FINGRID

CORPORATE MAGAZINE | FINGRID OYJ | 2 / 2015 | DIGITALISATION

FINGRID

Fingrid participated in the national Farmari 2015 agricultural fair held in Joensuu. Discussions with visitors concerned transmission line projects and land use in line clearings, among other things.

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Cover photograph: Senior Expert Minna Laasonen's hobby is frisbee golf, which can be played in a power line area. Read the story on page 25.
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IN THIS ISSUE

KARI SUOMINEN | FINGRID'S CHIEF INFORMATION OFFICER

DIGITALISATION MAKES THINGS POSSIBLE

You can't escape hearing the word 'digitalisation' recently – everyone's talking about it. Digitalisation is being heralded as the new driving force behind economic growth in Finland. In Fingrid's strategy work, digitalisation has been identified as one of the formative megatrends in our operating environment. So how does digitalisation relate to how a transmission system operator works? Our primary task is to ensure the disturbance-free transmission of electricity between producers and consumers.

Actually, there is already a long tradition of digitalisation in Fingrid's operations. The use of the power system, the asset management and the electricity markets and exchanges would not be possible without advanced digitalised processes. From a transmission system operator's perspective, digitalisation brings opportunities for the improvement of productivity and customer services.

The amount of measurement data relating to the use of the power system and the data collected from the grid infrastructure on the behaviour of components is continuously increasing. When combined with history data and its analysis, this data helps network planning to find areas which require improvement and makes it possible to carry out predictive condition management solutions. Fingrid has been a pioneer amongst transmission system operators in utilising the Internet of Things. We have been able to make use of analysed data and to make the right executive decisions concerning faulty components. As the quantity of data increases, so does the number of possibilities for its utilisation. This poses a challenge for us in the near future – how can we further improve the efficacy of predictive maintenance?

The utilisation of mobile devices has also been a part of digital business operations. Fingrid has taken great steps in this area, since our partners who supply maintenance and construction services make extensive use of Fingrid's mobile services. Management reviews, land and water construction measurements and occupational safety reports, to name just a few, are all carried out using tablets. This has achieved a marked improvement in working efficiency and in the quality of data produced on work sites.

Electricity retail markets are also undergoing digitalisation, and measurement and control data relating to consumer-specific electricity production and consumption is accumulating more than ever before. The status of small consumers on the electricity markets is changing and strengthening as solar power and other distributed power production increases and small consumers are able to participate in demand response. The datahub to be implemented by Fingrid in the near future will play a significant role in these market processes. The datahub is a prime example of *big data*, wherein a large amount of measurement data can be enriched with other external data. This will in turn allow for new business models which can be used to serve households all over the country in an entirely new way.

In addition to these business-related matters, the way we work will also change. There will be less reliance on time and place, but this shouldn't mean a reduction in face-to-face interaction between people. The nature of the work will become more meaningful as we move away from routines and the focus of work will shift to development and innovation.

> "From a transmission system operator's perspective, digitalisation brings opportunities for the improvement of productivity and customer services."

One of the most significant changes brought about by digitalisation relates to a whole new kind of customer experience. Information provided to customers will always be available, the service is even faster and more personalised and will make use of many channels. The information exchange must be multichannel and the service experience must be positive. Fingrid has accepted this challenge and its response will soon be seen in new kinds of services developed in phases for all interest groups. Follow us to see how we keep our service promises!

TOWARDS **CENTRALISED** INFORMATION EXCHANGE

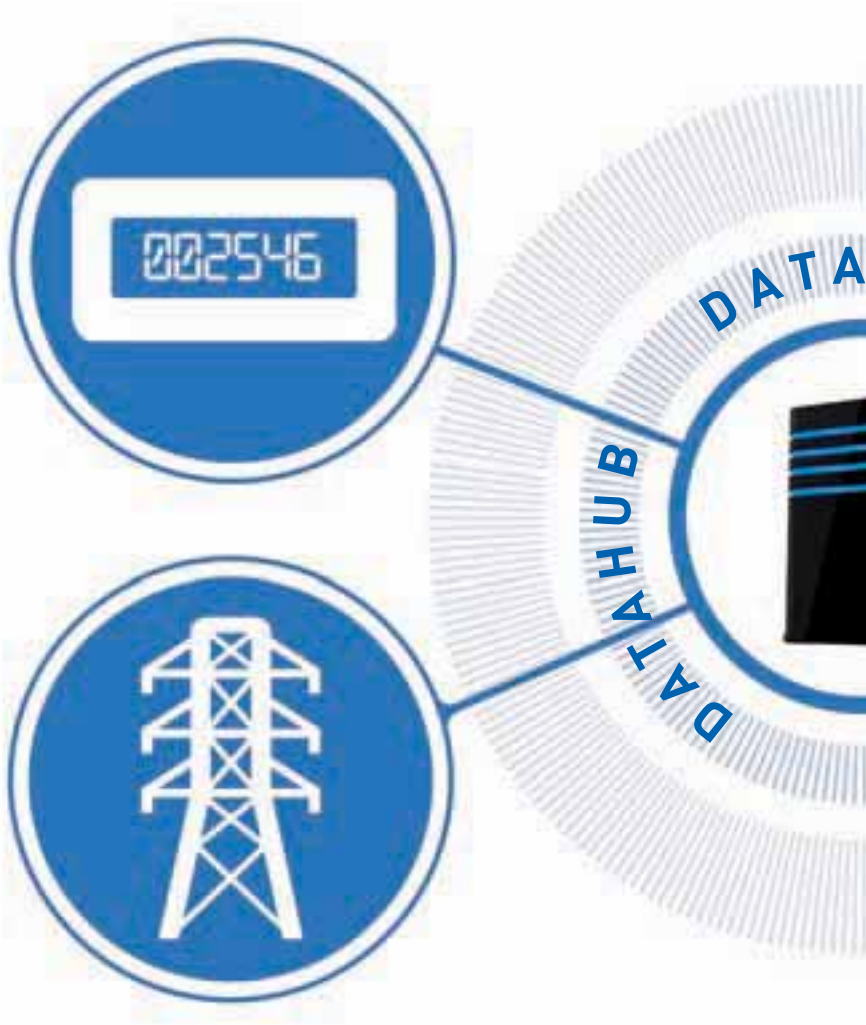
In spring 2015, Fingrid launched a project to clarify information exchange on the electricity retail markets and make it more efficient. In four years, data sent between electricity consumers, sellers and distribution companies will be stored in a datahub, where it will be equally available to all market operators.

TEXT SUVI ARTTI | **ILLUSTRATIONS** GOOMOOD OY

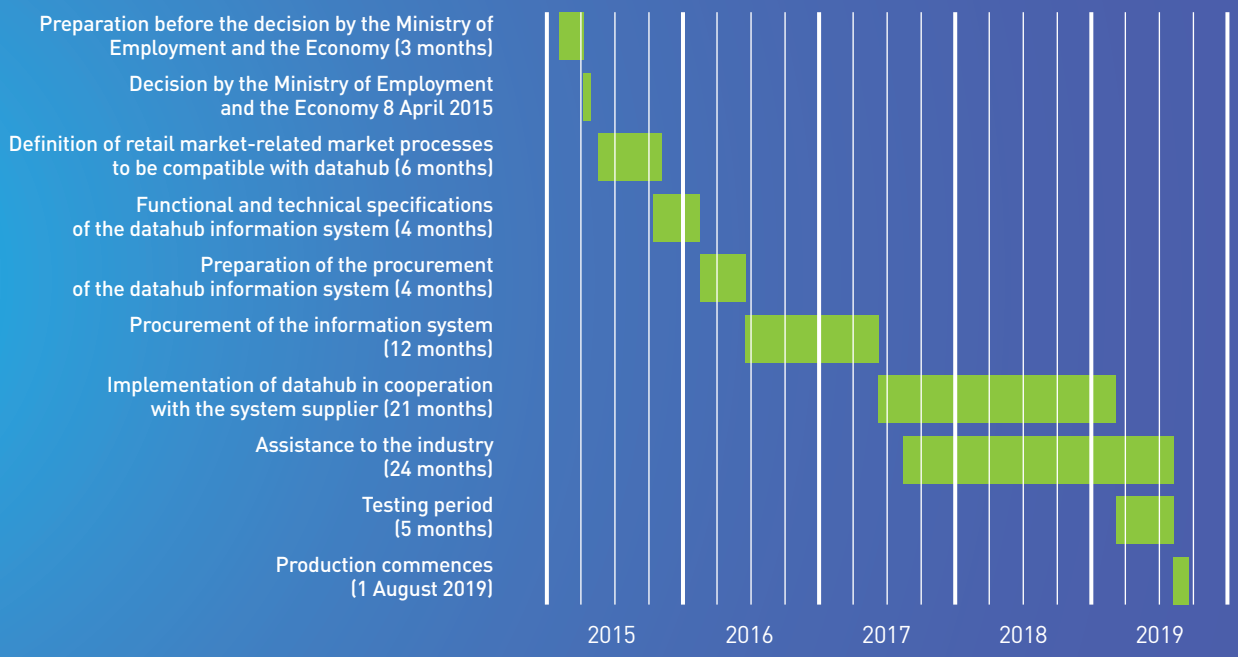
When a Finnish consumer changes their electricity supplier in 2020, all the necessary information will be sent between the electricity seller and distribution company via a centralised information exchange system known as a datahub.

The current practice is markedly more complicated; for example, when changing electricity supplier, the consumer must first contact a new supplier who then notifies the distribution network company of a new sales contract. In turn, the distribution network company notifies the current supplier of the new sales agreement and the current supplier then terminates its own agreement. The distribution network company then confirms the new agreement and delivers meter data to the new supplier for the start of the new agreement and to the old supplier for final invoicing. Several different but corresponding processes exist.

"In Finland there are approximately 300,000 changes in seller per year, so there is a large amount of data flowing back and forth between parties. This data is currently located in vari-



THIS IS HOW THE DATAHUB PROJECT PROGRESSES



ous companies' systems, making it very decentralised. The datahub will become a 'centralised warehouse for measurement data', where data supplied by distribution network companies is stored. Parties will no longer exchange information amongst themselves, but will instead communicate solely through datahub," explains datahub Project Manager **Pasi Aho** from Fingrid.

Changes in seller, moving house and other electricity contract changes are just one example of processes which require information to be exchanged and which will benefit from datahub in the future. Imbalance settlement carried out by distribution companies, for example, will be carried out in the new data bank.

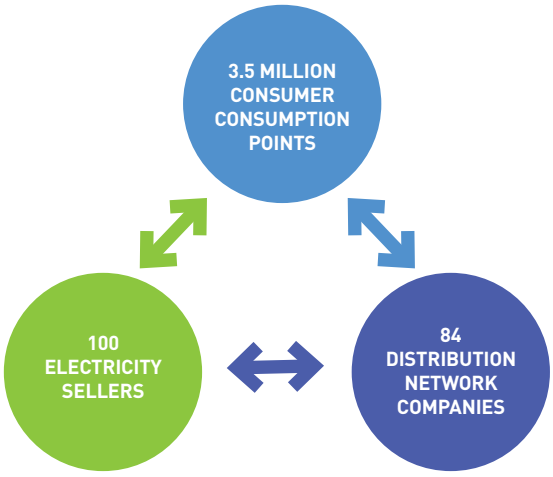
"Datahub simplifies, clarifies and speeds up electricity retail market activities and makes them more efficient. A centralised information exchange solution will also guarantee fair and non-discriminatory treatment for all. When core information used in market processes is stored in a single location, it is equally and simultaneously available to all market parties," Aho says. →

The most out of smart systems

There are approximately 100 electricity sellers in Finland and 84 distribution network companies. Consumers, on the other hand, number approximately 3.5 million. Thanks to smart electricity meters, data is collected on a daily basis from each metering point and datahub will allow us to better utilise this data. At the same time, datahub will allow for the development of various applications to serve consumers.

"The development of such services is not in Fingrid's job description, but datahub offers a technical interface for the data within it, and service providers can make use of that interface to provide services. Such a service could for example be a mobile application which the consumer uses to check electricity consumption data at both their home and summer cottage at a single glance, even though the metering points are located on opposite sides of the country," says Pasi Aho.

Consumers are taking on an increasingly active role on the electricity markets. Consumers can already connect their own small-scale production to the network.



"Smart systems allow for consumers to participate in demand response and for better utilisation of small-scale production throughout the entire power network. We need various service platforms for this to be possible. Datahub is one of them," Aho says.

An industry-wide project

Behind the datahub project is the Electricity Market Act, updated in 2013, which tasked Fingrid with responsibility for the development of information exchange required by electricity trading and imbalance settlement.

In 2014 Fingrid investigated the alternatives for implementing information exchange and the result was to favour a centralised solution. Having completed its investigation and heard from interest groups, on 8th April 2015 the Ministry of Employment and the Economy requested that

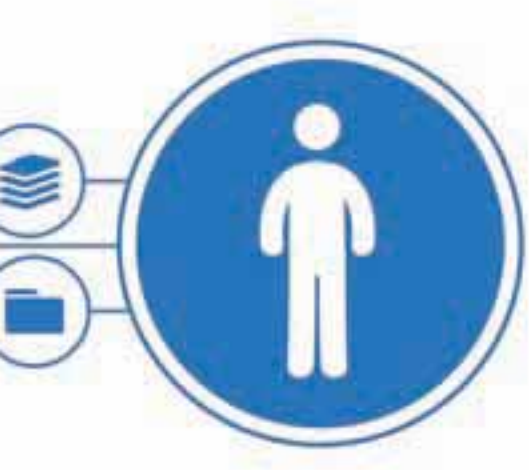
Fingrid launch its datahub implementation project.

The project is industry-wide, and there's plenty of work to do. The first task, to specify market processes, is currently under way. The specification work uniformly describes all of the most significant current processes which involve information exchange. After this, work will continue with the specification of the necessary processes in the datahub environment.

According to Aho, specification is a critical phase which requires retail market actors to make large investments. This must however be done before the development of datahub can progress. Two specialist workgroups have been established to carry out the work, with one representing electricity sellers and the other representing distribution network companies. Each work group consists of six members from industry companies.

"Fingrid's role is to lead this work and to produce the necessary material for the work groups. Once process work is complete, we will distribute it amongst the industry for comments and feedback," Aho explains.

"When core information used in market processes is stored in a single location, it is equally and simultaneously available to all market parties."



He emphasises that work is carried out in close cooperation with the entire industry. A monitoring group consisting of industry actors and interest groups constantly monitors the project's progress.

Why Fingrid?

Fingrid's report examined various alternatives for an administrative model for the service. In addition to a solution administrated by the transmission system operator (TSO), other alternatives included datahubs administrated by commercial actors or by an authority. The scale was tipped in Fingrid's favour however, one reason being that a TSO is an independent actor. Datahubs administrated by TSOs have proven successful in Denmark and Norway.

This new area of responsibility means an expansion of Fingrid's job description in the direction of the retail markets. A subsidiary to Fingrid will be established for the administration of datahub in order to keep activities transparent and roles clear: Fingrid's task is still to keep the country's lights on, and "Datahub Oy" will concentrate on managing and developing electricity retail markets' information exchange.

Fingrid requires new competences to match its new role. "Amongst other things, we need retail market specialists as well as specialists from the ICT industry to implement such a massive information system procurement," says Aho. He estimates that once complete, datahub will employ 8–10 Fingrid employees and possibly more during the project period.

Once specification work is complete, the aim is to initiate the procurement process in spring 2016. After the selection of a system supplier, the implementation of the system is expected to last between 2 and 2.5 years.

Aho points out that legislation also has to be changed: Fingrid's responsibility for datahub operation, and the roles of electricity sellers and network companies in the new model must be written into the Electricity Market Act.

WHAT IS DATAHUB?

A centralised information exchange service for the electricity retail markets. Plans estimate that it will be taken into use in 2019.

The estimated investment costs stand at approximately 20 million euros.

Main functionalities:

- Storage and transmission of measurement data
- Implementation of harmonised market processes
- Storage and transmission of customer and metering point data
- Monitoring of operational quality
- Open interfaces for third parties
- Testing and certification service
- Imbalance settlement by distribution network owners
- Statutory reporting of consumption data by distribution network owners and electricity sellers
- Authority reporting

Nordic cooperation

Lessons on how to implement datahub can be learnt from Denmark and Norway, whose TSOs engage in close cooperation with Fingrid. The topic is also dealt with in a cooperative group of Nordic grid network companies.

"The Norwegians are two years ahead of us in their project; their Elhub system will be taken into use in 2017. And the first version of the Danish DataHub is already in use," says Aho.

He believes that the implementation of datahubs in various countries will also lower the threshold for the creation of joint-Nordic retail markets.

You can follow the progress of the datahub project on Fingrid's website by clicking Customers → Datahub.

You can also watch a video about datahub (in Finnish) on YouTube by clicking **https://www.youtube.com/watch?v=bYDvYibc5hk**

DEMAND RESPONSE IS WORTHWHILE

An increase in demand response creates new kinds of opportunities to maintain Finland's power balance. This series will present pilot demand response projects.

Participants of the demand response project were photographed at the Riihimäki Prisma. From the left: S-Voima's portfolio manager Tommi Riski and Managing Director Mikko Halonen, Hämeenmaan Osuuskauppa's Technical Building Manager Hannu Tauriainen and Project Manager Hannu Kähärä.

FLEXIBLE ELECTRICITY CONSUMPTION IN SEVEN PRISMAS

S Group is cooperating with Fingrid to increase demand response with seven Prisma hypermarkets. The properties' ventilation units, heat pumps, electrical heating, outdoor lighting and backup generators are automatically adjusted.

TEXT MIRA MUURINEN | **PHOTOGRAPH** VALTTERI KANTANEN

Early this year, the Hämeenmaa and Pirkanmaa Cooperatives' Prismas installed systems to help automatically adjust electricity usage in the properties according to load on the electricity network. The aim of the project is to investigate whether the Prismas could participate in demand response by disconnecting devices during periods of peak consumption and discharge overproduction through their properties.

The pilot project is related to a project launched by Fingrid last year which searches for novel solutions to balance electricity consumption with production.

A wide range of electricity usage sites

At 1.15 terawatt hours per year, S Group is Finland's largest non-industrial consumer of electricity. The coop-

erative group has established its own electricity procurement company, S-Voima Oy. S Group owns 50 per cent of TuuliWatti Oy, which focuses on the production of industrial wind power. S Group's target is to produce half of the electricity it uses via its own wind power by the end of 2016.

> "The idea is that the adjustments will go entirely unnoticed by Prisma staff and customers."

A total of seven Prismas are participating in the joint pilot project between Fingrid, S-Voima and the Hämeenmaa and Pirkanmaa Cooperatives: The Linnainmaa and Lielahti Prismas in Tampere, the Forssa, Hämeenlinna and Riihimäki Prismas, and the Holma and Laune Prismas in Lahti.

These stores were selected because they have large back-up power generators which were designed with the idea in mind that they could potentially benefit the electricity markets during price spikes. "All and any benefit from demand response will be channelled into the Prismas participating in the project," says S-Voima's Managing Director **Mikko Halonen**.

In addition to the back-up power generators, in the pilot project various flexible electricity consumption sites will be adjusted in the store properties, such as ventilation units, heat pumps, electrical heating and outdoor lighting.

"For adjustment purposes, we've selected consumption which is unaffected by approximately 30 minutes of temporary cutoffs. The idea is that the adjustments will go entirely unnoticed by Prisma staff and customers," explains **Toni Sulonen**, energy engineer at Pirkanmaa's Cooperative.

"The adjustments are completely automatic, so they won't add to the workload of Prisma staff. The command to carry out adjustments is sent to the relay equipment based on network load and from there it is sent to building automation."

The aim of the project is to investigate which parts of the Prismas' electricity consumption can be adjusted and what kind of reserves they are suited for technically.

"There are many kinds of electricity consumption in a hypermarket store property and these provide the possibility to participate in various reserve markets. For example, a certain area of electricity consumption from each hypermarket could be placed under control, combined and then offered as a package to the most suitable market," explains Development Manager **Jonne Jäppinen** from Fingrid.

Overall consumption is the key

The pilot to be carried out in the Hämeenmaa and Pirkanmaa Prismas is not the first time that S-Voima has been involved with demand response. It participated in this project largely because of its positive experiences of a trial at the Forssa Prisma in 2011. The concrete benefits from the first trial broke even, but there was still a desire to search for demand response potential.

"We believe that adjustable demand will have great value in the future as the share of wind and solar power in production increases. Of S-Voima's electricity procurement, 40 per cent already comes from wind power, which is dependent on weather conditions. That's why we want to be active, so that our electricity consumption is more sustainable. We also want to be pioneers in a project that has great significance to society," explains Mikko Halonen.

S Group works continuously to save energy and improve the efficiency of energy use, so the response potential in individual sites is unavoidably low.

"We aim to extend demand response to all levels within the S Group. We have a total network of 1,600 outlets however, so overall consumption is the key," admits S-Voima's portfolio manager **Tommi Riski**.

Jonne Jäppinen agrees. "If all of the S-chain's premises were to engage in demand response, it would be a significant resource. The Prisma pilot is exactly what Fingrid was looking for: to test out novel solutions with an open-minded attitude with the aim of applying the project to other sites should it be successful."

Marketplace rules are a challenge

From Fingrid's perspective, the trial carried out with Prismas produces valuable information on a wide range of different consumption points.

"For example, the fact that a certain kind of consumption is simply unsuitable for any kind of reserve market is valuable information for us. We can then begin to investigate why that is, and what changes could be made in order for us to be able to utilise it," says Jonne Jäppinen.

According to Mikko Halonen and Tommi Riski, possible challenges associated with the pilot project relate to how a reserve composed of consumption sites is able to participate on the reserve markets.

"From our perspective the marketplace rules have to be changed in order for consumption to be better suited for reserve markets. The rules were drawn up largely with hydropower in mind, and Prismas are not hydropower plants," explains Mikko Halonen.

"Otherwise we think very positively about demand response, and we have other individual pilots under way with which to evaluate various balancing power solutions. If, after tests and analytical calculations, it seems that demand response is profitable, I don't see any obstruction to extending it within the S Group."

Halonen and Riski encourage all major consumers of electricity to consider the flexibility of their electricity consumption.

"The potential for flexible consumption can be found in many places. There are of course more challenges when new elements are introduced to existing technology, but in the future we hope that demand response will be given more consideration in new buildings," says Riski.

THE SMART FUTURE IS ALREADY HERE

Big data, the Internet of Things and digitalisation are expected to radically change the world in coming years. Fingrid is also involved in the development. So what's going on?

TEXT OUTI AIRAKSINEN | **ILLUSTRATION** ANSSI KERÄNEN

There's been lots of hype surrounding *digitalisation* recently – and for good reason. There is talk that it will save the public economy from debt and revolutionise both our daily and commercial lives. Discussions are also peppered with other terms such as *big data* and the *Internet of Things*.

In practice, the things we've seen in sci-fi films are beginning to become a reality as various measurement devices and cameras collect data and feed it into information networks, where devices communicate with one another and analyse data, sometimes completely autonomously.

For **Marcus Stenstrand**, who is the project manager responsible for the development of Fingrid's Elvis information system, digitalisation is both work and a hobby. He is especially interested in *Watson*, the cognitive, artificially intelligent technology developed by IBM, which learns and deduces things without having to be programmed in the traditional manner.

"Various measurement devices collect data and feed it into information networks, where devices communicate with one another and analyse data, sometimes completely autonomously."

Optimal asset management

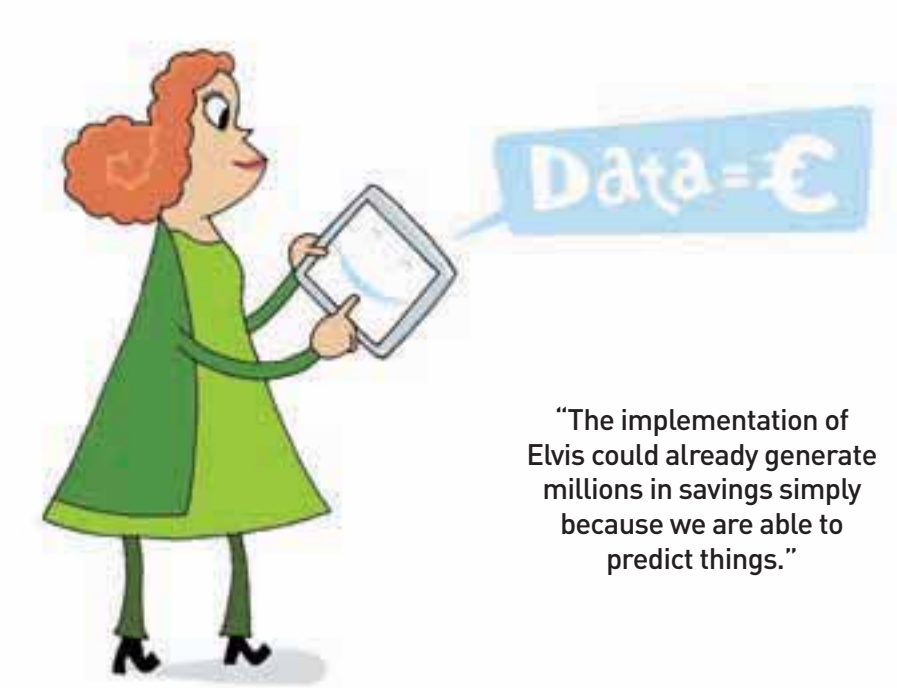
Though we are still quite some way from a self-learning, cognitive system at Fingrid, digitalisation is nevertheless well under way. The implementation of the Elvis information system could already generate millions in savings simply because we are able to predict things.

"We receive new measurement data on the grid's status every second. When you add in smart analytics, you begin to find minor differences," explains Marcus Stenstrand.

For example, the system was used to locate and repair a tiny gas leak caused by a manufacturing fault in a device before it became defective, and to top it off, while the warranty was still valid.

"When it comes to gas leaks, we could be talking about a change of less than one per cent in the trend line. Since pressure fluctuates all the time, we are only able to react to leaks once the set alarm limit is crossed. Now we can carry out further analyses if the trend line indicates something."

Stenstrand believes this is a step towards optimal asset management wherein artificial intelligence and real-time measurement data help us to consider everything that could have an impact on the grid network and its components throughout the entire life cycle of the assets. By screening meas-



"The implementation of Elvis could already generate millions in savings simply because we are able to predict things."

urement data combined and analysed along with previous data, publicly available data, weather data or research data, we can find new and valuable information to support decision-making.

"This method does result in a lot of noise you need to filter out. But on the other hand, the sky's the limit when it comes to the number of ways we can utilise the data," Stenstrand says.

Data is valuable property

The use of Elvis and the digitalisation of Fingrid's business operations have progressed to a stage wherein the grid network's "*master data*" is almost ready. Much hard work has gone into examining all of the data in the company and coordinating it so that there is no conflicting or erroneous data, and then storing it in a logical place. This is necessary in order for the data to be utilised and combined with real-time measurement data (*big data*).

"In addition to the hierarchy, we decided to organise all grid network data according to location and time, since all of our assets also have a time and location. For example, Elvis allows us to put all our maintenance costs on the map," Stenstrand adds.

Once the information is organised, sensors and meters can be installed in the grid's various components to obtain a flow of new information on the grid's status. The devices are connected to the information network (*IoT*) so that they can be read and controlled via the system. To support decision-making, we can also make use of *data visualisation*, which helps to quickly find connections. In order for all this to be possible, the quality of data must be good.

"If the master data is poor, so is decision-making and that results in flawed executive decisions, no matter how good the algorithms are," says Stenstrand.

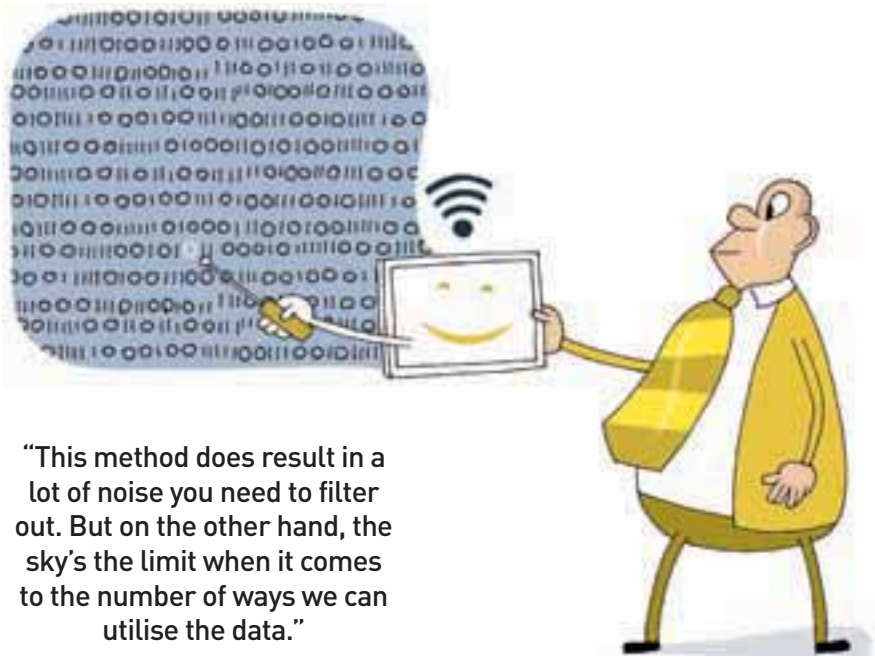
Stenstrand believes that data is a valuable asset that demands respect. For example, it's not enough to simply correct erroneous data; you have to find out how it came to be, and then intervene.

The next step in digitalisation

Where digitalisation previously meant converting the analogue world to an electronic format, we've now moved forward to a stage wherein no human labour at all is required for routine tasks. At Fingrid, the payment of invoices for investment projects has been streamlined.

"The digital method of handling invoicing frees up resources for our core activities. Our most important task is to lead the project," Stenstrand explains.

He estimates that the benefits of digitalisation will only truly be seen next year when Fingrid employees have mastered the new tools. The benefits are nevertheless clear. But should we be concerned that computers are self-learning and society is becoming increasingly dependent on data security? If we believe **Bill Gates**, **Stephen Hawking** and Tesla Motors' **Elon Musk**, it's high time we began to consider the boundaries of artificial intelligence and set down some ethical rules for cognitive intelligence. ■



"This method does result in a lot of noise you need to filter out. But on the other hand, the sky's the limit when it comes to the number of ways we can utilise the data."

MORE WOMEN IN TECHNICAL FIELDS

The Women in Tech week is held every other autumn in Finland. The background to the event is to highlight women who work and are successful in traditionally male-dominated technical fields and to thereby promote equality in the industry. This article introduces six Fingrid employees at various stages in their careers.

TEXT SUVI ARTTI AND MIRA MUURINEN | **PHOTOGRAPHS** MATTI IMMONEN AND STUDIO PSV

MINNA LAASONEN
Senior Expert

"I began my career as a planning engineer and mainly carried out network simulations and work relating to voltage control. I spent some years as a manager in power system planning before moving to the research and development unit to work as technology and development manager. Working with research and development, I saw how interesting the projects are that Fingrid carries out, and I began to prefer the more technical tasks to budgeting and making annual plans. In the end, I requested to go back to being an expert. I have four children, so there's enough coordinating and planning at home. At work it's nice to do something that corresponds more to the technical training I received while studying for my Master of Science degree.

My work is very challenging and interesting, and there is always the opportunity to learn new things. Fingrid has a flat organisational structure and employs a matrix management style of working, so there is lots of cooperation between various units and functions.

I don't feel that gender has been particularly emphasised in any way during my degree studies or my career, and certainly not in my current job. Of course, during my studies it was clear that there were more men than women. The teachers always remembered our names first, for example. In our house, the statistics were a little different; two of my three little sisters became electrical engineers."

"Gender doesn't stand out in my work."

"I wish girls the courage to work in a technical field."

MAARIT UUSITALO
Planning Manager

"When I was in secondary school, people often said to me 'You know, you're so nice, you'd be a brilliant nurse!'. Nurses carry out truly valuable work, but it made me wonder: why couldn't I just as well be a good doctor – or a good engineer?

When I began my studies in Otaniemi at the Helsinki University of Technology, only around twenty of the around 200 new students selected to study electrical engineering were women. As a woman you stand out from the "teekkari" guys, of course, but I never felt that it was a negative thing. I want to encourage more women to enter the industry. Work communities in which both genders are represented, are healthier all round.

As my studies progressed, I chose electric power technology as my major and in my second year of studies, I applied to Imatran Voima to work over the summer. I've worked with the grid network ever since. For a long time I worked in power system operation planning and found it interesting and diverse. While working with the current network operation planning, I became familiar not only with the Finnish and Nordic power systems, but I also met Fingrid's other employees all over the country.

In the 2000s I took up a position as development manager in the Technology and Environment unit, after which I moved to my current job as a long-term planning manager. In my current job, the focus has switched to European cooperation and my familiarity with the system has increased to a European level. I've come to know people from other Nordic countries and beyond when drawing up the European ten-year network plan. The best part of my job is when the members of my team are successful."

"You can make the world a better place in the technical fields."

HEIDI UIMONEN
Planner

"I graduated with a Master of Science degree in power engineering at the start of the year. I wrote my thesis for Fingrid on a European network code and now I'm continuing my work with it. I am able to follow major events in the power market: digitalisation, globalisation and an increase in renewable energy resources are huge developments which will greatly change the power systems and markets. It's really interesting to see the opportunities the upheavals will bring and to be involved in solving the challenges they pose.

At university, students are primarily assessed based on their grades, so there is no emphasis on gender. The power industry is nevertheless very male-dominated and there are far fewer women in the field, but that's never bothered me. During my studies I was one of very few women in a powerlifting club and the reception was positive there, too.

My choice of career was probably influenced by my father, who is also a Master of Science. As such, I was able to see from a young age that work in the field is more than just fiddling around with wires. During secondary school I wanted to save the world, and there was much talk of emissions from energy resources. I am still of the opinion that the development of technology is key to building a better world."

→

"The bar is set higher for women than for men."

SANNA SYRI
Professor, Energy Economics, Department of Energy Technology at Aalto University

Member of Fingrid's Board of Directors

"I came across energy and environmental issues in my second year of studies for my Master of Science degree, and I was instantly hooked. When I graduated, I had studied practically everything that Otaniemi had to offer about the topic. I wrote my doctoral thesis at the Finnish Environment Institute on the abatement of air pollutants in Finland and Europe, after which I moved to VTT Technical Research Centre of Finland to investigate how to limit carbon dioxide emissions in energy systems. In 2010 I was appointed to my current position.

It is in my nature that I'm interested in a wide range of fields. I am lucky in that I am able to learn very interesting things in my job and to work with motivated students. As a researcher, I'm most interested in the international restriction of emissions in energy systems, which of course is of huge significance to the energy markets. My membership on Fingrid's Board of Directors is a wonderful demonstration of trust, and I hope that my skills will be of use to the company.

I've noticed that women have to be very highly competent to advance a technical career – it's clear that the bar is set higher for women than for men. Women in particular might have to consider the requirements of family life whenever new challenges come up in their working life. Fortunately in Finland the two are not mutually exclusive – I have three quite small children, and we've managed just fine."

AULI KARVONEN-KÖYKKÄ
Specialist

"I graduated as an electric power technician from the Vaasa Institute of Technology in 1983 and I've been working for the grid network company and in operations-related positions right from the start.

The working culture and work itself has changed a lot since the start of my career and there's plenty to learn with regard to new technology and information systems. The industry's approach towards men and women is equal, but there are still very few women in the field of electrical engineering. I want to encourage young women to at least consider a career in a technical field – there are so many interesting tasks and plenty of opportunities for skilled people to advance their careers.

The best thing about my job is the variation. Even if I plan certain tasks for a given day, things can change drastically due to an acute problem. I also get to work a lot with customers. Fingrid is a dynamic working community that pays plenty of attention to personnel matters. Throughout my career I've been involved in all kinds of interesting things, and the future holds plenty more."

"Technical fields are packed with interesting jobs."

SALLAMARIA ILTANEN
Thesis worker

"I study electrical engineering at the Aalto University and major in electricity networks and high-voltage technology. I fell in love with electricity at secondary school, and in my final year I already knew I wanted to study electrical engineering. I didn't know what major I wanted right away, but I found it after some experimentation.

My first summer job in my own field was a place at Vacon assembling frequency converters. I wanted to see what the components looked like, since my studies didn't really contain any practical exercises. I started a summer job at Fingrid's Elvis project in 2013 and continued part-time alongside my studies and then again the following summer.

Now I'm writing my thesis for Fingrid on fault location in direct current connections between Finland and Sweden. The work is really important, since if either of the direct current connections is out of use, it has a major impact on the markets.

Fingrid is a nice place to work with a suitably laid-back atmosphere. Even though I'm young, I've been able to express what I have to say and I've been given lots of responsibility right from the start. In my own experience as a student and as an employee, gender has far less of an impact on how a person is treated than their personality or how they are as an individual. For example, I happened to be the only woman in the Elvis project's student group, but I didn't receive any special treatment. The same jokes were thrown back and forth regardless of gender."

"I fell in love with electricity during a physics course at school."

IN BRIEF

New capacity market for balancing markets

In early 2016, Fingrid will be taking into use a new balancing capacity market which is hoped to increase supply and flexibility on the balancing markets.

According to an agreement between Nordic transmission system operators, countries must ensure that they have the capacity to return the power system to a normal state within 15 minutes after the occurrence of the greatest possible disturbance. To this end, Fingrid has obtained a fast disturbance reserve; that is, an increase in electricity production or reduction of electricity consumption that takes place within 15 minutes.

Fingrid currently covers the needs of its fast disturbance reserve through long-term agreements with producers and major consumers of electricity, as well as with the reserve power plants it owns. In addition, it also makes use of up-regulating bids offered on the balancing power markets.

Agreements with electricity consumers are valid until the end of 2015, after which time they will be replaced with the new balancing capacity market. The aim is to ensure that there is sufficient capacity available on the balancing power markets for use as a fast disturbance reserve.

For Fingrid, the balancing capacity market will provide a flexible method of procuring capacity and for actors it will provide the possibility of a fixed reimbursement for participation in the balancing power markets. This is hoped to increase supply on the balancing power markets and to introduce new sites to the markets.

A trade completed on the balancing capacity market is a commitment undertaken by the actor to place an up-regulating bid on the balancing power markets. Both production and consumption can participate in the balancing capacity market, with bid sizes corresponding to the sizes of bids on the balancing power market.

The balancing capacity market was prepared in cooperation with existing and potential new actors. The details of the market will be set out in autumn 2015. The market will be further developed as necessary based on experiences.

Thwarting cyber threat

As society depends more and more on information systems and networks, taking care of information security becomes increasingly important.

TEXT SUVI ARTTI
ILLUSTRATION ANSSI KERÄNEN

The level of information security in Finland is higher than in many other countries, at least according to another high ranking in the international Security Intelligence Report published by Microsoft in May.

However, Head of Coordination Centre at the National Cyber Security Centre Finland **Antti Kiuru** warns against becoming too excited about the results of the report. "There are fewer infected computers and hacked servers on Finnish networks than there are elsewhere on the Internet. This does not however mean that there are no breaches in information security. This year alone we've been made aware of tens of thousands of observed security breaches that have affected Finns," says Kiuru.

For the past two years, the number of observations has been declining, but Kiuru believes this is not necessarily due to an overall improvement in information security; instead, it could simply be down to poor observation.

Kiuru explains Finland's good ranking with "victim notifications": all information security breaches that the Finnish Communications Regulatory Authority is aware of are immediately forwarded to those responsible for network information security, who then take action. A computer that has been the victim of a breach is identified, quarantined from the network and then cleaned significantly more quickly on Finnish networks than in the rest of the world. On the other hand, there is still room for improvement when it comes to Finland's cognitive preparedness.

Learning from mistakes

Antti Kiuru is pleased that information security threats are now observed better than ever and that they are approached with a new level of gravity.

"Where previously an information security breach might have been left to quietly fester in the background, nowadays at least we can find it after it has occurred. At the same time we've had to master incident management processes and methods."

"In past years it was the norm to be unwilling to prepare for the security incident response since it was deemed to be a sign of giving up and admitting defeat. It was thought that good planning and pre-emptive action would nip the problems in the bud →

TYPICAL INFORMATION SECURITY PROBLEMS

A Denial of Service attack prevents the use of a website. If a network connection or website becomes unavailable as the result of a DoS attack, contact the service provider, telecommunications operator or National Cyber Security Centre Finland. The National Cyber Security Centre Finland cannot stop the attack, but it can help to locate the sources and to analyse the data traffic.

Security breaches. In autumn 2013 Finland was struck by two extensive series of security breaches which stole user credentials, passwords, personal ID numbers, account numbers and credit card numbers. The impact of a security breach can reach far into the future. Once leaked, a password stolen from a single service can also be used to break into other services. A leaked password which remains unchanged can be taken advantage of even years later. The information can be used to commit identity theft or bank fraud, for example.

Fingrid involved in the implementation of a national cyber security strategy

As Finland's transmission system operator, Fingrid plays a significant role in society. As the company's business activities undergo digitalisation, cyber threats can have an extensive impact on its performance and thereby have nationwide ramifications. Cyber attacks can result in major damage and even paralyse some nationally critical functions, such as the transmission of electricity.

"Fingrid invests extensively in various areas of information security. We want to be confident that our activities will not be disrupted by possible cyber attacks," says Fingrid's CIO **Kari Suominen**.

The national cyber security strategy's policy is that by 2016, Finland will be a global pioneer in preparedness for information network threats and in managing subsequent disruption. Development is especially focused on strengthening competence through several research and training programmes.

One example is the further development of the cyber security research, training and development centre JYVSECTEC at the Jyväskylä University of Applied Science's IT institute. Fingrid is one of the partners in cooperation involved in the JYVSECTEC Center project.

"JYVSECTEC has already gained a reputation for its cyber security competence and training. We want to utilise these qualities in advancing our own cyber security and training our staff," says Suominen.

THE NATIONAL CYBER SECURITY CENTRE FINLAND

The National Cyber Security Centre Finland was founded under the Finnish Communications Regulatory Authority in early 2014 as part of the Republic of Finland's first cyber security strategy. The centre develops and monitors the operational reliability and security of communications networks and services.

The centre's Computer Emergency Response Team (CERT's) activities include the prevention, observation and resolution of information security breaches and the dissemination of information concerning information security threats. The National Communications Security Authority (NCSA) on the other hand is responsible for information assurance matters related to the handling of classified information in electronic communications.

The centre is on call twenty-four hours a day all year round. Its on-call number is meant for industry and commercial actors critical to the security of supply, public administration's information security actors, telecommunications operators and international partners in cooperation.

before they could even occur. Every incident is like a slap in the face for this school of thought: your plan doesn't work!"

Kiuru encourages the acceptance of a school of thought wherein you act according to the best and latest know-how, and then change the model gradually as things become clearer. In this way, there's no need to get rooted in errors and placing blame. Instead, we can compete as to who learns most from the mistakes.

Kiuru's recipe for information security management is a "balanced information security control basket", which contains not only actions to anticipate information security problems, but also actions which detect anomalies, limit damage and speed up recovery.

We must ensure datahub's information security

The National Cyber Security Centre Finland carries out cooperation with actors in the Finnish energy industry. Antti Kiuru considers the energy sector to be a trailblazer in networked information security cooperation. "I'm especially impressed by the unprejudiced attitude with which information security practices are developed and how experiences of effective practices are shared amongst the actors. I dare say that the good attitude has a direct effect on results."

One of the greatest information security challenges faced by the electricity industry in the near future is the datahub information exchange system for the electricity retail markets. The plan is to implement the system in 2019. Datahub stores data relating to electricity use in a single location, and Koivunen believes it will be a critical component with regard to security of supply and functions that are vital to society.

According to Kiuru, when planning datahub it is imperative to manage information security right from the start and to consider the "hacker perspective"; that is, preparedness for security breaches and denial of service attacks. We also have to think about how to achieve seamless cooperation between various authorities.

IN BRIEF

New peak load capacity plants selected

The new two-year peak load capacity period began in July 2015

Kanteleen Voima Oy's Haapavesi power plant and Tampereen Energiatuotanto Oy's Naistenlahti 1 power plant were chosen to be peak load capacity plants in competitive bidding organised by the Energy Authority. Now also for the first time demand response was selected for peak load capacity, when Fortum's Suomenoja 10 MW heat pump was chosen in the competitive bidding. A total of 299 MW of peak load capacity can be supplied by the power plants.

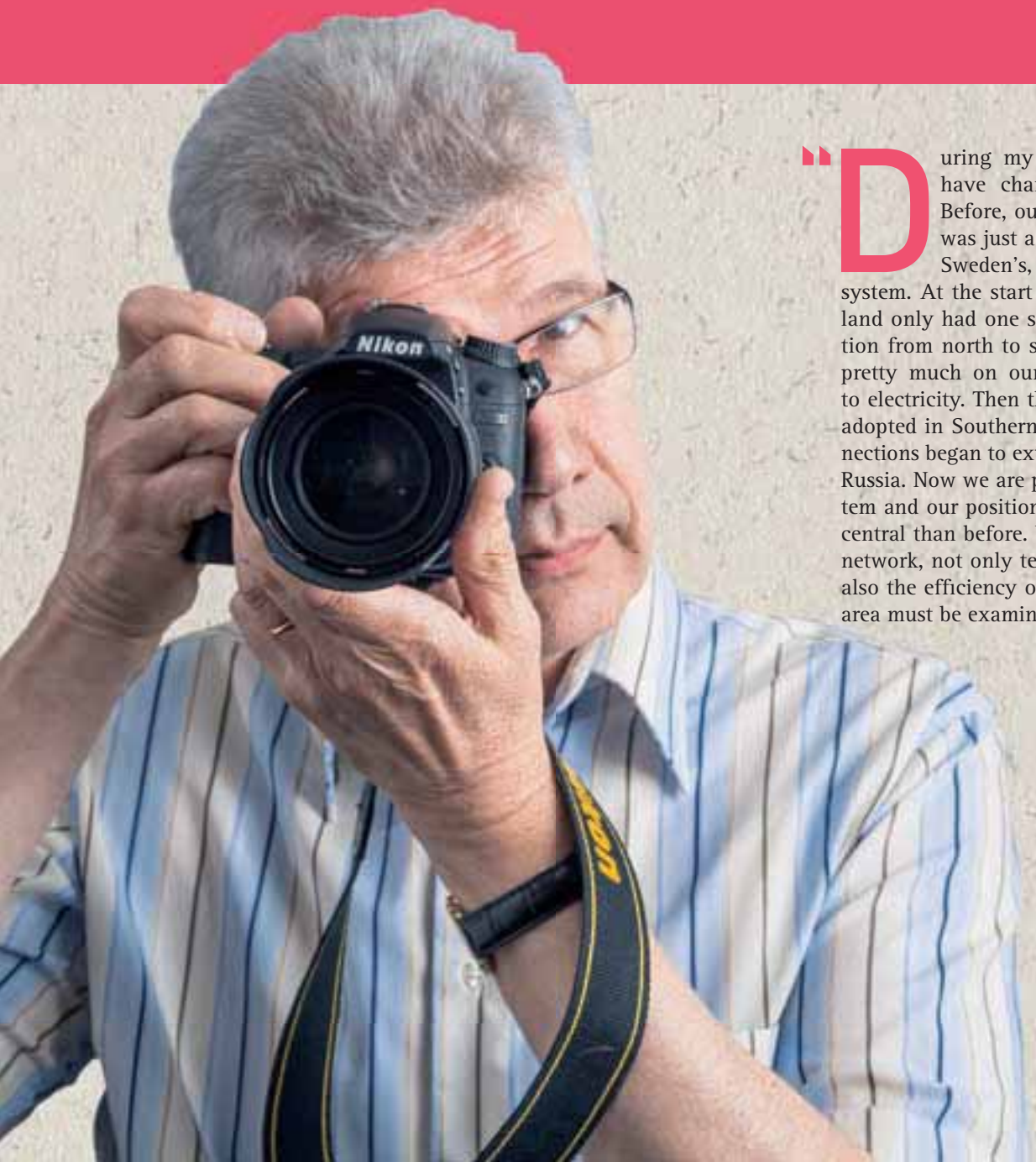
Altogether € 6.7 million per year will be paid as compensation to the selected plants. The peak load capacity system is financed by payments collected from electricity consumption.

During the winter season from December until February, the power plants are on 12-hour starting readiness and, at other times, on one-month starting readiness. The power plants belonging to the peak load capacity arrangement may not participate freely in the electricity market, and generally speaking can only be used for the needs of the peak load capacity system.

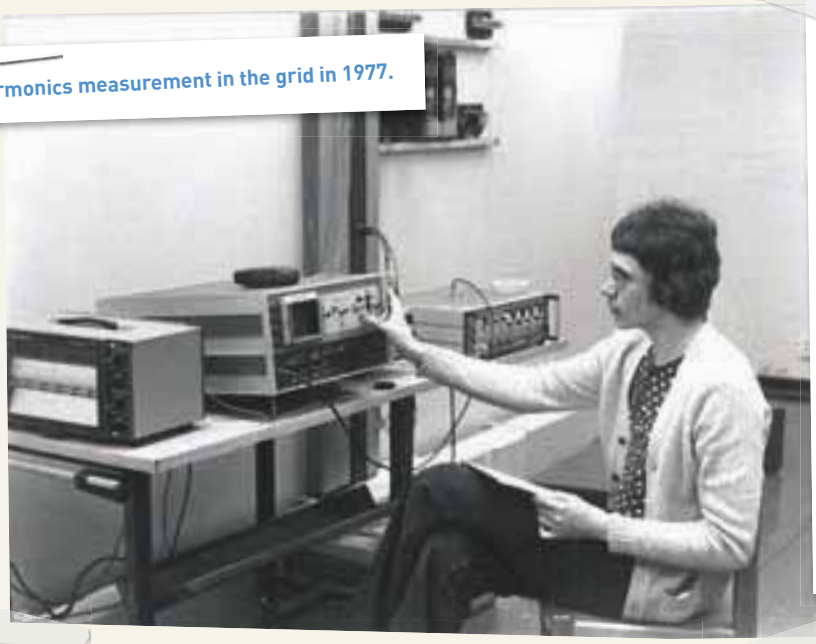
FOUR DECADES OF POWER TRANSMISSION

Fingrid's leading specialist Pertti Kuronen, 61, has forged a long career working with the grid. The photographs that have been collected in his files show the different stages of the history of Fingrid and its predecessors. Kuronen will retire on 4 September.

TEXT MIRA MUURINEN | **PHOTOGRAPHS** MATTI IMMONEN AND PERTTI KURONEN´S PHOTO ALBUM



"During my career, conditions have changed significantly. Before, our electricity system was just a small thing behind Sweden's, a sort of 'dead-end' system. At the start of my career, Finland only had one single long connection from north to south, and we were pretty much on our own with regard to electricity. Then the ring system was adopted in Southern Finland, and connections began to extend to Sweden and Russia. Now we are part of a larger system and our position in Europe is more central than before. When planning the network, not only technical aspects but also the efficiency of the whole market area must be examined." →



Harmonics measurement in the grid in 1977.

"I came to the Imatran Voima electrical laboratory in June 1976 as part of my university studies. This was a really good place to learn about electrical technology work, as I got to fiddle about quite freely with secondary circuits measuring grid harmonics at key substations such as Hyvinkää, Alajärvi and Pikkarala. Looking back, my hair stands on end when I think that they allowed access there to some inexperienced, wet-behind-the-ears technical student. At that time, there had been several cases of disturbance in 1974 and 1975, and I started work fully aware of the fact that if some connection slipped, in the worst case there could have been a new major disturbance in store. However, for the whole time that I was working in the grid, fortunately no major disturbance occurred."

Training operations personnel in the early 1980s.

"After I graduated, I was transferred to the Imatran Voima Sales Department, my area of responsibility being the investigation of disturbances and relay protection. Relay protection was a part of the job that I liked, the logic of which seemed to suit my own thinking very well. In the picture, I am giving relay protection training to operations personnel, which was one of my key tasks.

In the late 1980s, I had to give in to my then superior's suggestion to transfer to a management career as manager of the Power System Office. My tasks included medium-to-long-term planning of the grid, which meant questions about transmission capability and voltage control, and of course the analysis of relay protection and disturbances. Relay protection has also remained one of my pet likes throughout my career, and I have wanted to stay at the core of relay protection issues in addition to other work."

"In the 1990s, IVO Power Transmission had a technical services function, the personnel of which are pictured here. People used to call us the 'Kamppi Power Transmission University'. We carried out high-level grid research and development work and we solved technical issues for a couple of years until the decision was made to wind up technical services as it was felt it should not be part of the role of a grid company. On the table is Ritva Hirvonen's 'doctoral hat', which we as a group made for her out of a plastic bucket and silk cloth. We certainly got some amazed looks in the store, when we went to buy the materials and in the shop tried different-sized buckets on our heads!"

'Kamppi Power Transmission University' in 1993.

Pictured in the back row from the left Rami Vuola, Jussi Jyrinsalo, Aarne Korpi-Kyyny, Harri Nurminen, Pentti Oksanen, Mikko Koskinen, Heikki Ruhanen, Lauri Koivisto and Minna Laasonen. In the front row from the left Jari Siltala, Jyrki Uusitalo, Ulla Huhtanen, Liisa Haarla, Ritva Hirvonen, Pertti Kuronen.

Visiting Ylä-Tuloma power plant in Russia in the early 2000s.

"This picture is from the trip to Murmansk at the Ylä-Tuloma power plant on the Kola peninsula. At that time, we were engaged in close co-operation with Russia, and the construction of the Vyborg connection in particular has remained with me as one of the highlights of my career. Connections were also investigated in the direction of Murmansk. From these trips, I especially remember the midnight sun, the mosquitoes and then, in winter, the freezing sub-zero temperatures. I got to know many Russian colleagues some of whom I have been in contact with later, too."

"This is where we need the new connection!" Planning EstLink 2.

"Other milestones in my career have been the introduction of the Fenno-Skan connection in 1989 and the opening of the link to Estonia through the EstLink connections.

On the right is a picture of a planning meeting for the Baltic region grid study from 2006 – in the picture we are showing where the new connection, EstLink 2, will be needed. The Baltic connections got quite a boost from the infrastructure subsidies targeted at them by the EU.

The picture below is from Norway at the convening of the planning work group for the then Nordic grid companies' co-operative organisation, Nordel, when we went on a snowmobile safari up the fells. About 30 years passed in different duties of Nordel."

Norwegian snowmobile safari early 2000.

"For a long time now, I've been watching with concern how society is changing, with people increasingly preoccupied with their own benefits. Fortunately recently people have also started to talk a lot about community responsibility. In my opinion, in this sense the development of Fingrid's team spirit is very beneficial both for the company's efficiency and responding to the needs of society and stakeholders.

As I leave regular working life, I want to send my best wishes and warmest thanks for the past interesting decades to our customers, other stakeholders and all my other acquaintances and colleagues. Now I plan to spend more time on my hobbies: fishing, hiking, nature photography, literature and other forms of culture."

THE PROMISED LAND OF DATA CENTRES

Finland's stable political and economic situation combined with a cool climate and secure supply of electricity are advantages for large companies seeking locations for their data centres. Invest in Finland, a subsidy of Finpro, helps newcomers to find a place in Finland.

TEXT SUVI ARTTI | **PHOTOGRAPH** ISTOCKPHOTO

Since the amount of data online is growing explosively, we need increasing amounts of space to store it. Data stored in the "cloud" is in fact stored firmly on the ground – on servers which take up space, consume lots of electricity and require cooling.

The first international company to establish a data centre in Finland was the internet giant Google, which purchased the former Summa paper plant in Hamina in 2009 for that very purpose. Since then, the northern European data centre boom has only increased. Facebook chose Sweden while Apple preferred Denmark and Ireland.

Several data centres were set up in Finland with more on the way if even a fraction of the projects under way through Invest in Finland are realised. The latest international arrivals include the Russian Yandex search engine company, which set up its centre in Mäntsälä, and the German Hetzner Online, which is also involved in a submarine cable project between Finland and Germany. Early summer brought good news from within the country as Sonera announced its intent to construct a data centre in Helsinki with a capacity of at least 30 megawatts.

Affordable electricity attracts companies to Finland

Data centres provide the Finnish economy with a significant boost. Google, which invests a total of 800 million euros in Finland, is in a class of its own, but smaller data centres also bring with them jobs and indirect positive effects.

Invest in Finland makes it as easy as possible for international companies to set up in Finland, providing them with information and helping them to connect with authorities, electricity companies and telecommunications operators, among others.

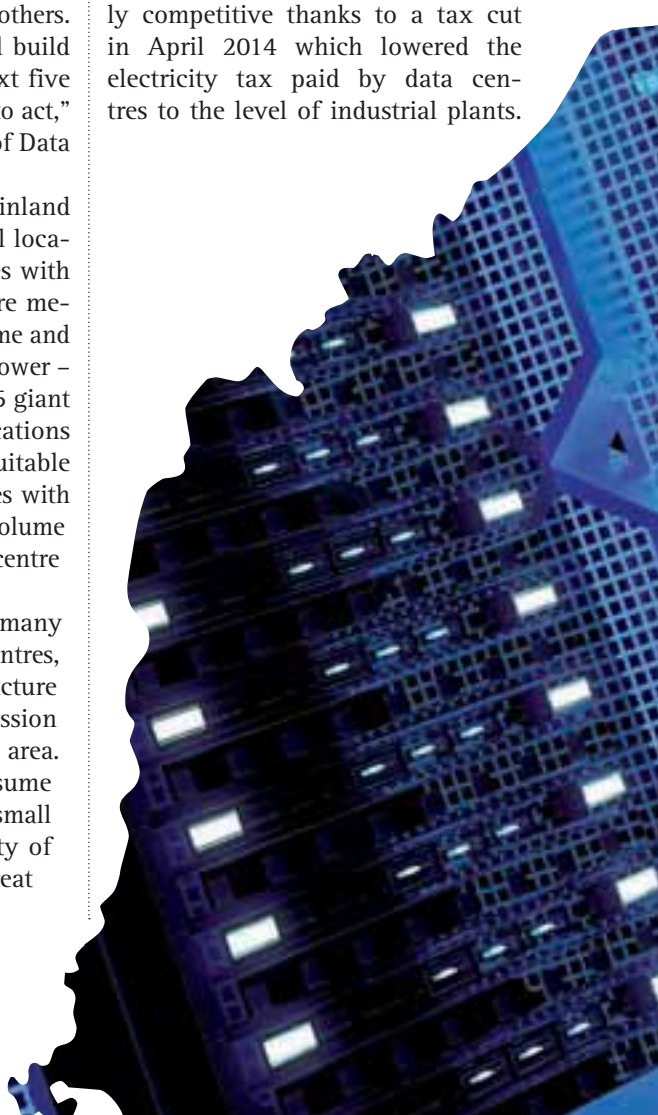
"Many large companies will build their data centres over the next five years, so now is the right time to act," says Invest in Finland's Head of Data Centre Industry **Alpo Akujärvi**.

On its website, Invest in Finland has compiled a list of potential locations. The list contains 44 sites with a total of over 5 million square metres of permitted building volume and 1,500 megawatts of electrical power – enough to meet the needs of 15 giant data centres. Some of the locations are decommissioned plants suitable for re-use while others are sites with space and permitted building volume for the construction of a data centre from scratch.

Empty paper plants are in many ways ideal locations for data centres, since there is ready infrastructure with strong electricity transmission connections in the surrounding area. A large data centre can consume up to as much electricity as a small town, so the price and security of the electricity supply are of great importance.

"A large data centre can consume up to as much electricity as a small town, so the price and security of the electricity supply are of great importance."

Finland's electricity price is highly competitive thanks to a tax cut in April 2014 which lowered the electricity tax paid by data centres to the level of industrial plants.



Finland's security is also a valuable asset. "We have a reliable grid network, stable bedrock, transparent decision-making and a stable political climate," lists Akujärvi.

Submarine cable to Germany to speed up data transfer

When seeking a location for a data centre, the speed of telecommunications naturally comes into consideration. Finland's telecommunications speed will improve significantly when a cable connection from Helsinki to Rostock and on to Frankfurt is completed in 2016. The new connection, constructed by Cinia Group Oy, has generated much interest in Finland, says Alpo Akujärvi.

"For now, all of our data traffic goes through Sweden. Once the cable connection to Germany is complete, we will be free of congestion and data transfer will speed up."

Data transfer is a matter of milliseconds. "The latency – that is, the time taken to transfer data – between Helsinki and Frankfurt is currently 28 milliseconds. That will drop to 19.5 milliseconds once the connection is completed," says Akujärvi.

"In some industries, such as stock trading, the latency should be close to zero, so the server has to be located very near to a large market. Google searches or Facebook status updates on the other hand aren't quite as critical."

A hub between east and west

All eyes are now on the Northern Sea Route, where Russia is planning a telecommunications cable. Finland hopes that the cable, which runs along the Russian coast to China and Japan will make it a telecommunications hub between east and west.

"The cable is planned to come ashore at either the Kola Peninsula or Norway. Finland already has strong fibre optic connections to Lapland. We only need 300 kilometres of new fibre to connect the cable to the existing Finnish fibre optic connection and on to central Europe," explains Alpo Akujärvi.

Thanks to the Northern Sea Route cable, the connection from Europe to Asia would also become significantly faster. Akujärvi believes that this could be very significant for Finland since data traffic coming to Europe from the east is estimated to increase by up to 300 per cent over coming years.

Larger data centres to be connected directly to the main grid

Depending on their electricity needs, data centres are connected either to a local distribution network or directly to the main grid. If it is clear in the planning stages that the need for electricity will be less than 15 megawatts (MW), the connection is usually made to a local distribution network. It is not usually practical or cost-efficient to connect low power directly to the main grid. The connection method is agreed on a case-by-case basis.

Customers planning a connection to the main grid should contact Fingrid's customer service as early on as possible. It is also recommended that distribution network companies check with Fingrid to ensure that the main grid's transmission capacity is sufficient and clarify technical terms before agreeing on connection to their network with the customer. Further information on connection can be found on Fingrid's website by clicking on Customers > Grid connection.

EUROPEAN COOPERATION

PRESENTING NETWORK CODES

Network codes are rules compiled by the European Network of Transmission System Operators for Electricity (ENTSO-E). Their purpose is to harmonise the European electricity markets. This column will present the network codes one at a time. First up is the Emergency and Restoration code for the management of emergencies and disturbances.

The ER network code improves disturbance management

The Emergency and Restoration network code (NC ER) sets minimum requirements on transmission system operators for dealing with situations involving extensive disturbance. The aim is to improve cooperation between transmission system operators and to thereby make disturbance management more effective on a European level.

Five different states are defined for the power system: *normal*, *alert*, *emergency*, *blackout* and *restoration*. The ER code applies to the *emergency*, *blackout* and *restoration* states.

In the *emergency* state, operational security is threatened. For example, a situation wherein the power transmission or frequency is significantly outside of the limits set for the normal state is an emergency. The system may also enter the *emergency* state if one of the transmission system operator's critical tools – such as the SCADA system – is lost, or if consumption is disconnected without agreement.

The *blackout* state, on the other hand, is a more serious disturbance wherein over 50 per cent of consumption is without power. The power system enters the *restoration* state when the voltage restoration begins.

Restoration must be possible without help from our neighbours

According to the ER NC, transmission system operators must draw up both a *System Defence Plan* and a *Restoration Plan*.

The *System Defence Plan* shall include the measures to be undertaken to prevent an *emergency* state from developing into a *blackout* state. These include for example the automatic and manual disconnection of consumption, the automatic and manual control and, if necessary, disconnection of production, as well as assistance and coordination amongst transmission system operators.

The *Restoration Plan* shall include the measures to be undertaken to restore the system from an *emergency* or *blackout* state back to the normal state as quickly as possible. These include a plan to restore voltage, frequency control during the restoration of voltage and methods to synchronise network islands.

Of particular note is the requirement that transmission system operators must be able to restore power to their own system independently when assistance from neighbouring countries is unavailable. As observed in the VALVE 2014 exercise, Finland still has work to do in this area.

Requirements also apply to other parties

The requirements set by the ER network code will affect not only transmission system operators, but also other parties who are essential to the management of disturbances and restoration of voltage. Requirements concerning information exchange and tools and facilities will require significant investments from various parties.

One of the most significant requirements is 24-hour operational capability during a blackout. This means that the control room, critical tools such as the operation control system, and telephone connections between the transmission system operator and named parties must be continuously operational during the disturbance.

In June, the Agency for the Cooperation of Energy Regulators (ACER) gave a positive statement concerning the ER network code, which will now move on to the comitology process and take on its final form. The network code is expected to come into effect during 2016 and its requirements must be met within the transition period of 2–5 years.

Material relating to the network code can be found on ENTSO-E's website. The website also contains the most recent draft of the code and supporting documents, as well as material published by ENTSO-E concerning public hearings and discussions.

Text Jari Siltala

Frisbee golf can also be played in a power line area

A power line area is very suitable as a frisbee golf course. The course constructor must, however, be aware that locating the metal baskets on the ground in a power line area is an activity subject to permit and Fingrid guidelines are needed for it. The frisbee golf course should be located so that no discs are thrown in the direction of power lines or power line towers.

A frisbee that hits a power line tower is unlikely to damage the structure, but the disc might get stuck in the tower. If, despite all precautions, this happens, on no account should anyone climb up to retrieve the disc, as climbing on power line towers can be fatal.

When playing frisbee golf in the vicinity of power lines, players may notice considerable spark discharges. This results from the electric field caused by the power line and is not hazardous.

Photograph Matti Immonen

Minna Laasonen, a Senior Expert at Fingrid, has been playing frisbee golf for about five years. She was encouraged to take it up by her husband, and he often plays with her. "When we play, we don't count handicaps or compete, but just try to throw as well as we can and enjoy the great outdoors," she says. She is pictured here at her 'home course', frisbee golf course in Kirkkonummi.

New species of lizard found in transmission line clearing

In 2014 we saw an indication of the positive impact that line clearings have on natural diversity, as sand lizards were spotted in Paimio underneath Fingrid's transmission lines. The species has not previously been observed within Finland's current borders. The sand lizard used to be a part of Finland's fauna before World War II, when it could be found around Lake Ladoga in Karelia. The lizard can also be found nearby in Estonia and central Sweden.

The male sand lizard is a vibrant green for part of the year, but in late July it swaps the green for brown. The female is always brown. Sand lizards are slightly larger than normal lizards and thrive in hot environments, requiring their habitat to feature fine sand and largely open locations with some coverage for shelter and hunting, such as clearing waste or birch tree roots. The line clearing in Paimio meets these requirements perfectly, since it is home to old gravel pits, dry heathland for hunting and clearing waste for shelter. Other rare species which favour hot, dry habitats have also been found in the area, such as the rattle grasshopper.

Photograph Arto Leppänen

IN BRIEF

New substation opened at Lavianvuori in Kangasala

Fingrid's new substation at Lavianvuori near Valkeakoski was taken into use around Midsummer. Earlier on, residents in the area were offered the opportunity to learn more about the substation at a public event organised by Fingrid.

The Lavianvuori substation was taken into use on 18 June. It replaces the nearby Tikinmaa switchgear, which is approaching the end of its technical service life. The new substation will provide the Pirkanmaa region with some much-needed transformer capacity.

In addition to the substation, the Pirkanmaa area will also see the construction of transmission lines between the Lavianvuori and Tikinmaa substations with transmission lines from Multisilta and Kangasala directed to Lavianvuori. There is much demand for the project, since the heavy industry in Valkeakoski and growing population have increased electricity consumption in the Pirkanmaa area. Construction solutions will help to secure residents' and companies demand for electricity and save on loss energy without having to extensively reinforce the 110 kilovolt network.

In May, Fingrid invited residents of the Lavianvuori area to visit and learn more about the completed substation. Pea soup was served and residents were given the rare opportunity to see the equipment at the substation close up. At all other times, only trained professionals are granted access to the substations.

The event attracted a large number of participants. "The residents were really interested in the substation and were glad that the event was organised. We received lots of positive feedback," says Project Manager **Hannu Heikkinen** from Fingrid.

IN BRIEF

Fingrid at the Farmari agricultural fair in Joensuu

Fingrid again participated in the national Farmari 2015 agricultural fair held in Joensuu from 2nd – 4th July. The event was organised by ProAgria Pohjois-Karjala ry.

Fingrid has attended the Farmari fair for several years. The event provides an important opportunity to meet landowners face-to-face and to discuss issues such as the use of line clearing areas, or construction projects which are under way. Fingrid's stall engaged in a daily average of approximately 100 different discussions relating to transmission line projects, land use in line clearings, maintenance, flora, and about electricity and its transmission in general. Visitors of all ages and backgrounds were interested in the 400 kilovolt insulator chain on display at our stall.

Fingrid's Elvis project receives an award

Geographical information system company ESRI has rewarded Fingrid's Elvis project for its innovativeness. Due to the implementation of new asset management systems, Fingrid is overhauling its coordinate and height systems during 2015.

Based in the US, ESRI presented Fingrid with an award at its international user conference in San Diego in July. Among other things, Fingrid's asset management system makes use of the ArcGIS geographical information system developed by ESRI.

SAG (Special Achievement in GIS) award winners are selected each year from over 100,000 users of ESRI systems from all over the world. ESRI recognised Fingrid's innovative use of the geographical information system.

Fingrid's CIO **Kari Suominen** and land use and environmental specialist **Pasi Turunen** travelled to San Diego to receive the award.

"ESRI's user conference is a world-class conference, with an atmosphere reminiscent of a major sporting event," says Kari Suominen.

"We're only just implementing the new system, so recognition in this phase really means a lot to us. We weren't the only SAG award winner, but we were the only energy industry representative to receive the award. It is fantastic for Fingrid to gain recognition in a global arena."

As part of the implementation of new asset management systems, Fingrid is overhauling its coordinate and height systems. The new plane coordinate system ETRS-TM35FIN is based on the European ETRS89 coordinate system. The change applies to material disclosed by and received for Fingrid Oyj's data systems, as well as to new documents and drawings.

The overhaul will be carried out in phases: substation data and functionality were implemented last year, transmission line data and functionality will be implemented this year, and digital communications data and functionality are due in late 2015.

The SAG award was picked up by Pasi Turunen (left) and Kari Suominen (right).

eSett gets new web pages

The service company eSett Oy, jointly owned by Nordic transmission system operators, has a new website. The site at **esett.com** offers information concerning the company and the NBS project, as well as an extensive material bank.

Fingrid rewards service providers

Fingrid has rewarded deserving representatives of service providers at a property management-themed day.

The awarding of the prizes for Constructor of the Year and Maintenance Person of the Year, which has become a tradition, took place in May at Fingrid's theme day in asset management. The prizes were awarded to representatives of service providers to thank them for their high-quality and long-term co-operation.

The prize for Constructor of 2014 went to Planning Manager **Rauno Hirvonen** from ABB Oy. The prize for Maintenance Person of 2014 went to Work Supervisor **Marko Nauska** from Infratek Finland Oy.

The recipients of the prizes are selected based on suggestions made by Fingrid personnel. The grounds for awarding the prizes emphasise willingness to co-operate and the ability to solve even the most surprising problems, for which both the recipients were acknowledged.

The theme day in asset management brings together Fingrid's personnel and service provider representatives. The event offers grid specialists the chance to exchange topical news and to discuss prospects for the future. The theme day was previously held every other year, but now the intention is to hold it annually.

From left to right: Marko Nauska (Infratek Finland Oy), Kari Kuusela (Fingrid Oyj) and Rauno Hirvonen (ABB Oy).

Lines over Ostrobothnia

WEATHERING THE CLIMATE

Liisa Rintaniemi is MTV News' meteorologist and will examine the factors behind recent weather conditions in this column.

STORMS AND METEOROLOGISTS: A LOVE-HATE RELATIONSHIP

I am one of those people who simply loves awful weather. The worse the weather, the more excited I am as a meteorologist. You've probably noticed how weather forecasts focus on the negatives: where it's raining, where it's windiest, where the heatwave is the most humid and where temperatures have plummeted.

Not to mention storms! Meteorologists and storms have a rather complicated relationship. Every well-trained meteorologist knows that you aren't allowed to follow fire engines or hang around staring at accidents. Even in Finland, storms can cause major material damage and, in the worst case scenarios, take lives. But on the other hand, having a destructive storm occur during a shift is one of the most exciting and fascinating things a weather forecaster can experience. Even in their free time, meteorologists are enthused by inclement weather and the most motivated drive hundreds of kilometres to get up close and personal with a storm.

When we speak of storms in Finland, we're actually referring to two different things which depend on the time of year. In autumn and winter, we are bombarded by low pressure systems coming in from the Atlantic, some of which can form what's known as a storm system. In a meteorological sense, only these are true storms. In autumn, while there are still leaves on the trees and the ground has not yet frozen, storms can cause widespread forest destruction.

In winter, on the other hand, storms are often accompanied by heavy snow, which accumulates on branches and causes trees to lean or fall on transmission lines. Winter also happens to be a time when our survival depends on electricity distribution – it's simply untrue to say that Finland's climate is not dangerous when it's twenty degrees below zero outside! Luckily modern weather models are able to predict low pressure storms reasonably well. We often know of an incoming storming a few days before its arrival, as well as the area expected to be most affected by the winds.

Cyclones occur less during the summer. Instead, meteorologists get excited by severe weather relating to storm clouds which can cause very localised but major destruction. When you look at the forest, reduced to matchsticks after the storm, you start to wonder whether the culprit was a downburst or a tornado. It's worth betting on a downburst, since the vast majority of damage to forests caused by severe weather is down to downbursts. Like the name suggests, a downburst is a burst of cold air that gusts downwards from a mature storm cloud. As it hits the ground, it spreads out in all directions producing strong winds with a momentary speed of up to 50 metres per second; clearly exceeding the threshold for hurricane-speed winds. A tornado is rare, but nevertheless we see a few each summer. Typical to tornadoes is the wake of trees they leave strewn about.

A couple of decades ago, storms and related severe weather were relatively poorly known phenomena. The development of weather radar equipment has markedly improved our knowledge of what happens inside storm clouds. I believe that the union between meteorology and storm chasing has done a lot of good. Meteorologists as professionals are now more enlightened as to the methods with which we forecast thunderstorms and severe weather. We've made some good progress: This decade a danger announcement system was created in Finland and sends targeted warnings to populated areas in the path of an oncoming storm or weather system.

It is however unlikely that the accuracy of forecasts of highly localised severe weather systems will ever develop to the same degree with which we can forecast winter low pressure systems. When it comes to the disruption caused by downbursts and tornadoes to electricity transmission, we have to be satisfied with forecasts with the ability to predict that there is a risk of powerful thunderstorms in the south of the country tomorrow – but whether they hit Lohja or Porvoo remains to be seen.

GRID QUIZ

Competition to the readers of Fingrid Magazine

Answer the questions and send your answers by 15.10.2015 to the address Fingrid Oyj, PL 530, 00101 HELSINKI. Please write "Grid Quiz" on the envelope. Three winners will receive Finnish knit caps and Fingrid slapwrap safety reflectors. Answers to the questions can be found in this issue.

1. How are seven Prismas in Hämeenmaa and Pirkanmaa participating in a demand response project?

- The stores will reduce their consumption of electricity by shortening their opening hours if necessary.
- The stores will dim their lighting when there are not too many customers.
- The project will make use of back-up power generators and ventilation machines, heat pumps and outdoor lighting.

2. How many electricity metering points for consumers are there in Finland?

- Approximately 3.5 million.
- Approximately 4.5 million.
- Approximately 5.5 million.

3. What kind of environment does the sand lizard thrive in?

- In hot, dry environments with fine sand, open places and protection from predators.
- In moist forests with heathland.
- In rocky islets and rugged terrain with smooth rocks and small nooks to hide in.

4. What's behind Finland's success in international information security studies?

- Information security attacks target Finland far less than other countries.
- There are strong firewalls on Finland's borders to prevent information security breaches.
- Whenever an information security breach is observed, action is immediately taken and the computer which is the focus of the attack is quarantined from the network more quickly than in other countries.

5. What does the 'ER' in the ER network code stand for?

- Emergency and Restoration
- Energy and Resources
- Electricity and Research

6. For what did Fingrid's Elvis project receive an award in July in San Diego?

- The development of mobile supervision on worksites.
- The innovative use of a geographical information system.
- The effective use of a condition management system.

7. Downbursts appear during the summer and cause localised but thorough destruction to forests. How do they form?

- Areas of low pressure coming in from the Atlantic develop into storm systems.
- A burst of cold air is released from a mature storm cloud and spreads out as a gust of wind as it hits the ground.
- Two tornadoes collide with one another.

Prizes for the previous Grid Quiz (1/2015) have been sent to the following winners who answered correctly: Kauko Vierimaa, Oulunsalo; Timo Ritonummi, Vantaa; Juha Alaviitala, Härmä.

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