Stronger together

Haakon Alfstad heads the new unit for all major projects in Statkraft. Come along to Fosen and Moglice.

DATA CENTRES
The new power-intensive industry
Some time ago, I went on a crash course in algorithms with one of the world’s leading professors in computer science. He spent six years developing an algorithm - we would get the knowledge “extra curricularly”. To me, mathematics became the hidden secret of new insight. That’s how it is: if we want to create something new, we must also change our perspective and see the world differently.

Some lucky Statkraft employees went a little deeper during “Coding Day” in Düsseldorf (page 30). They learned algorithmic trading, near real-time transactions. The goal was a meeting between smart and creative people and powerful machines, to help us get more effective results from market operations.

There is a lot of hype and buzz around algorithms, big data and digitalisation. Therefore it is important to get to the core of what the technology will be used for and see the world differently.

The classical economist Joseph Schumpeter supports the entrepreneur’s belief that innovation happens through “creative destruction”. However, innovation does not need to be history. It is growing pressure on margins and traditional business models. Customers are taking greater control. We need to crack some codes.

At the same time, this picture also gives reason for demystification. For example, Statkraft’s business is very used to automation. Just think about how we operate our power plants – and in more recent times, even virtual power plants.

What’s new is the enormous pace of change, which is compelling companies to take quantum leaps instead of small steps. An ambition of CEO Christian Stengel. Tønnessen is to have a large data centre in Norway. The task is to use power. A lot of power. Norway and the Nordics have a surplus of renewable energy. In addition, increased computing power is a prerequisite for future industrial and business development. Computer industry infrastructure can provide a boost. That is why ‘The Haga’ stands on a piece of land in Stokke (page 6) and talks about a plot that could maybe house a data centre. Finland has Google. Sweden has Facebook. Who knows what Norway will have?

Mathematical magic

S
ome time ago, I went on a crash course in algorithms with one of the world’s leading professors in computer science. He spent six years developing an algorithm – we would get the knowledge “extra- venuously”. To me, mathematics became the hidden secret of new insight. That’s how it is: if we want to create something new, we must also change our perspective and see the world differently.

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Statkraft Varme will supply 5 GWh of district heating to the new veterinary building at the Norwegian University of Life Sciences in Ås, Akershus County. The new building covers 63 000 square metres.

SELLING ÇETIN

STATKRAFT has signed an agreement to sell the Çetin hydropower project to the Turkish Limak Group. Limak already has several hydropower plants in the south-eastern part of Turkey in its portfolio. Statkraft decided to sell the project in 2016. Planned capacity for the power plant is 517 MW with an annual output of 1 418 GWh.

TAILWIND

Statkraft is acquiring ownership of SSVAB's wind farms in Sweden. The company was established in 2007 as a collaboration between Statkraft and the paper producer SCA to develop four wind farms in central Sweden. The wind farms have a total annual output of about 1.6 TWh, SCA remains as landowner.

THE GOVERNMENT’S PROPOSAL for a new dividend model for Statkraft was presented in the revised national budget in May. The model allows the company to retain more of the earnings from businesses other than Norwegian hydropower and a greater share of profits from sales of businesses outside Norwegian hydropower.

"This is very good news for Statkraft. The dividend model is positive for the strategic development of the company," says Christian Rynning-Tønnesen, CEO. In the press release announcing the new dividend model, Monica Mæland, Minister of Trade and Industry, emphasised the company’s need for predictability and investment capacity. "I see this as support from the government for the company’s strategy and its efforts to develop Statkraft as a group with activities both in Norway and abroad," says Rynning-Tønnesen.

NEW KNOWLEDGE

Brushless generators pay off

A TRANSITION TO brushless generators will make the production of hydropower more competitive, according to a doctoral thesis by Jonas Kristiansen Nøland at the University College of Southeast Norway. In Norway, brushless generators are not permitted for power plants over 25 MVA.

"I have researched an improved version of the brushless system," Nøland told the magazine Teknisk Ukeblad. "The technology has been proven to resolve many of the grid companies’ concerns." Statkraft has funded the research, which can reduce operating and maintenance costs in the future. "We want to determine the technical limits for wireless control of brushless magnetisation," said Jan Petter Haugli, head of the electrical and mechanical disciplines unit in Power Production in Statkraft, speaking to the same magazine. "The goal is to document this so that brushless magnetisation can be permitted on larger generating units."
Data centres consume a lot of electricity. According to new estimates from the consulting firm Menon Economics, a hyperscale data centre in Norway will require access to over 90 MW from the power grid. “In Norway, we have a surplus of pure energy, mainly from hydro-power,” explains Atle Haga, head of the data centre project in Statkraft. “Statkraft’s data centre project aims at making use of this power. Energy accounts for between 30 and 50 per cent of the operating costs of a data centre, and renewable power is increasingly popular among data centre investors like Apple, Facebook and Google.”

SELLING NORWAY
Statkraft does not invest in land, buildings, infrastructure or computers itself, but facilitates the establishment of data centres in Norway. “We prepare sites, provide the necessary approvals and licences, and market and sell the projects to data centre operators,” says Haga. “As a host country, Norway should be as attractive to data centres as our neighbouring countries. Sweden, Finland and Denmark have already established several large data centres. In Norway, we have excellent access to the power grid and an efficient power market, and thanks to flexible hydropower we can offer as much as 100 per cent emission-free power. In addition, the electricity tax for large data centres in Norway is competitive.”

So far, Statkraft has signed two contracts with site owners, one in Vestfold County and one in Telemark County. The 400 000-metre² site in Stokke in Vestfold is ideal for this purpose; it is flat, has a city and airport nearby, and has access to renewable power and a good fibre network.

“Here you could construct four 30 000-metre² buildings — each one could fill the entire city hall square in Oslo,” says Haga.

SPILLOVER EFFECTS
The data centre project works with Innovation Norway and respective site owners and municipalities. According to Haga, data centres will lead to more jobs in Norway. “In the operating phase, a large data centre has about 150 permanent employees. In addition, it creates significant spillover effects both locally and regionally.”

All the data centres in the world together consume more electricity than all of Germany. Now Statkraft is facilitating the establishment of a new power-intensive industry in Norway.

Heidi Bravik Sæther  Morten Brun

DATA CENTRE

A data centre is a freestanding building that houses a large number of servers. It also contains administration offices, cooling systems, reserve power supplies and connections to the power grid and fibre network. Data centres represent the world’s fastest growing power-intensive industry. Statkraft is preparing two sites in Eastern Norway for data centres, in Stokke (400 000 m²) and Skien (4 000 000 m²).
Decisive meeting at
LAKE RØSSVATNET

Nedre Rossåga power plant underwent extensive modernisation. Now the licence terms are being revised. How will consideration for nature conservation and power generation be balanced, and what will it mean for Statkraft?

Morten Ryen  Tine Poppe

Useful. Ragnhild Stokker (foreground) is senior engineer in NVE and leader of the revision of terms process for Rossåga. The inspection gives her a good opportunity to meet the stakeholders one last time before NVE delivers its recommendation.
When the first large hydro-power plants were built in Norway 100 years ago, there was less debate about the environment and nature conservation, than today. Providing people with light and heat and enabling industries to create jobs were the primary concerns at the time. Now that the licence terms for many of the old power plants will be revised, the situation is different. Environmental considerations have taken on a greater significance. Is it possible to right past wrongs? If so, what will that mean for power generation and profitability? How should one consider what will that mean for power generation but less focused on conserving nature and the environment.

IN THE FIELD Rain is pouring over houses and streets in Mosjøen, a suitable reminder that hydropower is a major source of prosperity in Norway. At Fru Haugans Hotel, twenty people dressed in fleece, all-weather jackets and mountain boots are boarding a bus that will take them up to Lake Røssvatnet. Around 90 kilometres further east, between Mosjøen and the Swedish border, Lake Røssvatnet is the reservoir for Øvre Røssåga hydropower plants, and Nedre Røssåga hydropower plants, and the group is conducting a two-day inspection in connection with the revision of terms for the two power plants.

“The purpose of the inspection is to visit the site and see the situation with their own eyes,” says Carsten Jensen, head of watercourse licensing in the Norwegian Water Resources and Energy Directorate (NVE). NVE arranges the inspection as part of the revision of terms process. But Statkraft has, as owner of the power plant, planned the actual excursion and stops. Jensen emphasises that the revision of terms is mainly about environmental measures, and that Statkraft is at no risk of losing their licence.

“What we’re going to discuss are minor changes in the terms for continued operations,” says Jensen. “The power plant has been operating for 60 years, and it will still be there after this.”

MULTY STAKEHOLDERS The inspection is open to all stakeholders, including the media, politicians and neighbours. In practice, the participants are representatives of the affected municipalities, interest organisations, Statkraft, NVE and the Environment Directorate.

Lake Røssvatnet is Norway’s second largest lake. There are long distances to cover, many hours on the bus and many stops along the way. At each stop, NVE’s representatives explain which requirements to the Norwegian Watercourse Licensing Directorate (NVE) and Environmental Directorates (NVE, Directorate of Petroleum and Energy. The Government decides on the requirements and then decides whether the terms need revision.

NVE asks the licensee (for example Statkraft) to comment on and costs of proposed actions taken and opinions on damage and disadvantages, actions taken and opinions on and costs of proposed measures. NVE assesses the consultation statements and submits a recommendation to the Ministry of Petroleum and Energy. The Government decides on the revision. Approved revisions to terms are implemented through orders from the relevant directorates (NVE, Directorate for Nature Management, County Governor).

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FAC T S Revision of terms

In Norway, the licence terms for many power plants are currently being revised, and one of the goals is to update the environmental requirements to the current standard. Selkjøen received revised terms in 2014, and terms are currently under revision for several watercourses, including Ytke, Vipsje, Røssåga, Sunn-/ Trolleåen, Altaaen, Avsa, Barnes and Rana. Several revision processes will start in the years to come.

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The good feeding conditions and stable water levels contribute to making this one of the finest wetland areas in Nordland County.

Gunnar Baarle, environmental coordinator in Statkraft.

There is a business-like tone to the questions and comments.

"The inspection is a great opportunity for us to present the various measures we’ve taken to reduce negative environmental impacts," says Bjørn Grane, environmental coordinator in Statkraft. "It’s also useful to hold a dialogue in the field where you can see directly what has been done."

GOOD NEWS FOR THE TROUT? One of the first stops is the Guggavass River, which is dry as a result of the development of Øvre Russåga power plant. Due to rain and inflows from streams, there is still water in the river but the rate of water flow is greatly reduced from its original levels. The reduced flow affects both the aesthetic experience and the conditions for fish in the river.

"We implemented measures here in 2001, long before there was any order imposed to do so," says Grane. He shows how Statkraft has built artificial pools and thresholds in the river to optimize the reduced flow.

"We’ve achieved good water flow in a narrower river, and the measures have had a positive and lasting effect. They benefit both the trout in the river and people’s enjoyment of nature."

INTERMUNICIPAL WORKING GROUP The municipalities of Hemnes, Hattfjelldal and Grane set up a joint working group early on, which has gathered input and requirements in connection with the revision of terms. One such requirement is a minimum summer water level in Lake Røssvatnet and the most stable water level possible throughout the summer.

"Varying water levels in the reservoir affect people’s experience of nature and create different types of challenges in using the lake," explains Håkon Økland, senior advisor in Hemnes Municipality and head of the working group.

"Depending on precipitation and power production levels, the water level can vary by many metres, and this creates practical problems. Launching boats can be challenging at low water levels, and reefs can appear in areas where there’s no problem under normal conditions."

Statkraft has tried to mark some of the reefs but the problem is that the ice shears off the markers. Økland believes the reefs need to be marked on GPS as well.

PLUS AND MINUS Interventions in nature can occasionally have surprisingly positive results. Between Øvre and Nedre Russåga power plants, 5,000 decares of marsh and woodland were inundated when the plants were built. "Lake Stormyrvannsget has become a popular nesting area for a variety of bird species," explains Bjørn Grane. "The good feeding conditions and stable water levels contribute to making this one of the finest wetland areas in Nordland County."

There is broad consensus that this is good, but Håkon Økland and the working group are not entirely satisfied. They want more water in the river downstream from the lake to prevent the river from becoming overgrown and the fish from freezing. They believe Statkraft can afford this.

"Since the power plant was built, rainfall has increased by about three per cent in this part of Norway," says Økland. "We believe that some of this increased water volume can be used to ensure a minimum water flow in the rivers. All that water doesn’t have to go to increased power generation."

He points out that requirements for minimum water flow in the rivers are mandatory for new licences today and it should also be possible to impose a minimum water flow when the terms of old licences are revised.

Pål Frøde Solbakken agrees. He is a member of the board of the local chapter of Friends of the Earth Norway. "Statkraft does a good job of power generation but I don’t feel that protection of nature and the environment is a priority. Therefore, this type of revision of terms is necessary so that the interests of the general public are voiced."

POLITICAL CONCERN The inspection concludes at Korgen, where the water from Nedre Russåga power plant discharges. Work on upgrading the plant’s intakes, station halls and the generating unit was recently completed. Statkraft believes these upgrades increase production and at the same time provide better growing conditions for salmon and sea trout. Among other things, the discharge from the new power plant was moved further upstream, which provides a larger and more even water flow in a longer stretch of the river.

Most participants in the inspection agree that these are good measures, but there is some concern about the long-term value of Statkraft’s self-imposed commitments, for example, to maintain stable water levels in some of the reservoirs.

Håkon Økland from the intermunicipal working group is among those who believe that Statkraft’s self-imposed restrictions...
must be formalised to a greater extent. “Who knows what the future will bring? After all, this is a licence for the next 30 years,” Økland says.

LOST PRODUCTION
Jarl Koksvik, senior adviser in the Environment Directorate, definitely shares this view. “The Environment Directorate has a responsibility for the management of salmon, sea trout and arctic char,” says Koksvik. “In Røssåga, we’re committed to ensuring the minimum rate of water flow and a power plant operation with the least possible impact on the fish. Statkraft’s self-imposed measures are good, but they should be formalised in the revised licence terms. This avoids uncertainty about how any changes in the ownership model or to requirements for operating the power plant will affect conditions in the river.”

For Statkraft there is much at stake. The company has invested NOK 1.8 billion in a new power station and in rehabilitating the old one in Nedre Røssåga.

“Changes to the licence terms will be crucial to how Statkraft can operate the new power plant and thereby the amount of power we can produce,” says Thomas Riddervold, project manager for the revision of terms process in Statkraft. “We believe formal reservoir restrictions will limit the flexibility of power generation. This can reduce the production of renewable power.”

THE KING DECIDES
The NVE representatives will not give any hints about their conclusions, but Senior Engineer Ragnhild Stokker, leader of the Røssåga revision of terms process in NVE, thinks the inspection was useful. “We’ve received an impression of the most relevant sites in the area, and the inspection enabled us to hear the concerns of the various stakeholders,” Stokker says. “An inspection always gives a more complete picture of what has emerged during the consultation process.”

Carsten Jensen from NVE thanks the participants and explains the next steps in the process: “We have already received written consultation statements, but after the inspection there is an opportunity to submit any new input within 14 days. Then we will complete our recommendation to the Ministry of Petroleum and Energy. In the end, it is the King in Council who makes the final decision.”

Laws and practices around hydropower licences vary widely from country to country, and revision of terms occurs primarily in countries where the licences are perpetual.

In countries with fixed-term licences (e.g. Chile, Nepal, and Albania), revision of terms is uncommon.

In some countries, like Turkey and Albania, irrigation has higher priority than hydropower production. This means that the hydropower plant can be ordered to increase the rate of water flow beyond the minimum level when necessary.

In Germany, most existing hydropower plants have licences for 100 years. Some expire in 2052, others in 2071. The Dörverden power plant is an exception, with a licence that expires in 2025. When existing licences expire, German authorities may grant new licences with terms of 20 or 30 years.

Licences and revision of terms in other countries

Architecture. Good architecture and natural building materials mean that the building above the new intake blends into the landscape. The surrounding area will be planted and restored to its original state before construction work began.
A windblown landscape in Fosen in central Norway, more than 100 construction workers are clearing forests, building roads and – literally – laying the foundation for Europe’s largest land-based wind power project. More than 22,000 kilometres away in the Devoll Valley of Albania work is in full swing to build the Moglice dam.

Up until 1 March, these two major construction projects were organised in their own separate business areas. Now the newly created Project Delivery unit is responsible for both these projects being implemented properly.

CRITICAL EXPERTISE

“We haven’t always succeeded 100 per cent in carrying out major projects in Statkraft,” says Haakon Alfstad who heads the new unit. “A little too often, budget, progress or delivery quality has suffered.”

He explains: “There are many reasons for this. One of them is likely that the best resources haven’t been gathered in one place to complete the relevant tasks. To be top of the class requires a certain volume of projects and a solid base of experience.”

The experienced project engineer has worked on projects since he joined Statkraft in 1987 on the construction of Svartisen hydropower plant. He believes the time was right to create a separate unit for projects. “Market conditions are very demanding,” he says. “To be profitable we must deliver top quality at every step, regarding both project and technical deliverables. It goes without saying that we have more impact and become more efficient when we concentrate our expertise rather than try to maintain several parallel professional environments.”

ENTHUSIASM

The differences between building wind power, hydropower and district heating are minor compared to the similarities of managing major projects. The unit will therefore handle all types of projects with budgets of NOK 300 million or more.

“I haven’t experienced any objections to the reorganisation in the business areas or amongst the employees who will now acquire new colleagues and tasks,” says Alfstad. “On the contrary, there is enthusiasm and eagerness to get started and get to know each other.”

New work processes will first be noticeable on future projects. The reorganisation will have minimal impact on the two major ongoing projects, Fosen and Moglice.
These projects have come a long way,” says Alfstad. “You could compare it with a ski jumper who has left the jump and is in mid-air. It would be bad timing to introduce new procedures now. Our role will be to support the existing plans as best we can and help the projects complete properly. For a unit like this, it’s always the ongoing projects that are most important. So Fosen and Moglice will be absolutely our first priority in the future.”

CHALLENGES

Alfstad chose Albania as the destination for the unit’s first management meeting in May.

“The Moglice project will report to a new management team and is in a challenging phase,” he says. “Therefore, it was useful to go down and get to know both the country organisation in Tirana and the project organisation.”

Twelve hundred people work on the project today, in a landscape that constantly tests the project team.

“Some of the work takes place in areas with rock types significantly different from those found in Scandinavia, so we’ve engaged external, international expertise,” he says, adding that a huge 6.2-metre-wide tunnel boring machine (TBM) is cutting through the mountain, while Europe’s tallest asphalt core dam is currently being built.

“We place a core of asphalt concrete no thicker than 1.2 metres at the bottom and narrower at the top,” Alfstad explains. “Then rock fill is placed on each side of the core to keep the water in place. Each of these operations is demanding. The goal now is to maintain the progress.”

PROUD HISTORY

Through more than 100 years of power development, Statkraft has solved challenges and often been a pioneer, from the first construction projects in the early 1900s – like Glomfjord and Nore, breakthroughs for Norway as an industrial nation – to the major projects in the 1960s, such as the Tokke power plants. Its vast size made Tokke a symbol of the engineering feats Norway could achieve. The 2000s saw the first international hydropower projects and the construction of wind power on land and at sea.

“Project implementation is incredibly exciting,” says Alfstad. “It’s satisfying to be involved in realising power plants that are very important to local communities or industry and help to increase the production of renewable energy.”

Alfstad himself has a varied project background, has worked with hydropower and Norwegian wind farms, and was involved in negotiating the acquisition of the Sheringham Shoal offshore wind farm in the UK. He also worked on the development of the gas-fired power plants Knapsack 1 and Herdecke in Germany and was already responsible for the construction of Fosen when the new unit was created.

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FACTS MOGLICE

MW installed capacity

ON LOOKOUT FOR IDEAS

Despite the fact that no new development projects have been approved recently, Alfstad is not afraid of becoming unemployed.

“With Moglice and Fosen, we have a demanding project portfolio until 2020,” he says. “Fosen is in fact six wind farms which are being built in a coordinated programme over five years. At the same time Statkraft is on the lookout for new project ideas.”

The new unit will primarily work on projects where a principal investment decision has been made.

“In the early stages, the project owners, meaning the business areas, are responsible for the project, even though we also assist in this phase,” he adds. “The next major project is likely to be in hydropower in South America or biofuel in Tofte. Statkraft wants to build new profitable projects. A new growth period is coming.”
The world’s tallest asphalt core dam, Albania’s first underground power station and 17 kilometres of tunnels make the Moglice project both exciting and demanding. “We’re constantly facing challenges, but no surprises.”

**MOGLICE**

**REPORT FROM THE FIELD**

Project Director William Burstrom emphasises this important distinction. “What you don’t want in the operational phase of a project are surprises. You have to expect challenges and problems, but they shouldn’t be of the unexpected variety,” says the experienced project manager.

Almost 70 kilometres southeast of Tirana, Burstrom and the project organisation are in full swing building stage two of the Devoll project. Last autumn the first stage, Banja, was commissioned with an installed capacity of 73 MW. Moglice will have an installed capacity of 183 MW when completed in 2019.

DEEP VALLEY The project is currently in a critical phase of dam construction. The world’s tallest asphalt core dam will be 167.2 metres high. According to the plan the first asphalt layer of the core will be laid in July.

“The valley is very deep and the terrain is steep,” says Burstrom. “On the left side the rock transitions to soil with the accompanying permeability and stability challenges. We have a team of skilled engineers on the case.”

In addition to the dam, Albania’s first underground power station is being built. The power plant will have two Francis turbines which together are expected to produce 440 GWh annually. There are also 11 kilometres of waterways being built, part of 17 kilometres of tunnels in the project. Six of these are being drilled with a Robbins tunnel boring machine (TBM). In March this year the project reached a milestone with the breakthrough of the downstream drive of the headrace tunnel.

SAFETY At its peak the Moglice project has employed 1,500 people, and 85 per cent of the workforce consists of local employees from Albania.

“Both we and the Turkish building contractor carry out extensive HSE training and follow-up,” says Burstrom. “Many of the people working here are not used to working within an HSE structure, and it demands a lot of the organisation.”

In the spring he and the rest of the project members had a visit from the management team in Project Delivery in Statkraft.

“We haven’t noticed head office organisational changes so much, except that I...”

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Experienced. Project director William Burstrom’s days are busy in the Moglice project office.
There are many people working in a project, often with different backgrounds. Communication is vital.

William Burstrom, Project Director

now report to Haakon Allstadb, who has also joined the Project Steering Committee (PSC). The PSC still retains all the original members, so continuity has been ensured," he says, adding: “For us who are out in the field on projects it’s important that the management level above us has the understanding and expertise needed to communicate what are often complex issues within the larger Statkraft organisation, and that we don’t have more points of contact than necessary. Efficiency is crucial in projects.”

TRANSPARENCY William Burstrom joined Statkraft in 2015. Before that the experienced project director worked on hydropower and other types of projects for other Scandinavian companies in countries such as India, Sweden and Colombia.

“One of the strengths of Statkraft is its commitment to openness and transparency,” says Burstrom. “Problems that may arise are raised for discussion, and then it’s easier to solve them. It’s like that direct approach. It makes it easier for both those who have my role and the management one level above.” From Burstrom’s standpoint, free information flow is one of the most important aspects of a well-functioning project organisation.

“William Burstrom, Project Director”

P2P WILL STOP WASTAGE

Purchases of goods and services represent large amounts of money in projects. Procurement routines are being tightened up throughout Statkraft.

Morten Byen, Ole Martin Wold

consider the following situation: a supplier delivers services to a large company and bills a fixed amount every month. One day the supplier is informed that the company no longer needs its services and the cooperation ends. Nevertheless the supplier continues to send invoices every month and the company continues to pay them.

“This happened to us,” says Margit Elisabeth Granheim, head of Procurement Systems & Processes in Statkraft.

WASTAGE In this particular case, the wastage was eventually discovered and the money was refunded. “The example shows nevertheless how easily a business of our size can be invoiced in error or pay too much for goods and services,” says Granheim.

“It may not necessarily be done with bad intentions, but could be the result of poor procedures with us, the supplier or both.” Analyses conducted by the audit sector in Norway indicate that there could be up to five per cent financial wastage in the oil and gas industry. Statkraft and other large companies are probably in the same boat.

“Based on our conservative estimates, Statkraft loses significant amounts each year due to financial wastage,” she says.

TIGHTENING UP In an era of small margins and pressure on the power industry, it is important to turn every stone to cut costs. The P2P project (Procure to Pay) will tighten up procedures throughout Statkraft.

New mobile apps will make it easier to make a requisition, approve a purchase order, confirm receipt and approve an invoice.

Training in new routines and systems will be conducted in 2017.

FACTS | P2P

The P2P (Procure to Pay) project will tighten up procurement procedures throughout Statkraft.

Since the fall of 2015 Burstrom has lived and worked in the Devoll valley of Albania. Many would say that it is far off the beaten track.

“It depends who you ask,” he says. “I have a colleague who lived 18 years in remote areas of India. For him this is almost cosmopolitan, while others think we’re in no man’s land. This is all part of project life. Personally I enjoy myself here in the heart of Europe with both Titana and Macedonia within easy reach for day trips. When you work hard on a project, it’s important to get away on your free time to recharge and relax. I also like to go bike riding in the local area after my working ends.”

It is a good thing the project director enjoys his work because the Moglice project has a year and a half to go. The reservoir will start filling with water in the autumn of 2018 and the power plant will be commissioned in the first quarter of 2019.

“It’s easier to solve them. I like that direct approach, when issues are raised for discussion, and then it’s easier to solve them. It’s like that direct approach. It makes it easier for both those who have my role and the management one level above.” From Burstrom’s standpoint, free information flow is one of the most important aspects of a well-functioning project organisation.

“William Burstrom, Project Director”

Positioned between Chile in the south to northern Norway in the north, Statkraft enters into framework agreements with suppliers in a number of areas. Procurement outside the framework agreements can be expensive. “It’s not hard to understand why someone who needs a new hammer or mobile phone prefers to go to the nearest store to buy it, but such a practice isn’t cost-effective for us,” says Granheim.

“First, it’s likely that the price is lower under a large framework agreement. In addition, such small purchases involve time-consuming and thus costly handling of invoices.”

CHANGING ATTITUDE Inadequate specification and planning of assignments is another potential source of additional expenses. “If the assignment description is not complete and accurate enough, it will be difficult for suppliers to price the job properly,” she says. “This can lead to unforeseen expenses, large additional invoices and inadequate cost control.”

Granheim believes that a change of attitude is needed. “With new procedures and more user friendly systems, we will manage to significantly reduce financial wastage in Statkraft. Wastage undermines not only the company but also the security of every employee.”

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With a new, centralised organisation, the Project Management Office (PMO) has strengthened its role and mandate. The role of the office is to support all units involved in investment projects in Statkraft, including construction and modernisation.

"To best gain experience across projects, we need a unified and effective system, or project model," says Elly Karlsen, new head of the PMO. "In this way we achieve a consistent method to conduct the projects. We avoid maintaining parallel systems and roles that would increase costs, and we get a more efficient process for sharing experience and improving results."

QUALITY ASSURANCE In May, the PMO started working in the new Project Delivery unit. "It’s important for us to be close to those who are responsible for delivering the largest projects during the implementation phase," says Karlsen. "We are five people with backgrounds from different business areas, including the previous PMO. This gives a good mix of continuity and perhaps new perspectives."

She makes it clear that the unit is not starting from scratch.

"We are working to harmonise and adapt the systems we have and we are developing a platform that will apply to all projects. There won’t be any revolutionary change, but even more emphasis will be placed on quality assurance, and the platform will be easier to understand and use," she says, adding: "This means, among other things, that the project process in Statkraft will be linked to the decision-making process. This will set clearer requirements for deliverables in the different phases of a project."

FOR THE FUTURE The work the PMO has started will have a limited impact on ongoing projects.

"We will not disturb projects already in the implementation phase but will assist them as needed, while working on introducing an improved project management system," says Karlsen.

How can one and the same project management system work for so many different projects such as the ones Statkraft has in its portfolio?

"Of course we take into consideration that projects differ in size and complexity," says Karlsen. "What is common to all projects must be uniform, while at the same time the system must be flexible in terms of technology, size and complexity."

She explains: ‘Everything we do must ensure that the projects deliver on time, on budget and on quality while also meeting requirements for health, safety and environment. Here we have a potential for improvement in Statkraft. Being involved in developing us further in this area is something that really motivates me."

**THE HUB**

A good project management system is essential for achieving quality at every step. The PMO is every project’s facilitator and supporter.

> Jenny Bull Tuhus  Ole Martin Wold

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**FACTS**

**PMO (PROJECT MANAGEMENT OFFICE)**

- Responsible for project management, quality assurance and benchmarking of projects, as well as project management training in Statkraft.
- Group function moving from International Hydropower to the newly created Project Delivery unit in Windpower, District Heating and Projects.

**FACTS**

Quality assurance. Elly Karlsen is new head of the PMO (Project Management Office). One of the most important tasks for her and the PMO is to strengthen quality assurance in projects.
Competing for customers

During his childhood, he liked to run faster than the other boys on the street. Now, the head of Fortum is more concerned with gaining market share than seconds. Recently, Pekka Lundmark took a bite of the Norwegian power market.

AGE: 53 yr.  POSITION: CEO of Fortum Corporation.  EDUCATION: Master’s degree in engineering from Helsinki University of Technology, major in information technology and international marketing.  MANAGEMENT EXPERIENCE: Previously, CEO of Nokia, CEO of Hackmann and leading partner in Startupfactory. Also, held various management positions in Nokia.  FAMILY: Married, three children.

The Norwegian market will be especially important for Fortum and its new ideas, digital products and services.

During several intense days in April, the Finnish energy group Fortum became a household name in Norway. An agreement with the City of Oslo with respect to the acquisition of Hafslund Marked, changed the company’s relatively anonymous existence. When Statkraft gathered the leaders of the Nordic power companies at the Statkraft Oslo conference in May, CEO Pekka Lundmark was the man of the hour. We asked him about the competitive situation, market outlook and of course, the Hafslund agreement.

What are you particularly pleased with about the acquisition?

“The City of Oslo and Fortum have been co-owners in Hafslund for many years. Now, we’ve decided to create new partnerships in areas where we can combine our expertise to drive innovation and development. I’m very satisfied that together we will work to enable individual consumers and businesses to make more climate-friendly choices.”

Why was it so important to acquire Hafslund’s retail business?

“With Hafslund Markets, Fortum will become the largest electricity retail company in the Nordic region, almost doubling our customer base to 2.4 million. This means achieving economies of scale, which will be particularly beneficial for the development of innovative services and solutions for customers. We want to engage our customers and be a driver in the transition towards a cleaner world.”

The talk in the industry is that this is the year of the customer. Now the customer is in charge. Is this a change that motivates Fortum?

“Yes of course. Norwegian consumers are widely recognised as early adopters of new technology and solutions, and the Norwegian market will be especially important for Fortum and its new ideas, digital products and services. Our Charge & Drive concept is already a leading provider of electric vehicle charging systems in Norway, and its success here is paving the way for further international growth. We consider Norway as part of our Nordic home market. We have a long-term commitment in Norway and an ambition to grow.”

“Both Hafslund and Fortum are organisations that want to build strong, customer-oriented businesses with extensive offerings of new digital services. This work will accelerate when we can join forces. When the agreed transaction is completed later this year, we will gradually roll out and offer new products and solutions. Our ambition is to enable individual consumers and businesses to make more climate-friendly choices, and at the same time manage their energy consumption and costs.”

Is Fortum planning more acquisitions in Norway?

“The energy sector in Europe is definitively consolidating. We have many plans in...
**POWERTALK**

**Different countries but for obvious reasons I can’t disclose these.**

How would you describe the competitive relationship between the major energy companies in the Nordic region?

"There is healthy competition in the Nordic market. There are many operators in the wholesale and retail markets, and that’s good. I want a well-functioning market. That is what gives customers confidence in our business."

Is Statkraft first and foremost a competitor or could we also be partners? If so, how?

"Statkraft is of course a competitor. But that doesn’t mean that we don’t have any contact points where we can cooperate. For example, we work together to provide a cleaner message and have more impact when it comes to influencing EU decisions in Brussels. Another example is that we share experience about increased safety, which I consider to be a common issue for different countries but for obvious reasons I can’t disclose these.

**Fortum**

- Finnish energy company with operations in the Nordic and Baltic countries, Poland and Russia.
- Produces and sells electricity and heat from hydropower, district heating, and nuclear, solar, wind and wave power.
- Is second-largest owner in Halti Holding ASA.

The company received wide attention in Norway in April when the City of Oslo and Fortum agreed to restructuring Halti’s ownership and delist the company from the stock exchange. The municipality becomes owner of power generation and the power grid, while Fortum takes over power sales. The agreement is subject to approval by Oslo City Council.

The energy industry is absolutely central to providing solutions to challenges caused by two major megatrends, climate change and urbanisation. We must find solutions that answer the world’s growing need for energy and at the same time dramatically reduce CO₂ emissions. We must also find sustainable solutions to challenges that rapidly growing urban areas face such as increasing pollution from heating, cooling and traffic as well as growing amounts of waste. So for young people who want to make a positive change in the world, the energy industry is the right place to be!

Thus, I think a Nordic market for end users is important.

What will the energy sector and energy market look like in 2027?

"There are many developments that will affect the power markets in the coming decade. The planned German shutdown of nuclear power will create a need for additional power capacity. At the same time, the EU commission has an ambition to tighten up the emission trading scheme and increase the price of carbon emissions to meet the climate targets. In the Nordic region, the transmission capacity to northern Europe will increase substantially, which enables using flexible Nordic hydro-power production to support a German power market more reliant on renewables. This could result in increasing price volatility also here in the Nordic region."

"As a leader, what are you particularly good at?"

"I think one of my best qualities as a leader is my ability to inspire and motivate others. For most people the greatest motivation comes through personal involvement – the feeling of doing something important, of being appreciated, of making a difference. In a large organisation it takes time to reach everyone personally. But I always encourage other members of the management team to foster personal engagement throughout the company." I see our industry worth considering for young people starting a career.

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**Recharging**

Sports have always been important to me. During my childhood I was particularly fond of running and had a highly developed competitive instinct, I’m still running. In addition, I relax with skiing in the winter, and badminton and golf during the summer months.

**Facts**

**Centre of Expertise for Energy Management**

The energy management unit in Market Operations and IT is responsible for the centre of expertise for energy management.

The centre will be a focal point for knowledge sharing and will generate expertise in hydrology, market analysis and production optimisation. The centre is committed to cooperating with colleagues all over the world with the aim of creating more added value.

**Adding more value in Chile**

Cooperation with Statkraft’s new centre of expertise for energy management has improved the financial performance of the Rucatayo power plant in southern Chile.

Experience shows that even relatively small power plants can achieve large gains by optimising production. For example, when Statkraft in Chile was asked to implement Statkraft’s operating model last year, they contacted the new centre of expertise for energy management in Oslo. It was quickly established that Rucatayo, with an installed capacity of 59 MW, had the potential to increase profitability.

**Increased Profitability**

With advice from the centre of expertise, Statkraft in Chile managed to identify several improvements in energy management at the power plant. This resulted in better processes, better division of labour and better utilisation of commercial opportunities. All in all, the measures have strengthened the financial performance of the hydropower plant by about NOK 2.4 million a year, which is excellent for plants of this size.

"This shows that better energy management can also deliver better results for power plants of moderate size," says Jaime Garcia in market operations in Santiago. Together, with Fredd Kristiansen in power optimisation in Oslo and the operators at the Rucatayo plant, he has been at the forefront of efforts to streamline operations.

"The market team and plant operators have gained an arena for cooperation to optimise production,” says Garcia. “A clearer distribution of responsibilities and tasks, and a strong sense of working towards common goals, laid the foundation for a more commercial mindset. This has led to better decisions and increased profitability.”

**Across Boundaries**

A stilted Tanem, head of the Energy Management unit, thinks there is much to gain from working more closely across disciplines and geographical divisions.

"The Rucatayo example shows that there are gains to be made through cooperation across organisational and geographical boundaries," he says. "Expedition and tools assembled in one place may be useful in other areas of the business."
The idea behind the e-trade project is to hop over the supercomputer part and go directly to the advanced trading level. "Computers are fast," says Wiegandt. They can do many things at once and are systematic, precise and reliable. People are creative and smart—they can propose and carry out new trading strategies, and they know the market so they can determine which algorithm to use in a given situation. By letting machines take care of tedious calculation tasks and having people retain full control of the strategy, it is possible to streamline intraday trading.

Another advantage of automation is that the computer documents every single detail. The processes are more transparent, and it is easier to provide documentation to the authorities who monitor that everything is done properly.

NOTHING TO FEAR During Coding Day, colleagues from various disciplines gather to brainstorm, both those who create automated systems and those who use them on a daily basis.

One of the items on the agenda is the Intraday Algo Trading Game, a game that shows how the different components of a power exchange function. Participants play the roles of the components, and information exchange takes place by each group sending a note to the next component with their decisions.

"We don’t want to just develop a self-driving car and then put the traders behind the wheel," says Wiegandt. "We want them to be involved in deciding how the car should be, so they can better understand how it works."

Studies show that people do not use their entire intellectual potential when sitting in front of a screen with a keyboard and mouse. Maybe it’s an idea to have colour codes on the screen? Perhaps traders use virtual reality goggles and cyber gloves so that they use their whole body and not just the hand that controls the mouse?" Wiegandt emphasises that automation and digitalisation are nothing we should fear.

"Robots will not come and take our jobs," he says. "This is about working in a different way. By using machines for the tasks they do best, we can concentrate even more on what we humans do best."
ANTI-CORRUPTION. All Statkraft employees have been trained in business ethics over the last two years. The courses, which are designed to prevent corruption, train participants in dealing with dilemmas and provide an introduction to international laws and regulations.

There were 4.9 injuries per million working hours recorded in Statkraft in 2016. That was less than the year before, when the figure was 5.9.

Powerful quartet

STATKRAFT CONFERENCE 2017: New opportunities in a Nordic energy shift gathered the leaders of the four power giants in the Nordic region for a debate on the challenges and business opportunities in a Nordic market characterised by power surpluses, rapid technological development and major market changes.

How can you, who are yesterday’s heroes, avoid becoming tomorrow’s losers? was one of the questions posed by debate moderator Bente Engesland, SVP of Corporate Communication in Statkraft, to Magnus Hall from Swedish Vattenfall, Pekka Landmark from Finnish Fortum, Hördur Arnarson from Icelandic Landsvirkjun and Christian Rynning-Tønnesen from Statkraft.

“In the Nordic region, we are experiencing a very positive trend with future-oriented carbon-free power generation, but we need to become more nimble and closer to our customers,” said Hall. “It will be tougher, but more fun, too.”

“I believe in survival of the fittest,” said Rynning-Tønnesen. “If we manage to have effective large-scale operations and test out business models with small groups, then roll out the ones that are successful, I think we can be among the winners in the future.”

See also pages 26 for an interview with Fortum CEO Pekka Landmark.

STATKRAFT STRIVES for a safe working environment and has introduced safety rules that apply to all high-risk activities.

“Experience indicates that there are some activities that account for the majority of serious incidents,” says CEO Christian Rynning-Tønnesen. “Many of these incidents could have been avoided if there were clear rules that were understood and followed. This is the background for the introduction of life-saving rules.”

Safe work basis. I care for my own and others’ safety and wellbeing.

Driving. I drive safely, use the seat belt and stay focused.

Work at height. I use personal fall protection equipment if working at height outside a protective environment.

Lifting operations. I ensure that no one is in the drop zone of a suspended load.

Energised systems. I ensure that energy sources are identified, controlled and isolated.

Heavy mobile equipment. I maintain a safe distance between people and moving equipment.

Ground works. I check that the work area is supported to prevent ground movement and declared safe before entering.

Confined spaces. I ensure that any atmosphere is safe and a stand by person is in place before entering.

NEW COLLECTION

A NEW COLLECTION of workwear has been launched for Statkraft employees in Norway and Sweden. Tranemo Workwear AS is selected as the new supplier of protective clothing, safety shoes and personal protective equipment, and is also providing a separate women’s collection. All the workwear is naturally flame-retardant, in other words no flame-retardant chemicals have been added to the material. Instead, flame retardancy is built into the molecular structure of the fibres. This creates a permanent form of protection that cannot be washed out or worn out. Good news for the environment and personal safety!

Norwegian business must be green, smart and innovative.

PRIME MINISTER ERNA SOLBERG AT THE STATKRAFT CONFERENCE IN MAY 2017

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The rules are mandatory and specify the minimum standard.

Life saving rules

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In the middle of the jungle, Simen Nordre Vogt-Svendsen is responsible for the safe operation of power plants. Powerful flooding, high temperatures and snakes in the facilities are all part of his working day. We asked him about ... ... the work. I work as maintenance manager at two hydropower plants in Laos. Together with my colleagues, I’m responsible for keeping the power plants running. This involves everything from upgrading equipment to maintaining turbines and access roads. I’ve worked for Statkraft in Laos before so I know the area and the operations here. ... inspiration. Challenges inspire me: I’m ambitious and have ideas about how to improve operations in Laos. This motivates me: Also, when I meet colleagues who have a positive attitude to difficult tasks I get inspired. Challenges are also important in my private life. I take part in ultra-running competitions, where we run between 60 and 160 kilometres. I also participated in Expedition Amundsen, a cross-country ski race over the Hardangervidda plateau in Norway. The feeling of having mastered such a challenge is very special. ... the downs. I was working on the project to design and build the new 'Nore power plant. After two years of work the entire project was cancelled, and only absolutely necessary upgrading was approved. This was a disappointment after working so hard on this for a long time. But I learned to reset myself and find new goals. ... the ups. I had a challenging period when I completed my master’s degree at Norway’s University of Science and Technology and at the same time led NTNUI, the university’s sports association with more than 12,000 members. But it was a highpoint in my life. It gave me an incredible sense of accomplishment to make it happen, and I met many of the friends I still have today. ... balance. I’m aware of the importance of maintaining a work-life balance and always make sure I have time for physical fitness. It’s important for me to be outdoors. I’m active in various endurance sports like running and skiing. In Laos it’s climbing and kayaking. Outdoor activities give me a refill of energy and make me more focused at work. ... pure energy. Pure energy covers our energy needs without depleting resources for the future. Making sure that we have an optimum production of pure energy gives my work in Statkraft a deeper meaning. 

SIMEN NORDRE VOGT-SVENDSEN

Position: Maintenance Manager
Where: Theun-Hinboun power plant in Laos (SN Power is part-owner and operator)
Worked in Statkraft since: 2012

Age: 30
Education: MSc in mechanical engineering
Currently: Recently moved to Laos to work on operations and maintenance at Theun-Hinboun

Statkraft has 3,800 employees, and there is always someone changing jobs.

ON THE MOVE

Name: Ayşe Filiz Kolat
Position: Head of Market Operations in Turkey
Country: Turkey
Years in Statkraft: 8

In February, Ayşe Filiz Kolat began as Head of Market Operations in Turkey, with particular responsibility for further developing the company’s market activities in the country. Kolat moved from the position of Assistant Country Manager in Turkey with responsibility for sustainability and business development, as well as compliance with laws and regulations, security and communication.

Name: Henrik Møistad
Position: Head of Financial and Support Functions in Brazil
Country: Brazil
Years in Statkraft: 7.5

Recently, Henrik Møistad moved to Rio de Janeiro in Brazil and the position of Head of Financial and Support Functions in International Markets. Here he is responsible for support functions related to Statkraft’s market activities in Brazil. His previous position was Head of Financial Reporting in the Group’s financial staff function.

Name: Heidi Bruvik Sæther

Current Affairs

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Current Affairs

Statkraft has 3,800 employees, and there is always someone changing jobs.
The central nervous system of the power station

When a fault occurs in an electrical installation, even seconds are a long time. This is why protection relays are so important. But what are they actually?

Protection, or protection relays, are found everywhere in technical facilities. If you are sitting in your living room one evening, and suddenly the lights blink a little, or the light dims slightly before returning to normal, then you know that a protection relay has been activated.

“When the lights dim it’s because there’s a fault somewhere, for example, a tree has fallen across a power line,” says Ronny Goin, senior specialist in protection relay systems in Statkraft. “When the light comes back, the protection relay has disconnected the fault and isolated it from the rest of the power grid.”

“If it’s a complete blackout however, it could mean that you are within the isolated area or that there’s a fault with the protection, so that a larger area than necessary is disconnected,” says Goin.

Protection in Power Plants

The fuses and ground fault interrupters found in every home are simple types of protection. In a power plant, protection relays are more advanced.

“When the first generators arrived at the end of the 1800s and the world was electrified, fuses were used, but a need quickly arose for more sophisticated equipment,” says Goin. “The fuses blew when there were faults other places, and there were many types of faults a fuse couldn’t detect. Today protection relays are computerised, and digitised measurements are processed by programs to assess whether disconnection should occur. The protection relays are programmed from PCs, and it is possible to monitor them from a PC in the office, so we can easily find out exactly where the fault has occurred.”

“Simply put, a protection relay is a device that detects faults and then carries out a disconnection,” explains Goin. “This limits the damage so that we avoid a total breakdown, and at the same time increases personal safety.”

Protection in Statkraft

“A protection relay measures electrical parameters. In a fault situation, the protection relay detects the fault, instructs the circuit breaker to disconnect, and shuts off the waterway. The operating centre also receives a message about what has happened.”

“When the values reach dangerous levels, the protection relay sends a signal to a circuit breaker that makes the disconnection,” Goin explains. “In a power plant, the mechanical energy coming from the water, and the electrical energy coming from the generator or power grid can be switched off.”

SEVERAL TYPES OF PROTECTION

Many different types of faults can occur in a facility.

“We work mostly with electrical faults that may occur in generators and transformers,” says Goin. “Faults can occur from external stresses such as lightning strikes in the power grid or material failure in the individual components. It isn’t possible to build in enough capacity to handle all types of stresses. Therefore, we rely on protection relays to minimise the damage.”

In addition to electrical protection, there are other types of protection.

“Mechanical protection can include vibration protection that detects a mechanical failure in a turbine or generator, for example if a part comes loose,” says Goin. “Then sensors register abnormal movement and give a signal to a circuit breaker that disconnects the unit, and at the same time the waterway is closed off. For oil filled transformers there are gas detectors and temperature gauges that will detect faults and ensure disconnection.”

ALL IN ONE BOX

“Many react to the concept of a protection relay because it can be easily misunderstood,” explains senior specialist Goin. “A relay is an electrical component that acts as a switch, while protection is simply protection. In other words, a relay that protects against damage.”

In Statkraft’s power plants, several protection units are assembled in a single box. “On one generator we have maybe ten different protection units together in one place, in what we call a protection system,” says Goin. “Our group develops technical standards that define what kind of protection we should have in Statkraft to satisfy government regulations and ensure the safety of both equipment and people. We decide what kind of values should be entered into the protection units.”

WHAT IS A RELAY?

A relay is an electrical component that acts as a switch that can break contacts in circuits with high power levels. Relays were first used around 1840 by Samuel F. B. Morse to amplify telegraph signals.
OLD BJØLVO POWER PLANT

The hundred-year-old that disappeared

Building a hydropower plant is an extensive and demanding process, and demolishing one is no laughing matter either.

Jenny Bull Tuhus
Eivind Senneset
H

gh above Hardangerfjord, three industrial mechanics are in full swing dismantling one of Europe’s steepest penstocks. Working on a 62-degree slope, well secured with ropes and pulleys, they are hard at work with cutting torches on the 100-year-old structure. “It’s demanding work”, says Statkraft’s project manager Rolf Yngvar Jenssen. “The terrain is steep and there are large and heavy components that need dismantling and removal. Without roads, it’s impossible to move a crane up there, so most of the work is done by hand.” His task is to ensure a safe and proper demolition with minimal noise and inconvenience for the residents of Ålvik.

MOTIVATIONAL HSE PRIZE
At the entrance to the construction site there is a large banner with the following text: “We are demolishing Old Bjølvo. Our goal is zero injuries. Our ambition is Statkraft’s HSE award.”

“This is high-risk work, so HSE has been a priority from the beginning”, says Jenssen, and refers all the way back to the choice of project organisation. “It has been crucial for us as the property developer to find a building contractor that is an expert in access technology and industrial mechanics, and we chose AF Gruppen,” says Jenssen. “A turnkey solution was a conscious choice with regard to health, safety and the environment. It’s important that the experts are also those responsible for planning the implementation. At the same time it’s a fixed-price contract – and this can also be a challenge for safety.”

The building contractor has to make decisions, and there will always be a risk that shortcuts might be taken. Thus, we as the property developer have been on site at 6:55 every single day, and together with the contractor, have maintained a focus on HSE. We conduct safety inspections both together and separately. It has also been important for the project that Statkraft’s CEO has put HSE high on the agenda. “At the same time the contract was signed, Christian Rynning-Tønnesen introduced a special HSE award.” says Jenssen. “This inspired us to set ambitious goals and develop several measures to strengthen HSE efforts.”

MAKING IT PUBLIC
Jenssen believes it is important to announce their ambitions, it builds commitment.

“Everyone has an interest in working injury-free. Making it public in the local community put some pressure on us, and that’s healthy.”

So far the project has avoided serious injuries, but Jenssen is still not satisfied. “We had two injuries requiring medical attention,” he says. “They were minor injuries and we are happy that they weren’t serious. But they could have, and should have, been avoided. Both incidents resulted from inadequate use of the correct protective equipment.”

LONG HISTORY
But it’s not just the physical conditions that have made it difficult to demolish Old Bjølvo power plant in Ålvik, Norway. From 2006, when the demolition order came from the Norwegian Water Resources and Energy Directorate (NVE), nine years would go by before work could begin.

“To understand why this has taken so long, we almost need to start at the beginning,” explains Vidar Riber, Statkraft’s power plant manager in Hardanger. Old Bjølvo power plant from 1918 is more than a series of technical installations. It represents a piece of Norwegian industrial history and the livelihood of the small community of Ålvik. The power from the mighty Bjølvefossen waterfall, the smelter provided badly needed jobs in the village. People flocked to Ålvik. Roads, homes, a school and a community centre were built. The power station itself, designed by architect Thorvald Astrup (1875-1940), stood as a symbol of the emergence of modern Ålvik for nearly one hundred years. No wonder that there was a reaction when the demolition order came.

TUG OF WAR
When Statkraft took over Old Bjølvo in 1996, as a result of the principle of reversion to state ownership laws, we considered all options, including continuing to operate the plant,” says Riber. “But the maintenance

GLOSSARY

TURNKEY SOLUTION
A building or construction project where the building contractor is responsible for both engineering design and implementation.

REVERSION TO STATE OWNERSHIP LAWS
In 1909, the Storting (the Norwegian parliament) passed laws aimed at preventing foreigners from buying Norwegian power resources. The principle of reversion to state ownership would ensure that privately-owned power plants reverted to state ownership after 60 years.
CURRENT AFFAIRS
OLD BJØLVO POWER PLANT

“We were open to proposals for new activities in Bjølvo for its historical value,” says Riber. “We decided that Old Bjølvo should be comprehensively documented using photography, film and text, and then demolished.”

In April 2000, Statkraft received a licence for the New Bjølvo power plant. The licence included permission to build a new waterway. Four years later, the new power plant opened with an installed capacity of 98 MW.

“Many people wanted to preserve Old Bjølvo for its historical value,” says Riber. “We were open to proposals for new activities in the old power station and the upper guard house, but the initiatives lacked funding.”

Statkraft had to follow the demolition order from NVE until the county council, municipality with NOK 800 000 to put the building waste from the power station.

The demolition project has a budget of NOK 67 million. In addition to the stated HSE goal, the intention is to recycle as much of the building waste from the old power station.

“Bjølvo Municipality has been creative and operations in Southern Chile. Statkraft currently operates Rucatayo run-of-river hydropower plant. Since 2004, SN Power has owned 50 per cent of Rucatayo hydropower plant, La Confluencia and La Higuera. In 2014, Statkraft took over SN Power’s shareholding and began operating in the country as Statkraft Chile. In 2015, Statkraft acquired Empresa Eléctrica Pihuela, a company with developments and operations in Southern Chile. Statkraft Chile currently operates Rucatayo, a run-of-river hydropower plant (55 MW) in the Pihuela River, and is also involved in the Los Lagos greenfield project (52.2 MW) and Osorno (48.5 MW) in the same river system.

The energy market in Chile is dominated by private companies. Fossil fuels account for 60 per cent of energy production, hydropower for 30 per cent, wind power for 4.8 per cent and solar energy for 4.8 per cent. The government’s target is 60 per cent renewable energy by 2035 and at least 70 per cent by 2050. There has been strong growth in renewable energy production in recent years and conditions are excellent for continued growth. The country has large hydropower resources in addition to good conditions for wind, solar, geothermal and ocean energy.

NEW LANDMARKS
Project Manager Jenssen, who was first assigned as Statkraft’s Health, Safety and Environment (HSE) coordinator for the initially planned demolition in 2006, is pleased a solution is decided.

“The plant deteriorated quickly after closing the doors in 2004,” he says. “It was sad to see how the once fantastic facility became overgrown. Mildew crept up the walls and nature was on its way to reclaiming the area.”

The demolition project has provided the documentation of Old Bjølvo power plant. The demolition project has received a temporary preservation order in 2014, “Kvam Municipality has been creative and has accepted 400 metres of penstock, and track from the cable car system,” says Jenssen. “This will be used as flower pots, curbs and to mark walkways. The demolition project has provided the documentation of Old Bjølvo power plant.

“The demolition project will start. Demolition project continues.”

THE LIFE CYCLE OF A POWER PLANT

MILESTONES OF BJØLVO

1894: Contract signed for the sale of waterfall rights in Ålvik.

1906: Minor construction work on the mountain begins (at the dam).

1913: Construction work proceeds at full speed before the war.

1915: The starting issues A/S Bjølvehusa with a licence. The licence for the New Bjølvo power plant.

1916: Major construction work begins.

1918: Bjølvo power plant is commissioned along with the smaller to produce castable, and later ferroalloy.

1919: Ruptures in penstock as a result of temperature stress.

1936: Penstock 2 and generating unit 4 in the power plant are commissioned.

1940: Subtage and ruptures in the penstock.

1941: Generating unit 5 becomes operational.

2004: New Bjølvo power plant is commissioned and the old one closes its doors.

2006: Cable car system is shut down.

2009: County conservator in Hordaland County issues a temporary preservation order.

2010: Directorate for Cultural Heritage lifts the temporary preservation order.


2015: Demolition project starts.

2017: Demolition project continues.

CHILE

DID YOU KNOW

Chile ranks seventh in the US Department of Commerce’s list of top renewable energy markets. The 2016 edition of the IEA Renewable Energy Top Markets Report status that few countries have as much potential for renewable energy as Chile.

- THREE AS LONG AS NORWAY: Chile is 4,270 kilometers long, but has an average width of only 177 kilometers.

- THE DRIEST: Desert on Earth is the Atacama in Chile. The desert has one of the world’s highest levels of solar radiation and is attractive for solar power.

- WINES are an important export product for Chile. The signature grape is Carmenere which came originally from the Bordeaux region in France.

- THE ELEVENTH OF SEPTEMBER has been a dark day in Chile ever since President Salvador Allende was deposed by a military coup in 1973. The date will always be remembered as the day when the presidential palace in Santiago was bombed and attacked.

SOURCE: WIKIPEDIA, INL, VIMMELSETKRISTAL

CHILE

POPULATION: 18 million
CAPITAL: Santiago
SYSTEM OF GOVERNMENT: Democratic republic
PRIME MINISTER: Michelle Bachelet
LANGUAGE: Spanish

THE ENERGY MARKET

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THE CONCLUSION IS CLEAR: DATA CENTRES CAN BE A MILLION DOLLAR STORE FOR NORWAY! DOWNLOAD THE REPORT. @statkraft @menonBE @EnergiNorge

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