. To summarize, Giant Leap took me to the core of strategic sourcing and offered me a truly rewarding chance to influence practices and ways of thinking," says Jukka-Pekka.



Giant Leap to Boston

As a technology company, Vaisala may not be the most obvious choice for a young marketing student looking for her first job. Nonetheless, Business student **Niina Reponen** applied and was selected to Vaisala's Giant Leap internship program in 2011.

"What really got my attention was the international aspect of the company as well as the interesting Giant Leap projects. I'm glad I kept my mind open and joined the company, as the Giant Leap summer exceeded all my expectations. I got to work with an interesting and meaningful project, strengthening my skills in digital marketing, which is my field of specialization", tells Niina.

Best People Globally

After her Giant Leap summer, Niina wrote also her master's thesis about Vaisala. Ever since, she has held several marketing positions in the company, working currently in the United States.

"International projects have led me to Boston, where I'm currently located. It's eye-opening to see the company's operations in another continent and from another perspective. Vaisala is truly a global

company, which makes the business and everyday work all the more exciting. However, even if it's a cliché, the people are the best part of Vaisala. I feel privileged to work with such an amazing, professional, fun and talented group of people", she says.

Niina is amazed and happy about the amount of responsibility Vaisala gives to its young professionals. Overall, the unique approach allows the young talents to kick-start their careers and gain insight on our mission – observations for a better world.

Vaisala Opened Africa Weather Services Hub in Kenya

Responding to growing demand, Vaisala has opened an office in Nairobi, Kenya on September 20th. The office was established in order to deliver high-quality weather measuring systems to Vaisala's customers in Eastern and Southern Africa as well as improve measurement infrastructure in the face of extreme weather and pollution.

The Nairobi hub is the company's only office in Africa, and it will serve the Eastern and Southern African market for weather observation systems. Weather observations and improved weather infrastructure are critical for the region's agriculture and civil aviation sectors. Traditional monsoon weather patterns are also becoming less predictable, driving a move to stronger weather data.

Kjell Forsén, CEO, states: "There is increasing demand for sophisticated weather services from a range of industries and government departments across Africa. Weather has a huge impact on economic growth and national development plans."

Since 1980, Vaisala has delivered weather observation systems to aviation authorities and meteorological offices in Africa. Vaisala has provided weather observation systems to Jomo Kenyatta International, Kisumu and Eldoret airports.

"Reliable and accurate weather observation system is a prerequisite for safe takeoff and landing of an aircraft. Most of the major airports in the world rely on Vaisala's technology. We have a long history in weather-related capacity building projects, renewing infrastructure and weather measuring systems," Forsén continues.

Vaisala's new Africa hub will offer expanded environment and weather



CEO Kjell Forsén giving interviews after a busy press conference on opening of Nairobi office.

services, including air quality measurement instruments and services. Air pollution is a growing health problem around the world: in 2016, World Health Organization (WHO) stated that 92% of the world's population lives in areas where air quality levels exceed WHO limits.

"Air pollution is affecting cities all over the world. However, high growth, high-density cities in the developing world are most prone to disruption from weather and pollution. We're seeing high levels of economic growth across Eastern and

Southern Africa, which drives urbanization and new settlement. Weather and air quality measurements are critical elements in managing this development for quality of life and sustainability," Forsén concludes. Vaisala has chosen Nairobi as the location for its Africa hub thanks to its infrastructure, good connections and Kenya's established trade relationships with Finland. The office address is: 4th Floor, Cavendish Building, 14 Riverside Drive, Nairobi, Kenya.

200 Issues Ago

First there was no. 1, now we're at 201. 58 years and exactly 200 prior issues have come and gone since the publication of the first Vaisala News. To honor this respectable history, let us travel back in time to the year 1959 and see what was written in the first issue.

Customer-focused and global. That is how Vaisala customers and employees describe our business. In this respect, it has been a steady and even road for 58 years and more, as the same message resonates also in the familiar tone of the very first Vaisala News editorial in 1959, written by professor **Vilho Väisälä** – the founder and first Managing Director of Vaisala. He sheds light on the reasons for establishing the publication.

Over the years, starting from 1930's, Vaisala had become more and more international with the Väisälä Sounding System in global use. Indeed, the first issue portrays images and short snippets on the international voyages of the radiosonde – the product from where it all began – and is thus firmly rooted in the heart and birth of the business. Ranging from South America to the Northern archipelago of Norway, the depicted journeys took place during the International Geophysical Year in 1957–1958. For the global growth, a medium to inform customers about the latest developments was an order.

"We hope that the VAISALA NEWS will be appreciated by all those whose work lies in the meteorological field, and trust that the publication will also serve as a link in international meteorological co-operation," concludes Vilho Väisälä the editorial.

Vaisala News was born.

Greetings from the Factory

The articles in the first issue are scarce compared to where we are today, amounting to the modest total of two, the editorial excluded: "The Vaisala Factory and Väisälä Sounding System" by **Pentti Väisälä** (Assistant Managing Director) and "Vaisala Aerological Station" by Vilho Väisälä. As the headlines reveal, the texts are quite technical, presenting Vaisala business and history, division of work as well as the new factory in Vantaa. The office is introduced also on the cover, with the Finnish flag flapping proudly in the air in front of the building.

The texts are coupled with detailed tables depicting the monthly sounding results of the Vaisala Aerological Station that was established to perform regular soundings in Vantaa and to answer to the increasing production of the radiosonde. Whereas nowadays Vaisala News gives voice to our customers and their experiences, the magazine was first created to serve customers with scientific subjects written by Vaisala staff.

Customer at the Core

In the first issue, customers are welcomed and encouraged to contact Vaisala, as illustrated in the article by Pentti Väisälä. "Vaisala is always willing to help customers in any



problem which may arise in the use of the sounding instruments manufactured by the company. Please feel free to call on us at any time," he writes.

Customer service was the nucleus of the company to an increasing level already at the time, and the articles also promote Vaisala's free courses on the use of the sounding systems. Moreover, on the last page the "Väisälä Sounding System presents a new mixing hygrostat" for radiosondes: the advert informs customers of the new product and is in appearance a testament to the times.

The customer, the science and the combination of Finnishness and internationality form the backbone of the first issue. As such, many things have remained the same but many have also changed. The product offering has expanded exponentially from the radiosonde to a wide array of products, and with the 12 pages and two articles in total, the first issue constitutes a compact, technical package from which we have travelled to the over 20-page publication and customer pieces of today.

To read Vaisala News from years passed, visit <https://issuu.com/vaisala>

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