

No 1.1 / 2023

Luleå INDUSTRIAL PARK

A MAGAZINE FROM
LULEÅ MUNICIPALITY



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THE GREEN INDUSTRIAL REVOLUTION IS HAPPENING HERE

» We can
really help
to save the
world «



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LULEÅ INDUSTRIAL PARK MAGAZINE

PUBLISHER: Robert Eriksson, Luleå Industrial Park. EDITOR: Ronny Olovsson, Vinter. GRAPHIC DESIGN: Peter Kemi, Vinter. PRINTER: Lule Grafiska.

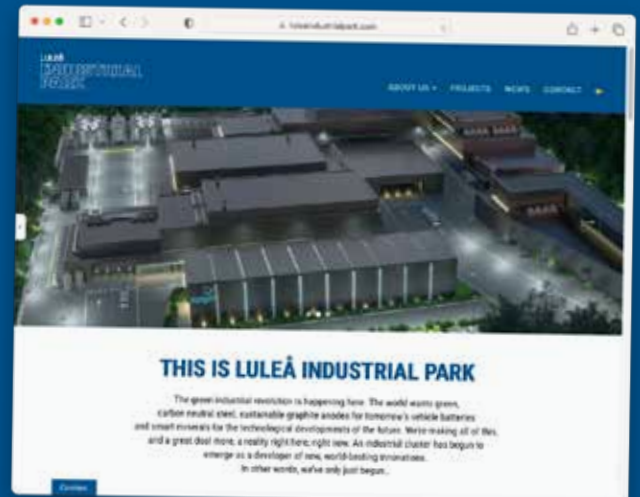


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New website tells the story of Luleå Industrial Park

If you want to find out more about what is happening at Luleå Industrial Park, visit our new website.

www.luleaindustripark.com



IN COLLABORATION WITH:



» THERE ARE FEW PLACES IN THE WORLD SO WELL PLACED FOR A GREEN TRANSITION AND WITH SUCH GOOD ACCESS TO GREEN ELECTRICITY «

Ursula von der Leyen, president of the EU Commission, Norra Skog, 15 October 2021.



» NORTHERN SWEDEN IS WHERE THINGS ARE GOING TO BE HAPPENING IN THE COMING YEARS «

Erik Hagenrud, business development officer with the Swedish Export Credit Agency, 31 August 2021.

» THERE IS A GOLDEN OPPORTUNITY FOR NORTHERN SWEDEN TO TAKE THE LEAD IN THE INDUSTRIAL REVOLUTION AND BECOME A DRIVER OF GREEN INNOVATIONS THAT CAN BENEFIT ALL OF SWEDEN, AND ULTIMATELY, ALL OF EUROPE «

Ebba Busch (Christian Democrats), Minister of Energy, Business and Industry, Johan Pehrson (The Liberals), Minister of Employment and Integration, and Andreas Carlson (Christian Democrats), Minister of Infrastructure and Housing in Dagens industri, 11th January.

18

million tonnes of carbon dioxide can be saved by the fossil-free steel from SSAB and H2GS.

92%

Talga's natural graphite battery anodes can reduce carbon dioxide emissions by 92 per cent compared to modern synthetic graphite.

» WE AIM TO CHANGE HEAVY INDUSTRIES FROM THE GROUND UP. WE WILL HAVE A DIGITALISED AND MODERN INDUSTRY. WE WILL EMPLOY 1,500 WORKERS AND PRODUCE FIVE MILLION TONNES OF STEEL A YEAR, WHICH IS MORE THAN WE CURRENTLY PRODUCE IN SWEDEN «



Othilia Wimyr, H2GreenSteel, Vårt Luleå, 27 September 2022.

100%

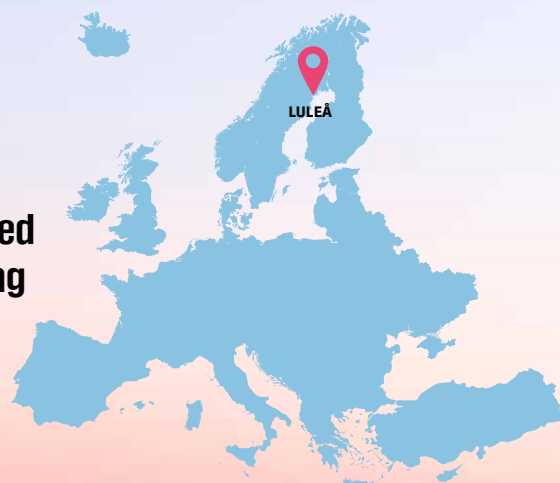
Grupo Fertiberia is to build a new artificial fertiliser factory in Luleå that will be powered by 100-per cent fossil-free energy.

THE EU'S HOTTEST REGION



- ✓ **FOSSIL-FREE POWER.** Hydro and wind power, natural sustainable energy.
- ✓ **CENTRE OF EXCELLENCE.** University and world-class research and education.
- ✓ **SAFE LOCATION.** Stable country with high standards.
- ✓ **GREAT LOGISTICS.** Port, airport, railways, and roads.

The north of Sweden is the hot spot for the green industrial transition. Billions of euros are currently invested in an industrial cluster and connecting infrastructure.



Why have billions of euros been invested in a region in the far north of Europe, just a stone's throw from the Arctic Circle. And why now?

There are a number of crucial reasons. First of all, the mines have been an important historical driving force for over 100 years. The industrial steel plants are one effect of the great amount of minerals in the iron ore fields in the northern part of Sweden. Many other minerals have also spurred additional industrial investments during the last 50 years.

Connected with the industrial evolution, Luleå University of Technology grew rapidly. Today, academic collaborations with regional industries are one important reason for the investments made in Luleå and the nearby cities.

The other major reason is the significant amount of green energy generated by the rivers in Norrbotten and Västerbotten, now complemented by the vast windmill parks built in the region.

Combined with a stable society, good logistics and a region packed with a high level of tech solutions for the industry, all of these factors have led to the formation of a cluster of industrial investments, securing the green transition for the future.

This is why Facebook chose Luleå for their first investment outside the US. It's also why Northvolt established itself in Skellefteå. And it's the reason behind the many other investments happening in this region.

Right here, right now.

Welcome to the future. Maybe your future... ■



[LTU.SE/ACOOLERFUTURE](https://ltu.se/acoolerfuture)

BECOME THE GREEN TRANSITION

JOIN US FOR A COOLER FUTURE

In northern Sweden, billions of euro are currently being invested for a fossil-free future. Luleå University of Technology plays a key role in the green transition. Through groundbreaking research and education, we are creating a better tomorrow.

LULEÅ
UNIVERSITY
OF TECHNOLOGY



» WE CAN REALLY HELP TO SAVE THE WORLD «

Luleå is poised to play a crucial role in saving the world through a world-leading industrial green transition.

The initiatives in new fossil-free industries in Luleå and in the surrounding region will have a significant impact on national climate targets. "If we can use this transition to eliminate close to 80 million tonnes of carbon dioxide per year, it will have a huge significance for Sweden, Europe - in fact, the whole world," confirms Carina Sammeli, Mayor of Luleå from the Swedish Social Democrat Party. »



A bright future lies ahead for Luleå. The billions of euros invested in climate-smart industry are propelling Luleå and the Norrbotten region forward. However, there is still much work to be done for Helén Wiklund Wårell, Director of City Development; Anders Dahl, CEO of the Port of Luleå; Carina Sammeli, Mayor of Luleå municipality from the Swedish Social Democratic Party; Robert Eriksson, Project Manager at Luleå Industrial Park; and Anna Lindh Wikblad, Municipal Director of Luleå municipality.

PHOTO: RONNY OLOVSSON

New ventures by SSAB, H2GS, and LKAB in the manufacture of fossil-free steel position these companies as world leaders in the global race to eliminate carbon dioxide emissions. The use of new production processes, innovative technology, and renewable energy are the keys to their success.

Carina Sammeli, Mayor, Luleå:

“Here in northern Sweden, we are uniquely placed to succeed – so we have to accept our responsibility and do this, here and now. We have the renewable energy, the technical know-how and the unique raw ingredients. We really can help to save the world.”

One component of this initiative is the Luleå Industrial Park, comprising the already established industrial area on Svartön and a new area in Hertsöfältet, connected via a bridge. Work is progressing at a rapid pace to establish a deep-water port with an entirely new capacity to receive large cargo vessels ranging from 55,000 to 160,000 tonnes. The industries’ requirements for new facilities will be met with all-weather terminals and temperature-controlled storage premises, known as the ‘Coils Hotel.’

» HERE IN NORTHERN SWEDEN, WE ARE UNIQUELY PLACED TO SUCCEED – SO WE HAVE TO ACCEPT OUR RESPONSIBILITY AND DO THIS, HERE AND NOW «

Carina Sammeli.

» ONCE COMPLETED, THIS EXPANSION WILL INCREASE OUR CAPACITY FOR GOODS BY A FACTOR OF FOUR, ACTUALLY MAKING US THE SECOND-BIGGEST PORT IN SWEDEN «

Anders Dahl.

Anders Dahl, CEO of Port of Luleå:

“Once completed, this expansion will increase our capacity for goods by a factor of four, actually making us the second-biggest port in Sweden after Gothenburg. The first stage is dredging the channel to a depth of 15 metres, which starts in 2024, the so-called Ore port.”

At Luleå Industrial Park, plans are currently underway for LKAB’s new venture, involving the extraction of rare earth metals and phosphorus. SSAB is also in the planning stages for a new fossil-free steelworks. There are several other new developments, including Talga, which will manufacture battery anodes, and Grupo Fertiberia, which is investing in the construction of a large artificial fertiliser factory. Collectively, these investments amount to a total of €6,2 billion.

The ventures are expected to create 1,500–2,000 new jobs directly within the industry, with additional knock-on effects anticipated to generate even more employment opportunities.

“Right now, we have a unique opportunity to create a new Luleå for future generations – a Luleå with entirely new opportunities for exciting careers and innovative development. It’s an opportunity we do not want to miss out on,” says **Anna Lindh Wikblad, Municipal Director**. Anna is overseeing the social transition work, with a specific focus on addressing the needs of the new industries. This involves the development of new homes and roads, along with the necessary accompanying services.

On Hertsön alone, there are currently plans for a new school, a sports hall and swimming pool, a new residential area of approximately 2,000 homes, and a new industrial area as a part of Luleå Industrial Park.



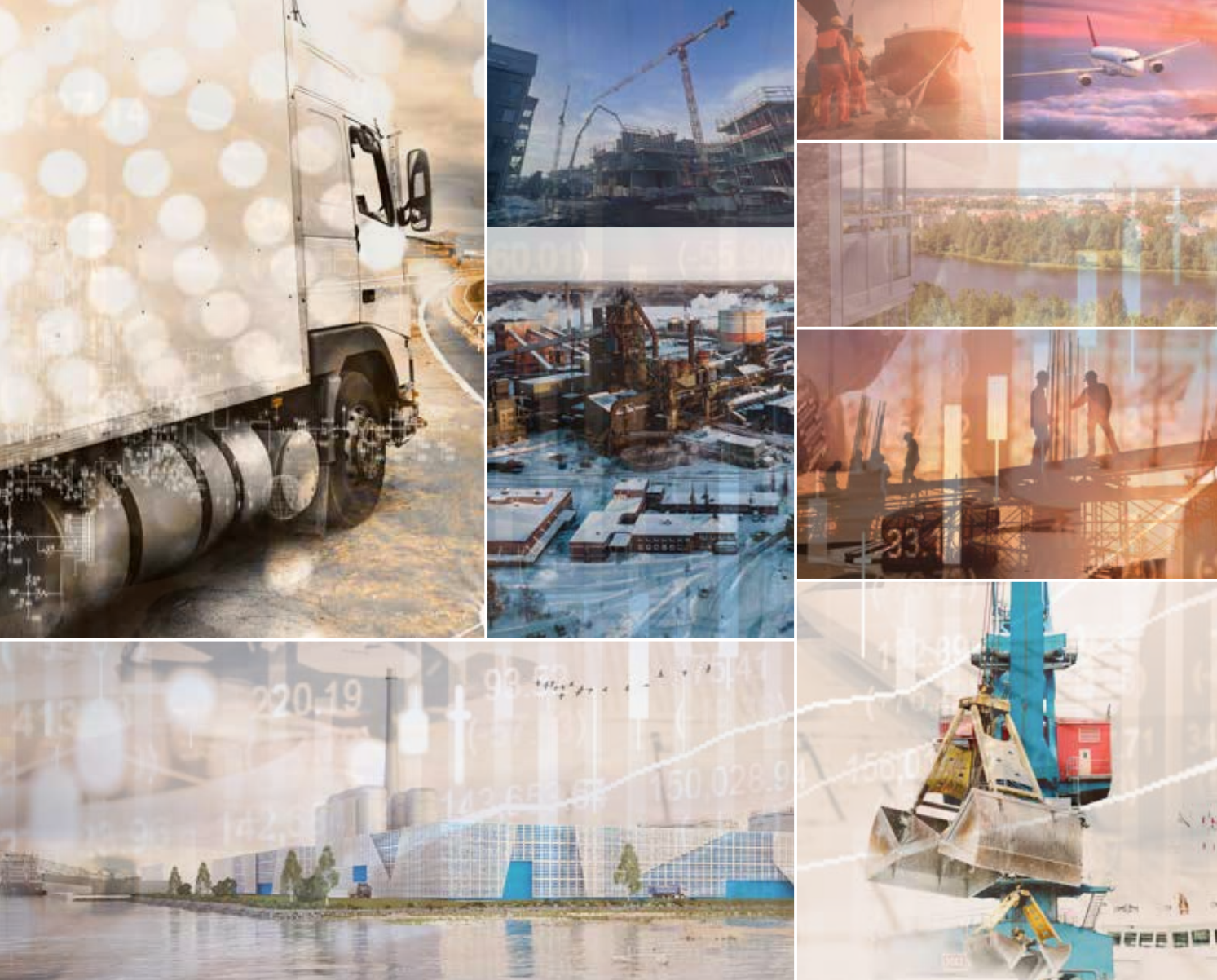
Carina Sammeli.



Anders Dahl.



Robert Eriksson.



The green industrial transition in Luleå is yielding significant effects, not only in Sweden but on a broader scale.

PHOTO: HENRIK STENBERG AND OTHERS

Robert Eriksson, Project Manager for Luleå

Industrial Park, thinks Luleå and the country should take pride in the current developments.

We're at the forefront of the green transition – we're world leaders. Hundreds of billions of euros are being invested in a green industrial revolution here in Norrbotten and Västerbotten. Luleå Industrial Park is the hub for the huge investments currently being made here in the north. Our port is the logistics hub, and the industrial cluster currently taking shape in close collaboration with Luleå University of Technology is creating a 'Silicon Valley' for green technology and a fossil-free industry. This is something we should be proud of."



Anna Lindh Wikblad.

» RIGHT NOW, WE HAVE A UNIQUE OPPORTUNITY TO CREATE A NEW LULEÅ FOR FUTURE GENERATIONS – A LULEÅ WITH ENTIRELY NEW OPPORTUNITIES «

Anna Lindh Wikblad.

Carina Sammeli, Mayor, Luleå:

"The new jobs and the new residents relocating to the municipality mean that we will have higher tax revenues, resulting in an improved municipal economy. So the development is benefiting everyone." ■

THIS IS WHERE THE GREEN INDUSTRY OF THE FUTURE IS BEING BUILT



SSAB

uni
per

PORT OF
**LULEÅ
HAMN**
SWEDEN



talga

SSAB



 **LKAB**



A total of €6,2 billion is being invested in a concentrated area near the city centre in Luleå. This investment is giving rise to a 'Silicon Valley' of new green industrial technology at Luleå Industrial Park.

Green steel, sustainable anodes for batteries, rare earth metals, hydrogen, and artificial fertiliser all play a role in the future of Luleå Industrial Park. Massive projects are in the works within a concentrated area linked to the Port of Luleå. SSAB, LKAB, and numerous other companies are already active in the Industrial Park, while new companies are currently progressing through various stages of investments, obtaining necessary permits, and commencing on-site construction. ■

Grupo Fertiberia ²

The Spanish company is planning to construct a large new factory for manufacturing artificial fertiliser. The allure of green energy is the driving force behind their decision to invest approximately €887,3 million in this new facility. ■



Uniper ³

A hydrogen hub is in the planning stages to provide the required hydrogen for the new steelworks planned by SSAB and H2 Green Steel. There are also plans to supply ships with hydrogen as a climate-friendly fuel, addressing a crucial aspect of promoting green transport. ■

Port of Luleå ¹

The expansion of the Port of Luleå is a fundamental requirement for the ongoing industrial developments. Among other things, All-Weather Terminals (AWTs) are being constructed – gigantic heated garages where vessels can enter for loading and unloading beneath a roof. Additionally, there are Coils hotels, which are temperature-controlled storage premises with conditions that can be adjusted based on the materials to be stored.

Once completed, this expansion will increase our capacity for goods by a factor of four, making us the second-biggest port in Sweden after Gothenburg. The first stage is dredging the channel to a depth of 15 metres, which starts in 2024, the so-called Malmporten (the Ore Port). Dredging will continue successively up to 2028.

The Port of Luleå is a strategically prioritised EU port, crucial for ensuring the supply of ore and steel as raw materials. Approximately 90 per cent of the EU's iron ore production comes from the ore fields in Norrbotten. ■



Talga ⁴

The plans involve mining the internationally unique natural graphite deposit in Vittangi and utilising it for manufacturing battery anodes in a new state-of-the-art factory in Luleå. Unlike current practices that use synthetic graphite derived from crude oil in car batteries, Talga's graphite has the potential to reduce carbon dioxide emissions by up to 92 per cent when this planned production becomes a reality. ■



LKAB ⁵

LKAB's new industrial project is designed to extract rare earth metals and phosphorous. Rare metals are crucial components in permanent magnets used in electric vehicles (EVs) and wind turbines, while phosphorus is essential in mineral fertilisers. An investment of approximately €887,3 million is being made in this initiative. ■



SSAB's new steelworks ⁶

In parallel with the current steelworks that are operating at full capacity, an entirely new facility is under construction. The new production process will replace coal with fossil-free electricity. The combined investments in Luleå and the Finnish Brahestad amount to a total value of SEK €4 billion. This initiative aims to reduce carbon dioxide emissions by approximately 90 per cent. The transition by SSAB is expected to eliminate around 10 per cent of Sweden's total carbon dioxide emissions. ■



New website tells the story of Luleå Industrial Park

If you want to find out more about what's happening in Luleå Industrial Park, visit our new website.



www.luleaindustripark.se



REVOLUTIONISING STEEL:
**A NEW ERA OF
FOSSIL-FREE
PRODUCTION**



» WE SHOWED THAT IT IS POSSIBLE TO PRODUCE FOSSIL-FREE STEEL «

Lotta Jakobsson, technical development manager at SSAB's Transformation Office.



The first fossil-free steel sponge was manufactured in Luleå.

PHOTO: RONNY OLOVSSON

Lotta Jakobsson, technical development manager at SSAB's Transformation Office, is presently involved in the development of the new steelworks in Luleå, dedicated to producing fossil-free steel. "The fact that the raw material for the first fossil-free steel was manufactured here in Luleå is fantastic," she says.

On September 23, 2019, the UN General Secretary, António Guterres, extended a global invitation to a climate action summit. The objective was to present concrete and realistic plans for reducing greenhouse gases, aiming to achieve net-zero emissions by 2050.

The summit was attended by the Hybrit project, a joint venture involving SSAB, LKAB, and Vattenfall. The project aims to replace coal and coke with hydrogen and electricity, thereby eliminating carbon dioxide emissions from steel production. This goal is particularly significant, considering that the steel industry is one of the largest sources of carbon dioxide emissions. In Sweden, SSAB is responsible

for 10 per cent of emissions, and globally the steel industry accounts for 7 per cent.

In other words, when the first fossil-free steel was presented at this climate summit in New York, it was an historic event.

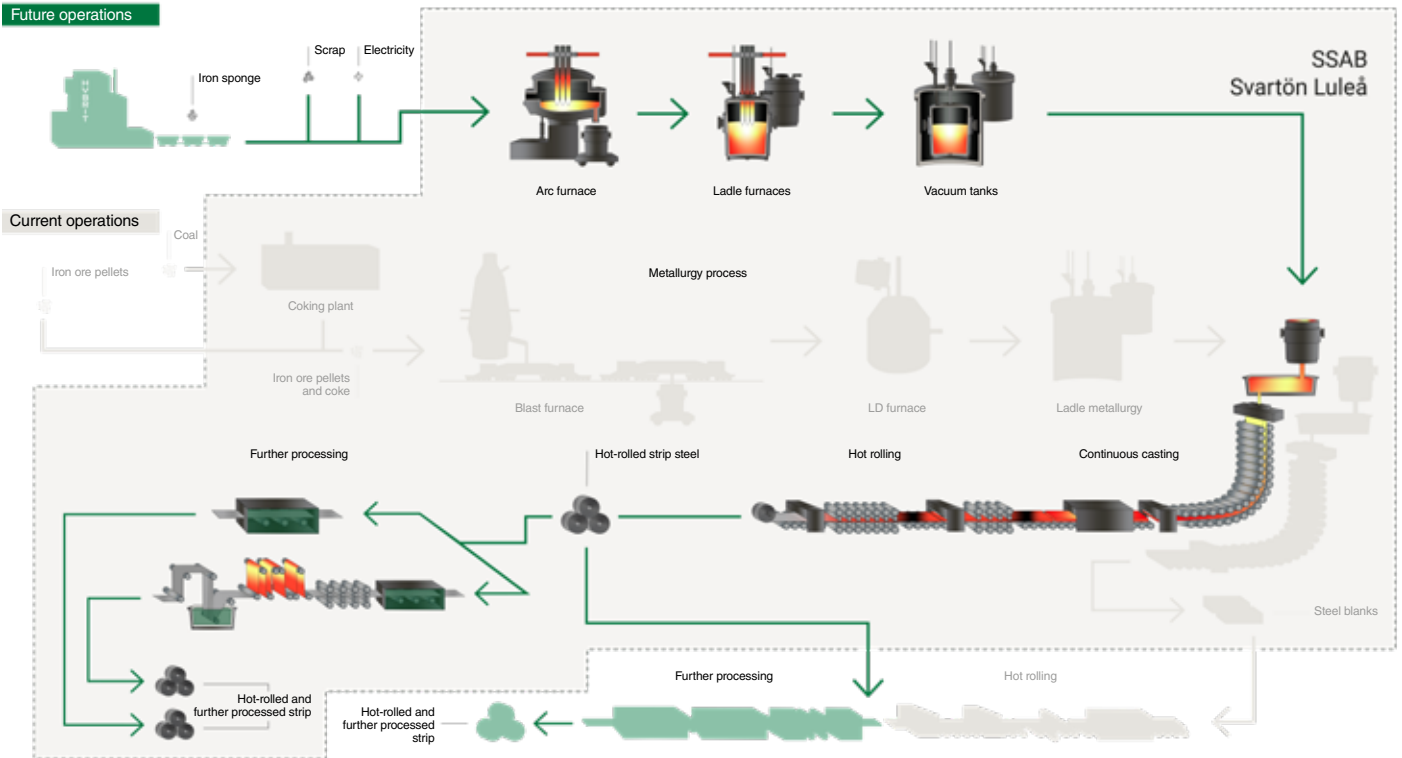
SSAB'S PRESIDENT AND CEO, MARTIN LINDQVIST, WAS FULL OF CONFIDENCE AHEAD OF THE SUMMIT:

"The steel industry is seen as one of those sectors that is difficult to change, but we're convinced that net zero is possible. That's why we took the initiative to form Hybrit. Fossil-free steel has enormous potential, and it can help a lot of customer segments to become completely fossil-free. We believe the transformation is positive both for the climate and for the competitiveness of our industry."

Several years on, SSAB is fully engaged in the work to transform its entire production.

LOTTA JAKOBSSON, TECHNICAL DEVELOPMENT MANAGER AT SSAB'S TRANSFORMATION OFFICE, is among those working on the steelworks of the future, based in Luleå.

The UN's 2019 climate summit is an event she still thinks about to this day.



How SSAB's process is changing.

ILLUSTRATION: BRIGHTNEST

“It’s not something you think about every day, but the fact that the first fossil-free steel has its origin here in Luleå is fantastic. It was the beginning of a journey, and not just for us. It’s easy to forget to be proud of our contribution to the work that led up to the first fossil-free steel.”

More specifically, Lotta is focusing on the aspects of the transformation that are unique to Luleå. SSAB has made a policy decision to convert all of its activities, but the implications vary for the operations in Oxelösund, Luleå, and the Finnish Brahestad.

The entire group is expected to undergo transformation around 2030, with Oxelösund being the first location to undergo this change according to an investment decision in 2023.

Due to significant interest in fossil-free steel among SSAB’s customers, a decision was made to accelerate the pace and convert SSAB’s steel production by around 2030.

THE TRANSFORMATION OF THE NORDIC PRODUCTION SYSTEM WILL UNFOLD IN THREE STAGES:

- **In 2023**, the decision to invest in Oxelösund was made, with the plant expected to come online around 2026.
- **In 2024**, the next investment decision will be made. The location, whether Luleå or Brahestad, is yet to be determined, but the chosen plant is scheduled to come online around 2028.
- **In 2026**, the third decision will be made to invest in the remaining plant, bringing it online around 2030.

The work is challenging in a number of ways. There are complex systems that are to be converted and multiple external factors that have a considerable influence.

JAKOBSSON:

“The biggest issue right now is that of the electricity supply. That is absolutely crucial, of course. However, at a more operational and organisational level, the information flows represent the toughest challenge. Making sure that the right hand knows what the left hand is doing at all times. Making sure that all the various parts can be linked up both in planning and implementation, so that nothing gets lost on the way.”

What will be the most significant difference between the current steelworks and the upcoming new facility?

“The reason we are doing this in the first place is of course to reduce carbon dioxide emissions, our environmental impact. That’s the biggest difference, but it’s not one that is immediately noticeable. What is easier to see and appreciate is of course that we are building an entirely new facility and closing down the coking plant, the blast furnace and the old steelworks.”

There appears to be strong symbolic value attached to the old plant, and there have already been calls to ‘keep the blast furnace’ as a reminder. What are your thoughts on that?

“Well, there are two options here. Keep it as some kind of heritage site or we take down the blast furnace and recycle the scrap steel in our new arc furnace. I’m in two minds myself – each option has its own pros and cons. But then we have to remember that although the blast furnace has become a symbol for the steelworks, the blast furnace standing there today is only 23 years old. So this isn’t how it has looked since the 1940s, when the operation in Luleå started up.”



The new steelworks is being built further out on Svartön.

ILLUSTRATION: BRIGHTNEST



The old blast furnace can be recycled as scrap in the new furnace.

The new steelworks won't use as much coal – how will this affect the immediate environment??

“Well, specifically we won't need the large coal stores down at the coking plant, which will make a big difference for anyone near to the port.”

What improvements can be expected for the working environment inside the new steelworks, now that you have the opportunity to build brand new and modern facilities from the ground up?

“There has been some discussion about how work is to be done in this new plant. For instance, should we have multiple small control rooms spread throughout the plant, or perhaps just a few larger ones? And could we do a better job of getting daylight in despite the size of the plant? We have an ongoing design programme that is also highlighting these issues and as part of which interviews have been conducted out in production in order to obtain further input. The fact that we are building from new means that we are able to change everything from the ground up instead of rebuilding parts, as we had previously done – meaning that work on automation and digitalisation can progress much faster.”

» THE GOAL IS THAT WE SHOULD BUILD A BEAUTIFUL STEELWORKS «

Lotta Jakobsson, technical development manager at SSAB's Transformation Office.

Converting SSAB will result in a 10 per cent reduction of Sweden's total carbon dioxide emissions. Does the fact it will have such a great impact put you under pressure?

"It's true that we have a big role to play in helping AB Sweden achieve its environmental goals. It's a responsibility that we accept. And when others realise that it's actually a possibility, more will follow our lead. We're showing that the transformation is possible."

By significantly reducing environmental impact and demonstrating how the entire industry can make this change, you are playing a role in 'saving the world.' Have you ever considered the magnitude of what you're doing, that it extends beyond the immediate task at hand?

"Not saving the world, as such, but it is true that we are making a contribution and that we're showing that it is possible."

After the investment decision is made, you will build a new factory while simultaneously continuing the current steel production in parallel.

"Yes, we will be sharing these spaces, so some reorganisation is required. The main processes are where they are, but we need to move materials and make room. When we do start up the new plant, we will have to ramp up the new process while continuing to run the old one in parallel. So it will be a puzzle. Existing production will still have to continue to the very end. It is thought that construction of the new works will take three to five years, and once we can start up the new plant, we reckon it will take no more than one to two years before we get into full production."

After the new steelworks on Svartön has been built and commissioned, what will happen to the old one? Perhaps more importantly, what are the plans for the old industrial land?

"Once we have reached full production with our new operations, we will be closing down our existing production facility. No decision has been made as yet as to what buildings will be demolished and what will be left – it depends entirely on what comes next."



The new plant is being built while the old one will continue to be run, confirms Lotta Jakobsson.

PHOTO: RONNY OLOVSSON

"Right now, we're working on issues of more immediate concern, in other words building the new plant. What is good is that we are building the new facility on land that is already industrial land, so we don't need to use up any more natural land. And then we also have a fantastic workforce that is joining us on the journey, so we don't need to start from scratch."

You mentioned that you're currently developing a design programme for the new steelworks. What will it entail? Will the design feature rust-coloured steel?

"We're working on an overall plan for what the steelworks will look like. It's important that we give this some thought before we start on the detailed design work. What colour should it be, where should we have footpaths and cycle lanes, what should the green spaces and surface water management look like, and so forth... What should visiting rooms and control rooms look like?" says Jakobsson, adding that SSAB's management has set out a clear goal:

"The goal is that we should build a beautiful steelworks." ■

We are presented with a unique opportunity – a chance to not only help Sweden achieve its climate targets but also contribute to Europe and the world’s efforts. In doing so, we can reshape Norrbotten entirely. This is a rare opportunity to redefine the fundamental conditions in the region, one that may not present itself again in our lifetime. It’s something we must handle with care.

» **THE RESEARCH MUST BENEFIT SOCIETY** «

All of this is made possible by the industry’s current investment of hundreds of billions of euros in the significant green transition, encompassing fossil-free processes and products. The industry is leading the way, actively driving the transition, and Norrbotten and Västerbotten are positioned in the spotlight as exemplary models, both nationally and internationally.

Success for these world-leading innovations and changes requires research and development. We are still at the beginning of a journey that requires fine-tuning of our circular material flows and recycling processes, hydrogen production, and improvement of transportation and storage techniques. Artificial intelligence and robotics need to be integrated into manufacturing processes and maintenance operations – to name just a few examples.

Luleå University of Technology has closely collaborated with our local basic industries since early 1971. The university has actively contributed to the development of new knowledge aimed at facilitating the green transition and enhancing the competitiveness of companies and industries.

The interdisciplinary research that we have been conducting for a very long time now also allows us to take on social challenges at a more comprehensive level. An example of this is when our researchers in the field of natural resources collaborate with researchers in other fields such as political science, economics and jurisprudence. Together, they are then able to analyse challenges and conflicts of interest relating to natural resources and find ways to quality-assure the licensing processes and make them more efficient.

For the knowledge generated by this research to benefit society broadly and propel development forward, education is essential. We have therefore developed five new courses that are related to the green transition and the needs created by the industrial change-over.

We have gained international attention for our initiatives in the green transition, and we are also dependent on international expertise. Sweden is a small country, and if we are to retain and strengthen our position as a knowledge nation, we as a university need to recruit students and staff from all over the world. We are now therefore boosting our internation-

**Birgitta
Bergvall-Kåreborn,**
vice chancellor,
Luleå University of
Technology



**» WE HAVE GAINED
INTERNATIONAL
ATTENTION FOR
OUR INITIATIVES
IN THE GREEN
TRANSITION «**

al recruitment of students onto some of our courses. But we all need support to ensure that both our national and international students stay in the region after they graduate.

I am therefore urging both private and public sector employees to get in touch with the university so that we can help to establish contacts between employers and students, because we have to remember that we are faced with a great need for expertise in just about every area. In order for people to choose to relocate to Norrbotten and Västerbotten to live and to work, attractive societies with well-functioning welfare systems are needed.

We also need support in pointing out the unique opportunities that are present in northern Sweden and in stimulating curiosity among our young people about the basic industries and the important role they play in the green transition.

Because it is now that we have a unique opportunity to transform Luleå, Norrbotten and Västerbotten and to give the world a nudge in the right direction. Luleå University of Technology will do everything it can to help in this work. Are you with us? ■

Illustration of LKAB planned circular industrial park for critical minerals in Luleå.

THE EMERGENCE OF A NEW CIRCULAR INDUSTRY IN NORRBOTTEN



In Luleå, LKAB is currently planning a circular industrial park for extracting critical minerals, potentially generating up to 500 new jobs. The facility holds significant importance for enhancing Sweden's and the EU's self-sufficiency, reducing dependence on China and Russia, particularly concerning rare earth elements and mineral phosphorus fertilisers.

There's much focus on the north as we witness what is being described as the 'green industrial revolution' in Norrbotten. In Luleå, LKAB is in the process of developing a groundbreaking initiative—a new fossil-free and circular industrial park aimed at repurposing mining waste (tailings) from their iron ore production into critical raw materials: phosphorus and rare earth elements. This not only signifies the birth of a completely new business for LKAB but also marks the establishment of a new chemical engineering industry for Norrbotten.

"The facility will be of great importance in making Sweden and Europe more self-sufficient in critical minerals that are absolutely crucial for achieving our climate transition," says David Högnelid, chief strategy officer at Business Area Special Products, LKAB.

The demand for rare earth elements for electric cars and wind turbines, among other applications, is expected to increase more than fivefold by 2030. At present, Europe relies on imports of these minerals, with China predominantly controlling production.. Phosphorus is one of three nutrients in mineral >>



» LKAB'S PLANS TO EXTRACT CRITICAL MINERALS WILL BE OF GREAT IMPORTANCE IN MAKING SWEDEN AND THE EU MORE SELF-SUFFICIENT «

Planned layout of LKAB circular industrial park for critical minerals in Luleå.

David Högnelid, chief strategy officer, at Business Area Special Products, LKAB.



PHOTO: SISAVNE LINDBLAD



fertiliser and is essential for our food production. Along with rare earth elements, it is on the EU's list of critical minerals. Europe is dependent on imports of these critical minerals and China completely dominates the market for rare earth elements, a factor which increases the vulnerability of European industry. Increased self-sufficiency in critical minerals is therefore high on the agenda throughout Europe.

AT THE HEART OF THE ENTIRE project lies LKAB's iron ore. Throughout the iron ore processing, by-products, known as tailings, are generated and subsequently deposited in tailings ponds. The tailings sand contains valuable minerals, including phosphorus and rare earth elements, and LKAB now plans to extract and utilise them. LKAB's strategy paves the way for zero carbon dioxide emissions from its own processes and products by the year 2045. The industrial park and its processes will be powered by fossil-free electricity and have its own production of raw materials and fossil-free hydrogen.

"The first step in the plan is to build an apatite plant directly adjacent to our production facilities where we will produce the apatite concentrate. The apatite concentrate will be transported via rail to the industrial park located on the coast in Luleå, Sweden, where it will be further processed to separate phosphorus and rare earth elements – with gypsum as yet another by-product," says David Högnelid.

IN EARLY 2022, LKAB disclosed the exploration findings from the Per Geijer deposit north of Kiruna. The re-

sults indicated that the ore in this deposit holds up to seven times more phosphorus than the ore bodies currently mined by LKAB in Kiruna. Further studies during 2023 have shown that the deposit has more than 1.3 million tonnes of rare earth oxides (REO) that are used to produce rare earth elements – elements necessary for the permanent magnets needed for the manufacture of electric cars and wind turbines, among other applications. This makes it, at the time, Europe's largest deposit of rare earth elements with a great potential for expansion of LKAB's planned industrial park for critical minerals in Luleå.

"By extracting phosphorus and rare earth elements as by-products of the iron ore mining, future mining of the Per Geijer deposit would give us the potential to replace the previous imports of phosphorus into Europe from Russia and would make a significant contribution to EU self-sufficiency in REE," says David Högnelid.

IN THE CIRCULAR INDUSTRIAL PARK in Luleå, LKAB will produce a concentrate containing a mix of the 17 rare earth elements, and the next step is to separate these. Today, this part of the value chain is dominated by China. In 2022, LKAB acquired the majority ownership in the Norwegian company REEtec. REEtec has developed an innovative and sustainable technology for separation of rare earth elements – a process with up to 90 per cent lower carbon dioxide emissions than the dominant Chinese production. The first factory for separating rare earth elements in Herøya will produce the rare earth elements neodymium and praseodymium used for permanent magnets, necessary in motors in electric cars and wind turbines.

"Since Europe currently has no extraction and has only marginal processing capacity, the partnership between LKAB and REEtec marks the start of something new in Europe. We are establishing the basis of a new value chain for sustainably produced products that is currently dominated by China," concludes David Högnelid. ■

LKAB'S PLANNED EXTRACTION OF CRITICAL MINERALS

- In LKAB's ores the rare earth elements, and phosphorus, are bound in apatite. The rare earth elements always occur as a group and therefore all of them are found in LKAB's ores.

LKAB COULD BECOME A SIGNIFICANT PRODUCER FOR AGRICULTURE AND CLEAN TECHNOLOGY

- Roughly half of the world's food production relies on these nutrients. Europe currently depends on imports for 90 per cent of its phosphorus, and Russia has historically contributed significantly to global production.
- Rare earth elements are also included on the list of critical raw materials, none of which are mined in Europe. China dominates both mining and processing, while Europe is largely dependent on rare earth elements for manufacturing the permanent magnets which are necessary for electric vehicles and wind power turbines, integral components for the green transition.

EMPOWERING EUROPE: LKAB'S DRIVE FOR MINERAL SELF-SUFFICIENCY

LKAB's comprehensive exploration efforts in recent years have borne fruit, leading to expanded mineral resources for iron ore, phosphorus, and rare earth elements. This positions LKAB to contribute to the increased self-sufficiency of both Sweden and Europe.

We have found more mineral resources at all our mine sites – Kiruna, Svappavaara and Malmberget in Gällivare. And there is more ore at greater depths. Not only that, but the Per Geijer deposit north of Kiruna is significant and contains more than just iron ore. In 2023 we reported volumes and concentrations of rare earth elements for the first time. As you might know, these elements are needed for our mobile phones, electric cars and wind turbines. They are necessary for the green transformation of industry and society, and, as a bonus, are present together with the iron ore.

We are developing the technology to extract these elements. The concentrations are not extremely high, but the volumes are large and since we are already mining the ore to access the iron, we can take the opportunity to establish additional steps during the process. The rare earth elements are found in a mineral called apatite – which also contains another substance, phosphorus, in even higher concentrations. Historically, the high phosphorus content was a disadvantage as it made the iron brittle in older production processes. However, once the Thomas process was invented in the 1870s, iron ore that was rich in phosphorus also became valuable – which was one of the reasons why the deposits in the Swedish ore fields became profitable to extract.

We can now separate the apatite, and for many years we have deposited it in tailings ponds along with the waste rock that we separate from the iron ore in the processing plants above ground. Until now, extracting phosphorus has not been sufficiently profitable – but now the technology has been developed and demand has increased. Why is that? Well, partly

because phosphorus is an essential nutrient in mineral fertilisers, which are in turn crucial for the global food supply. Without mineral fertilisers, global food production would decrease by half. In Sweden alone, the agricultural sector uses around 850,000 tonnes of fertiliser per year. However, we have no domestic fertiliser plants. Europe is 90 per cent dependent on imports of phosphorus and, before its war in Ukraine, Russia accounted for a significant portion of the production. Nitrogen, potassium and phosphorus are the most important nutrients in modern mineral fertilisers. LKAB's extraction of phosphorus would reduce our dependence on Russia for our food supply. And not just in Sweden: we could produce five times the Swedish demand for phosphorus used in mineral fertilisers from our ongoing production alone, without extracting from previously deposited material. We would therefore also be able to export significant amounts – to other European countries, for example. The deposit in Kiruna, named after the geologist Per Geijer, contains up to seven times more phosphorus than the orebodies we are currently mining. Once we start mining it, we could replace all the former Russian exports of phosphorus to the EU. There is also a health aspect to reducing import dependence. The European Commission wants to reduce the amount of cadmium in food. A major source of cadmium in food is the phosphorus used in fertilisers. LKAB's deposits contain cadmium-free phosphorus. And what about rare earth elements and our dependence on imports there? Here we are at the mercy of China, which dominates the entire value chain. There is currently no production within the EU. The undersupply is significant, and new mines and processing capacity are needed in Europe to meet the needs of the green technology shift.



Anders Lindberg,
group media relations
manager at LKAB

We are now working hard to put these plans into action. We will extract apatite concentrate at our mines, which will then be transported to an industrial park in Luleå where the phosphorus and rare earth elements will be processed further. We can continue mining iron ore for many years to come. We have resources and reserves amounting to over four billion tonnes of iron ore. If we make a comparison, since we were founded in 1980, we have extracted two billion tonnes.

A significant portion of our profits goes to the Swedish state, to build a stronger society. And now, our deposits have the potential to contribute to increased self-sufficiency in critical raw materials. ■

LULEÅ BECOMES SILICON VALLEY FOR THE GREEN REVOLUTION

» **WE HAVE THE EXPERTISE AND TRADITION** «

On 8 September, it was finally time to break ground at Hertsöfältet – now officially named Luleå Industrial Park. Talga, an Australian battery materials company, is set to process graphite for use in various applications, including batteries for cars, boats, and tractors. Their mining operation, currently undergoing a license application process, is planned for Nunisvaara, near Vittangi in Kiruna’s eastern municipal district.

We live in a dynamic region and in exciting times. A surplus of green electricity means that we have had and continue to have the eyes of the world on us. What began with Facebook setting up in 2011, when the social media giant chose Luleå for its first computer centre outside the USA, receiving the thumbs up from Greenpeace for its computing operations being powered by green electricity from the Luleälven instead of coal power or some other fossil fuel, is now continuing with new companies in multiple sectors. At Luleå Industrial Park they are working really hard to cluster together companies from different sectors that have a common denominator – they want everyone to play a key role in the green transition. The Spanish chemical manufacturing company Fertiberia has been allocated a large parcel of land where, if all the pieces of the puzzle fit together, they will be producing artificial fertiliser and green ammonia. The food sector is known to be a significant source of carbon dioxide emissions, and one way of reducing these emissions is to make the production

of artificial fertiliser fossil-free. Producing artificial fertiliser has become a matter of national importance due to Russia’s aggressive war against Ukraine having resulted in a dramatic reduction in import options, and it is therefore an important component in improving our level of self-sufficiency.

Another company, Juniper, will be making methanol for use as a fuel in ferries here in Luleå. When the world’s leading companies make the change, it’s a sign that the green transition is progressing – step by step. It is no longer acceptable to transport input materials, and certainly not to ship out manufactured goods on vessels powered by bunker fuel. Even sea transport must transition toward zero carbon dioxide emissions.

Of course it is challenging to get all the pieces of the puzzle to fit together. The fact that SSAB is planning to continue manufacturing steel in its current production process while simultaneously constructing a new factory to produce fossil-free steel is of course particularly challenging. No new steelworks have been built in Europe in

almost 50 years! But here we have the expertise and tradition required to run major projects.

We also have the University as a centre of excellence, and we are a stable region.

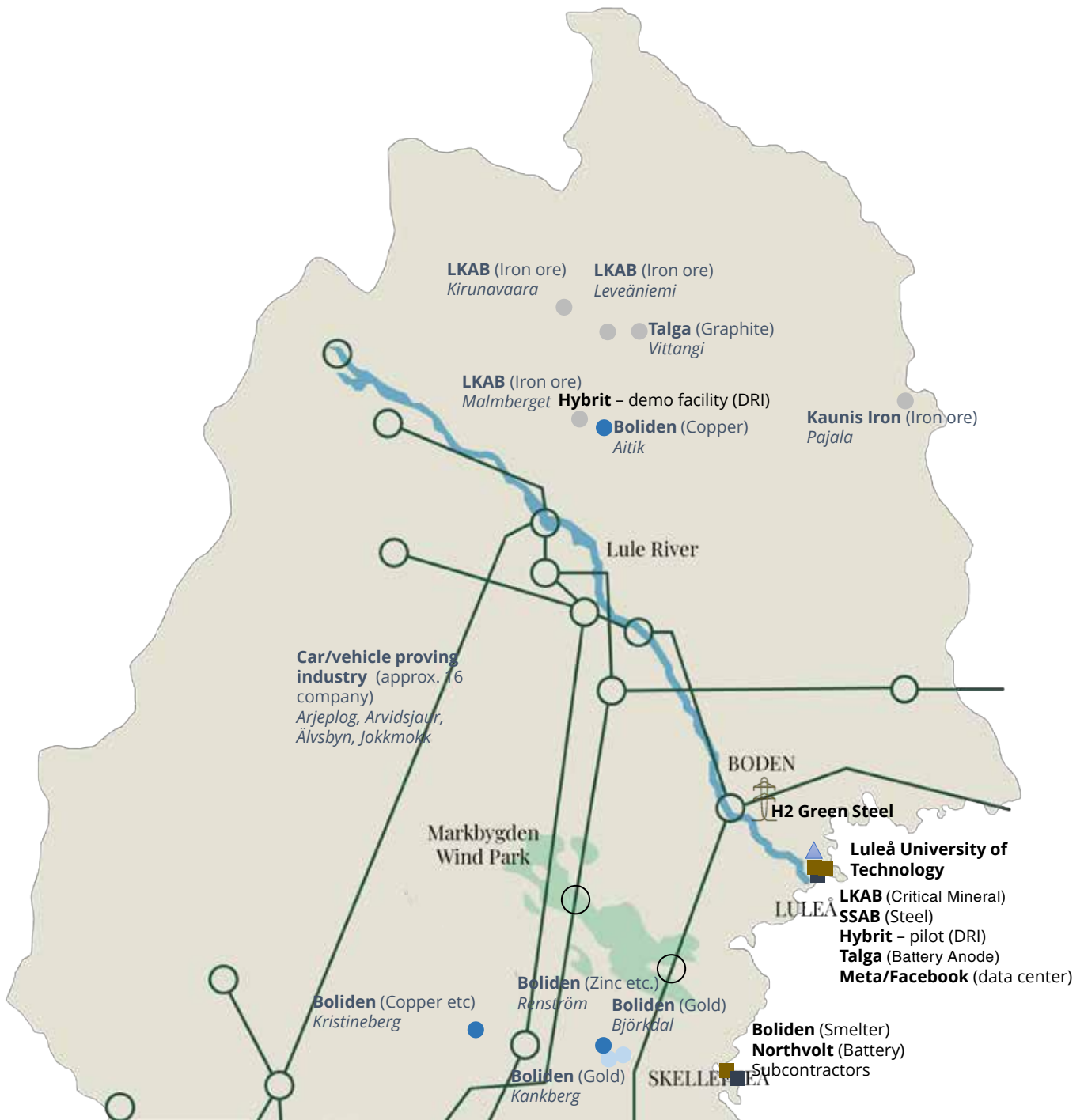
Perhaps this is happening now because we are ‘the perfect location’ and what we are building is on the path to becoming a Green Silicon Valley, right here in Luleå, Norrbotten.

We now have an opportunity not only to supply other regions with raw materials such as ore and energy, but also to create jobs in processing, and so improving life here in Luleå and Norrbotten. What is being built now will surely remain standing and in operation in a hundred years, benefiting us and future generations. It is also important to remember that every job in industry produces knock-on effects; it is usually claimed that every established job in industry generates three further jobs in the surrounding financial ecosystem. So factories built at Luleå Industrial Park will also benefit the hospitality sector, and the commercial and public sectors. I’ll be eagerly following the developments! ■

A portrait of Oskar Hederyd, a man with dark hair and a slight smile, wearing a white shirt and a dark suit jacket. The background is dark.

Oskar Hederyd,
business developer
investments,
Luleå Business Region AB

**» PERHAPS ALL THIS
IS HAPPENING NOW
BECAUSE WE ARE THE
PERFECT LOCATION «**



Hundreds of billions of euros invested

Luleå is in the centre of the hottest industrial region in Europe right now. Hundreds of billions of euros are invested in the region in various industrial projects that encompass the entire chain, from green energy and raw material supply to fossil-free steel, climate-smart car batteries, biobased

innovations, and numerous other initiatives focusing on world-leading sustainable solutions. And many of these projects are done in close collaboration with the University and technology industry in Luleå. We have the knowledge and the work ethic to solve truly challenging problems.

Maybe because all our ancestors had to in the past because of the arctic climate. If you didn't work hard and really solved the problems, you died. We had to succeed. And today we face another problem we have to solve. We have to succeed. ■

I think Luleå is a perfect small city. We have a vibrant cultural scene and a wide range of restaurants.

LULEÅ + MALIN

Influencer Malin Åsén is collaborating with Luleå municipality, showcasing the city and its lifestyle to her followers on Instagram.

"The collaboration suits me! I always speak highly of Luleå and often show how beautiful it is. I can hardly go for a walk without taking a photo or a video clip," she says.

Her channel focuses on pre-loved fashion, aiming to inspire others to embrace second-hand shopping. Sharing her everyday life is nothing new for Malin.

"I've been posting videos on YouTube since I was little. Since 2020, I've focused on fashion, especially second-hand," she says.



In addition to creating fashion content, Malin is proud to show off her hometown. She was born and raised in Luleå and has no plans to move.

"I think Luleå is a perfect small city. We have a vibrant cultural scene and a wide

range of restaurants. Things are happening here, and, at the same time, you're always just five minutes away from the quiet nature. It's the best of both worlds!"

She also highlights the available job opportunities and the fact that you don't need to move away to advance in your career.

"I really enjoy it here. You can live more affordably and can spend money on things like travel. This collaboration is my love letter to Luleå."

Follow @luleasweden or @malin.asen on Instagram



MOVE TO LULEÅ

H2 Green Steel secures agreement with Port of Luleå:

A PIVOTAL MOVE FOR BOTH PARTIES



Jenny Marin, logistics manager, H2 Green Steel, and Anders Dahl, CEO of Port of Luleå.

PHOTO: BRIGHTNEST

H2 Green Steel and the Port of Luleå have entered into a cooperation agreement. According to the agreement, the port in Luleå will serve as the primary logistics and transportation hub for intermediate goods and products to be transported to and from H2 Green Steel's new steel mill in Boden. This arrangement particularly pertains to the export of green steel, produced with close to zero emissions, which is slated to be supplied to the global market. The planned production start is in 2025, with volume ramp-up scheduled throughout 2026.

"This is a significant step for both parties, but especially for the green transition currently taking place with full force in northern Sweden," says Port of Luleå's CEO Anders Dahl.

In autumn 2022, a letter of intent was signed between H2 Green Steel, Port of Luleå and the port's owner, Luleå Municipality. Throughout 2023, a collaboration agreement has been negotiated and has now been signed by both parties. The agreement ensures that H2 Green Steel has access to the Port of Luleå and obliges the steel company to utilise the port for the inflow and outflow of intermediate goods and products.

"The agreement is a milestone. It secures our collaboration with a new customer who is expected to contribute substantial freight volumes within a few years. Additionally, it presents us with a crucial component in our efforts to strategise the expansion of a port that must increase its cargo capacity by several hundred per cent by 2030. This expansion is necessary to cater for the requirements of several significant indus-

» THIS NEW COOPERATION AGREEMENT WITH THE PORT OF LULEÅ IS YET ANOTHER IMPORTANT PIECE OF OUR PUZZLE IN SUCCEEDING WITH OUR GREEN STEEL MILL IN BODEN «

Jenny Marin, logistics manager, H2 Green Steel.

The new Port of Luleå is under construction, as well as the new steel plant H2GS. >



trial clients who have made substantial investments in growth and the transition towards sustainability," says Anders Dahl.

For H2 Green Steel, which aims to begin production of fossil-free steel in Boden as early as the end of 2025, the agreement allows them to progress and strategise a logistics and transportation solution involving cargo flow through the Port in Luleå.

"This new cooperation agreement with the Port of Luleå is yet another important piece of our puzzle in succeeding with our green steel mill in Boden. We have been working very closely with Luleå Municipality and the Port of Luleå since day one of our launch. Thanks to good cooperation and a shared vision, we now have a clear plan for our next steps. We fully understand the challenges that the Port of Luleå faces in securing necessary land as well as financing, and we are grateful that we now can focus on concrete solutions that align with our tight time plan," says Jenny Marin, Logistics category manager at H2 Green Steel. ■

ABOUT LULEÅ HAMN AND H2 GREEN STEEL

- By 2030, Port of Luleå aims to have the capacity to transport three to four times the amount of goods compared to its present capabilities, and handle completely new types of cargo and products. This will require new railway networks, quays, terminal areas, and all-weather terminals. The estimated cost of these developments ranges between 620,7 and 887,3 million euros, depending on the scope. Port of Luleå was recently tasked with seeking a solution with external partners who can participate in financing, constructing, and operating the future Port of Luleå. This decision was unanimously approved by Luleå Municipal Council on 22nd May.
- H2 Green Steel (H2GS AB) was founded in 2020 with the aim of using green hydrogen to accelerate industrial climate transition. Steel, which is the source of significant carbon dioxide emissions, is H2 Green Steel's first industry vertical. H2 Green Steel's founder and biggest shareholder is the investment company Vargas, which is also the co-founder and one of the biggest shareholders in the battery company Northvolt. H2 Green Steel has offices in Boden and Stockholm, with its first plant in development in Boden.

BILLION EURO INVESTMENTS IN THE NORTH OF SWEDEN

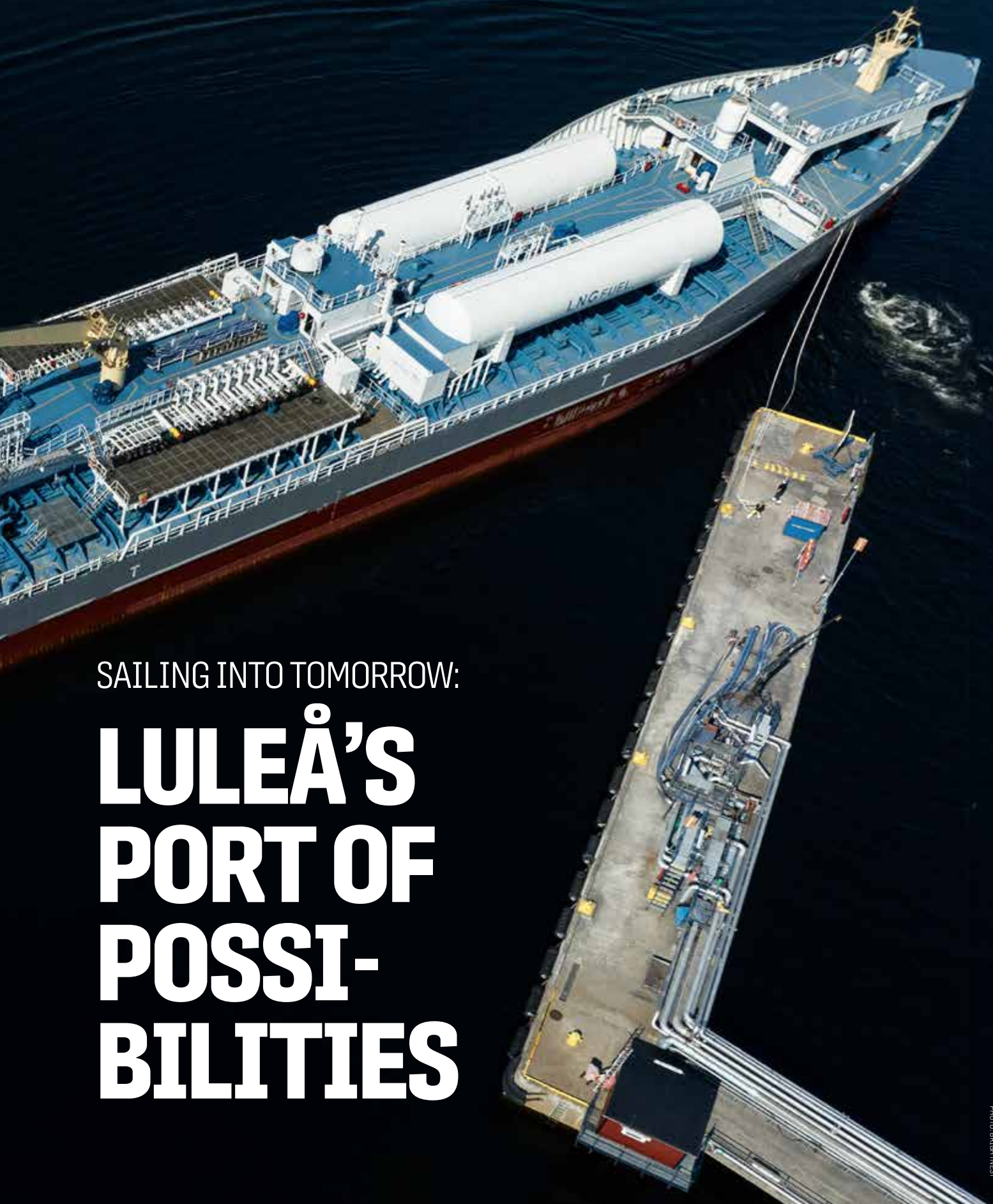
- SSAB
 - LKAB
 - Grupo Fertiberia
 - Talga
 - Uniper, among others
 - H2 Green Steel fossil-free steel in Boden
 - Hybrit in Malmberget/Vitåfors/Luleå
 - Kaunis Iron new mines in Pajala
 - Talga graphite mine in Vittangi
 - Ozonair new factory in Luleå
 - Nordion Energi and Gasgrid Finland, Nordic Hydrogen Route
 - Markbygden wind farm in Piteå 750 turbines
 - 840 billion Euro investments in new 400 kV grid and substations
 - Esrange Space Center new investments in Kiruna
 - Meta/Facebook data center expansion in Luleå
 - The North Bothnia Line 270 km of railway
 - Malmporten dredging the sea fairway in Luleå
 - Northvolt battery gigafactory in Skellefteå
- And more to come...

» THESE ARE EXCITING TIMES WITH PLENTY OF CHALLENGES. WE WILL DO WHAT NO-ONE HAS DONE BEFORE. WE ARE BUILDING A PORT THAT CAN MEET THE GROWING NEEDS OF INDUSTRY: A PORT THAT WILL ALLOW NORRBOTTEN TO BECOME A WORLD-LEADER IN THE GREEN TRANSITION. AT THE SAME TIME, WE ARE SECURING LULEÅ'S ROLE AS A LIVING MARITIME CITY FOR FUTURE GENERATIONS «

Anders Dahl, CEO of the Port of Luleå.

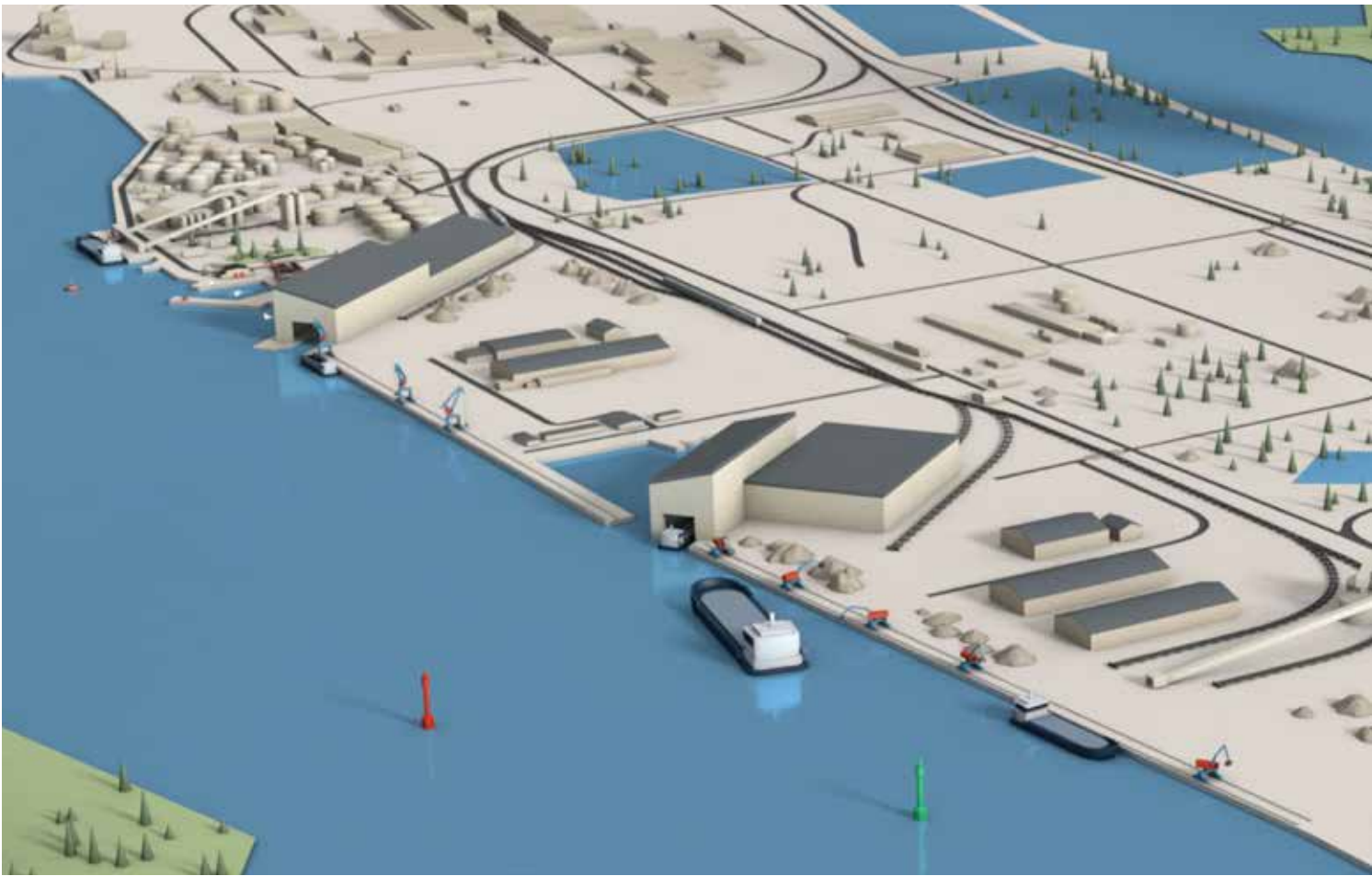


PORT OF LULEÅ



SAILING INTO TOMORROW:

LULEÅ'S PORT OF POSSI- BILITIES



A mock-up of the New Port of Luleå, showing new rail networks, terminal areas and an all-weather terminal.

In a few years, the Port of Luleå will handle three to four times its current freight volume, accommodate four times more shipping, and handle entirely new types of freight – all with a fossil-free value chain. This historic expansion is crucial for the ongoing industrial investments in the region. The journey to the New Port of Luleå has begun.



Anders Dahl, CEO of the Port of Luleå.
PHOTO: BRIGHTNEST

The industrial investments currently being made in northern Sweden in areas such as fossil-free steel, rare earth metals and critical minerals are the biggest in the country's history. For all the stakeholders to meet the objectives with their investments – and for their products to be able to reach the world market in the next stage – there is a need for new infrastructure, complex logistics solutions, and a strong transport link between Norrbotten and the rest of the world.

READY FOR INDUSTRY

By 2030, the Port of Luleå will have sufficient capacity to handle three to four times the volume of freight that it

does currently, receive four times as much shipping, and handle entirely new types of freight and products – in some cases, types of freight that have never been handled before.

It is a venture that will require, among other things, new railway networks, a new rail depot, terminal areas and an all-weather terminal. In just a few years, entirely new areas of land will be created to provide space for a logistics park, fossil-free industrial ventures, a new quayside, and more. As the port area grows, the channels to the port are being widened and deepened, more berths are being built and a brand new deep harbour is being constructed.

“It is a huge project that requires an entirely new way of



3D: BRIGHTNEST. WORDS: BRIGHTNEST



The Port of Luleå is set to accommodate a fourfold increase in maritime traffic. PHOTO: BRIGHTNEST

THE FUTURE PORT is the site of many of the ventures that are strengthening and developing the infrastructure and the logistical flow, and making the Port of Luleå ready to handle entirely new types of freight and products that will be loaded, unloaded, stored and transported in entirely new ways. This will require, among other things, new rail networks and a new rail depot, an all-weather terminal and terminal areas. The project is being implemented by the Port of Luleå.

THE ORE PORT is Sweden's largest dredging project in modern times. The project will see Luleå's channels deepened, widened and be given new channel markings, while at the same time a new deep harbour will be constructed. Some of the dredged material will be re-used to create entirely new land areas. These ventures will help to improve maritime safety, create more efficient sea transport and improve access to the port by traffic all day and year-round. The Ore Port project is a collaboration between Luleå Hamn AB, Luleå municipality, the Swedish Maritime Administration and the Swedish Transport Administration.

thinking. We're not just growing in size – we are also dealing with new conditions in an entirely new world, and we will also be increasing the number of freight types we'll be handling by a factor of five. Among other things, we will need to predict and plan for needs that have not yet become apparent," says Anders Dahl, CEO of Port of Luleå.

A FOSSIL-FREE VALUE CHAIN

For the Port of Luleå, it is not enough for the steel products that are to be carried by sea to be green.

"We are going to be the world leaders in sustainable freight handling, with completely fossil-free value chains. Vessels that choose e-methanol as a fuel must also be able to bunker in our port. If they choose fossil-free hydrogen, they must be able to fill up with that. Our plans therefore include a hydrogen plant in the port," says Anders Dahl.

TWO MAJOR PROJECTS CREATING THE NEW PORT OF LULEÅ

This historical development and expansion of the Port of Luleå is taking place primarily as two extensive projects: The Future Port and the Ore Port. ■



As the Port of Luleå undergoes preparations for the future, its day-to-day operations, as one of the most vital ports, continue seamlessly. PHOTO: BRIGHTNEST



ON THE 11TH OF JANUARY, 2023, just ahead of the EU's summit meeting in Luleå, Ebba Busch emphasised Norrbotten's crucial role in the green transition when speaking with the media:

"What is currently happening in Norrbotten is important both for Sweden as a country and for all of the EU," she said, before continuing,

"Right now, we have a situation where the potential is as big as the challenges. What is happening here is entirely decisive in terms of our ability to succeed with the green transition."

"We will take inspiration from Luleå municipality, which is currently stress-testing the limits for how much licensing processes can be speeded up when something important is at stake." ■

LULEÅ AND NORTHERN SWEDEN UNITE FOR EQUAL OPPORTUNITIES IN INDUSTRY

Luleå's Municipal Director Anna Lindh Wikblad:

"This is an important question for Luleå's growth and for society as a whole, and the transition in which we are involved. I would say that it is essential for the future that we adopt a joint approach and work in the long term for a society in which there are equal opportunities for women and men. We need to work together to highlight positives and address challenges in order to create the sustainable society that we want to live in."

The agreement means that Luleå municipality will be working up to 2030 on securing a management-controlled equality initiative. The declaration of intent on



Luleå municipality, together with several other actors in Norrbotten and Västerbotten, has drawn up a declaration of intent on equal opportunities in industry. Luleå's Municipal Director Anna Lindh Wikblad is seen here, signing the agreement. PHOTO: MARIA SIRVIÖ

equality in industry is a collaborative agreement crafted by the county government boards of Norrbotten and Västerbotten in

dialogue with various stakeholders, including industry, municipalities, and regional authorities within the counties. ■

» THIS PROVES THAT FANTASTIC THINGS CAN BE ACHIEVED WHEN FORCES FOR GOOD WORK TOGETHER «

King Carl XVI Gustaf on the new industrialisation in northern Sweden.



Malin Larsson, CEO Luleå Energi, and Johan Svenningsson, CEO Uniper Sweden.

PHOTO: STELLAN STEPHENSON

Uniper and Luleå Energi sign agreement – improving Luleå's district heating system

BOTHNIALINKH2 is a collaborative project involving Luleå Energi, Uniper, ABB, ESL Shipping, and Luleå Port, with the goal of producing fossil-free maritime fuel. Together with Uniper and other partners, arrangements are being established for an entirely fossil-free value chain, covering the delivery of raw materials, production, and distribution via a fossil-free maritime transport system.

"We are very happy to sign an agreement with Uniper, which is the first of the new industries to become involved

in utilising surplus heat for the district heating system in Luleå," says Malin Larsson, CEO of Luleå Energi.

"This method of using surplus heat from energy processes to heat homes etc. is entirely in line with the fundamental concept of circularity that we and Luleå Energi are so enthusiastic about. Being able to use surplus energy from a process as an input for another process is an example of how the green transition can be driven forward," says Johan Svenningsson, CEO of Uniper Sweden. ■



Luleå's Mayor Carina Sammeli was in Almaden, Visby, to receive the distinction. Seen here alongside the minister for Civil Service, Erik Slottnér. According to the 2023 Fokus ranking of municipalities, Luleå is the best place to live in Sweden.

PHOTO: LULEÅ MUNICIPALITY

Top ranking for Luleå: **BEST PLACE TO LIVE**

EVERY YEAR, THE FOKUS NEWS MAGAZINE compiles a ranking of municipalities based on 13 areas, including homes, demography, democracy, leisure and culture, municipal economics, security, and education. The results are then compared among the various municipalities. Luleå topped the list in 2023, coming first out of Sweden's 290 municipalities. Based on the results for the year, this makes Luleå the best place to live.

Luleå's Mayor Carina Sammeli was present in Visby:

"It's great to receive confirmation that we really are a good community to live in. In Luleå, you get a good quality of life, great jobs good leisure opportunities all in one package. Now that we are aiming to grow and attract new people to Luleå, it is particularly important that we are able to show that there is not just a good life to be lived here – but actually the best."

Peter Santeson, CEO of Infostat, explains the supporting data:

"The private economy is the starting point for the entire survey. The most important thing is to put together your housing cost estimate, and here the price level is absolutely decisive, together with the local job opportunities. Next come other factors that can play a role when deciding where to live: job, security, schools, communications, services, and so on."

Luleå's Mayor Carina Sammeli is proud of the distinction and is happy to extol the virtues of her home town, especially in her official capacity.

"I think the best thing about Luleå is the proximity to everything, while at the same time there is a wide range of most things. We are close to the countryside, but at the same time you can do almost everything here." ■

€6,2

BILLION is invested
in Luleå Industrial Park.

10%

OF SWEDEN'S CARBON
emissions could disappear
when SSAB change their
process.

**US FOREIGN
CRETERY
ANTONY BLINKEN
ON X FROM LULEÅ:**



In Luleå, I visited HYBRIT, a site developing the world's first low-carbon steel and leading the way on the clean energy transition.

@hybrit_project's near zero-emissions steel is helping reduce Sweden's total carbon dioxide emissions and paving the way for change. ■

TALGA PIONEERS EXPANSION IN LULEÅ INDUSTRIAL PARK

In September 2023, work commenced on establishing a new industry at Luleå Industrial Park. First came Talga, in the new part of Hertsöfältet. This facility is set to produce battery anodes using natural graphite sourced from Vittangi, leading to an impressive 92 per cent reduction in carbon dioxide emissions.



Cheerful and optimistic participants at the ground-breaking ceremony for Talga's battery anode factory at Luleå Industrial Park in Hertsöfältet. Seen here are Martin Phillips, European CEO and Global COO of Talga; Melissa Roberts, Talga's Chief Financial Officer; Carina Sammeli, Mayor of Luleå; Lotta Finstorp, County Governor, Region Norrbotten; Mark Thompson, Talga's Founder and Group CEO; and Johan Pehrson (Liberals), Minister for Employment and Integration.

PHOTO: TOMAS BERGMAN



**» OUR VISION IS TO
BECOME THE LEADING
SUPPLIER OF SUSTAINABLE
EUROPEAN BATTERY
ANODE MATERIAL «**

Mark Thompson, founder
and group CEO of Talga.

The natural graphite comes from Vittangi.

PHOTO: TALGA

Luleå Industrial Park is set to attract industrial investments totalling up to €6,2 billion.

It is here that the new green industrial revolution will happen. New climate smart technology will be established that will dramatically reduce carbon dioxide emissions. The project has captured global attention, putting Luleå on the world map.

Now the first sod has been turned. Talga has started work on building its new factory at Luleå Industrial Park, with construction taking place at Hertsöfältet next to Gräsörsvägen, where the company has acquired ten hectares of land for €1,5 million. The construction phase of the production facility is expected to create hundreds of jobs. The plant will also be run entirely on renewable energy, making it one of the most sustainable battery anode factories in the world – and a significant part of the green transition in Norrbotten.

“This is an extremely important milestone for us, and we will be the first commercial battery anode factory in Europe. Our vision is to become the leading supplier of sustainable European battery anode material,” says the company’s founder and group CEO, Mark Thompson.

ANNUAL PRODUCTION of battery anode material is sufficient for approximately 200,000 electric cars per year. The carbon dioxide saving from using Talga’s Talnode-C anode in batteries will be up to 92 per cent, thanks to the unique graphite and Talga’s in-house-developed technology. This gain has been calculated in comparison with the most common synthetic graphite anodes,



Robert Eriksson, on the right, visited Talga’s ground-breaking ceremony together with Oskar Hederyd of Luleå Business Region.

PHOTO: EVA SUNDGREN

which are often manufactured in China using oil as the raw material. Graphite is used in batteries due to its unique ability to conduct electricity.

“The result from this study is fantastic, and it can mean a substantial annual reduction in total carbon dioxide emissions for electric cars. Our aim is to be the best in the industry, and with the EU requirements for declaring the carbon dioxide footprint of batteries coming into place in 2025, we feel confident,” says Peter French, environment manager at Talga AB.

The ground was formally broken at a ceremony in the Hertsö area of Luleå Industrial Park on 11 September 2023. >>



Luleå's mayor Carina Sammeli giving her inaugural speech at Hertsöfältet.

PHOTO: EVA SUNDGREN

"The start of construction by Talga at Hertsöfältet in Luleå Industrial Park is a milestone. The preparatory planning, licensing procedures and land contracts have now become an actual industrial construction project," said Luleå's Mayor commissioner Carina Sammeli.

The factory that Talga is to build at Hertsöfältet is part of a project that has been named the "Vittangi Anode Project".

"Talga is the first piece of the puzzle in a huge industrial park that is going to result in a green transition throughout

Swedish industry, in more regions than just Luleå – but right now we're celebrating Talga," said Carina Sammeli in her inaugural speech at Hertsöfältet.

All that remains for the production to commence in Talga's full-scale battery anode factory is the construction of the factory itself. Additionally, all the licenses for the extraction of graphite at the deposit in Vittangi, Kiruna municipality, need to be in place, ensuring the factory has access to the necessary raw material from the local area. ■

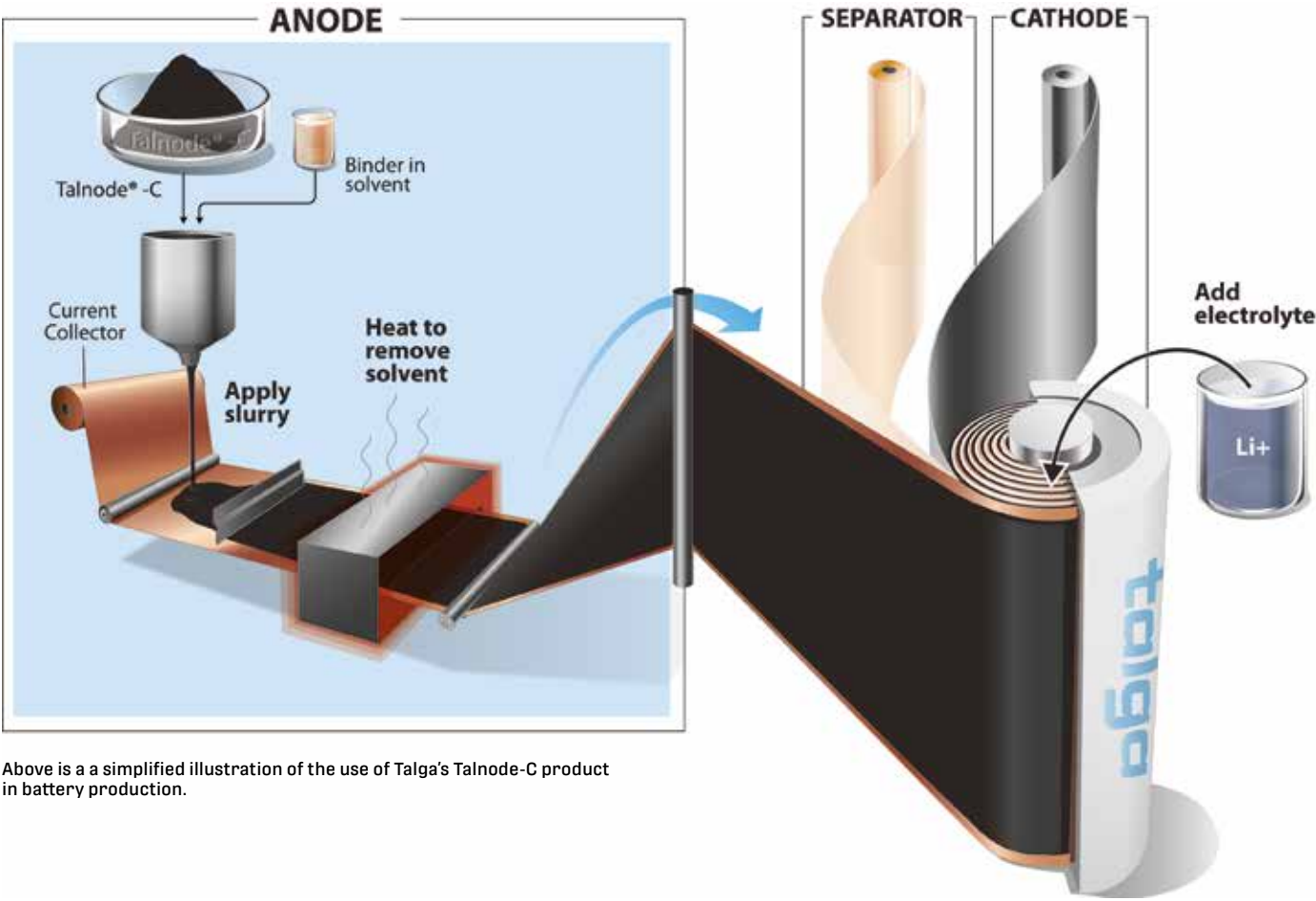
» TALGA IS THE FIRST PIECE OF THE PUZZLE IN A HUGE INDUSTRIAL PARK THAT IS GOING TO RESULT IN A GREEN TRANSITION THROUGHOUT SWEDISH INDUSTRY «

Carina Sammeli, Luleå's Mayor.

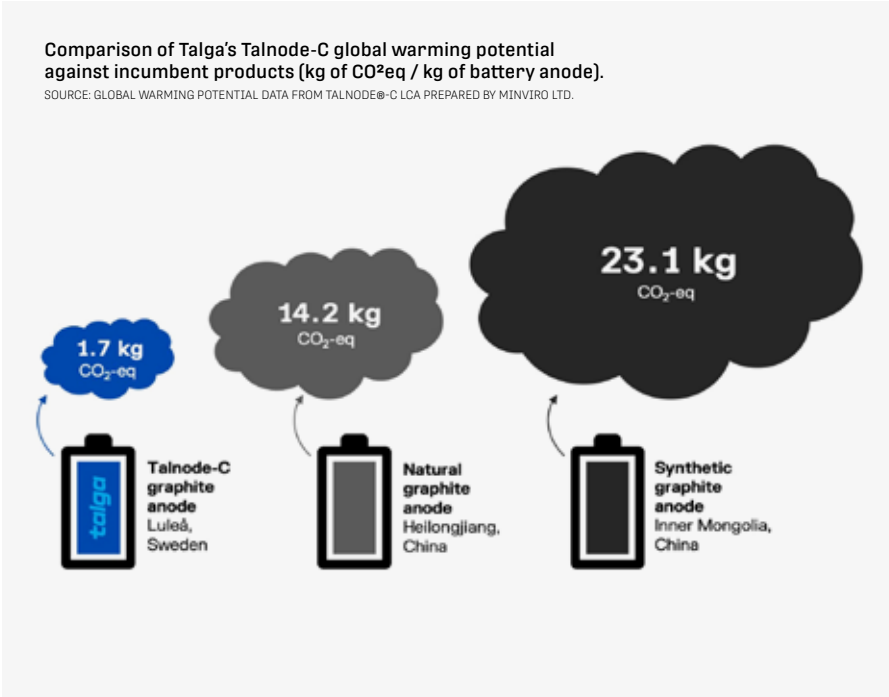


There was significant interest in attending the ground-breaking ceremony for Talga. This is hardly surprising, considering that it is here at Hertsöfältet where the new green revolution will unfold – a revolution that will establish innovative climate-smart technology, dramatically reducing carbon dioxide emissions. This project has garnered global attention for Luleå.

PHOTO: EVA SUNDGREN



Above is a simplified illustration of the use of Talga's Talnode-C product in battery production.



FACTS/TALGA'S PRODUCTS

TALNODE-C
 Talnode-C is made from Swedish high-quality natural graphite and using proprietary coating processes to offer industry-leading active anodes in sub-6 micron sizes. Talnode-C can be fine-tuned for different applications in Talga's vertically integrated production. It is characterised by low ohmic resistance, low swelling and low surface area, providing unique fast-charging properties and low-temperature performance for electric vehicles and consumer electronics.

TALNODE-SI
 Silicon-carbon composite (30–50% silicon) for use as an energy-boosting additive to existing commercial battery anodes. The drop-in design uses our proprietary graphene, silicon and graphite technology to enable low swelling and commercial production calendaring pressures, in a lower cost and highly scalable manufacturing process.

TALNODE-E
 Talga's proprietary next generation graphite-metal composite anode for solid state batteries. Talnode-E is designed as an alternative to pure metallic lithium anodes that can cause a range of issues hindering solid state batteries, including slow charge/discharge, safety of transport/production and higher manufacturing cost.



SUSTAINING THE STREAM: **INNOVATING WATER SOLUTIONS IN LULEÅ**

Luleå, a coastal city where water is never far away – a place where access to fresh water straight from the tap is taken for granted. Here, ongoing research and development aims to safeguard valuable drinking water, and develop new kinds of water. How does it all work?



"Luleå is a water city," asserts Petra Viklund.

Petra Viklund is the Director of Water and Waste Water at Lumire. When it comes to water quality and quality of life – areas which overlap to some degree – she has the following to say:

"Luleå is a water city, and many of us are accustomed to seeing beautiful mirrored water surfaces from our homes or when we're out and about. Water in its different forms is important for our sense of identity – including as snow and ice during the winter."

Over the last 15 years, Luleå has upgraded and updated its water and wastewater systems – from waterworks via pipe networks, and on to wastewater treatment plants. Lumire and Luleå municipality have

ensured that the city is equipped to accommodate almost twice as many residents as it currently has.

HOW HAS LULEÅ SUCCEEDED IN BEING SO FAR-SIGHTED?

"We have had brave politicians in our municipality who understood that water and wastewater are fundamental components when building a community. These therefore need to be in place before other components are developed. The result is a city that is prepared to welcome both people and companies wanting to move here," says Petra Viklund.

Looking at research and development relating to water, it is clear that there is a lot happening right

» WATER IN ITS DIFFERENT FORMS IS IMPORTANT FOR OUR SENSE OF IDENTITY – INCLUDING AS SNOW AND ICE DURING THE WINTER «

Petra Viklund, Director of Water and Waste Water at Lumire.



Lars Ekblad supplies technical water to the industrial park.

now. The objectives of these efforts differ all over the world, but what they have in common is the desire to find new ways of making the best use of drinking water, while at the same time developing new kinds of water, including what is known as technical water.

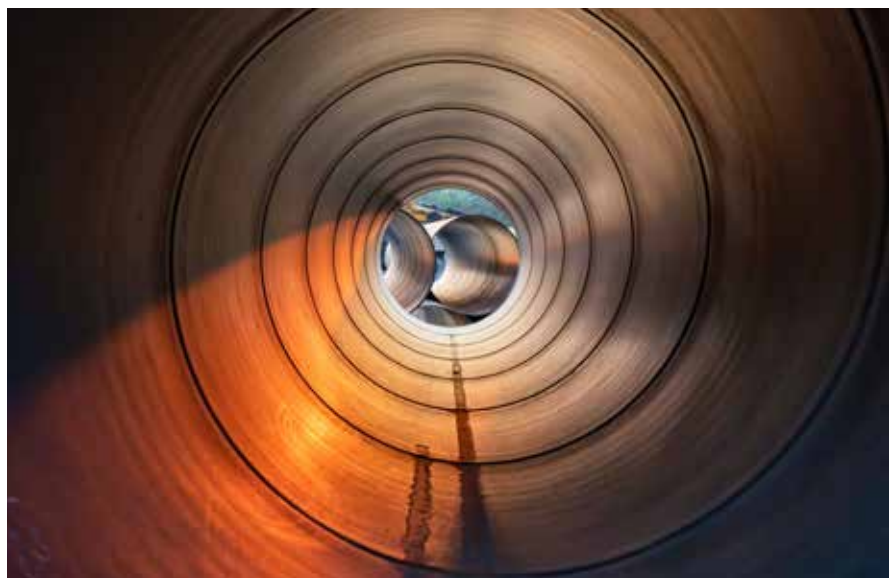
“There’s actually no legal definition of technical water, but what we mean when we talk about technical water in Luleå Industrial Park is a distributed water that might be cooling water, process water or deionized water. This is water that is not intended for use as drinking water and so does not need to be of drinking water quality,” explains Lars Ekblad, who is a project manager at Lumire.

HOW IS TECHNICAL WATER USED?

“It is common within industry to have your own technical water intake for cooling and process water, as is already the case for some industries in Luleå. Now, with new initiatives in progress, there are major benefits to be had from coordinating technical water solutions where large volumes are required by several operators. There are also applications where treat-



Lumire's CEO, Per Ekervhen, stresses that we should use the “right water” as technical water.



ed wastewater is used as technical water – something we have already looked at in Lumire and which could potentially fulfill some of the water demands on Svartön,” says Lars Ekblad.

For the municipal company Lumire, which provides both water processing and recycling and re-use in Luleå, circularity and sustainability are fundamental principles. Besides addressing the crucial water issue, Lumire is collaborating with partners in Norrbotten to develop practically fossil-free fuels, such as biogas. So far, biogas, which is used to run vehicles such as buses and refuse trucks, is just a small but important piece of the puzzle in terms of meeting future energy needs.

In conclusion, Lumire's CEO, Per Ekervhen, states:

“We want to change the profile of water, and also the way in which it is used – from something that is taken for granted, to our most important resource. It is something that is our shared responsibility. In our role in helping to build a society, we must also make sure, through research, development and by working together, that we can reduce our consumption and instead ensure that the right type of water is used for the right purpose.” ■

▲ The pipe network for technical water is a prerequisite for industries.

It means everything.

It doesn't look like much, does it? A solitary power line cutting through the tranquil pine forest. But don't be fooled. This line means everything. It represents the green transition underway in northern Sweden. Within industries, businesses and in the everyday lives of people. And at its core, powering this monumental shift, is fossil-free energy. The driving force, so to speak. **That's what we do.** Right from the center of this great change, we are creating a circular, innovative, and fossil-free energy system. Smart and robust enough to enable a world-leading green transition in northern Sweden and Luleå.

Climate change waits for no one, and neither do we. We make things happen for a better tomorrow. That's our true driving force.

What drives you?

