

3 2024

# FINGRID

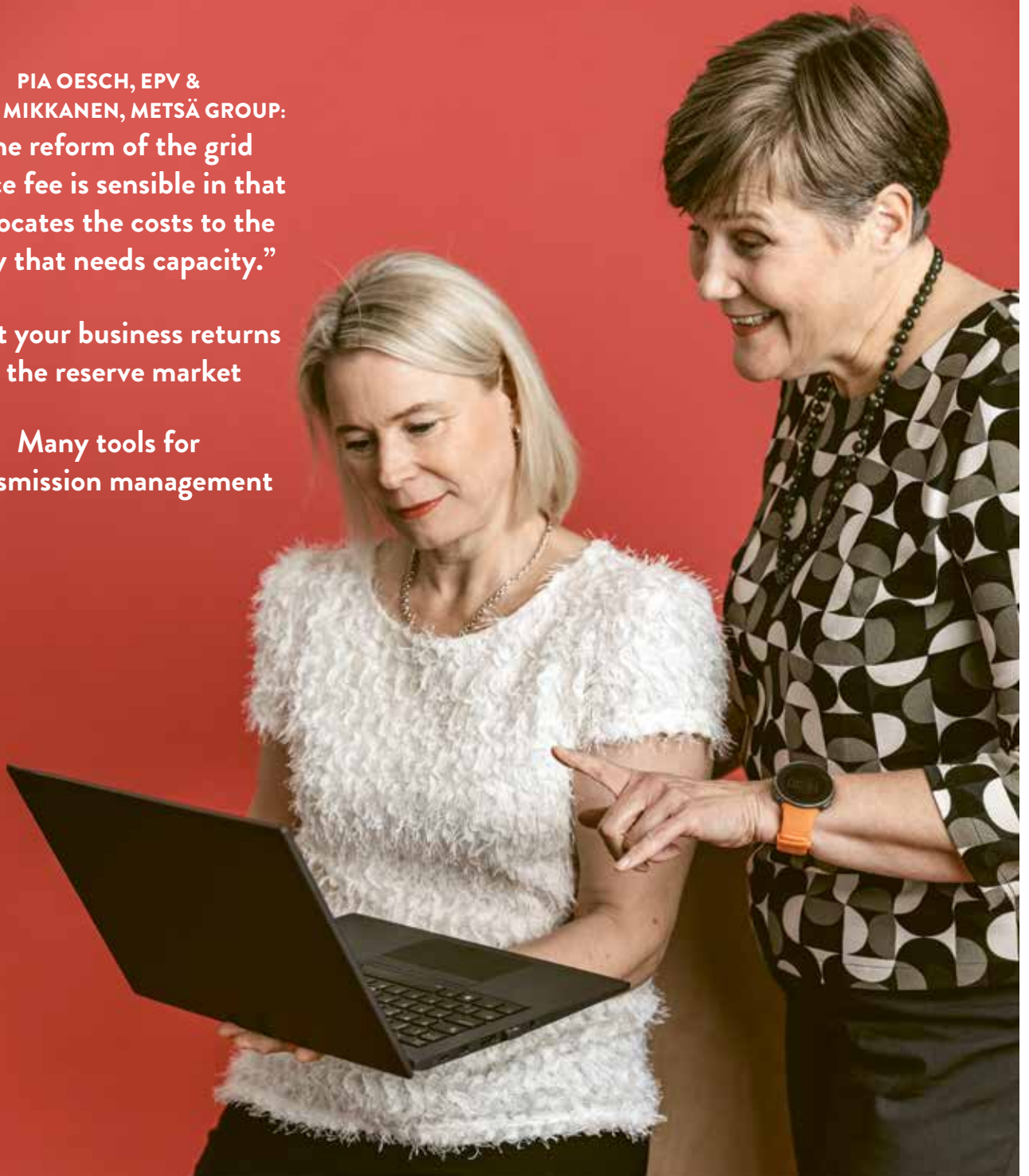
TRANSMISSION SYSTEM OPERATOR'S MAGAZINE / RENEWING THE ENERGY SYSTEM / [fingridlehti.fi](http://fingridlehti.fi)

PIA OESCH, EPV &  
PIRITA MIKKANEN, METSÄ GROUP:

“The reform of the grid  
service fee is sensible in that  
it allocates the costs to the  
party that needs capacity.”

Boost your business returns  
in the reserve market

Many tools for  
transmission management



**1–2**  
**field visits**

ARE CONDUCTED  
FOR EACH PROJECT.

EACH FIELD VISIT TAKES

**1–5**  
**days,**

DEPENDING ON THE  
SCOPE AND LENGTH OF  
THE PROJECT.

## The terrain dictates the route

When specialists plan transmission line routes, they visit the terrain to study the surrounding nature, soil, buildings, and landscape on site.

**E**nvironmental impact assessments are always conducted for new 110-kilovolt transmission lines. Before that the route of the transmission line is planned. The goal of this plan is to identify a route that minimises the environmental impact, meets the technical objectives, and is feasible for construction. Settlements and natural values are considered carefully.

An essential aspect of route planning is to visit the terrain: it is impossible to determine the accuracy of objects or their significance for the planned transmission line route simply by looking at a map.

Visiting the terrain draws the attention to the condition of business properties, holiday homes, and residences and their

proximity of the planned transmission lines.

The soil is analysed to determine the feasibility of construction. The locations of corner towers are especially important: they must be built on solid ground. The structures and condition of existing transmission lines are significant for the placement of the new line. Other important considerations include technically challenging modifications, such as transmission line crossings or lateral moves.

Attention is also paid to the position of the transmission line in the landscape when viewed from near and far, as well as how the towers will stand out in important locations or places that are otherwise sensitive to changes. ♦



“When we plan new transmission line routes, we endeavour to build new lines alongside existing ones whenever possible,” says Tiina Koivunen, an Expert at Fingrid.

RENEWING  
THE ENERGY SYSTEM

**12 GRID SERVICE FEES**

Fingrid is planning reforms to restructure the grid service fee and contribute to improving the network's adequacy during the transition of the power system.

**18 THE RESERVE MARKET PAYS COMPANIES FOR FLEXIBILITY**

Flexibility keeps the power system balanced and generates good returns.

**20 POWER EXCHANGES**

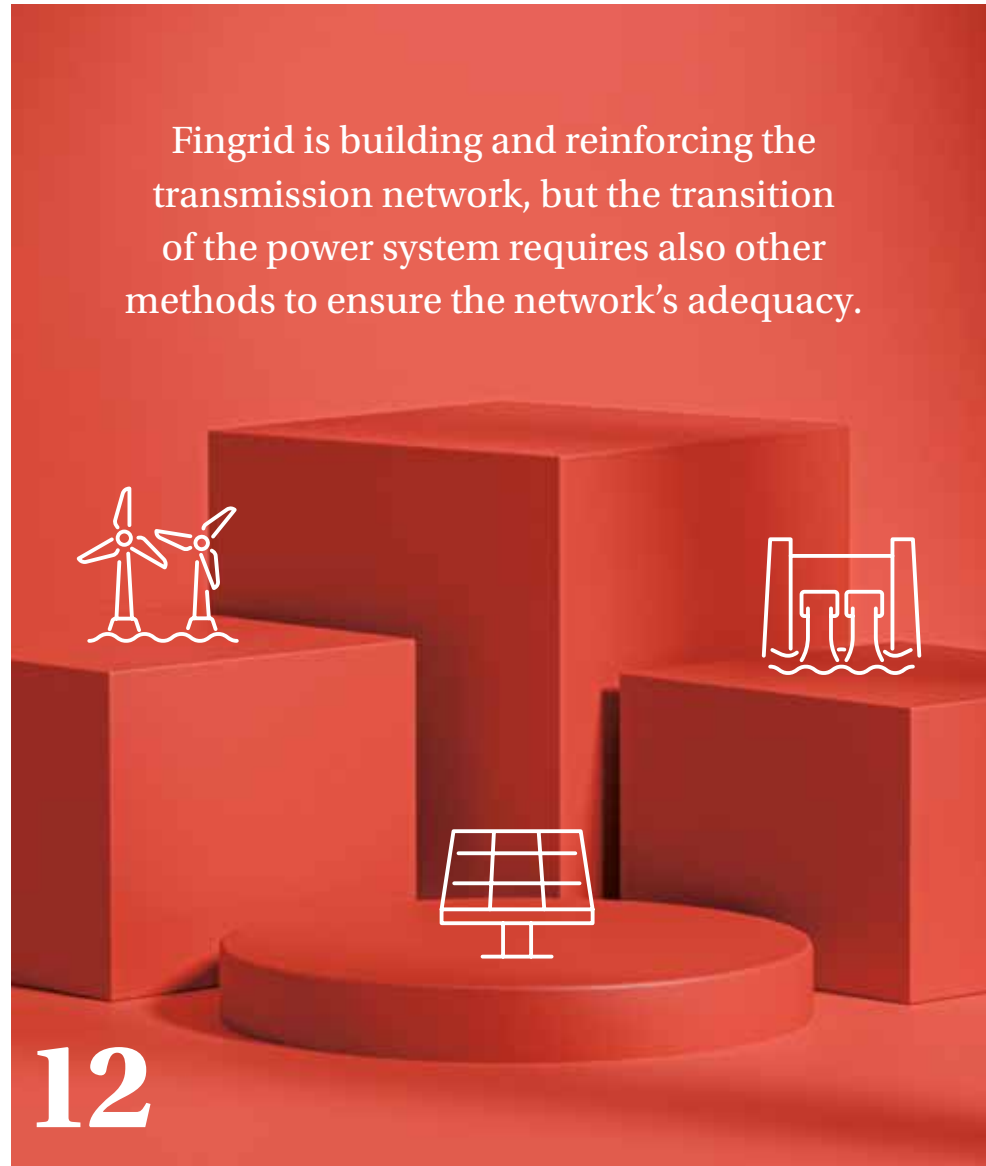
Power exchanges are developing their operations to respond to the transformation of the electricity market.

**22 SYSTEMATIC TRANSMISSION MANAGEMENT**

The aim is to offer as much transmission capacity as possible without jeopardising the main grid's system security or disrupting the electricity market.

**28 REPORTAGE**

Switchgear installation technicians do varied work in outdoor settings.



Fingrid is building and reinforcing the transmission network, but the transition of the power system requires also other methods to ensure the network's adequacy.



22



28

**REGULAR SECTIONS**

- 2 Work order
- 5 Editorial
- 6 In brief
- 9 Practical question
- 10 Infographic
- 26 New start
- 32 Environment
- 24 Column, *Arto Rajala*
- 35 Around the world

**FOLLOW US ON SOCIAL MEDIA**



## What is required for clean, reliable, and affordable electricity?

**RENEWABLE ENERGY** production has grown while combustion-based power generation has decreased.

Out of all the European countries, this change has occurred fastest in Finland. Finnish households, companies, municipalities, and cities benefit from clean and affordable electricity, which is also a source of competitive advantage for the country. At the same time, Finland's electricity self-sufficiency has increased—it currently produces almost as much electricity as it consumes every year. In contrast, in 2018, about one-quarter of Finland's annual electricity consumption was imported.

This trend in the electricity market development has received international attention, and Fingrid receives many enquiries from various industries about connecting to the main grid. The Confederation of Finnish Industries has published an impressive, clean transition investment portfolio in Finland, worth over EUR 250 billion.

In addition to investments in the electricity network, this trend requires more from [the] power system operations and ensuring the availability of electricity.

The power system is expanding at pace. The geographic separation and production increases the need for electricity transmission and increases transmission losses. As more societal functions are electrified, more power system reserves and electricity transmission management solutions will be needed to

ensure a reliable electricity supply and the efficient management of changes and disturbances in the power system.

The cost of operating the power system is climbing. Fingrid's investments in the main grid are large in relation to the company's investment capacity, which is defined by the regulatory methods. Managing the nationwide power balance has become more important, and the revenue from balance services has accounted even for as much as two-thirds of the company's revenues. As a result, Fingrid has transformed from an infrastructure company into a service company.

The cost of maintaining the power system has risen as the electricity price declines. The combined outcome is cheaper, cleaner electricity for consumers.

As the weather-dependent power system expands, there is a greater need for system operations. Today, Fingrid purchases power system reserves equivalent to about one-fifth of Finland's real time electricity production. New electricity market solutions will continue to be introduced. When combined with high demand, they will offer new opportunities to capitalise on the capacity for flexibility in responding to the power system's needs.

Now is the ideal time to rethink earning models: actively participating in the electricity market is a fantastic business opportunity. It is also a responsible act that contributes to the efficient operation of the clean power system and Finland's overall competitiveness.

*Finland's electricity self-sufficiency has increased.*



**Jukka Metsälä**  
CFO  
Fingrid

## FINGRID

**FINGRID** Fingrid Oyj's magazine, 27th volume **PUBLISHER** Fingrid Oyj, [fingrid.fi](http://fingrid.fi) **EDITOR-IN-CHIEF** Marjut Määttä, [marjut.maattanen@fingrid.fi](mailto:marjut.maattanen@fingrid.fi) **EDITORIAL TEAM** Eeva Ahotupa, Kati Koivunen, Niko Korhonen, Marjut Määttä, Risto Rynnänen, Katariina Saarinen, Jarno Sederlund and Tiina Seppänen **EDITORIAL OFFICE** tel. 030 395 5226, fax 030 395 5196, postal address PO Box 530, 00101 Helsinki, street address Lakkisepäntie 21, 00620 Helsinki **AD** Laura Ylikahri **PRODUCER** Susanna Haanpää **CONTENT PRODUCTION** Legendium **COVER PHOTO** Elna Manninen **CHANGES OF ADDRESS** [assistentit@fingrid.fi](mailto:assistentit@fingrid.fi) **SUBSCRIPTIONS AND CANCELLATIONS** [fingrid.fi/tilauslomake](http://fingrid.fi/tilauslomake) **PRINTING** Punamusta  
ISSN-L 14557517 ISSN 14557517 (printed) ISSN 22425977 (online publication)





Updated outlook for electricity production and consumption:

## Longer-term outlook unchanged

**W**e updated the electricity production and consumption forecasts used for main grid planning. The longer-term outlook is unchanged: Finland has promising opportunities to compete for green transition investments. At the moment, the electrification of district heating production and data centre investments are progressing particularly quickly in Finland.

The forecast is based on connection enquiries received by Fingrid for production and consumption and on the results of electricity market modelling. The forecast helps Fingrid proactively resolve challenges related to the power system transition and find solutions that enable the company to facilitate investments in clean electricity in Finland.

[fingrid.fi/en/prospectsQ32024](https://fingrid.fi/en/prospectsQ32024)

### Flow-based method introduced in the Nordic countries

**ON** 29 October, the Nordic Transmission System Operators, Power Exchanges and Regional Coordination Centre introduced a new flow-based method for capacity calculation and market coupling.

The new method helps to control the significant fluctuations in electricity transmission demand resulting from the energy transition in Finland and the other Nordic countries. It is expected to enhance the efficiency of the transmission grid and provide further opportunities to trade electricity across bidding zones.



TEKNIKAN MUSEO CC BY 4.0

### When a miniature model of the main grid was not so mini after all

**IN** 1957, Finland began using a main grid network model, an electro-mechanical miniature replica of the main grid. It was an essential tool for network planning, enabling changes in the main grid to be modelled, for example. Today, the network model is digital and replicates network phenomena more diversely than the old model.

PROFILE

## Picturing the power system of the future

Tommi Asp, a Specialist, works to enable the green transition.

TEXT MINNA SAANO / PHOTO SAMPO KORHONEN

**W**ork in Fingrid's strategic grid planning, where we paint a picture of the power system 10 and even 20 years from now.

Models are prepared in two phases. Discussions with customers and other transmission system operators provide the inputs for the market model, which contains the projected demand and production projects and cross-border connections. The market modelling data is used in network modelling, where network investments are planned from a technical and economic standpoint.

The work targets three time spans. At the top is the electricity system vision, where models are examined for 2035 and 2045. Fingrid's forecasts guide everyday planning over the next ten years. The third level is closest to the present moment and combines planning and operation. We also work on scenarios for the joint European ten-year network development plan (TYNDP).

The energy transition has revolutionised our planning. The increase in connection enquiries and weather-dependent production has expanded

the number of potential pictures for the future, requiring a new approach to risk management.

It is exciting to work at the heart of the energy sector and develop the main grid. We are enabling a new era where a strong main grid is one of Finland's key competitive advantages." ♦

**WHO?**

Tommi Asp

**WORK**

Specialist

**FAMILY**

Spouse and two-year-old dog

**FREE TIME**

Golf, jogging, and reading

## Power adequacy calls for reliable domestic production

The adequacy of electricity in Finland is expected to remain stable in the coming winter, provided that there are no faults at significant production plants and electricity can be imported as normal.

Fingrid's estimate indicates that there will be enough electricity in Finland, even under the difficult circumstances that were modelled—i.e., cold periods with no wind.

Fingrid estimates that electricity consumption could peak at around 15,000 megawatts on a very cold and calm winter's day. At best, Finnish production can cover an estimated 11,800 megawatts of consumption on such a cold day. The remaining 3,200 megawatts can be imported from Sweden and Estonia. During a very cold period, electricity consumption could even be higher than this if plenty of wind power is available. ♦

[fingrid.fi](https://fingrid.fi)



SHUTTERSTOCK

Fingrid estimates that electricity consumption could peak at

**15,000 megawatts** on a very cold and calm winter's day.



### The electricity network is being developed in cooperation in Eastern Finland

WE worked with the distribution system operators in Eastern Finland to compile a separate network development proposal for Eastern Finland. The proposal combines the development plans for the main grid and the distribution networks with separate plans based on customer needs prepared by distribution system operators and project developers.

The electricity network in Eastern Finland has plenty of space for new production and consumption projects. The regional electricity network is developed based on customer needs in cooperation between the distribution system operators and industry operators.

[fingrid.fi/Ita\\_Suomi\\_kehittamisesityys](https://fingrid.fi/Ita_Suomi_kehittamisesityys) (in Finnish)

### Report on main grid connections for offshore wind power

FINLAND has significant potential as an offshore wind power producer. In November, Fingrid published a report on the possibilities for connecting offshore wind power to the main grid. The report identified seven potential connection points in Mainland Finland for offshore wind power in the 2030s.

[fingrid.fi/en/offshore\\_windpower\\_report2024](https://fingrid.fi/en/offshore_windpower_report2024)

### PRACTICAL QUESTION

## What is a transmission management agreement?



Transmission management in the power system is becoming more demanding, and the old methods are no longer enough. The transmission management agreement is a new tool for this purpose, says Tuomas Mattila, Expert at Fingrid.

TEXT MARJO TIIRIKKA / PHOTO FINGRID

### 1 What is a transmission management agreement?

A bilateral agreement in which Fingrid and a seller agree on flexible electricity production or consumption in response to transmission management needs. The agreement sets out the terms of flexibility in advance, so it is not necessary to negotiate them once a situation arises.

A transmission management agreement is suitable for flexible electricity production or consumption capacity of at least 10 megawatts that is not technically compatible with the balancing market.

A transmission management agreement specifies the flexibility payments and certain prerequisites, such as the activation time and the necessary information exchange. The terms are the same for everyone entering a transmission management agreement, but certain information, such as the activation time and remuneration for specific units, are agreed upon separately in an appendix.

Initially, the agreement includes the simplest possible arrangement, which is already in use for winter 2024–2025.

Initially, the agreement includes the simplest possible arrangement.

### 2 Who needs a transmission management agreement, and what does the agreement contain?

Fingrid needs agreements to manage transmissions under especially difficult operating conditions and ensure system security. They represent an opportunity for sellers to offer flexible electricity production and consumption capacity that is not technically compatible with the balancing market.

They represent an opportunity for sellers to offer flexible electricity production and consumption capacity that is not technically compatible with the balancing market.

### 3 Who is best suited to a transmission management agreement?

Transmission management agreements can be recommended for production and consumption units that cannot participate in the balancing market.

Fingrid is also considering new ways to meet transmission management needs. ♦

# THE MAIN GRID'S FORMATIVE YEARS

Since 2010, Finland's main grid has expanded more than ever before. The pace will accelerate further in the coming years. The Aurora Line transmission link is this decade's most significant investment in the main grid.

COMPILED BY HENRIK GUMMERUS / INFOGRAPHIC BY LAURA YLIKAHRI

Over **1,000 km** of new 400 kV transmission lines were commissioned between 2010 and 2023.

Lake Line, southern section

**152 km**

- Yllikkälä-Visulahti-Huutokoski
- Commissioned in 2012

Coastal Line, southern section

**115 km**

- Ulvila-Arkkukallio-Kristinestad
- Commissioned in 2014

Coastal Line, northern section

**212 km**

- Hirvisuo-Jylkkä-Valkeus-Pyhänselkä
- Commissioned in 2016

Modernisation of the Iron Lady line

**212 km**

- Lieto-Forssa-Hikiä-Orimattila + Hikiä-Hyvinkää
- Commissioned in 2013, 2016, 2018, 2019

Forest Line and Oulujoki

**350 km**

- Petäjävesi-Pysäysperä-Pyhänselkä + Pyhänselkä-Nuojuankangas
- Commissioned in 2022

**215** substation projects were completed between 2010 and 2023

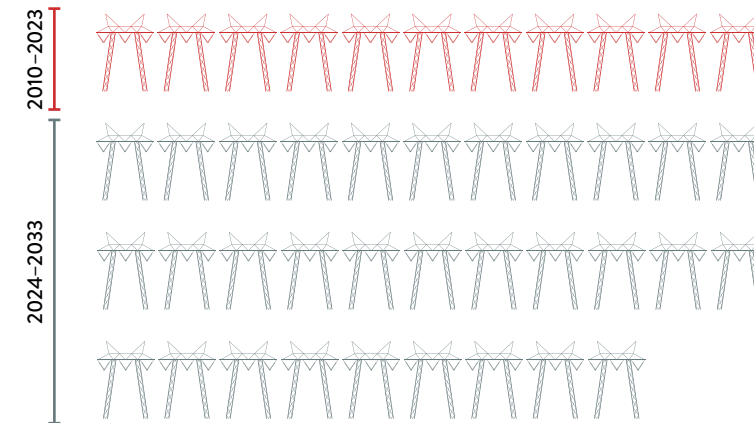
The following are planned by the year 2033:

**3,800 km** of new 400 kV lines

**2,300 km** of new 110 kV lines

**162** substation projects

The pace of construction is accelerating

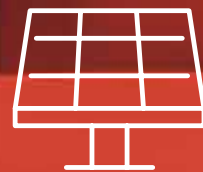
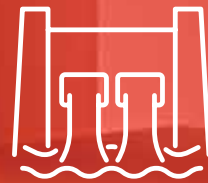
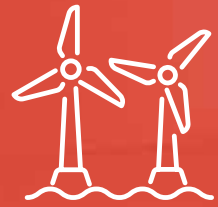


By the year 2033, Fingrid will build over **2,700 km** more 400 kV lines than between 2010 and 2023.

Aurora Line **200 km** in Finland

- 180 km in Sweden
- Commissioning in 2024/2025

# MAIN GRID FEE REFORM TO EASE CONGESTION



# IN THE GRID

Fingrid is planning reforms to restructure the main grid fees and contribute to improving the network's adequacy during the transition of the power system. The new model encourages a regional balance, easing congestion in the transmission network.

TEXT SUSANNA CYGNEL / PHOTOS SHUTTERSTOCK AND ELINA MANNINEN

**F**inland is undergoing a revolution in electricity production as society strives towards renewable and low-emission energy production. Traditional fossil fuel power plants are closing in the south of Finland, while an increasing share of electricity is produced by wind power, mainly on the west coast and in the north.

However, most of the country's electricity demand has remained in the growth centres in the south, so electricity needs to be transmitted over long distances. This is piling the pressure on the power transmission grid.

"The power system has undergone a rapid transformation, and the grid cannot keep up unless we take action," says **Petri Parviainen**, Unit Manager, Main Grid Services, at Fingrid.



**"The power system has been changing very quickly, and the network will not be able to keep up unless we take action."**

**Petri Parviainen**  
Unit Manager, Main Grid Services  
Fingrid

New wind power is growing at a rate of more than 1,000 megawatts per year, which is a significant addition to a system the size of Finland's. Fingrid is building and reinforcing the transmission network: investments of EUR 4 billion are already planned.

But other methods are needed. Therefore, Fingrid is planning changes to connection fees and main grid service fees collected from network users in the hope of utilising the network more efficiently.

In addition to the fee for direct connections to the main grid, a regional power-based tariff is planned to be introduced on the "user pays" principle. In other words, there would be an additional charge for increasing the production in a production-heavy region or increasing consumption in a consumption-heavy region.

**FEE DEPENDS ON THE LOCATION OF PRODUCTION AND CONSUMPTION**

Parviainen emphasises that the primary objective of the reform is to allocate the power-based tariff on the "user pays" principle to the new customers whose connections increase costs and the pressure for investments in the main grid.

"In addition, the reform could influence the choice of connection point for those customers who have more leeway in choosing a connection point," he adds.



**"A fixed rebate will be paid in return for being flexible."**

**Laura Ihamäki**  
Customer Manager  
Fingrid

Another proposed reform is the introduction of a flexible main grid service. The reformed model is intended for existing customers and new customers who can be flexible in pre-agreed circumstances. It would thereby support transmission management in the main grid.

"A fixed rebate will be paid in return for being flexible. The rebate will be linked to the customer's consumption fee or the power plant's power-based fee. The flexible main grid service would be well suited to facilities such as electric boilers, which are rapidly becoming more common," says **Laura Ihamäki**, Customer Manager at Fingrid.

As a third reform, Fingrid proposes implementing flexible connections also as a permanent solution. Temporary flexible connections are already in use, but the proposal calls for them to be permanently available in return for financial remuneration.

The above proposals are still in the preparation stage. Fingrid is conducting an impact assessment on the connection fee reform, with the results to be presented at a stakeholder event in December.

In addition, Fingrid has decided to introduce a power-based fee for grid energy storage systems in the middle of next year. The Energy Authority's approval is required before this fee can be introduced.

**CONCERNS ABOUT TRANSMISSION NETWORK CONGESTION BRING PEOPLE TOGETHER**

EPV Energy produces, sources, and transmits electrical energy. It operates Finland's largest regional high-voltage network and is the third-largest wind power producer in the country.

EPV is concerned about the rapid change in the power system's operating environment and congestion in electricity transmission.

"Wind power and renewable hydro power are isolated in areas where the natural conditions enable production. Conversely, consumption is focused on urban centres," says **Pia Oesch**, Public Relations Manager at EPV.

"It is good that the transmission system operator is considering how to manage electricity transmission as the circumstances change and how to



**"It is not just a question of where the most energy can be produced; it is also about where investments can be productive and profitable."**

**Jukka Lassila**  
Professor  
LUT



**Local production reduces bottlenecks**

"THE location of any asset near consumption reduces the need for storage and transportation," emphasises Professor **Jukka Lassila** at LUT University.

Local power production helps reduce transmission network bottlenecks that raise electricity prices and incur costs for taxpayers.

"It is not just a question of where the most energy can be produced; it is also about where investments can be productive and profitable," Lassila states.

He says it would be worthwhile exploring the possibilities of building wind power elsewhere in Finland rather than concentrating it on the west coast and in the north.

"Wind turbines eat into each other's returns if they are built in the same place: in windy weather, all the turbines spin at the same time, but bottlenecks in the transmission network prevent the full electricity from being used to full effect. Returns could be higher elsewhere, even in less windy places."

Lassila emphasises that regional connection pricing is one way to incentivise appropriate locations for production and consumption.

"Transmission system operators and local network operators must actively guide development so that it makes sense for the power system."

Lassila points to the example of solar power production plans, which are being built in increasing numbers.

"Investments should be directed to where the grid infrastructure is already prepared for it instead of building production in random locations. This allows existing transmission networks to be used effectively."

Lassila stresses the importance of dialogue and sharing information.

"Fingrid has been exemplary in creating open platforms for sharing information, and the grid service fee reforms are a step in the right direction. Local electricity distribution companies will also play an important role in the transition."





**“Wind power and renewable hydro power are isolated in areas where the natural conditions enable production. Conversely, consumption is focused on urban centres.”**

**Pia Oesch**  
Public Relations Manager  
EPV

develop transmission capabilities. We consider this very necessary and important.”

EPV is concerned that the planned actions will not be enough to resolve the challenges. For large projects, the megawatt investment costs can be around EUR 1 million, and an additional surcharge of EUR 20,000 is a drop in the ocean against the total cost of ownership.

“However, the reform of the grid service fees can be a partial solution under which the costs of system reinforcement are collected on the ‘user pays’ principle,” Oesch says.

EPV estimates that the connection surcharge for renewable electricity production will dent the profitability of smaller projects and, in the worst cases, slow a positive trend in energy production.

**FLEXIBLE MAIN GRID SERVICE IS AN INTERESTING OPPORTUNITY**

Metsä Group has several production plants throughout Finland that consume and produce energy.

“Consumption and production are always linked, and we cannot influence the fees levied on us,” says **Pirita Mikkanen**, Vice President, Energy at Metsä Group.

Metsä Group’s views align with EPV: both agree that the connection fee reform is likely to have a very small steering effect in relation to the high costs of the hydrogen economy.

“The ‘user pays’ principle makes sense. For a company like Metsä Group, the reform will hopefully have only a minor effect,” Mikkanen says.

Metsä Group is interested in the possibility of supporting the power system in pre-agreed circumstances by being flexible with its electricity consumption. Under the proposed model, a fixed rebate will be paid in return for flexibility. The rebate will be linked to the customer’s consumption fee or power-based tariff.

“Many of our electrical loads are too slow for the reserve market. However, if we receive notice of the need for flexibility in advance, we can or-



**“The ‘user pays’ principle makes sense.”**

**Pirita Mikkanen**  
Vice President, Energy  
Metsä Group

ganise our production activities and reduce consumption, for example, when there is shortage of electricity production in the grid and temperatures are very low,” Mikkanen explains.

**TARIFF REFORMS IMPLEMENTED IN DENMARK**

The fees for connecting to Denmark’s power grid were reformed in January 2023. New producers were not previously charged connection fees. Instead, the costs were covered by general grid fees paid by consumers.

The new model includes two different connection fees. The first fee is a standard fee that covers the cost of the producer connecting to the grid. The second connection fee depends on the geographical location of the production plant, i.e., whether there is already a lot of production in the area.

“Connecting new production units to existing production surplus areas is expensive because it

leads to major construction costs in the transmission network,” says **David Hartz** at Energinet, Denmark’s transmission system operator.

The developers of new production plants were naturally unhappy with the additional charges, although some admitted it was fair to introduce connection fees.

“Consumers, on the other hand, were happy with the fairer distribution of costs between the different user groups,” Hartz mentions.

He notes that it is still too early to draw conclusions on whether the geographical incentive will encourage new production plants to locate in consumption areas. Many other factors influence producers’ business decisions, such as land prices and planning permits.

“In any case, the new connection fees will at least ensure that producers pay a larger share of the costs of expanding the transmission network,” says Hartz. ♦

# COMPANIES ARE PAID FOR FLEXIBILITY IN THE RESERVE MARKETS

Lidl Finland and Lumme Energia sell their capacity for flexible electricity consumption to Fingrid, helping to keep the power system in balance. Flexibility can be found in surprising places and can be handsomely rewarded.

TEXT SUSANNA CYGNEL / PHOTO SAMPO KORHONEN

Electricity producers and consumers plan their operations as thoroughly as possible in advance so that electricity sales correspond to production and purchases correspond to consumption. The goal is to keep the grid balanced under all circumstances.

However, changes occur constantly, so Fingrid maintains an electricity reserve markets: the reserves fine-tune the balance of the power system during each hour of the year.

The need for reserves is growing all the time, and the spotlight has now shifted towards consumers in addition to producers. For example, the reserve market would like to attract more industrial sectors, logistics hubs, or data centres that can increase or decrease their electricity consumption according to the power system's needs.

"Flexibility could be found in the main or subsidiary processes of industrial plants, refrigeration, heating, or ventilation: the reserve market



**Katri Tuovinen**  
Energy Manager  
Lidl

*"It is worth looking into the opportunities the reserve market can offer."*

welcomes all types of flexible consumption," says **Maria Joki-Pesola**, Head of Balancing Markets at Fingrid.

The reserve market represents a business opportunity for companies. It will not be their primary business, but it can facilitate the cost-efficient use of electricity, as companies can earn money for their flexibility.

## LIDL'S VIRTUAL POWER PLANT CONSOLIDATES RESERVES FROM ITS STORES

Lidl Finland has participated in the reserve market since 2020 and sold its electricity flexibility to Fingrid. This has allowed the large retail chain to balance its high energy costs.

"It is worth looking into the opportunities the reserve market can offer, especially if your company consumes a lot of energy. Flexibility can be found in surprising places," says **Katri Tuovinen**, Energy Manager at Lidl Finland.

Approximately 140 Lidl stores have been consolidated to create a virtual power plant that combines electrical loads. The battery energy storage system at Lidl's distribution center in Järvenpää is also involved in the reserve market.

"We have now added our ventilation machines to the virtual power plant, and we are constantly thinking about other sources of flexibility. For example, the electric boilers and the solar panels on the roofs of our stores could provide further flexibility," Tuovinen considers.

Joining the reserve market required Lidl to make investments, but it was able to combine the purchases with renovations of the building automation systems in stores. The technical requirements of the reserve market were taken into consideration when the new distribution centre was designed and built.

Lidl has utilised third-party service providers since it began planning to join the reserve market.

"The company does not need its own resources to produce flexibility. The desire to get involved and reduce the company's energy costs is enough," Tuovinen says. She adds:

"The reserve market offers a way to become part of the energy transition and contribute to ensuring that the market functions and the power system remains reliable."

## LUMME ENERGIA'S CUSTOMERS

### GET INVOLVED

Lumme Energia provides electricity sales services and energy solutions to households and businesses. It is bringing six of its customers' data centres and several solar power plants into the electricity reserve market with the goal of providing dozens of megawatts of flexibility.

The entry into the reserve market included several technical steps and interactions with different partners and entities.

"In some cases, we have needed new plans for controlling the entity. However, the initial investments remained moderate. In other words, a small outlay can lead to large returns," says **Olli**



*"Fingrid and ELFI have examined whether demand facilities could participate in the reserve market," say Pasi Kuokkanen, CEO at Suomen ELFI Oy, and Maria Joki-Pesola, Unit Manager at Fingrid.*



**Olli Partanen**  
Project Manager  
of Demand  
and Production  
Flexibility  
Lumme Energia

*"A small outlay can lead to large returns."*

**Partanen**, Project Manager of Demand and Production Flexibility at Lumme Energia.

Fingrid offers support for companies entering the reserve market. Partanen also had his questions answered quickly, although he had rather a lot of questions.

Lumme Energia has also noticed that surprisingly many flexible resources can be very valuable.

"The returns can be higher than you would first think. It is worthwhile for companies to examine the opportunities to provide flexibility," Partanen states.

He says everyone wins in the reserve market. "The company increases its cash flow, reduces carbon dioxide emissions, and helps Fingrid manage the power system and keep the lights on, even if a fault arises." ♦

## Steps in entering the reserve market



# POWER EXCHANGES are more than marketplaces

Power exchanges are constantly innovating and developing to respond to the transformation of the electricity market.

TEXT KATARIINA KRABBE / PHOTO SHUTTERSTOCK

The electricity price is determined by market supply and demand in power exchanges. The price influences supply and demand, helping to keep the electricity market balanced.

However, power exchanges must constantly develop as the demand for electricity rises and an increasing share of electricity production is dependent on the weather. It is hugely important that the systems work because an error could, in the worst case, bring down the entire power system.

“The electricity market today is completely different to how it was ten years ago, and ten years from now, it will look different again,” summarises **Thomas Ignatius**, Finland’s Market Manager at the Nord Pool power exchange company.

The pace of change at the moment is particularly high. For example, the flow-based method of calculating capacity based on transmissions was introduced in the Nordic countries in October, and the day-ahead market will switch to a 15-minute trading period throughout Europe next year.

Large fluctuations in electricity prices have strengthened the need for electricity derivative markets.

“The electricity market must be kept in balance from one second to the next, and the electricity price can vary greatly over the course of a day. This makes it more challenging for market parties to predict how much they will receive or pay for electricity. Derivative markets allow parties to enter into longer-term agreements on the price of electricity. Derivatives trading is separated from the physical power market trading, but the two markets are still highly interrelated. It provides the predictability customers crave when dealing with electricity prices,” explains **Tom Darell**, CEO of Nord Pool.

Next year, Nord Pool will launch its own derivative marketplace in addition to the derivative exchanges operated by EEX and Nasdaq.

## NORD POOL HAS A STRONG PRESENCE IN FINLAND

Nord Pool’s journey began in Norway 31 years ago when it became the world’s first power exchange.

It began facilitating international trading between Norway and Sweden in 1996, and Finland was integrated into the exchange in 1998.

Today, it operates in the electricity markets of 16 European countries, facilitating participation for over 400 customers, and also offers innovative technologies and services, consulting, and training in other markets.

“Nord Pool is Europe’s trailblazing power exchange. It brings a Nordic touch to European market development, especially in areas such as legislation and reporting,” says Ignatius.

“Although Nord Pool’s role has evolved over the years, our main goal has remained the same: to create an efficient and transparent marketplace.”

Nord Pool has two headquarters, one in Oslo and one in Keilaniemi, Espoo, with approximately 50 employees.

“All the IT developers, product management and market integration employees are here, and we do most of our IT development work here. For example, we are currently focusing on interfaces for intraday trading. We have strong local knowl-

edge of the Finnish market, and our solutions are continuously developed to meet the all-around needs of our customers, including trading, reporting, consulting, training, and, in the future, derivatives.”

## EPEX SPOT: COMMUNITY MANAGER AND MARKET SOLUTIONS PORTAL

EPEX SPOT, headquartered in Paris, was founded in 2008. It is a marketplace for the physical energy markets in 13 European countries, and it provides electricity market services in a total of 19 countries.

More than 400 companies trade on the EPEX SPOT platform. It has operated in the Nordic countries since 2020, offering a marketplace integrated into the region and the rest of Europe, both for the day-ahead and intra-day markets, like Nord Pool.

“In addition to providing a technical platform, we feel we are also a community manager who sets the rules and offers innovative tools. These help our customers meet business needs and satisfy regulatory requirements, produce market data, and, above all, endeavour to ease the navigation of complex electricity markets,” says **David Assaad**, Director of Marketing and Customer Solutions.

The electricity spot prices are the same in both marketplaces, but operators can choose which marketplace to use based on aspects such as the additional services that the companies offer.

EPEX SPOT also offers market solutions for the electricity market, such as an auction platform for electricity certificates and local flexible markets.

“The evolution of the electricity market towards faster and increasingly digital trading, including automated trading through APIs, will be an important part of the future market. We are also developing solutions that will allow new operators to enter the wholesale market without intermediaries,” says Assaad. ♦



*Operators can choose which marketplace to use based on aspects such as the additional services that the companies offer.*

# SYSTEMATIC TRANSMISSION MANAGEMENT

An electricity network can transmit a limited volume of electricity within the constraints of system security. Fingrid manages electricity transmission to ensure that it remains within the limits of the transmission capacity at all times.

TEXT VESA VILLE MATTILA / PHOTOS FINGRID  
AND VANTAAN ENERGIA SÄHKÖVERKOT OY



**F**ingrid aims to offer as much transmission capacity as possible to its customers and the electricity market without jeopardising the main grid's system security or disrupting the electricity market.

The main grid must be resilient and remain functional under all circumstances, including, for example, during faults in transmission lines or connections and network construction.

Fingrid resorts to transmission management if electricity transmission volumes seem likely to exceed the network's transmission capacity.

#### ECONOMICALLY RATIONAL TIMING

Transmission management is largely systematic and predictable.

"For example, we know years in advance when maintenance is planned at nuclear power plants. We are informed about 18 months in advance when Fingrid and the neighbouring countries' transmission system operators need to implement transmission outages affecting cross-border connections and transmission capacities," says **Tuomo Mäkihannu**, Expert at Fingrid.

Fingrid plans major transmission outages that affect the electricity market every autumn.

"When a transmission outage requires restrictions to the transmission capacity, we aim to schedule it outside the times of peak demand for electricity transmission. We notify customers as soon as we can and, if necessary, make agreements with them on the scheduling."

Mäkihannu notes that Fingrid must also consider Finland's economic interests when managing transmission. Restrictions must not cause unnecessary electricity price spikes.



**"Fingrid must also consider Finland's economic interests when managing transmission."**

**Tuomo Mäkihannu**  
Expert  
Fingrid

#### MARKET-ORIENTED APPROACH CREATES OPPORTUNITIES

Our society is becoming increasingly electricity-intensive as industry and, for example, urban heating are electrified. At the same time, electricity production, consumption, and transmission are increasingly dependent on the weather.

This trend has made transmission peaks more common and more pronounced.

"As electricity production and consumption become more market-based, we hope Fingrid will gain additional resources for real-time transmission management. However, this requires the marketplaces to develop further and parties to be active," Mäkihannu says.

"The more electricity production and consumption units of all sizes that can participate in the reserve market, the more we can manage —"



transmission regionally. All electricity market parties will benefit from this.”

Transmission management needs are growing as the green transition progresses, and Fingrid is considering new ways to meet these needs. The new tools for this could include flexible connections and a flexible main grid service—we describe these elsewhere in this magazine.

In addition, Fingrid is collaborating with Helen Sähköverkko to experiment with a new common transmission management marketplace for the main grid and distribution networks. ♦

### Fingrid’s existing transmission management tools

**BALANCING POWER AND CAPACITY MARKET (MFRR):** Exploiting balancing power resources—i.e., the rapid up- or down-regulation of production or consumption.

**RESTRICTING THE TRANSMISSION CAPACITY:** When the cross-border transmission capacity is limited, only a specific volume of electricity can be imported into Finland or exported from it.

**RESTRICTING PRODUCTION AND/OR CONSUMPTION:** Restricting customer trading, which can only apply for short periods, mainly during transmission outages.

**INTERNATIONAL COUNTERTRADING:** Increasing electricity imports or exports within the limits of the available transmission capacity in a neighbouring country.

**BILATERAL COUNTERTRADING AGREEMENTS:** Purchasing the electricity production capacity required in a grid area in advance.

**TRANSMISSION MANAGEMENT AGREEMENT:** New tool, more at page 9.



“More investment results in more outages, which must be coordinated.”

**Timo Kaartio**  
Operations Manager  
Vantaa Energy Electricity Networks Ltd



## Transmission outages and major investments

For electricity network operators, transmission management leads to transmission outages and calls for investment. They require various parties to work more closely together.

**FINGRID’S TRANSMISSION** management means that Vantaa Energy Electricity Networks Ltd. must plan transmission outages annually. Unavoidable construction and maintenance work leads to outages, which must be scheduled and planned with Fingrid and the other network operators in the area.

“In the autumn, we meet with Fingrid to review the outages in the following year and coordinate our schedules,” says **Timo Kaartio**, Operations Manager.

He points out that electricity consumption in the Helsinki metropolitan area is expected to rise sharply in the coming years.

“As we try to make more efficient use of consumption flexibility and network capacity, transmission management will encounter new challenges. More investment results in more outages, which must be coordinated.”

### HIGHER DEMAND FOR ELECTRICITY AND MORE SMALL-SCALE PRODUCTION

Two special features will affect Porvooon Sähköverkko Oy’s area of operation in the future.

The production units at Neste’s Porvoo oil refinery in Kilpilahti and a few other operators are planning large electrolysis projects in Porvoo. They will greatly increase the demand for electricity.

On the other hand, the number of small-scale production customers is rising all the time. From time to time, customers may sell electricity from their solar panels and battery systems to the grid or the market.

**Magnus Nylander**, Managing Director of Porvooon Sähköverkko Oy, contemplates the effects of accelerated electrification in Finland.



“We need to be prepared for substantial repair and construction work in the distribution network and transmission lines.”

**Magnus Nylander**  
Managing Director  
Porvooon Sähköverkko Oy

“Will there always be enough power? How will the distribution network cope when, for example, increasing numbers of electric vehicles need to charge during a cold snap or excess electricity production is fed into the network on hot summer days?” he wonders.

“Our company and Fingrid need to be prepared for substantial repair and construction work in the distribution network and transmission lines. Consequently, we will invest as much in 2026 as we currently earn in annual revenue.”

Nylander says that new tariffs and electricity meters could help to cater for consumption peaks in the future.

“The meters installed for our customers over the next few years will supply more accurate and timely information. This will enhance the opportunities for flexible electricity consumption and transmission management.” ♦

# Service providers smooth the path into the reserve market

Turnkey service providers can help their clients enter the reserve market. Optimisation solutions identify the best possible return per megawatt.

TEXT MATTI VÄLIMÄKI / PHOTO SHUTTERSTOCK



**M**ore flexibility is needed in electricity production as the energy transition progresses. Electricity production and consumption must remain balanced when the wind lets up and the turbine blades slow down.

Reserves are also needed in case of failures or too much electricity in the network.

A company that has a controllable production plant, demand facility, or grid energy storage system and is interested in selling its electricity reserves can contact Fingrid's experts.

Turnkey service providers can also help their clients enter the flexibility market. They also have optimisation systems that seek to maximise sales.

Fingrid has reserve products for various purposes, all with their own rules and technical requirements. Providers can earn more by directing their flexible capacity to the right product at the right time.

## FLEXIBILITY IN INDUSTRY AND BUILDINGS

Vibeco Oy, wholly owned by Siemens, helps to manage energy flexibility in industrial locations and large buildings, among other sites.

CEO **Veikka Pirhonen** says that the company handles the entire process if, for example, an industrial operator wants to integrate its electric boiler as a flexible load in the electricity market.



**Veikka Pirhonen**  
CEO  
Vibeco Oy

*“Cooling and ventilation can be adjusted without compromising the conditions.”*

“We plan the entry so that it satisfies the factory's requirements, Fingrid's terms and conditions, and strict information security criteria. We also offer an AI-based optimisation system.”

A similar process applies to buildings.

“Buildings have a huge amount of flexibility. For example, cooling and ventilation can be adjusted without compromising the conditions.”

## MAXIMIZING RETURNS FROM ELECTRIFICATION INVESTMENTS

Intergrid specialises in connecting industrial heat and steam processes to the flexible power markets. Its customer base includes district heating companies, process industry, and greenhouses.

“We use artificial intelligence to model how much flexibility a company can offer and we handle all the necessary steps to allocate the capacity



**Olli Kangas**  
CEO  
Intergrid

*“We use artificial intelligence to model how much flexibility a company can offer.”*

to the markets with the best returns depending on the prevailing situation,” says **Olli Kangas**, CEO.

Intergrid also helps companies that are still considering replacing an oil boiler with an electric boiler, for example.

“Many investments become profitable when the company also participates in the flexibility market.”

It is important to streamline the process of becoming a flexibility provider as much as possible. Luckily, Fingrid has already invested in this a lot,” says Kangas from Intergrid.

## GRID ENERGY STORAGE GROWING IN IMPORTANCE

Capalo AI offers AI-based multi-market optimisation to bring grid energy storage systems into the flexible and wholesale markets and maximise returns.

The company's customers include energy companies and a private equity firm investing in energy infrastructure.

“We optimise electric batteries of all sizes, from container-sized systems to home batteries,



**Henri Taskinen**  
CEO  
Capalo AI

*“Consumers will soon be able to contribute to the green transition and make money from it.”*

More service providers:  
[fingrid.fi/en/reserves](https://fingrid.fi/en/reserves)

in every marketplace offered by Fingrid and the Nord Pool power exchange,” says CEO **Henri Taskinen**.

Among other things, Capalo AI trades capacity from Taaleri Energia's 30 MW/36 MWh battery system in the reserve and wholesale markets.

“The number of batteries and their importance for the reserve market will increase. Even small household batteries can play a role: consumers will soon be able to contribute to the green transition and make money from it.”

## MARKETS DEVELOPED IN COLLABORATION

Service providers appreciate Fingrid's collaboration. They also have suggestions for the future.

“Data enables service development, so it is worth continuing to invest in the availability and quality of data,” says Pirhonen from Vibeco.

“It is important to streamline the process of becoming a flexibility provider as much as possible. Of course, Fingrid has already invested in this,” says Kangas from Intergrid.

“It should also be as easy as possible for consumers to join the system,” adds Taskinen from Capalo.ai.

Kangas mentions that it has also been easy for SMEs to become flexibility providers thanks to the high degree of digitalisation in the grid. He hopes that flexibility markets will remain open and transparent. ♦

## Fingrid's reserve products

**FFR** Fast Frequency Reserve

**FCR-D** Frequency containment reserve for disturbances

**FCR-N** Frequency containment reserve for normal operation

**aFRR** Automatic Frequency Restoration Reserve

**mFRR** Manual Frequency Restoration Reserve



Switchgear installation technicians work with many different technologies in transformer and switching substations. “The best thing about my job is how varied my days are,” says Mika Oilinki from Omexom.

# INSTALLATION TECHNICIANS

## WORK ON A VARIETY OF TASKS OUTDOORS

To keep the nation’s lights on, substations must operate resiliently. They are monitored remotely, but inspections and maintenance are performed on-site.

TEXT MARJO TIIRIKKA / PHOTOS JUUSO HAARALA

**F**ingrid has 130 substations in Finland at the moment, and the country is divided into ten maintenance districts. The operation and condition of substations are monitored using SCADA, condition monitoring and video surveillance systems. In addition, they undergo various on-site technical, environmental, and safety inspections annually.

Four service providers currently handle the basic maintenance of substations in the ten maintenance districts. All in all, Fingrid works with approximately 80 installation technicians and supervisors through its service providers.

On an autumn morning, **Mika Oilinki**, Switchgear Technician from Oulu, visits the Omexom office to pick up the maintenance supplies and personnel lift he will need for the day.

Oilinki enjoys his work, as his long career history proves: after graduating as an electrician in 1996, he joined Imatran Voima. His next job was in Fingrid’s regional control centre in Oulu 1998.

The regional control centres have since been centralised in Helsinki. Oilinki moved to Fortum and eventually ended up at Omexom following some mergers and acquisitions.

**They undergo various on-site technical, environmental, and safety inspections annually.**

“The best thing about my job is how varied my days are because I always work at different substations. I like being in the fresh outdoor air. Well, working at temperatures of -30°C may not be entirely comfortable, but, luckily, it rarely gets that cold.”

Once the day’s work tools are in the maintenance van, he heads to a nearby substation.

### WORK NEARBY AND FURTHER AFIELD

Substations are typically located far from population centres. The electrical areas at substations are fenced off, and third parties should not enter them. The substations are mostly transformer and switching stations using a wide range of technologies.



Switchgear installation technicians also work on standby. “Every five weeks, I need to be available 24 hours a day for one week, and I can be called out to sites, if necessary,” says Mika Oilinki.

Oilinki’s region is Northern Finland, so he sometimes needs to travel long distances and stay at hotels.

“On average, I need to travel every other week, so travelling is a part of the job. I mainly work during the day, but if a fault occurs, I may end up working into the evening,” says Oilinki.

Oilinki’s job also requires him to be on standby one week in every five weeks, so he needs to be available 24 hours a day and visit sites if necessary.

He recalls one particular case from his standby work: an alarm sounded, reporting that a sub-

**“On average, I need to travel every other week, so travelling is a part of the job.”**

station’s reactor coil had tripped off the network. Oilinki went to check and found the reactor coil in flames. The control centre called the fire brigade.

“The alarm sounds roughly once a week when I am on standby. The most common cause is a device failure. For example, a circuit breaker may have tripped.”

### Plenty of work for switchgear technicians

**TIMO HEISKANEN**, Manager, Maintenance Management, at Fingrid says that the employment prospects in the sector are good and more experts are needed.

In principle, substation maintenance and installation technicians receive the electrician’s training at a vocational college. However, there is no specific training for this job, and there can be many career paths.

Maintenance work is a wide-ranging field, requiring technicians to work independently. They also need to be flexible, as the working days can sometimes begin early in the morning and end late in the evening. The job also involves travelling, as substations can be far apart.

“Important attributes for this job are commitment, responsibility, and attention to detail. Working with

substations is a job that is essential to society,” says Heiskanen.

There will be no shortage of work in this field: the clients and service providers in the sector are stable companies.

“The outlook for the future is good: there is plenty of work for willing and skilled technicians.”



FINGRID HAS  
**130**  
substations in  
Finland.

FINGRID WORKS WITH  
APPROXIMATELY  
**80**  
installation  
technicians  
and supervisors  
through its  
service providers.

(12/2024)

### REMOTE MONITORING IS NOT ENOUGH

When high-voltage switchgears are maintained, the work location is first de-energised and earthed to ensure safety. This is done in coordination with the switching supervisor at the Main Grid Control Centre during a phone call.

The Main Grid Control Centre monitors activity at the substation, controls the switchgear remotely, and sets various automation configurations. However, inspections and maintenance must be performed at the substation.

Today, Oilinki’s task is disconnecter maintenance. A disconnecter is a device that reliably separates two parts of the electricity network. His work can also include fault repairs and local

switching when the main grid’s switching state changes.

As the working day nears its end, his attention turns to reporting in Fingrid’s asset management system. Oilinki enters the reporting information required by the application, such as the results of condition monitoring measurements and the checks performed.

Today, he finishes work on time.

Oilinki is also an outdoor person in his leisure time. In the winter, he enjoys skiing and snowmobiling. In other seasons, he goes mountain biking, motorcycling, or boating. But today, he spends the evening at home with his family. ♦



# GREEN ALUMINIUM slashes emissions

When transmission lines are made from aluminium produced with renewable energy, their carbon dioxide emissions decrease substantially. Fingrid has encouraged conductor suppliers to produce green aluminium and is pioneering the use of such conductors.

TEXT MINNA SAANO / PHOTO SHUTTERSTOCK

**T**he overhead lines that Fingrid uses have a galvanised steel core with aluminium strands wound around it.

“Aluminium has good electrical conductivity and corrosion resistance,” says **Rami Isomäki**, Project Manager at Fingrid, regarding the importance of aluminium.

Aluminium extracted from the soil is bound with other minerals and requires a smelting phase—electrolysis—to extract it, which consumes a great deal of electricity. Conductor suppliers in China and India have begun buying aluminium ingots from smelters whose hydrolysis processes use renewable energy, such as hydro, wind, or solar power. These zero-emission energy sources yield what we call green aluminium.

Fingrid defines aluminium production as green when 95 per cent of the electricity used for smelting is fossil-free.

“Green aluminium itself is the same as any other aluminium; the only difference is that the energy source is renewable instead of fossil fuel,” says Isomäki.

## DRAMATIC DROP IN EMISSIONS

In spring 2023, Fingrid prepared a report indicating that 70–75 per cent of Fingrid’s carbon footprint comes from aluminium conductors.

“Each tonne of aluminium produced using fossil fuels results in approximately 16 tonnes of emissions. Switching to green aluminium reduces this figure to around 4 tonnes, slashing emissions to a quarter of their previous value. We can reduce our carbon footprint enormously by purchasing conductors made from green aluminium,” says Isomäki.

Could conductors be made from recycled aluminium?

“No, because conductors require high aluminium purity, which is almost impossible to achieve with recycled aluminium.”

Fingrid’s values call for it to reduce its carbon footprint. The EU’s Carbon Border Adjustment Mechanism is another good reason to use green aluminium. The mechanism is meant to put a price on the carbon emitted during the production of products imported into the EU.

“In practice, this means that if you import aluminium produced using fossil fuels into Europe, you will need to pay for it from 2026. The Carbon Border Adjustment Mechanism will take full effect in 2034.”

## FULLY GREEN DELIVERIES

At the beginning of the year, Fingrid received its first lots of green aluminium conductors from



Approximately  
**75%**

of Fingrid’s carbon footprint comes from transmission lines.

Fingrid defines aluminium production as green when 95 per cent of the electricity used for smelting is fossil-free.

two suppliers and used them on the Aurora Line, Siikajoki–Sorsaraivio, and Huittinen–Forssa work-sites. Fingrid found the trial lots flawless and has since received many more lots.

“We made new conductor agreements in the summer, requiring only green aluminium to be used in the conductors. We have also amended our existing agreements with ZTT Group of China



**Joseph Jin**  
Nordic Sales Manager  
ZTT Group

*“Fingrid is the first European transmission system operator to which we supply green aluminium wires.”*

and Sterlite of India to require green aluminium,” Isomäki says.

Since May, only green aluminium has arrived on Fingrid’s sites.

## FINGRID AS A PIONEER

**Joseph Jin**, Nordic Sales Manager at ZTT Group, a manufacturer of conductors, says Fingrid’s forward-looking operations provided the impetus for ZTT Group to build a green supply chain.

“We met with Fingrid in April 2023, and they enquired about the possibility of using emission-free electricity to manufacture aluminium.”

In the same year, ZTT Group sought out qualified aluminium suppliers.

“Third-party organisations have certified the Chinese green aluminium products to ensure quality and compliance,” says Jin.

Currently, 1.81 per cent of the aluminium in ZTT Group’s wires is green aluminium, but the company plans to gradually increase production to 100 per cent.

“Fingrid is the first European transmission system operator to which we supply green aluminium wires. The transmission system operators in other European countries, such as Germany and Sweden, are still biding their time, but we see growing market interest in green aluminium.” ♦



## How would you describe the construction of the main grid and high-voltage distribution network?

**THE HIGH-VOLTAGE** network is currently being built at a record pace in Finland. Designing and building electricity networks is the job of engineers. The outcomes are the arteries of Finnish society, carrying energy to where it is needed and keeping society, business, and citizens' livelihoods running.

Conversely, the attorney's tool is the law. "The country shall be built on laws" is an old principle based on Roman justice, but it is the foundation of modern states governed by the rule of law. However, a lawyer working on drafting laws will inevitably come upon the question, 'How should the country be built?'

In the spring, I was tasked with leading a government programme project to strengthen the functionality and adequacy of the electricity transmission network as the basis for the energy transition and as one of Finland's key competitive advantages. The government programme contains several statements that specify this objective.

To facilitate investments, the need for electricity to be transmitted to nationally important industrial hubs and reasonable electricity transmission costs will be ensured. To reduce the need to build new sections of the main grid and decrease the effect of bottlenecks, major investments that consume and produce electricity will be encouraged to be sited in close proximity so they do not require main grid connections. The amendment to the Electricity Market Act enables a distribution system operator to consolidate the connecting lines to wind turbines.

In addition, the government is examining whether to expand Fingrid's remit to encompass the construc-

tion of transmission grids in urban areas to serve the energy transition.

Smoothly integrating the rapidly growing volumes of electricity consumption and production into electricity networks demands a reassessment of the responsibilities involved in connecting to the main grid and high-voltage distribution network, the network operators' obligation to develop their systems, and the network permit regulations—at least in part.

Rising electricity production and the entry of renewable hydrogen into the market will create a need to facilitate the construction of separate lines and hybrid connections covering production, consumption and storage. The Electricity Market Act also takes into account offshore wind power in the exclusive economic zone.

We are accustomed to having an efficient and reliable main grid in Finland without internal bottlenecks. However, the rapid electrification of society and industrial investment plans already pose a major challenge to the development of the power system.

The high-voltage network project aims to secure the construction of the electricity transmission networks required for important industrial investments, rapidly increasing renewable electricity production, and the electrification of district heating. Ensuring that Finland remains a single bidding zone is also essential.

The government programme sets the targets for the drafting work, but the drafters and working groups still have plenty of things to work out before it becomes clear how high-voltage networks will be built in the future. ♦

*Ensuring that Finland remains a single bidding zone is also essential.*



Arto Rajala  
Ministerial Counsellor  
Energy department/Energy market  
Ministry of Economic Affairs and Employment

TEXT PÄIVI BRINK / PHOTOS EIRGRID

## Ireland is investing in offshore wind power

The Irish TSO EirGrid develops, manages and operates the electricity grid in Ireland. It ensures that Ireland's five million inhabitants have a constant, sustainable supply of electricity. In order to reach a low carbon future, Ireland is investing heavily in renewable energy sources.

Ireland's electricity grid is currently connected to both Northern Ireland's and Great Britain's grids.

EirGrid owns and operates the East West Interconnector linking Ireland to Wales. Currently, the Irish TSO, in conjunction with the French TSO RTE, is building a 575 km interconnector to France called the Celtic Interconnector. It is partially funded by the EU and will be completed in 2026. These interconnectors support supply security and the integration of more renewables into the electricity system.

"Because we're an island, it's important that we're connected to other grids. Ireland's grid is synchronised with the grid of Northern Ireland and we have a HVDC connection to Great Britain via Wales. We are engaging with our neighbouring countries in order to collectively transition towards a renewable energy future," EirGrid's Head of Future Operations Eoin Kennedy says.

### WORKING TOWARDS 80 % RENEWABLE ELECTRICITY SOURCES BY 2030

In 2020, about 40 % of Ireland's electricity came from renewable sources, but they are working towards 80 % by 2030, as set out by the Government.

Wind power has a major role in this change, and currently 34 % of Ireland's electricity is produced with onshore wind power. EirGrid is making Ireland's

grid renewable ready, as it needs to be stronger and more flexible.

"Today, our main energy sources are gas and onshore wind. The next tranche of renewable energy will be dominated by offshore and the Government has a target of 5 GW of offshore wind by 2030," Kennedy says.

There is also increasing investment in solar energy.

"Over the last decade, EirGrid has made huge strides in operating the grid with very high levels of renewables and now 75 % of electricity on the grid can come from renewables at any given time. In the future, we will need more energy storage and interconnection between grids."

The shift towards green energy means there is a need to employ more people with skills to work with renewable energy.

"It's a highly competitive market and we need to work closely with universities and research institutions to secure a pipeline of new, skilled employees," Kennedy says. ♦



In Ireland, 75 per cent of the electricity can already be from renewable energy sources.



Wind power production in Ireland is currently concentrated mainly on the windy west coast, while consumption is on the east coast, where the capital city, Dublin, is located.

# Open data – the key to innovation

**ARE** you familiar with Fingrid's open data service?

Open data provides free information about Finland's power system and electricity market. The service promotes the functioning of the electricity market by making information openly available to citizens and various societal actors.

Open data is used by energy professionals, researchers, developers, and IT companies offering services for the sector. And perhaps you as well.

The total consumption and small-scale production at electricity accounting points are now available as open data, along with new data about the reserve market.

Fingrid's open data is available  
at [data.fingrid.fi/en](https://data.fingrid.fi/en)



# FINGRID

DELIVERS. RESPONSIBLY.