

FINGRID'S OCCUPATIONAL SAFETY PUBLICATION FOR SERVICE PROVIDERS | 1/2016

SAFETY ON THE LINES

A photograph of a worker in a snowy environment. The worker is wearing a white hard hat, safety glasses, a grey knit hat, and a bright yellow high-visibility jacket with reflective silver stripes. They are wearing black gloves and are reaching up to work on a metal structure, possibly a power line tower. The background shows a snowy landscape with trees and a yellow vehicle.

**INDUCED
VOLTAGES
POSE A SERIOUS
DANGER**

p.7

CONTENTS

- 3 Editorial
Don't compromise on safety
- 4 Learning from mistakes
- 7 Induced voltages pose a serious danger
- 10 Comprehensive safety thinking at
reserve power plants
- 12 Updates on the development project –
training on-site and online
- 14 Towards zero accidents with
a positive attitude

SAFETY ON THE LINES

Fingrid's occupational safety publication 1/2016

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Don't compromise on **safety**

2016 is off to an energetic start and construction on the Finnish grid is continuing at a high level of activity. This year alone, 16 substation projects and 9 transmission line projects are due for completion. Four of the latter are important 400 kilovolt transmission connections. Many projects are in the hectic phase of finishing work, final inspections and commissioning, with deadlines looming. As we find ourselves rushing, it is good to stop and remember that we must not compromise on safety.

In recent years, Fingrid has launched a number of occupational safety projects which have led to concrete procedures in worksite practice. It has been a joy to see how the safety culture throughout the entire industry has developed positively over the years. Many things, such as personal safety gear and MVR inspections, have become a part of worksite routine. Digital-era tools that enhance operations are also here to stay.

But there is still some room for improvement. Last year, the accident frequency index suffered a setback compared to the previous year. Together, we must turn that around and get it back on track towards our target of zero accidents.

The increasing number of near miss reports and hazard observations is a positive thing. We can learn from them and prevent similar situations from occurring again in the future – before anyone gets hurt. Take the initiative!

When it comes down to it, occupational safety is all about attitude. If the occupational safety culture is good, everyone working on the site feels that they have the right to and responsibility for safe work. Everyone also has the right to intervene in unsafe work. It is the responsibility of veteran employees to take care of their colleagues and friends, especially when there are young interns or inexperienced employees working on the site.


Wishing everyone a safe 2016 both at work and at home!

Daniel Kuosa

Construction Manager
Fingrid Oyj



LEARNING FROM MISTAKES



A summary of accidents and dangerous situations in 2015 reveals that there is still room for improvement in occupational safety on Fingrid's worksites.

Text: Karri Koskinen | Photographs: iStockphoto, Henri Luoma and Risto Uusitalo

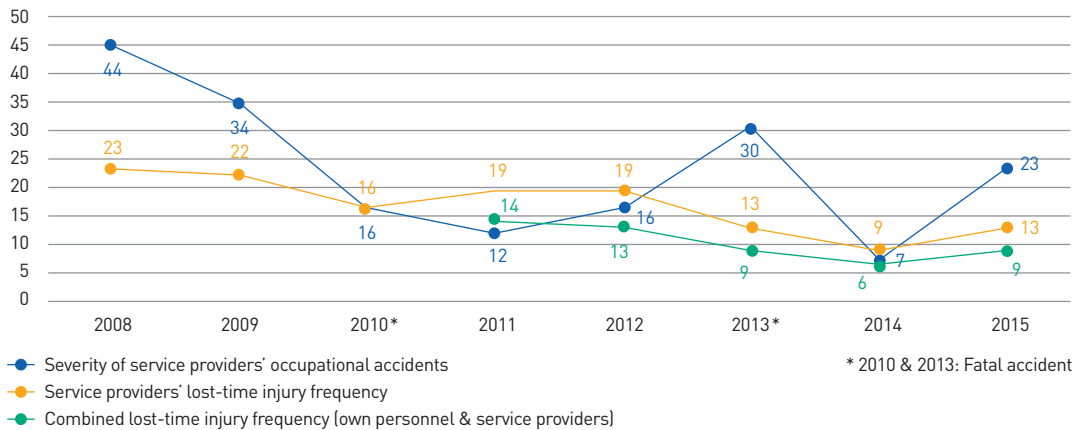
In 2015, the level of occupational safety in investment projects and maintenance fell in comparison to the previous year when using lost-time injury frequency (the number of lost-time injuries / million completed work hours) as an indicator. Fingrid's service providers suffered 13 lost-time injuries, and Fingrid's own personnel experienced 1. The combined lost-time injury frequency rose to 9 from 6 in the previous year. In addition, Fingrid's service providers saw twelve 0-day accidents. With the exception of the day of the incident, these accidents do not cause inability to work and are not used in calculations of the lost-time injury frequency.

Of the service providers' occupational accidents that led to absence, 4 were classified as being in severity category A based on their severity and potential consequences. Of these, 2 led to inability to work lasting in excess of 30 days: a fall from 3

metres when removing protective scaffolding from an intersection on a transmission line worksite and a 200 kg crane jib fell onto an employee's foot. Both of the serious accidents occurred on transmission line worksites.

An accident in which an employee slipped on a tower at a transmission line site and broke a finger was classified in category A, the most serious, due to repeated accidents at a single site. One of the category A accidents took place in December 2015 when a transmission line worker's foot was fractured after a steel beam fell on it. In this incident it was probable that the period of inability to work would have lasted longer than 30 days. Another A-category lost-time injury that led to absence was an incident in which a Fingrid specialist was seriously injured after receiving an electric shock from a cable terminal base plate.

Lost-time injury frequency and severity of accidents



Lost-time injury frequency = Number of lost-time injuries that led to at least one day of inability to work/million completed work hours

Severity of lost-time injuries = Days of inability to work caused by lost-time injuries/number of lost-time injuries

Service providers' man-years 2015	593
Service providers' work hours 2015	1 008 264

There were 13 lost-time injuries that led to absence, of which 8 took place in transmission line projects. Of these, half were slipping or tripping on the ground or on towers. No lost-time injuries occurred in substation projects or reserve power plants, so the zero accidents target was achieved. One person tripped while handling vegetation, and was absent for more than one day.

Maintenance saw 4 lost-time injuries that led to absence, 2 at substations and 2 at transmission lines. One transmission line-related incident was caused by slipping on the tower, while the other incident involved crushing a thumb in a tool. In substation maintenance, one incident was caused by physical strain on the foot as the rotary type disconnecter was turned manually. Another occurred due to an error as an employee took hold of a disconnecter's motor axle, injuring his finger.

Dangerous situations were reported more actively in 2015. Thank you to everyone who reported a near miss or hazard observation! 91 near miss situations were reported, which is almost double the corresponding number for last year. Of these, the majority (73) were category C incidents, indicating lesser severity. These reports provide a good foundation on which to develop operating methods.

10 near miss situations were classified as category B, requiring further investigation.

We escalated eight incidents to category A, the most serious category, as they contained a high risk of serious consequences. Three serious near miss situations related to the correct installation and detachment of additional earthing. Two of these were caused by complete disregard for occupational safety. Additional earthing was detached in one case and connected in another without using an earthing rod. Induced voltages are a significant danger factor on Fingrid's worksites. They have caused fatal accidents and serious dangerous situations, and everyone should be aware of the risk. Risks are nevertheless taken, causing serious dangerous situations. That's why induced voltage is one of the themes of this magazine. Read more on page 7!

Serious danger has also been caused by demolition work, in which particular care should be paid to planning. A serious dangerous situation occurred during lifting work, when a crane operator installed the crane line incorrectly when changing the block and tackle, causing the line to fray and almost snap as it lifted a load of approximately 20,000 kilograms.





Another dangerous situation took place when a 20 kilovolt voltage transformer exploded at a substation. The explosion sent heavy debris flying 15 metres. The site manager was approximately 10 metres from the transformer, but luckily was not hit by any debris.

In December 2015, a serious near miss situation occurred on a transmission line site. Employees were fastening a conductor when the cross arm failed and tipped downwards (see picture above). The employees fell 2–3 metres and were saved by their fall protection. The biggest reason for the tipping of the cross arm was an incorrect working method: the conductors in the tower were bound to the ground, placing too much force on the cross arm when lifting the line from the pulley. For this

reason it is not permitted to fasten a tower whose conductors are bound to the ground.

Approximately 70 hazard observations were made, more than in 2014. The number is nevertheless small in relation to the approximately one million work hours carried out by service providers on Fingrid's worksites. We need more hazard observations in order to take action against hidden danger factors. It is everyone's responsibility to point out any dangers they observe and to also report them to Fingrid. You can also report a safety observation online. Instructions on how to do so can be found on page 13 of this magazine. **F**

REMEMBER!

- 1. Safety attitude** – Don't take risks. Think twice about whether it is safe to carry out the work.
- 2. Planning and risk assessment** – All work must be planned, and plans must be checked before work begins.
- 3. Slipping and tripping** – In 2015, a large number of accidents leading to absence were caused by slipping and tripping. Don't take risks on towers; take proper care of cleanliness and tidiness, and choose appropriate footwear for the task.



Induced voltages pose a serious danger

During this decade, several incidents have occurred in the main grid in which persons skilled in electrical matters have either received or been in danger of receiving an electric shock due to induced voltage.

Text: Pasi Lehtonen | Photographs: Henri Luoma

Two of the electric shocks have even led to fatalities. In addition, extremely serious incidents have taken place in which the induced voltage's electric current passed through the body and caused convulsions. In these situations, the employees' lives were saved by their colleagues' quick and careful actions.

In 2015, induced voltage contributed to an extremely serious electric shock incident involving a fatal voltage. A direct current cable's neutral circuit was being tested under circumstances in which testing voltage required earthing for work to be discon-

nected. The worker received an electric shock in a boom lift during testing when using a mobile phone camera to photograph small insulators which were difficult to see. In searching for a good angle, the worker's hand came into contact with the live metal plate which was connected to the neutral circuit and on top of the insulators.

A 0-day accident involving an electric shock caused by induced voltage also took place in 2015. An experienced electrician received the electric shock as additional earthing was carried out on a reactor at a substation for inspection. The current was →



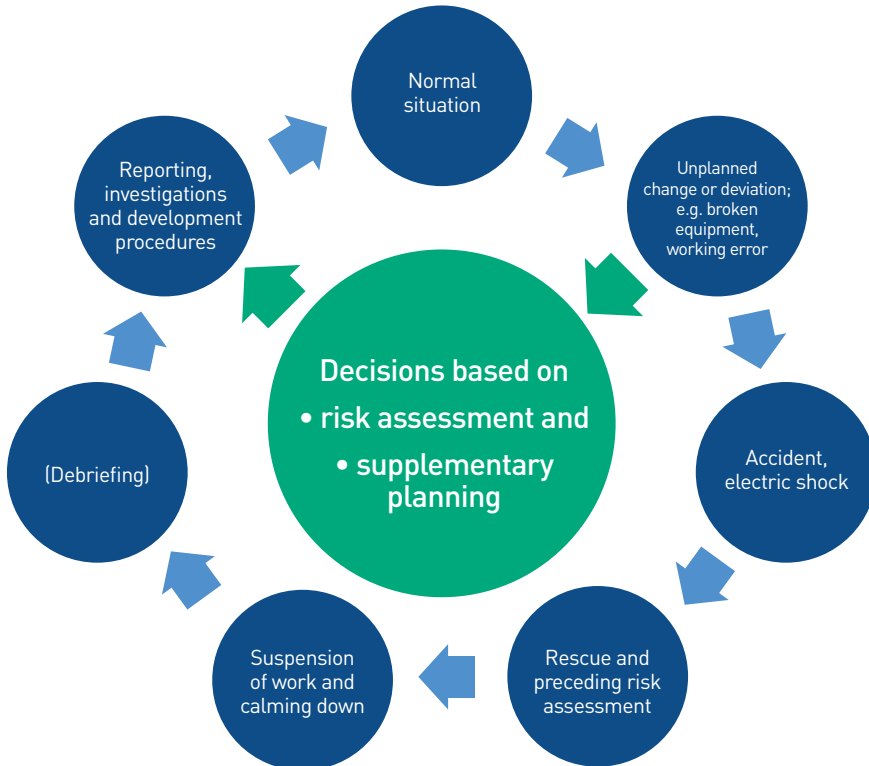
able to flow as due care was not followed and the electrician's hand came into contact with components to be earthed before the conductor clamp was attached.

In two of last year's serious incidents, experienced professionals either connected or detached the conductor clamp for a transmission line's additional earthing equipment without the necessary earthing rod.

In one incident, the danger of electric shock was caused by moving the main earthing for work at the substation without the permission of the Main Grid Control Centre. Personnel noticed that equipment had been moved during restoration switching as, when removing excessively long and overlapping main earthing for work, a ground clamp was erroneously opened while the conductor clamp was still connected. In addition, during restoration switching it was observed that ground clamps had been poorly connected when reconnecting main earthings.



The diagram below depicts accidents involving an electric shock or risk thereof.





In the diagram, the blue path depicts a series of events in which changes or deviations at a site are not sufficiently taken into account, thereby lowering the threshold for accidents to occur.

The following are significant steps on the path to an accident:

1. A deviation can manifest as erroneous instructions or unpredictably helping another person in a task, such as detaching equipment.
2. The error can be deliberate or accidental.
3. A risk assessment must always be carried out before rescuing a person who has received an electric shock. Without a specialist risk assessment of rescue methods, the rescuers might find themselves in trouble.
4. The suspension of work removes immediate site risks and prevents new accidents. Things that are essential to the investigation should be left unchanged where possible.
5. Calming down helps to avoid new risks, with decisions made on a case-specific basis as to what work can be carried out without a recovery period and who should carry out the work.
6. Debriefing is indispensable after a serious incident.

Healthcare professionals strive to take care of people who have experienced an emotional crisis. The diagram's green path shows action in which the observed change always leads to a new site risk assessment, safety planning, and decision-making to ensure safety. In the model, the condition of equipment, actions of personnel and safety are all continuously monitored.

Basic rules for additional earthing for work, or removing the danger of induced voltage, are set out in e.g. the new online school. Further information is available in Fingrid's instructions and in training concerning their requirements.

The simplest way to prevent dangerous situations is to take action to modify your own behaviour and that of your work group. Any uncertainty relating to competence can easily be clarified by asking. It is even easier to make changes to your own attitude problems. Remember that when working as an instructor, you hold personal responsibility for your junior colleague. Only teach him or her the correct, safe working methods.

Care for yourself, your loved ones and your colleagues by following the instructions you are given. Set an example and require others to do the same! ■

Comprehensive safety thinking at reserve power plants

Fingrid's reserve power plant unit aims to make safety thinking a part of the daily routine at plants.

Text: Harri Ollikainen | Photographs: ManjaMedia



The Forssa reserve power plant was completed in 2012.



Fingrid's corporate security unit and reserve power plant unit are responsible for managing and developing safety matters at reserve power plants. The day-to-day responsibility for safety, nevertheless, lies with the reserve power plants' use and maintenance service provider.

Previously, environmental audits at reserve power plants were carried out by external consultants to inspect plants from an environmental and chemical perspective. Now, we are implementing a comprehensive safety audit, which also takes into account the following safety matters:

AUTHORITY REQUIREMENTS AND PERMITS

- Environmental permits and latest inspection visit
- Chemicals Act permit and latest inspection visit
- Other reviews and inspections

INSTRUCTIONS, OPERATING METHODS AND DOCUMENTATION

- Instructions and book-keeping
- Work permits
- Working alone
- Change management

PLANT TOUR

- Route to plant
- Fuel unloading points and fuel containers
- Power plant buildings
- Other outdoor areas

Comprehensive safety audits have been carried out in accordance with the new model at the Huutokoski and Tolkkinen plants. The inspections found some room for improvement, but all fundamental

matters were in order. The content of the audit will be further adapted to suit its purpose based on experiences.

Plants' safety reporting practices have been enhanced so that in the future, safety reports will always be made by the operation and maintenance service provider's person responsible for the reserve power plant.

An external contractor will always be ordered by either Fingrid or the service provider. The reserve power plant's service provider's responsible person will be on site whenever an external contractor arrives at the plant. External contractors' details and a task description will be submitted to the person responsible for the plant, who will draw up a safety report and can prepare to provide guidance on the upcoming work.

The plant orientation form has been divided into two sections. The orientation form contains general matters pertaining to the plant. Plant orientation is valid for one year. All work-related matters, on the other hand, were transferred to the work permit form. A separate work permit is issued for each individual task. The service provider will also use the work permit form for separate jobs. Work permits are work-specific.

Reserve power plants will implement online orientation during 2016.

The service provider's hazard observations and initiatives, as well as plants' environmental and chemical matters will be examined monthly in reserve power plants' meetings together with the service provider. The NordSafety system will be implemented at reserve power plants in early 2016. ■

Updates on the development project – training on-site and online

Fingrid's occupational safety development project is continuing to work for safety. Part of the project is the online school implemented this year. In addition, we are enhancing the use of the NordSafety system and organising training in contract terms concerning safety.

Text: Karri Koskinen | Photograph: Henri Luoma

The occupational safety development project has developed operating models and tools to improve occupational safety since 2011. Occupational safety levels have risen during the project, but there is still room for improvement. Our aim is to remind people working on Fingrid's sites that each of us plays a significant role in ensuring occupational safety.

In December 2015, Fingrid organised an occupational safety seminar attended by almost 100 service providers and Fingrid representatives. The seminar collected ideas on how to deploy occupational safety requirements. Most suggestions related to training and orientation. In particular there was a desire for more training in contract terms concerning safety.

The ideas collected during the seminar have been taken into account in the deployment plan for occupational safety requirements in 2016 and they will be dealt with in May 2016 in the asset management theme day.

Fingrid organises training in contract terms concerning safety and in safety management for both its own personnel and for service providers. Training is aimed at service providers' project managers, site managers, maintenance supervisors, and occupational safety managers and specialists. In addition to contract terms, training also examines shared workplaces and construction sites, investigations into accidents and dangerous situations, Fingrid's online school, toolbox talks, risk assessment and the NordSafety reporting system. Over the

THE ONLINE SCHOOL

Fingrid's online school was implemented in January 2016. Service providers must ensure that everyone who works on their site completes the online school. The online school will be translated into English, Croatian and Estonian during the spring.

The online school can be found at fingrid.trainings.gimletlms.com





course of the year, four training events for service providers will be held in Finnish and one event will be held in English.

During 2016, Fingrid's safety specialist will visit most transmission line and substation projects to train workers. The aim is also to carry out a site tour with site management. Safety training will also be organised for maintenance workers with regard to attitude, work risk assessment and contract terms concerning safety. Occupational safety information events will also be held as necessary at the start of projects and contractual periods.

We aim to take the NordSafety reporting system into active use in 2016. In the future, all occupational safety reporting and investigations into accidents and dangerous situations will be handled using NordSafety.

The system is designed to be user-friendly and user training will be arranged as necessary.

NordSafety features a tool for toolbox talks, and we hope that all our service providers will make use of it. Worked hours are also collected in NordSafety on a monthly basis. Reports must be submitted by the 15th of the month following the month to which reporting pertains.

System development will continue in 2016. We are still striving to improve usability and are developing new tools.

We still wish to receive hazard observations from worksites. Observations can currently be submitted online in NordSafety without user credentials. You could save a colleague from an accident by reporting a hazard observation. ■

REPORT A HAZARD OBSERVATION OR NEAR MISS!

Don't hesitate to report any danger factors you have observed! Reports can be submitted on minor and major danger factors. Every observation is significant and all observations will be dealt with positively.

You can report a safety observation or near miss at portal.nordsafety.com/publicforms/8f83ty8jydmxetbh?lang=en



Towards zero accidents with a positive attitude

Fingrid presented its first award for occupational safety in construction and maintenance in December. Award-winner **Mika Ahosmäki** believes that some of the most important factors when it comes to occupational safety are the good planning of work, a trust in workers' professional skills and realistic schedule targets.

Text: Meri Viikari | Photograph: Pirve Honkonen



Fingrid has long invested in the development of occupational safety and has brainstormed development procedures together with service providers. Good ideas and practices relating to occupational safety are shared at Fingrid's occupational safety seminar, which is held every two years.

The seminar in December 2015 concluded with the first presentation of the award for occupational safety in construction and maintenance. The award is presented for exemplary and distinguished activity in occupational safety matters. It is awarded for a positive safety attitude and setting a good example on site, as well as the active and improvement-oriented promotion of occupational safety.

The first occupational safety award was presented to Mika Ahosmäki from TLT-Building Oy. Mika has been a positive, safety-conscious and exemplary site manager on transmission line projects. He took the initiative in implementing the NordSafety reporting system at the Hovinpaikka-Kontiolahti transmission line project and assisted in system development. There has not been a single occupational accident at Mika's worksite.

We called Mika to find out how to get workers involved in the promotion of occupational safety.

Good morning, Mika! You are the winner of the 2015 occupational safety award, and safety levels on your worksites are good. How have you achieved that?

When it comes to occupational safety, it is important for all workers, including subcontractors, to commit to safe working methods. A professionally skilled workforce also plays a key role. New workers should be given ample time to learn.

From a site manager's perspective, it's crucial to make enough time for planning. If a site manager manages several sites at once, work planning suffers and the threshold for accidents is lowered. It would be ideal if the site manager could concentrate on what is essential without having to carry out administrative work, for example. That's the project manager's job.

Personal protective gear is a large part of daily work for engineers. Work comfort, and thereby occupational safety, are significantly improved if employees are allowed to select appropriate clothing and gear themselves. Boundary terms concerning the procurement of protective gear come from the employer of course, but warm shoes and waterproof overalls, for example, help workers to better focus on their work. If you are annoyed by having to wear the same cold shoes day after day, occupational safety will suffer.

When it comes to contractor companies, occupational safety is improved if the contractor is familiar with the local conditions.

It is often heard that safe working methods can be found between the worker's ears. How can a change in thinking on site come about, and how can we promote it in practice?

A change in thinking can be achieved through a positive approach to occupational safety promotion, as well as examples set by the site management and

client. If, for example, the client issues new occupational safety-enhancing changes which slow down work, it is essential that the client comes down to the site to explain the new requirements. If the client justifies changes and highlights the benefits, it's much easier to accept the changes. A positive attitude is contagious!

You mentioned that it is essential for workers to commit to safe working methods, but how can we achieve that? How can we get workers to commit to safe working methods?

Trust in the workers' professional skills increases commitment. Overly strict instructions concerning protective gear, for example, weaken commitment. It's also counterproductive to set excessively tight schedule targets. The workgroup should be given time to think about their own performance and how work should be carried out. It is never good to hurry.

For clients, site supervision is extremely important. In order to promote workers' commitment to safe working methods and new occupational safety requirements, the client's representative must have a real presence on the worksite. If the supervisor is a professional, site situations and issues can be solved together and we can come up with better working methods.

How can we deploy Fingrid's target of zero accidents to every worksite?

It is of crucial importance to invest in work planning and to allow everyone enough time. If enough time is reserved for both the planning and performance of work, a shared site will automatically become safe.

Thank you Mika, have a safe day at work! 📌

CONTACT US

We are continuously striving to improve our operations concerning occupational safety. Occupational safety affects us all, and we wish to improve safety in cooperation with suppliers. All feedback is important. Please send any ideas for articles, tips for development and feedback on the magazine to Expert Karri Koskinen. Please don't hesitate to get in touch if you have any questions about occupational safety.

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