

Part 1

Eramet Norway

Sustainability Report 2021



Key Figures Eramet Norway

2021



*Number of injuries with and without absence per million working hours

Part 1

In this part of the report, we present our company and what is important to us:

Our employees, our products and our social responsibility.

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We are stronger together and we improve together



Bjørn Kolbjørnsen
CEO Eramet Norway

2021 was the first year for ERAMET's new manganese alloys entity, and we got off to a good start. Both operational performance and financial results for this part of the Group's operations were higher than in previous years. The main reason was our ability to utilise our experience, flexibility and collaboration in a turbulent market, along with favourable prices.

When we do well and have solid plans, the Group invests. Eramet Norway is a key part of the Group's manganese alloys business and we have never been in a better place to achieve our goals of leading the way in sustainability and keeping our position as a world leading producer.

Working together to ensure health and safety

The Covid pandemic affected much of last year as well, and we worked hard to safeguard the health of our employees and contractors while maintaining operations at our three plants. In one of the most challenging Covid periods, from April to June, the relining of Furnace 11 in Porsgrunn involved more than 200 contractors. This work was carried out without anyone becoming sick or getting injured.

However, we were not able to improve Eramet Norway's overall

safety results compared to 2020. Though we had a plant with no injuries in 2021 as well, which proves that this goal is attainable. The "Best Sammen" (Best together) initiative started in Porsgrunn in 2021, and the program aims to improve the culture of safety and improvement in our organisation. How we communicate and collaborate is at the core of this program, which is also a central aspect of "Safe learning environment" in our "Lærende Hverdag" (Every day learning) model. We have partnered with Kulturkompaniet for this training, and the program will be rolled out to all plants in 2022.

Now that we are well into 2022, I am happy to be back at the office and once again meeting up with all of our committed staff.

Working together to solve the climate crisis

As the climate challenge is massive and its effects are getting increasingly apparent, it is good to see that more and more people agree on both objectives and measures, and that we all work together to solve it. In Europe, we see that the policies that utilise both incentives and fines, i.e. risk relief and climate quotas, are starting to have an effect. As an example, the quota prices rose from EUR 34 to EUR 82 per tonne in 2021, an increase of almost 240%.

EU has launched 'Green Deal' and a number of other targeted programs. At Eramet Norway we are part of the Horizon 2020 PREMA and EIT RM TripleLink projects. In addition, we are applying to the Norwegian government for risk relief for some of our projects.

In 2021, we made significant progress on a number of our important climate projects. We are involved in several ongoing collaborative initiatives to develop a unique biocarbon product as a substitute for fossil coke as a reducing agent in our furnaces. One of the products has been validated through a pilot study, and the next step is to conduct industrial tests. Enova supported us with risk relief of up to NOK 62 million to confirm the technical feasibility of this innovation. This is an important milestone in our climate roadmap!

The pilot facility for energy recovery at the Sauda plant was launched in the late summer of 2021. This project aims to reduce energy loss by recovering furnace gas and utilising it in gas engines to generate electrical and thermal energy. This can be used for both internal and external industrial purposes. The first results are very encouraging. We have received good backing from Enova on this project as well.

In addition, we are well underway with our carbon capture project, where our first goal is to install a pilot plant in Sauda as a basis for the development of a full-scale capture facility. In the first phase of this project, we have greatly benefited from being part of the Eyde Cluster and the support we have received from Gassnova.

Our customers in the steel industry performed well financially last year. As a result, projects related to low-emission steel production are accelerating as the large steel companies can now afford to invest in the future. The greenhouse gas emissions related to the production of our manganese alloys are among the lowest in the industry, which in the years to come will be a competitive advantage. And our ambition is clear: We will still be here when the requirement is zero CO₂ emissions!

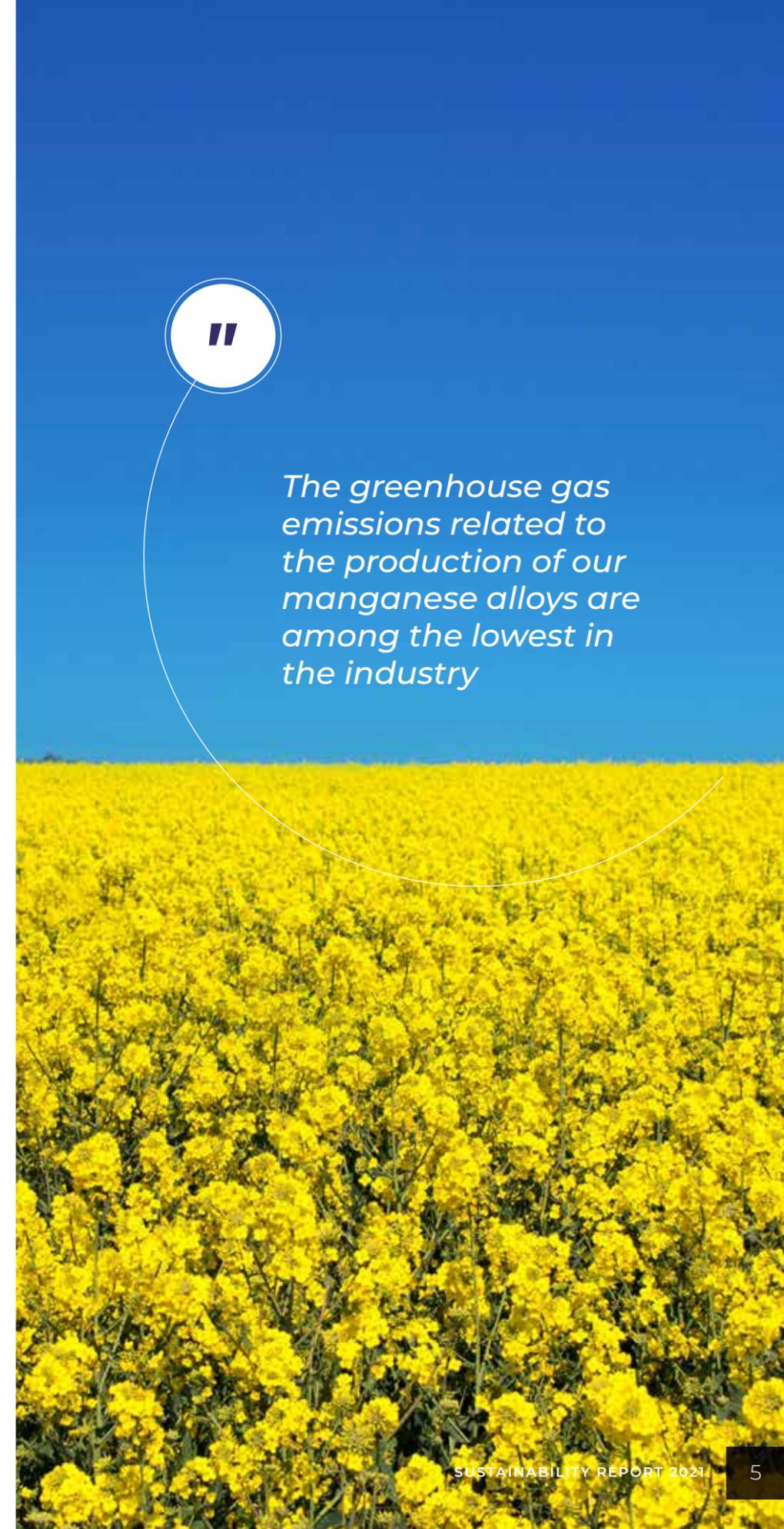
Working together to end Russia's war with Ukraine

The year 2022 began with something as unexpected as a war in Europe. It is difficult to say how the war will develop and what the implications will be for those of us who are not yet directly affected. Fortunately, most countries in the world condemn Russia's actions and support the Ukraine, and we give our wholehearted support to the collaborative effort of the economic sanctions against Russia. Even if the ripple effects of those sanctions can be severe in our markets and for us, they are most definitely preferable to an escalation of the war.

We are once again facing a year that will be challenging in many areas, and again our ability to adapt will be important. We are committed to our ambitious goals, and we will, in cooperation with our many stakeholders, maintain our pace and keep our position as a world leader in the production of manganese alloys.

”

The greenhouse gas emissions related to the production of our manganese alloys are among the lowest in the industry



The ERAMET Group

Eramet Norway AS is fully owned by the French mining and metallurgy group ERAMET SA which have 13,373 employees worldwide.

The Group's overall goal is to «become a reference for the responsible transformation of the Earth's mineral resources for living well together». In 2021, this goal was included in the company's statutes, strengthening ERAMET's position as a socially responsible, committed, and contributive corporate citizen.

From robust and resistant infrastructures to more efficient means of mobility, safer health tools and more effective telecommunications devices, metals serve our well-being every day. They are also essential for tomorrow's world, with a strong demand for critical metals required in the transition to renewable energy.

In 2021, ERAMET accelerated its repositioning as a pure player in mining and metals with a two-folded strategy:

- Grow in metals supporting global economic development: manganese ore & alloys, nickel, and mineral sands
- Develop critical metals and activities for energy transition: lithium, nickel/ cobalt salts and battery recycling

ERAMET's excellent performance in 2021 with a doubling of its EBITDA to more than EURO 1bn fully confirms the relevance of this strategy.

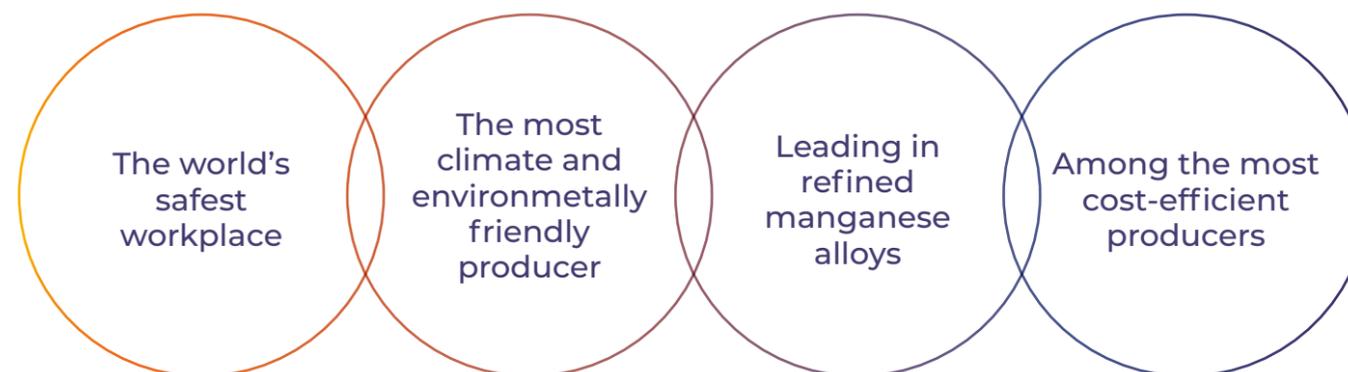
Eramet Norway's three smelters play a major role in the Group's manganese alloys activities, which also consists of the smelters in Marietta (USA), Dunkerque (France), and Moanda (Gabon). In 2021, these activities contributed significantly to ERAMET's EBITDA thanks to an increase in production (+7% vs 2020), improvements in the product mix and record-high price levels.



About us

OUR STRATEGIC GOALS

In our industry, we aim to be:



We work in a learning environment

With its three smelters in Porsgrunn, Sauda and Kvinesdal, in addition to an R&D department in Trondheim, Eramet Norway is a world-leading producer of manganese alloys for the global steel industry. The company currently has about 530 employees and welcomes a large number of apprentices each year to complete their vocational training at our facilities.

Eramet Norway is firmly rooted in Norwegian industrial history with over a hundred years of operation at the smelters in Porsgrunn and Sauda, and production at the plant in Kvinesdal since 1974. Our smelters are modern facilities due to continuous process and equipment development, and use of new technology and management systems.

Skilled employees

Our skilled employees have developed their expertise across generations to ensure good use of equipment, and they work purposefully to implement improvements. This means that our processing plants have high stability and good capacity utilisation.

Modern technology

The refining process is today an advanced, high-tech process: precision and experience are essential - from the optimal combination of manganese

ore and coke mixed and filled in the furnace, to the management of the crucial refining process. With the aid of advanced control systems, every single part of production is monitored, and the laboratories continuously take samples to ensure the quality of both raw materials and products.

World-leading

Eramet Norway is today one of the world's most climate and environmentally friendly producers of manganese alloys due to several years of systematic knowledge building, targeted investments and continuous development of the organisation. This work continues, and the company's roadmap for climate and the environment includes ambitious goals and development projects related to biocarbon, carbon capture and circular economy which are described in Part 2 of this report.



OUR VISION

A world-leading manufacturer of manganese alloys through involvement, innovation and job satisfaction

Our organisation

Eramet Norway produces metals the world needs for the future zero-emission society, and we do so in a resource-efficient way. Eramet Norway is more than a world-leading supplier of manganese alloys to the global steel industry.

We are also a partner for development and innovation both locally, nationally and internationally, and we are committed to contributing to the development of robust and future-oriented industrial regions in collaboration with local initiatives.

Organisation

Each plant is led by a plant director with a management team who are responsible for safety, environment, operation, and maintenance at the plants.

The head office is located at the plant in Porsgrunn where the CEO and several of the directors of our common support functions are based.



We aspire to be a preferred supplier, a value-creating corporate citizen, a good neighbour, a respected partner and an attractive workplace.



The most flexible production system

The smelter, established in 1913, is part of the leading industrial cluster on Herøya. This location provides great opportunities for cooperation and further development of processes and working methods, including in areas like circular economy. This plant is considered to have the most flexible production system of all the manganese smelters in the ERAMET Group.



- 160 employees
- 14 apprentices



- Two furnaces at 38 and 32 MW
- A facility for Manganese Oxygen Refining (MOR)



- Ferromanganese: HC FeMn, MC FeMn 1.0-1.5%, LC FeMn 0.5%
- Silicomanganese: Standard SiMn
- By-products for external sales: MOR dust, Silica Green Stone (SiGS), energy rich furnace gas
- Large amounts of by-products are used internally

* High Carbon, Medium Carbon, Low Carbon

Environmental milestones:

- 2000** Mercury cleaning facility (MRU)
- 2002** Centre chimney filter Furnace 11
- 2007** MOR filter extended
- 2011** New centre chimney filter Furnace 11
- 2018-19** Measures to reduce noise: new doors, gates, isolated walls, sound silencers and fans/equipment
- 2020** Pilot "New process water cleaning concept" (SRA)
- 2020** Project for measurement and analysis of content of dust downfall
- 2021** Relining of Furnace 11 / MOR – reduction of dust emissions

The largest refined ferromanganese producer

The plant in Sauda has been a large part of the local community since its establishment in 1915, and it remains an important partner for business development and cultural activities. In the ERAMET Group, the smelter in Sauda is the largest in terms of number of tonnes produced and it has the highest production of refined ferromanganese. The by-product ferromanganese slag is an important input factor in the production of silicomanganese at the plant in Kvinesdal.



- 166 employees
- 29 apprentices



- Two furnaces at 42 MW
- A facility for Manganese Oxygen Refining (MOR)



- Ferromanganese: HC FeMn, MC FeMn 1.0-1.5%, LC FeMn 0.5%
- By-products for external sales: MOR dust, recycled electric and thermal energy
- Large amounts of by-products are used internally

Environmental milestones:

- 2000** Upgrade of water treatment plant (VRA)
- 2002** Construction of heavy metals treatment plant (MRU)
- 2004** Construction of centre chimney filter
- 2010** CCT for dust emissions surveillance
- 2012** New treatment plant at MOR
- 2014/17** Watering system over sandbeds MOR and furnace house roof openings
- 2017** Continuous laser measurements for dust in furnace house
- 2020** New slag casting smoke extraction system



Specialised silicomanganese products

The plant, established in 1974, has an efficient production flow with its compact infrastructure, and slag from the Sauda plant is used as a raw material. About 80 GWh of electrical energy is recovered annually at the thermal power plant, and surplus heat is used both internally and by external customers. The plant has the ability to produce a number of specialised silicomanganese products.



- 203 employees
- 21 apprentices



- Three furnaces at 30 MW



- Silicomanganese: Standard SiMn and LC SiMn
- By-products for external sales: Silica Green Stone (SiGS), electric and thermal energy
- Large amounts of by-products are used internally

Environmental milestones:

- 2000** Cleaning facility for PAH
- 2000** Mercury treatment plant (MRU)
- 2015** New deposit established at Fosslund
- 2016** Extraction system above the casting beds
- 2018** New slag water system
- 2019** New centre chimney filter
- 2020** Improvement of mercury treatment plant (MRU)
- 2021** New treatment facility for surface water

Research and development for a sustainable future

Eramet Norway's R&D department is located at Sintef/NTNU in Trondheim. The department develops technological solutions and innovations to produce more efficiently and to further reduce our climate and environmental footprint. In 2021, the department's focus areas were expanded to also include the Group's three other manganese plants.



• 4 employees

The department aims to support the plants' long term goals by developing expertise in the following areas:

- Manganese Oxygen Refining (MOR)
- Low carbon silicomanganese (LC SiMn)
- Carbon materials, including biocarbon and electrodes
- Dust emission control
- Climate solutions
- Circular economy
- Digital transformation

The department cooperates with Eramet IDEAS, the Group's technology centre in France, and with leading universities, research institutes, clusters and other companies.

The collaborative projects have an annual budget of about NOK 250 million, and several of these projects are supported by the Research Council of Norway, Enova, Gassnova, Innovation Norway and the EU.



Photo: Erik Børset

Our most important research partners

NTNU

NTNU, the Norwegian University of Science and Technology, is the country's largest and leading educator of engineers and civil engineers. The disciplines range from nanotechnology and IT to petroleum engineering and ship design. NTNU cooperates with some of the country's most important technology and industrial companies and has its own research environments. Eramet Norway cooperates mainly with the Department of Material Technology.



FFF

The Norwegian Ferroalloy Producers Research Association (FFF) is the most important arena for the industry's joint research. The organisation was founded by the Norwegian ferroalloy industry to collaborate on research on ferroalloy processes and products.

FFF goal is to support the Norwegian ferroalloy industry to maintain its strong position through long term collaborations with leading research institutions and to contribute to maintaining relevant educational programmes.

Swerim

Swerim is a Swedish leading metal research institute that conducts research and development of metals and processes from raw materials to finished products. The goal of the institute is to strengthen the industry's competitiveness through increased product quality, higher resource efficiency and more sustainable production processes. By being a strategic R&D partner, the company wants to strengthen its customers' competitiveness and contribute to the development of new processes, materials and product solutions.

SINTEF

SINTEF is a broad, multidisciplinary world-leading research institute with international expertise in technology, science, medicine, and social sciences. SINTEF conducts commissioned research as an R&D partner for business and local authorities and is among the four largest mission research institutes in Europe. Eramet Norway cooperates mostly with SINTEF Industry, in addition to projects with SINTEF Energy and SINTEF Digital.

NORCE

NORCE Norwegian Research Centre AS was founded in July 2017 and is one of Norway's largest independent research institutes. NORCE delivers research and innovation in energy, health, climate, environment, society and technology to contribute to required innovation and restructuring together with business and the public sector. Their solutions respond to key social challenges and contribute to value creation locally, nationally and globally.

Safety work is never finished

We work systematically, every day, to ensure that our employees go home just as healthy as when they arrived to work. Our goal is to achieve zero harm: "Safety first, for everyone, always".

In addition to "Our Safety Requirements", which are our rules for what we must do to work safely and securely, we have established a Safety Roadmap on how we can become "the safest workplace – without injuries". The roadmap includes four pillars, and it is the combination of these pillars that provides potency and brings a totality to the roadmap. The pillars are:

- Strengthen our safety organisation
- Reinforce "Our Safety Requirements" and increase risk competence
- Improve safety systems, methods, and equipment
- Further develop a strong and mature safety culture



Injury rates

TRI: Number of injuries with and without absence per million working hours. The columns show the number of injuries with absence for our own employees and contractors.

■ Contractors
■ Employees
● TRI rate



Increase competence in risk investigation and root-cause analyses

It is said that dangerous situations and accidents do not occur, they are caused, that there are reasons why they (almost) happen. We have a risk-based approach to our safety work, and if we are to anticipate incidents, we need to understand why incidents happen.

All employees should have an active relationship to what risk is and how hazards can be identified and managed. We have therefore made a clear commitment to increase the organisation's awareness and understanding of risk. Through the combination of theoretical training in classrooms and practical training in the field, the hazard and risk identification are linked directly to the employees' own work situation. We

have seen a very positive development in the use and the understanding of Take 5 by including it in risk training. Take 5 is our tool for individual assessment of risk to be used in advance of a work operation.

To prevent repetition of dangerous situations and accidents, we must also understand why they occur. This requires thorough, systematic root-cause analyses, including investigations. We work systematically to increase the organisation's expertise in this important field – both through training and active participation in these processes.

What is required to learn from mistakes?

It is human to not always want to report faults or mistakes you have made, or things you have been exposed to. But very often when investigating

incidents a little more thoroughly, it is established that the cause is of a different nature than first assumed. Events, both with and without actual consequences, provide good learning, and we would like to be informed so that we can understand them and improve.

To gain a better understanding of the total risk situation and to more effectively find and implement the correct and timely measures, we need two things:

1. An environment where people are comfortable and are encouraged to report incidents
2. A reporting system that is effective – both to file a report and to manage the cases

Our improvement measures in 2021

The «Care» programme and a culture for speaking up

To improve our safety culture, we continue to work on the «Care» program, where transparency, trust and safety are important characteristics. The focus is to further develop our culture for speaking up, including training on ways to provide and receive constructive feedback.

Colleague conversations

In the autumn of 2021, we introduced the concept 'conversations between colleagues' at the plant in Porsgrunn. This is a casual conversation about safety between colleagues where the purpose is to reflect briefly together on how the level of safety is at one's own workplace, how one contributes and how to improve. The feedback is very positive, and the conversations help to strengthen the ownership of safety work in the organisation.

Safety coaches

The safety coaches - our boots on the ground - continue to do a brilliant job in promoting and guiding people in how to work safely. The success is confirmed and recognised by the scheme being extended beyond the original two year period.

Safety walkabouts

In 2021, we have also seen an improvement on the safety walkabouts on several aspects of the safety work and the performance of the organisation. The plant management and other key personnel conduct these walkabouts several times weekly. Through these encounters, the plant management receives important information directly from employees and demonstrates that they care and take safety seriously.

New reporting system

In the autumn of 2021, Eramet Norway exchanged the Synergi incident reporting system with Cority, a system recently introduced as a group standard. Cority is a complete system with different modules, and through 2022 we will work on implementing and making use of the various modules that Cority offers. The goal is to improve structure and visibility with safety measures and improvements, as well as strengthening the exchange of experiences and learning across both Eramet Norway and the Group.

Rytech Orion traffic safety system

Rytech's system for detection of personnel has been fully tested and implanted at the plant in Sauda and is now being rolled out in Kvinesdal and Porsgrunn. The system is designed to avoid collisions between heavy vehicles and pedestrians at our locations. All employees are to install a small transmitter in their helmet, and drivers are notified via screens in the heavy vehicles where they are in relation to the vehicle.

Sickness absence

Our short-term absence is low, and the total sickness absence in Eramet Norway amounted to 5.7% in 2021 compared to 5.9% in 2020. Despite that the year was marked by a pandemic and we at times experienced high short-term absence, this did not adversely affect the company to a significant extent. We are also pleased that none of our employees became seriously ill from Covid-19.

As an IA company (Inclusive Working Life), we are committed to preventing and reducing sickness absence and preventing exclusion from working life.

We believe that a positive working environment characterised by involvement, innovation and job satisfaction is a prerequisite for success, and we strive to be a company that is inclusive and that has a high well-being and a safe working day.

Sickness absence %
2018: 4,9%
2019: 5,8%
2020: 5,9%
2021: 5,7%

Our “Silent knowledge” is golden

Imagine if we could access all the experiences a person has - what a knowledge base!



Our employees have extensive experience and valuable knowledge. Many of our employees have worked here for 20, 30 and 40 years and have experienced many challenging situations. These experiences are internalised and often resurface in similar situations, even after 10-15 years.

Eramet Norway will see 60% of its employees change over the next 10 years due to retirement, and as a result a lot of knowledge might get lost. Therefore, one of the goals of the Læring-på-jobb (Learning on the job) project has been to capture some of this silent knowledge and document it through targeted training programs.

After a competence mapping in Sauda, we realised that the first version of Læring-på-jobb did not sufficiently cover knowledge about the furnace regulation. We have many skilled operators, but their knowledge and experience are not always easy to document or share. After brainstorming with operators and managers, a new and exciting concept saw the light of day.

More than 50 short training films; field exercises including walkabouts; test questions for independent study, and group assignments became a total concept that incorporates all learning strategies: «see, hear and do».

During the development of this project, it became apparent that much of this knowledge is also of relevance to others. Therefore, a bespoke programme has been created for everyone at the Sauda plant based on the original program.

Benjamin Nordhagen, former chemistry and process apprentice and today a photographer and designer, was in charge of the project together with Kitty Bøckman, project manager for the Læring-på-jobb project.

Nordhagen said: «As a former apprentice at Eramet Norway Sauda, I guess I had some reservations about how people would react to this, especially connected to being on camera. I've also been on the receiving end and thought 'now we're going to have to do this too', and to put it mildly, I was apprehensive about how this would be received. However, this nervousness I felt would prove to be completely unfounded. Basically everyone involved has been positive

about the project and has contributed with both their input and commitment.

«I have been approached by both apprentices and permanent staff. In fact, on several occasions many of the apprentices have asked when the material will become available, simply because they are excited and can't wait to see it. I think this also suggests that many people have a lot of expertise that they are proud of and that they appreciate the opportunity to share it.»

Prior to the filming, several meetings were held to determine the content of each film. Nordhagen said, «In addition, I must admit that I am impressed by how many people who have said that it was perfectly okay to be filmed. In fact, every single person who, after the first filming, have been asked to participate in another film have said yes!

«On a general basis, my impression is that most people see the benefits of the films and look forward to seeing them. For example, on several occasions people have experienced an eureka moment during this work. Several people have also asked me what topics are to be covered, whereupon they have said that they are looking forward to seeing the films. Overall, these are good indicators of the usefulness of these films.»

Everyone at the Sauda plant is to complete the training in 2022, while the development of a similar programme is now underway in Kvinesdal and in Porsgrunn as of the autumn 2022.



More than 50 training films are available.

About Læring-på-jobb

The Læring-på-jobb (learning on the job) project started as a pilot in 2016/17 to raise the competence of the operators in the warm process area. At the centre is the concept that operators create training for their own. They know exactly what is important to be able to do in the task at hand and create the right questions that require you to look up work instructions, procedures and digital tools to find the right answers.

Much of the training itself takes place through self-study, so that you can train your «learning muscle» by actively having to seek out the knowledge in the systems we have, or approach colleagues for discussions and experience sharing. After finishing the training, the employee signs up for verification of the knowledge. This is a review of different aspects of the curriculum, and here the operator has the opportunity present the knowledge gained to an experienced specialist, who evaluates the operator's knowledge level.

The training course should be repeated after 2-3 years. Tailor-made arrangements have been created for operators in warm process, cold process, environment, mechanical, electro / automation, and for safety delegates, managers and specialists, as well as arrangements for simulator (furnace regulation).

Part-time engineering studies

Eramet Norway wants to stimulate all employees to develop in their jobs. For operators, this might involve further studies. We have several employees who go on to technical college after completing their apprenticeship. We also have operators who receive a type of trainee positions, where they work 50% and study engineering 50% in a flexible scheme. We currently have four trainees in process, automation, mechanics, and construction.

The Eramet Norway Sauda - Sauda upper secondary school collaboration



«For the school and its pupils, it is a privilege to be able to focus on sustainable development together with an industrial partner that is a pioneer in the green shift.»
-Bård Lien, principal

To be both an upper secondary school and a county municipal regional centre of competence is a great social mission: For students, business and the regional communities, Sauda upper secondary will open the doors to the world and the future.

The school's mission includes facilitating learning within the following three interdisciplinary topics:

- Public health and life skills
- Democracy and citizenship
- Sustainable development

Training with such a direction requires competence. Therefore, the school must be among those that lead.

Upper secondary education in vocational areas

The school's curricula and Eramet Norway's systems mutually benefit through the vocational training for students in the subjects of technology and industry as it is dependent on both the school's and Eramet Norway's competence through an expanded corps of competent instructors and teachers.

During the first year (Vg1), the pupils also experience what it is actually like to work at the plant, and they receive knowledge about operational technology that the school cannot provide, which stimulates motivation and expands learning outcomes.

During the second year (Vg2), the pupils are given expanded knowledge about the production processes and relevant professional competencies. This is reinforced by pupil placements for four weeks in autumn and three weeks in the spring, in addition to visits at various technical installations.



Foto: Roger Haraldsen

Vocational and study competence (YSK)

Eramet Norway Sauda was among the driving forces and initiators for establishing this training programme which results in both a professional vocational certificate and access to higher studies. The pupil studies both subjects preparing for university studies and practical vocational training. YSK is a long-term investment as students with vocational training become excellent specialists.

The YSK programme requires a formalised training collaboration between the school and the company. Every year, two to three local young people are offered placements as YSK candidates at Eramet Norway Sauda. Four years of training at the company from the age of 16 results in skills and knowledge that increases the chance of recruiting some of these candidates after they have completed their engineering studies.

When the industry and the school system collaborate

«The smelter i Sauda brings joy to the hearts of those of us who love the process industry. Sauda, together with Ullensvang, Kvinnherad and Suldal, constitutes one of Norway's many robust process industry regions.

A strong and dynamic school system and educational programmes that reflects the need of our businesses is crucial for preserving and further developing the national competence advantage that we have today – and it is a prerequisite if we are to succeed in creating new and exciting green industry initiatives.

One of the characteristics of Norwegian industry is the interaction between business and the school system. Through the Sauda YSK programme, highly sought-after candidates are educated through a valuable combination of practice and theory, and best of all, the education takes place locally.»

Stein Lier-Hansen
Managing director
Norsk Industri – the Federation of Norwegian Industries



Competence development for Eramet Norway's employees

Specialist operators at the smelter's mechanical department receive training and the exam for the DNV-approved welding certification, as well as recertification and professional upgrading of skills at Sauda upper secondary school. The professional operators are qualified for repairs, maintenance and major operations.

Inspection of welding work, among other things, on lance heads and tap ladles is carried out by a certified controller and teacher at the school. This special competence is also available to the school's vocational students, both through theoretical training and by practical participation.

Through the school's cooperation with Western Norway University of Applied Sciences and other institutions, higher continuing education is formed by the requirement from Eramet Norway and other private and public enterprises in the region.

The school is also engaged in language training for foreign employees.

Regional and community development

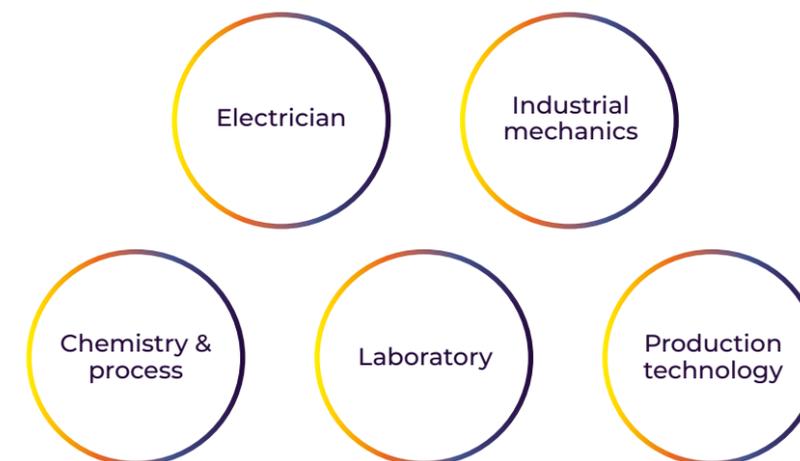
The national 'Competence Reform' (Kompetansereformen) states that no one should become outdated due to a lack of competence. Competence enhancement for businesses in our region is facilitated through the MOR collaboration (Motivation – Opplæring – Rettledning: Motivation – Education – Guidance).

A MOR board composed of county, municipal and business representatives, including Eramet Norway, stimulates and supervises competence development processes in the region. In addition, Sauda and Suldal have a joint cooperation forum that meets regularly to discuss new areas of collaboration and interaction.

Facilitation of education and lifelong learning where people live is considered crucial for success.

In the time ahead, we will focus on the competence needs associated with new and green business development initiatives in Ryfylke.

Eramet Norway's vocational certificates



Eramet Norway Sauda offered 31 pupils from Sauda upper secondary school a placement to complete their vocational certificates at the smelter between 2017 to 2021.

Best practices and continuous improvement groups

Our culture is built on a participation-based management philosophy. In short, it is all about trust, and we know employees themselves see how tasks can be handled in an optimal way. Thus, employees have been engaged in developing best practices and documenting our procedures.

Eramet Norway's approach is «Lærende hverdag» (every day learning), which describes the interaction between the people who operate and support our plants, the technology that enables us to produce manganese alloys in a resource-efficient way, and the organisation of our methods and tasks. Procedures and work descriptions are an important part of all six principles of «Lærende hverdag» and are an essential prerequisite for continuous improvement. They form the basis of where we are now and the starting point to discuss how to get better.

LÆRENDE HVERDAG OUR WAY OF WORKING



Continuous Improvement Groups

Supported by management, we have established continuous improvement groups to achieve the best results. Each team is composed of operators from several different work shift teams and their focus is to initiating / being drivers in improvement work in a single process. Each group is responsible for the preparation of best practices for its assigned process. This ensures input from all shifts and that best practice is communicated throughout the organisation.



The continuous improvement group who worked on "Reduced time between blows in Sauda", from left to right: Knut Ove Hetlesæther, Terje Håheimsnes, Øyvind Viland, Marcus Tomassen og Knut Nødland. Gruppen består også av Roar Birkeland, Vidar Johansen og Jon Birger Lofthus.

Two examples of continuous improvement groups:

Update of work descriptions

A major update of work descriptions on who to produce metal in Porsgrunn was conducted in 2021 where we reviewed existing documents and established new ones if needed. We also created a system for easy navigation using flowcharts and links. With the help of the continuous improvement group, we ensured broad support in the operations organisation.

Reduced time between blows in Sauda

Refining ferromanganese is done in a batch process where oxygen is blown into liquid metal to remove carbon. To increase the refining capacity, a continuous improvement group in Sauda has been working to reduce the time between blows. The group has included representatives from all shifts, as well as a mechanical operator and a metallurgy process specialist.

By identifying best practices and making improvements to equipment, the time between blows has decreased by about 10% and the daily production of refined increased by 3%.

The group has also worked on other improvement measures in the area, and this has been a good arena for discussing safety risks when working in the furnace house. The HSE department has also been an important contributor to the team.



Lean Six Sigma

In 2021, Eramet Norway started a collaboration with the Norwegian company Lean Tech to raise our expertise in problem solving and improvement work. The company offers training in Lean Six Sigma, which is a fact-based structured problem-solving method that emphasizes understanding of problems and causes before introducing solutions.

The competence levels within Lean Six are divided into colour-coded «belts»: Basic knowledge is white belt, level two «improve own processes» is yellow and level three «lead improvements and support others» is green, followed by black belt «Coach, lead and support others» while the champion level is «create culture of improvement».

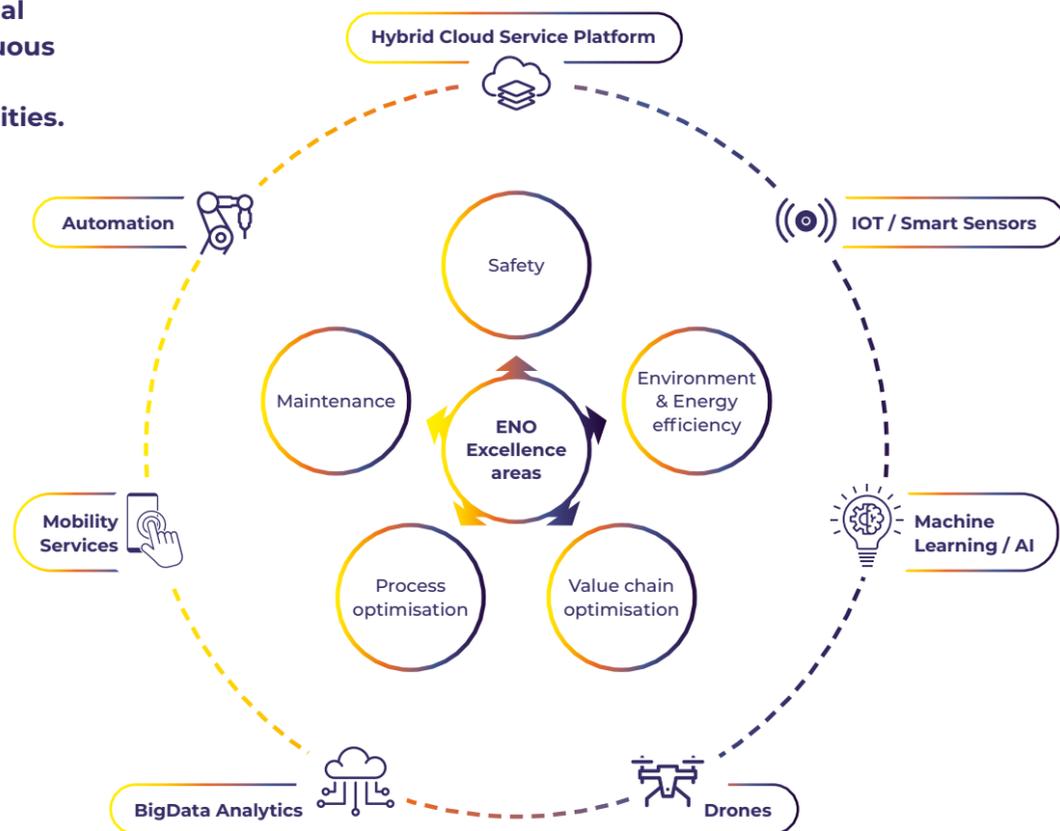
In the autumn of 2021, 24 of our employees started their training for the «Green Belt». The course, which is a mix of e-courses, online meetings and project assignments, will give participants the competence to lead improvement projects and support others in structured problem-solving.

Key to improving productivity and reducing costs

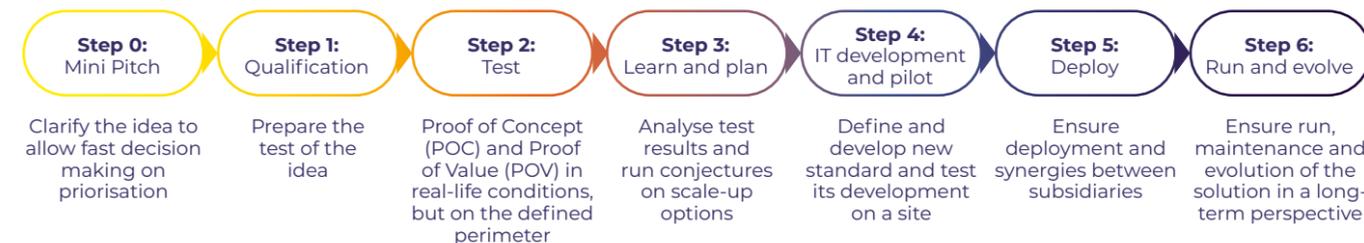
The implementation of the Digital Transformation Roadmap within ERAMET is key to improving productivity and reducing costs within all Group activities. The Digital transformation is one of the essentials of operational excellence and continuous improvement of our manganese alloys facilities.

Digital transformation at Eramet Norway was initiated in February 2017 with the development of the Proof of Concept (PoC) tests as a part of continuous improvements.

The first Digital Transformation annual Roadmap was launched in 2019 focusing on six key excellence areas mainly driven by seven digital levers:



To execute the digital roadmap projects, a seven-step digital transformation operating model was developed in alignment with the corporate plan for digital transformation:



The various digital transformation projects conducted at Eramet Norway the past few years have shown good results and helped understand the stakes, the required capacities and the cultural change behind digital transformation.

The enhanced cooperation between the manganese alloy plants started in 2021 called for a renewed Digital Transformation strategy consolidating all sites. Taking this opportunity to make sure we have a common strategy that will make the most of what digitalization can bring to the plants, a digital transformation vision and strategic long-term roadmap was created: **«Our digital transformation will contribute to a safe, sustainable, effective and flexible business unit through integrated, optimized and data-driven operations to provide the best manganese alloys to our clients.»**

An ambitious long-term roadmap was created taking current projects into consideration, with emphasis on process and transversal use cases that create the most value. It focuses on two scopes as defined:
Process optimization: Objective is to improve plants' production
Integration: Objective is to increase plants interconnection to boost business flexibility, building on existing initiatives.

Several digital transformation projects have been deployed during the last couple of years, to name a few:

- The anti-collision system Rytech Orion (see page 17) to improve safety at Sauda
- Manganese Furnace control (MFC Tool) for the Optimal control of the Manganese alloys furnaces at Kvinesdal
- Deployment of a de-slagging camera at Sauda for metallic loss reduction
- Installation of Monixo IOT sensors for conditional monitoring of health of critical furnace equipment
- MOR Advanced control system modelling for optimising the MOR process

There are also ongoing successful POCs contributing to the process optimisation and improvement, such as automation quantification of dust emissions, thermal monitoring ENP11 furnace, MOR refractory 3D scanning system, online analysis of material characterisation etc.



WHAT IS MANGANESE?

Belonging to group 7 in the periodic table, manganese is a metallic element with the chemical symbol Mn. Manganese is the most common heavy metal after iron.

There are large manganese deposits in the earth's crust, and manganese is also found as nodules on the seabed in deep oceans. Pure manganese is a hard steel grey metal, but it is readily pulverised.

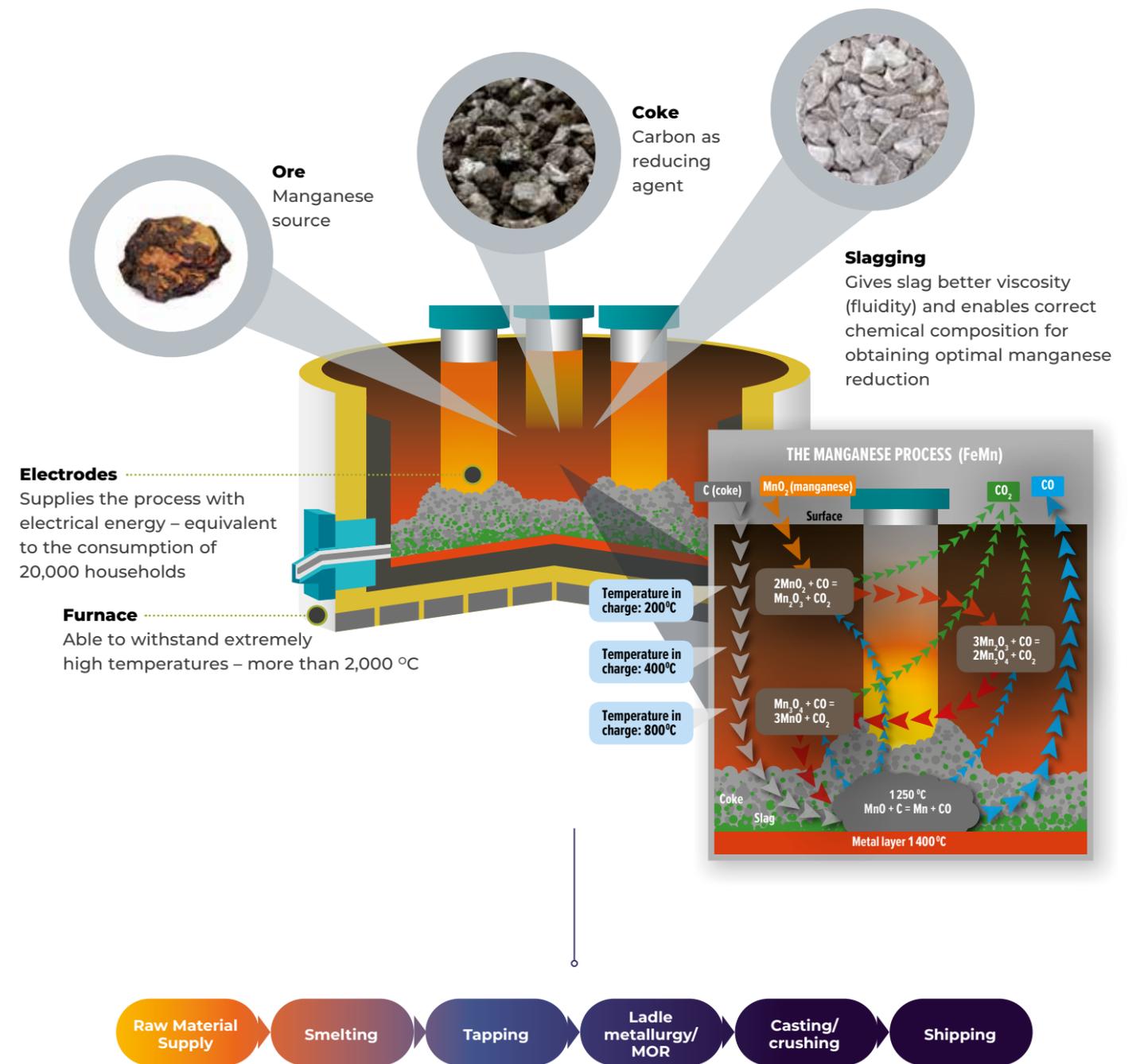
Manganese is extracted mainly from the mineral pyrolusite (MnO₂), commonly known as manganese ore. More than 80% of the deposits are in South Africa and Ukraine. Other significant deposits are in China, Australia, Brazil, Gabon, India and Mexico. Eramet Norway uses mainly ore from the ERAMET Group's mines in Gabon, as well as ore from suppliers in South Africa.

Our three smelters process the ore into ferro and silicomanganese alloys, which are input factors in steel to increase its strength, flexibility and heat treatment abilities. Refined ferromanganese alloys are specifically used by the car industry, while silicomanganese alloys are mainly used by in steel for the construction industry. Eramet Norway's main markets are Europe and North America, and our products are primarily transported to our customers by ship.

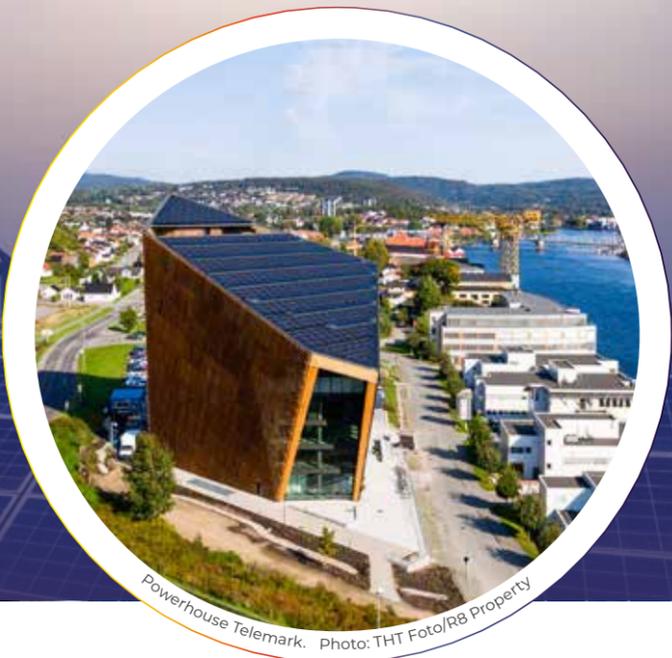
Manganese alloys is used as a component in steel to increase its strength, flexibility, and heat treatment abilities.



Manganese alloys production



Steel's significance in a zero-emission society

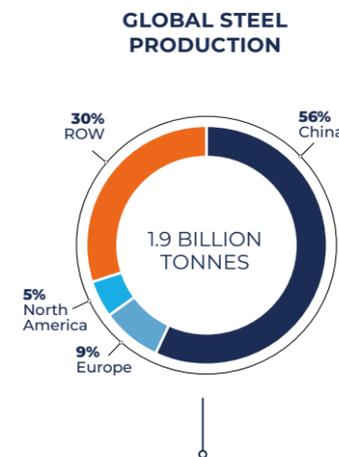
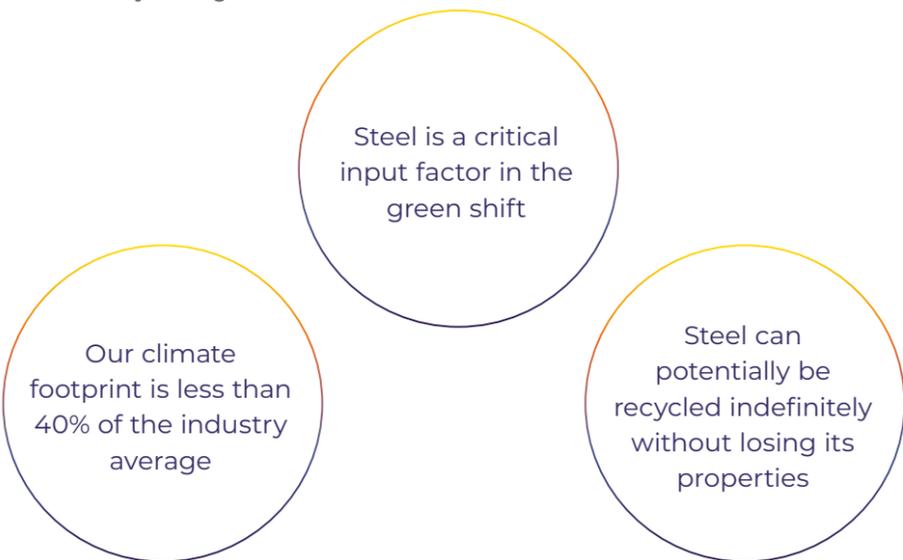


Steel is the world's premier construction material in everything from structures, industrial equipment and cars to consumables. As a result, steel, and thus also manganese alloys that make the steel ductile and durable, is an essential input factor to transform vital sectors like energy production and transport.

Robust, durable infrastructure is also crucial to create economic development and prosperity related to the many challenges connected to population growth, urbanisation, poverty alleviation and measures to reduce the negative effects of natural disasters.

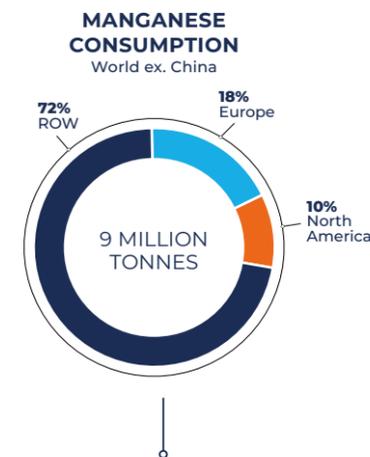
Although the production of steel and manganese alloys is resource-intensive, these products are crucial to society's zero-emission vision. The environmental footprint of Eramet Norway's manganese alloys, measured at Scope 1 and 2, are less than 40% of the industry average.

Steel can potentially be recycled indefinitely without losing its properties. In average, one tonne of steel includes about ten kilograms of manganese alloys and the production of manganese increases in accordance with the quality of the steel.



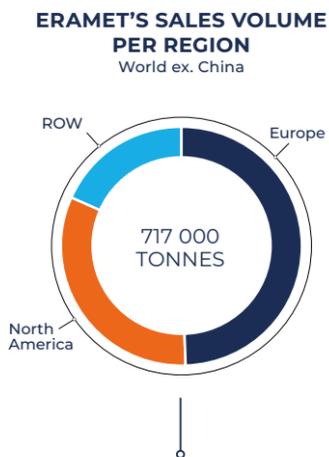
Steel
In 2021, the world's total production of carbon steel amounted to about 1.9 billion tonnes. China accounted for 56% of this, while steel production in our main markets, Europe and North America, accounted for 9% and 5% of the total respectively.

More than 35% of the world's steel production is used for structures and infrastructure, while about 20% is used for car production.



Manganese alloys
The total global consumption of manganese alloys outside China was in 2021 about 9 million tonnes, where of Europe and North America accounted for 18% and 10% respectively.

The consumption of alloys in the world outside China (ROW) distributed among the different manganese alloy products indicate that silicomanganese (SiMn) amounts to 59%, High Carbon ferromanganese (HCFMn) 28%, refined FeMn 9% and electrolytic manganese 5%. Eramet Norway's main product is refined FeMn.

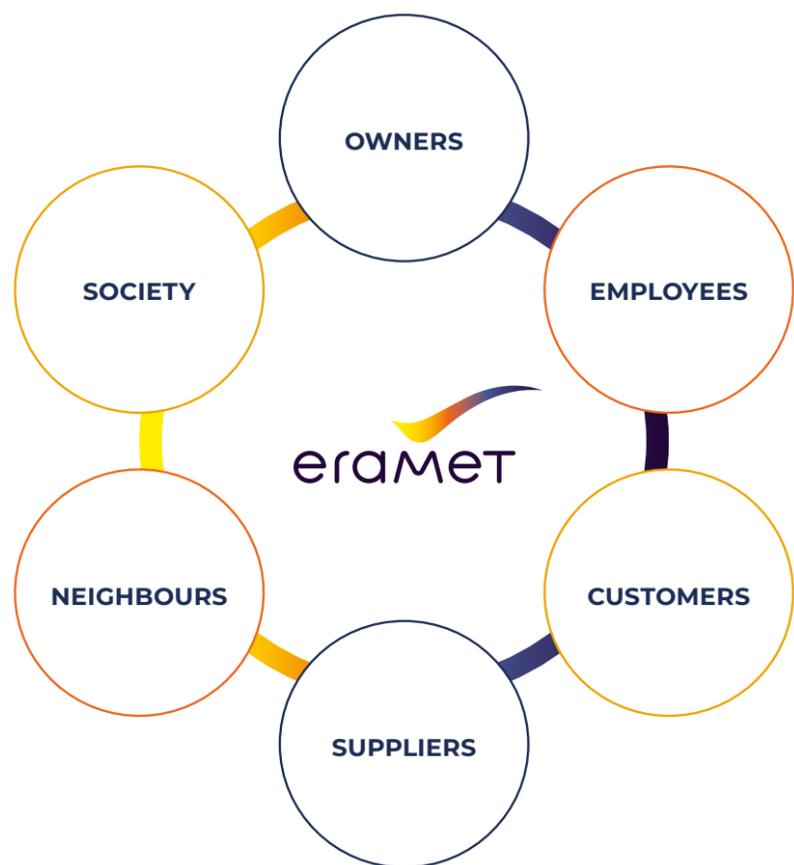


Our market position
The ERAMET Group sold more than 80% of its manganese alloys to customers in Europe and North America in 2021. We work systematically to increase our market shares in other regions like the Middle East, North Africa and Latin America.

Our market shares on the standard products SiMn and HC FeMn is rather low, while we are a world-leading producer with a high market share of refined FeMn.



Our social responsibility



Eramet Norway strive to be a driving force for community development in the communities where we operate. As part of the ERAMET Group, we focus on all aspects related to corporate social responsibility and sustainability.

We regularly conduct checks to ensure that we have a good balance between what we provide our stakeholders and what we ask to receive in return.

- Our **customers** will get their **products** at the right time and with the right quality – so that we can maintain and increase our market share.
- Our **employees** must experience a sense of **security** for themselves and their families – so that we can make the best use of their expertise and commitment.
- Our **owners** must receive a **return on investment** – so that we are secured resources to further develop our smelters in Norway.

- We must be a **demanding and predictable customer** who offers interesting contracts – so that we can achieve competitive terms from development-oriented suppliers.
- We will put minimal strain on the local environment and continuously **improve our environmental performance** – so that communities and neighbours value our presence and support our development plans.
- We will **create value** based on good access to renewable power and our high competence – so that we are ensured favourable conditions for further development and innovation, and we are viewed as an attractive partner for the authorities, competence environments and national public funding institutions.

We contribute

- We produce metals that are crucial to the success of the green shift, and our emissions are less than 40% of the industry average.
- We use renewable Norwegian energy in a way that creates jobs and economic value.
- We buy goods and services in Norway for about NOK 2,5 billion annually, where of about NOK 750 million in our local regions.
- We support sport teams, organisations and events in our local communities.
- We have on average of about 70 apprentices at any given time, and we are involved in the development of the educational system.
- We participate actively in work connected to business development and infrastructure in our regions.



«The Factory» and Sauda

Ever since its establishment in 1915, the smelter in Sauda has played a central role in the local community, a tradition continued by Eramet Norway. In addition to being an attractive workplace, we want to be a respected partner and a value-creating social citizen. In Sauda, we are involved in a number of projects for the benefit of our employees and the local community. Three major projects we allocated funding to in 2021:

Andedammen

Andedammen - the duck pond – located across the river from the smelter, is a park with small animals, including rabbits, pigs, goldfish, and many birds. Andedammen is a fun adventure for the little ones, and the park has barbecue facilities, tables and benches and a simple pavilion with benches in case of poor weather. With its central location, Andedammen is also a good starting point for walks both along Storelva and in the hills around Sauda. Several of our employees have been greatly involved in the extensive upgrade that has taken place in the area in recent years.

Åbøbyens venner

Åbøbyens venner is a volunteer association that works to ensure that cultural remains associated with the industrial establishment in Sauda at the beginning of the 20th century

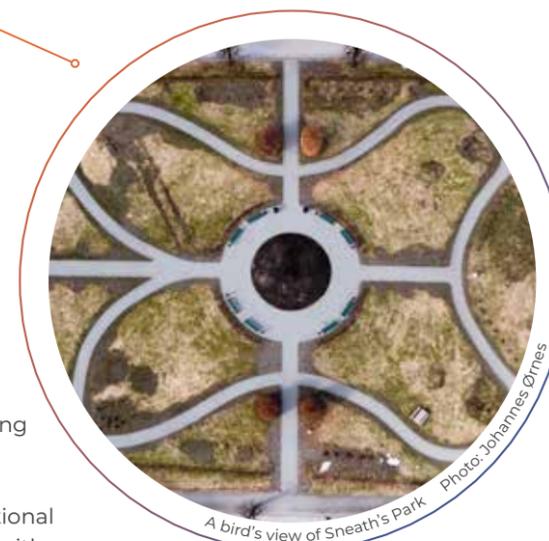
are preserved. The group is committed to motivating, planning and coordinating voluntary work related to maintenance and development of park and recreational areas in Åbøbyen in accordance with the cultural history of the area. An important element of this work is to increase the wellness of Åbøbyen as an inspiration to residents and visitors. Employees at Eramet Norway are involved in the association.

The largest project in 2021 was the upgrade of Sneath's Park, a park built in honor of the first director of the smelter, American William Henry Sneath. The park's official re-opening is scheduled for June 2022.

Sauda Klubb

Sauda Klubb was built as a banquet hall for the smelter's officials. The building was later sold, and the private real estate company Sauda Klubb completed the renovation of the premises in 2021. The club is now returned to its former glory with modern facilities, and the hall is available to rent for parties and it can include accommodations.

Eramet Norway supported the project because of the building's history and the desire to make it accessible to everyone.



Robust industrial regions

The Norwegian process industry produces metals, materials and chemicals that are essential to the success of the green shift. Many of these companies are now world-leading within their industries, both in terms of competitiveness and their climate and environmental footprint.

Norwegian industrial companies are often located in rural areas, and therefore it is important for the future of these companies that these regions are considered attractive places to work and live. These communities must be well-functioning, and they must offer a good quality of life and have health and welfare services.

A robust industrial region is characterised by:

- Good access to skills and expertise
- Varied job market, accommodation and services
- A competitive and adaptable business sector
- An equitable and stable health and welfare provision

Many industrial companies in Norway today have foreign owners, and most companies compete internationally. As a result, it is crucial to preserve and further develop the national competitive advantages we have.

In addition, Norway must actively participate in the European collaborations to ensure good competitive conditions and avoid special Norwegian schemes that will weaken the overall position of the process industry.

Norway is correctly placed for expanding on our national advantages through the design of a comprehensive policy that ensures further development of robust industrial regions and local communities.



«The Norwegian process industry has contributed to the growth and welfare for more than 100 years. Eramet Norway stands firmly on the shoulders of its history, aiming towards a future where we are in the forefront creating new history»

Conditions for further growth:

Renewable energy

Competitive and predictable conditions are essential to ensure that major and important decisions are taken in order to achieve our own and society's sustainable value creation goals.

The Norwegian process industry is processing renewable energy for products that are essential to the green shift. Norway's great potential for increased production of renewable energy must be managed in a way that meets the industry's needs.

Education and competence

More than 100 years of experience has given Norwegian industry another advantage. The high level of Norwegian competence, the participation-based work method and three-party cooperation must be preserved.

We are also facing a shift in terms of competence, both due the age profile and the increased needs related to sustainability and digitalisation. And the authorities must follow up guidelines described in the Competence Reform and Completion Reform.

Climate and environment

We need to prepare for another 100 years! Norway must participate actively in the European cooperation to ensure good competitive framework conditions and avoid special Norwegian schemes that weaken the position of the process industry.

Stable social conditions and a solid national economy ensures that Norway has a unique opportunity to ensure necessary risk relief at a level that reflects the major tasks we face.

Innovation and business development

The process industry represents a potential for increased value creation and new jobs based on circular economic solutions for higher energy utilisation and innovative concepts for the reuse of by-products and waste materials.

Technological solutions can become new sources of income for industry and competence environments, and it may contribute to increase the attractiveness of rural communities across Norway.

Transport and infrastructure

Industry is a driving force for local and regional development. The high value creation must be considered in the prioritisation of transport and road projects that facilitate larger work, living and service regions.

Good transport solutions are fundamental for the continued development of strong industrial regions in order to succeed with recruitment, establishment of new suppliers and contribute to increased collaboration between services and regions.

Eramet Norway is part of the competitive Norwegian process industry built on renewable energy and a skilled workforce.



Sustainability at all levels



The choice of supplier and product is an important part of our corporate social responsibility work because the ERAMET Group purchases on average 80% of its goods and services through external suppliers. We want to use sustainable and innovative suppliers.

The ERAMET Group is a responsible financial player, and we impose strict requirements on our suppliers. Everyone must comply with our policies and the applicable national legislation. We strongly oppose corruption and the Group's anti-corruption directive contains clear guidelines. In 2020, we introduced a whistleblowing system that enables all stakeholders, both internal and external, to report unwanted behaviour, corruption, and ethics violations.

Eramet Norway produces manganese alloys, a work that involves a certain level of risk. We therefore require all to abide to our strict safety requirements.

Below is an overview of our purchasing guidelines:

- Climate Change Policy
- Responsible Purchasing Charter
- Eramet Group's Ethic Charter
- Group Energy Policy
- Biodiversity Policy
- Group Health Policy
- Group Sustainable Development Policy
- The Environmental Charter

To read more about what each policy requires, please visit: www.eramet.com

All suppliers must register in our supplier system which is accessible via the Group's website.

The value of good suppliers

Eramet Norway have a close working relationship with its suppliers who contribute with their specialist knowledge, new ideas, practical solutions and good products. We aim to be a good partner and a demanding customer who require timely deliveries and sustainability.

In 2021, Eramet Norway's purchasing organisation acquired goods and services for NOK 3 billion, of which NOK 758 million from suppliers in our industrial regions.

Improvement suggestions

The good cooperation between the local plant organisations and their suppliers has been developed over many years. Today, the suppliers are important contributors, especially in our operations, maintenance, projects and internal transport, as well as in our improvement work.

As part of our cooperation with suppliers, we encourage them to present improvement proposals. Suppliers have specialist knowledge in their core areas and have contracts with other companies, and as such they often have insight into alternative solutions which benefit all parties.



A global player with a high national value creation

Close to 80% of ERAMET's manganese alloys are sold to steel mills in our main markets, Europe and North America. Together with the Group's sales force in France, we work to increase our market shares in other regions, including the Middle East and Latin America.

Raw materials and energy account for more than 75% of Eramet Norway's operating costs. Manganese ore is sourced from Gabon and South Africa, and in 2021, reducing agents were imported from several countries, mainly in Eastern Europe. Renewable power is our largest national cost element, but silicon sources are also purchased from Norwegian suppliers. National costs amount to about 45% of our total expenditure and investment costs.

Local goods and services for NOK 758 million in 2021

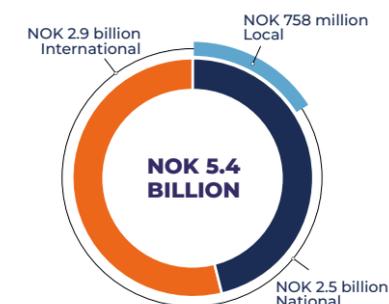
We bought goods and services for about NOK 2.5 billion domestically in 2021, despite being an international player that imports most of our raw

materials and sells our products in a global market. More than NOK 750 million of the national purchases take place in the regions where our smelters are located. The proximity of highly qualified suppliers in various disciplines is important to achieve both a safe and stable operation and to plan and implement development projects at the smelters.

Solid cost position provides high value creation

Eramet Norway operates in a competitive market with demanding customers who expect high quality and competitive prices. Continuous focus on development and improvements has enabled us to achieve a solid cost position. Several different reports have reviewed Norwegian business sectors and have concluded that the process industry is significantly more productive measured in value creation per employee than the national business and industry in average.

Purchases in 2021



Good results

Our green commitment generates solid environmental revenues which prove that a strong sustainable strategy can go hand in hand with improved performance and cost efficiency.

Total investments in Eramet Norway since 2000 equals NOK 3.5 billion, of which about NOK 1 billion is related to safety and environment

Significant increase in investments compared to 2020

The level of investment increased significantly compared to 2020 (+95%), mainly linked to the relining of Furnace 11 in Porsgrunn.

During 2021 the investment portfolio was largely focused on safety projects and environmental protection with new technologies implemented at all three plants. In addition, we delivered several major projects related to new equipment and maintaining productivity.

MNOK	2018	2019	2020	2021
HESE investments	69	63	95	81
Other investments	199	195	103	301
Total investments	268	258	198	382

Important environmental investments in 2021:

- Upgrade of the water treatment plant, Kvisnesdal
- Pelletizing facility for slag, Kvisnesdal
- Rebuild of MOR off-gas extraction system, Porsgrunn
- New cooling system MOR, Porsgrunn
- Cleaning of surface water, Sauda
- Adaption for PAH-free electrodes, Sauda
- Shore power, all locations

R&D spending increased by 6% vs 2020

In 2021, Eramet Norway spent 25.4 MNOK on R&D representing 0.40% of turnover (2020: 0.43%). Through alliances with other competence environments and companies in relevant industries, we are also involved in several collaboration projects with an annual spending of about NOK 250 millions. Climate and environmental projects make out around 60% of our R&D costs

97 MNOK
Sale of manganese dust

1.9 MNOK
Sale of Silica Green Stone

75 MNOK
Sale of recovered energy at Kvisnesdal

0.2 MNOK
Sale of hot water at Kvisnesdal

Making the most of a very favourable price environment

Adaptability in production and agility of the organisation

The overall alloys production in 2021 was 528 000 tonnes, 27 000 tonnes above 2020, thanks to the market recovery.

Our main focus was on Refined FeMn to consolidate our world-leading position. Despite the relining of Furnace 11 in Porsgrunn, Sauda's new production records and the exceptional flexibility of our industrial set up made it possible to tackle the booming demand.

On SiMn, all our furnaces ran smoothly and Kvisnesdal recorded its best production in several years.

The agility of the organisation, our integration with the other manganese smelters and the good cooperation between sales teams, supply chain and production sites allowed us to make the most of skyrocketing prices in Europe and the United States.

Significant increase of operating income

Operating income went up from 670MNOK to 1244MNOK. Turnover was positively impacted by market recovery both on volumes and sales prices vs 2020. Operating income went up in large due to manganese alloys market conditions.

The cash generation was satisfactory, but it was lower than last year due to higher level of investments in 2021 compared to 2020.



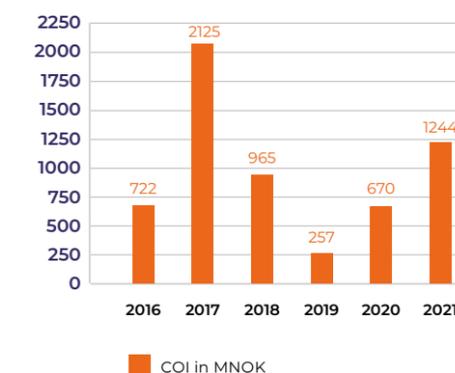
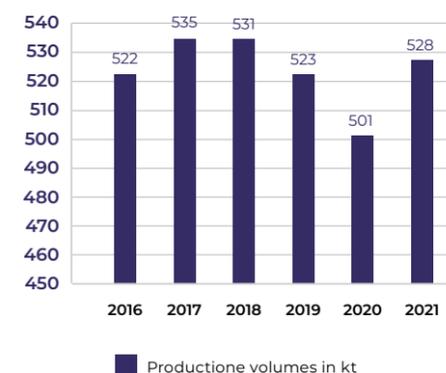
MNOK	2021	2020	Evol %
Revenues	6368	5553	15%
Raw materials & energy	-3862	-3608	7%
Personnel costs	-535	-492	9%
Depreciation of assets	-189	-201	-6%
Other operating const/income	-538	-583	-8%
Current operating income (COI)	1244	670	86%
COI margin	20%	12%	
Interest-/financial cost	-224	-86	160%
Corporate taxes	-322	-128	152%
NET RESULT	699	456	53%

Production
528 000 tonnes
+5% vs 2020

Revenues
6 368 MNOK
+15% vs 2020

COI
1244 MNOK
x 1,85 vs 2020

Free Cash-flow
477 MNOK
-344 MNOK vs 2020



Part 2

Eramet Norway

Sustainability Report 2021



Part 2

In this report, we present Eramet Norway's climate and environmental goals categorised in the following areas:

Climate 10

Environment 26

Energy 16

Circular economy 32

Under each of the target areas, we present our goals, status as of 2021 and what we have achieved during the past year, as well as important processes and projects to achieve these ambitious goals.

Finally, we have included historical emission figures with explanations. As an industrial company located in Norway, we are subject to strict national laws and requirements. Our emission permits are closely monitored in close dialogue with government agencies, and we are constantly challenged to deliver even better results.

Welcome to our Sustainability Report!

We strive for Eramet Norway to be the most climate and environmentally friendly manufacturer in our industry.

It is important for us to show that we are working on concrete projects that give us measurable results. We believe that there is a clear correlation between sustainability and the company's long-term profitability, since in both cases it concerns:

- Achieving safe and stable operations at our production and environmental facilities
- Utilising our most important input factors efficiently
- Reusing and creating value based on waste energy, by-products and waste materials
- Reducing our environmental costs related to climate quotas and taxes
- Being an attractive and developing workplace for current and new employees
- Ensuring good framework conditions to facilitate further growth
- Ensuring access to risk-relieving support schemes for our development projects

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Our contribution



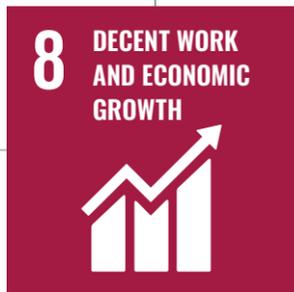
The UN Sustainable Development Goals (SDGs) are the world's common workplan to eradicate poverty, fight inequality and stop climate change by 2030. Sustainable development entails addressing the needs of people living today, without reducing the ability for future generations to meet theirs.

- The SDGs reflect the three dimensions:
- climate and environment
 - economy
 - social conditions

Eramet Norway's work on sustainability primarily relates to the following objectives:

Sustainable Development Goal No. 8 "Decent work and economic growth"
Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

Eramet Norway contributes to this goal by having a good ethical framework and high focus on safeguarding the safety and health of all who work for us. Our procurement processes ensure that suppliers are thoroughly assessed regarding safeguarding human and labour rights, the environment and other requirements we impose. Suppliers who enter into agreements with us are obliged to provide information about any subcontractors so that we have insight into the entire value chain. Norway has a well-functioning three-party-collaboration between authorities, employee and employer organisations and a comprehensive working environment legislation that provide a good framework for ensuring inclusive and sustainable economic growth.



Sustainable Development Goal No. 9 "Industry, innovation and infrastructure"
Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.

Eramet Norway contributes to this goal through the production of manganese alloys which are essential components in high quality steel, which is required for infrastructure and development of new industrial operations. Eramet Norway also contributes to economic growth based on sustainable industrialisation through research and development to continuously create cleaner and more environmentally friendly production technology. Infrastructure must be upgraded steadily to meet the future challenges associated with sustainability. Innovation and prioritising investment in science and technology are prerequisites for sustainable industrialisation and economic growth.



Sustainable Development Goal No. 12 "Responsible consumption and production"
Ensure sustainable consumption and production patterns.

Eramet Norway contributes to this goal through research and development and continuous improvement to reduce resource consumption and emissions. Technological solutions and work processes must become increasingly resource efficient through the recovery and recycling of energy streams and materials as well as safe handling of chemicals. Sustainable consumption and production involve doing more with less: reduce resource use, avoid greenhouse gas emissions and limit adverse effects on the environment while creating economic growth.



Sustainable Development Goal No. 13 "Climate Action"
Take urgent action to combat climate change and its impacts.

Eramet Norway contributes to this goal through development and implementation of new technology that facilitates the use of other raw materials, in addition to the reuse and capture of CO₂. We also strive to achieve increased energy utilisation through continuous improvement of our process performance and operational activities, as well as developing new solutions for energy recovery and utilisation.

ERAMET's perspective on CSR



ERAMET started its journey of a strategic, managerial and digital transformation in 2017 in order to ensure the Group's excellence. In this new ERAMET, Corporate Social Responsibility (CSR) is at the core of the Group's strategic decisions based on the conviction that the mining and metal companies of the future must be exemplary corporate role models.

The Group's commitment translates into an ambitious CSR Roadmap built around 13 goals on which significant process has been made since its introduction in 2018. The goal is to develop the Group in a sustainable and value-creating manner while helping to preserve a world that benefits the many.

The five pillars of our strategic vision:



Sustainable value creator



Business partner of choice



Committed and contributive corporate citizen



Home for best talents



Entrepreneur

The Roadmap 2018-2023:

The Roadmap 2018-2023 provides a framework in order for the Group to organise, define and measure its progress in CSR, and the Group's 13 goals are divided within three main categories: Commitment to people, be a responsible economic player in daily life and commitment to the planet. The Roadmap has been shared with and validated by the Strategy & CSR Committee and the Board of Directors, who review it periodically.



Key achievements in 2021

To assess the overall progress of the roadmap, ERAMET measures its performance annually against the CSR performance indicator. In 2021, the Group achieved indicator 104 (100 indication validation of all targets). The Group is well on its way with most of the targets to be achieved by 2023.



Some of the targets scored higher than their annual milestone in 2021: Progress on the material recovery targets described in the Circular Economy Action Plan and reduction of the energy and climate footprint are ahead of schedule.

- 46% reduction in the number of accidents vs. 2020 (TRIR: 2.2 in 2021)
- 26% female leaders
- 39% reduction in CO₂ intensity (CO₂ tonnes per tonne outbound product, scope 1 and 2) and validation of the Group's CO₂ emission reduction target "well below 2°C" by SBTi
- Rehabilitation rate at 1.32 in 2021, 30% more rehabilitated areas and validation of the Group's biodiversity obligations in accordance with act4nature
- Continued support for populations near our facilities in Africa
 - Provided medical treatment to 22,000 people
 - Improved access to drinking water for 13,000 people
 - Improved learning conditions for 14,000 students



Commitment to people

1. Ensure the health and safety of employees and subcontractors
2. Build skills and promote talent and career development
3. Strengthen employee engagement
4. Integrate and foster the wealth of diversity
5. Be a valued and contributing partner of our host communities



Be a responsible economic player in daily life

6. Be an energy transition leader in the metals sector
7. Actively contribute to the development of the circular economy
8. Be a company of reference in terms of respect for human rights in our field of activity
9. Be an ethical partner of choice
10. Be a responsible company of reference in the mining and metallurgy sector



Commitment to the planet

11. Reduce our atmospheric emissions
12. Protect water resources and accelerate the rehabilitation of our mining sites by fostering biodiversity
13. Reduce our energy and climate footprint

Become the world reference for Greener Metals

We are one of the world's cleanest producers of manganese metals thanks to renewable energy, cutting-edge production processes and advanced cleaning facilities. And because we want to continuously improve and become a reference for the responsible transformation of manganese, we are committed to a stringent decarbonisation roadmap.



We strongly believe that sustainability provides a competitive advantage. Not in a likely future, but now. In 2022, 53% of Eramet customers have declared that CSR aspects including CO₂ content is already part of their product selection criteria* and for 25% of them, CSR items will be a part of their purchasing decision by 2030. And beyond customers, a solid sustainable approach makes us also more attractive to governments, investors, and young talents.

We are well positioned to make the most of this context, but we need to do better at documenting, marketing, and communicating the climate footprint of our products.

Our ambition is to be the first manganese alloys producer to communicate the carbon content of all our products against the competition, in a simple yet expert way. This is a huge and extremely complex project which requires collecting, clarifying, and comparing an extensive amount of data as well as defining

a reliable CO₂ calculation method based on renowned standards.

To make it achievable, we will first limit the scope to the carbon content of our products before possibly extending it to other CSR criteria. Our customers will be our primary communication target.

As a first step, a comprehensive CSR survey was sent to all our customers in January 2022 to better understand their expectations in terms of CSR related information and data.

*Eramet 2022 CSR Survey

ERAMET NORWAY

Climate and environment – our direction



Vision
The world's leading producer of refined manganese alloys through empowerment, innovation and job satisfaction

Strategic goals
We shall be the most environmentally and climate friendly producer in our industry

Long-term goals:





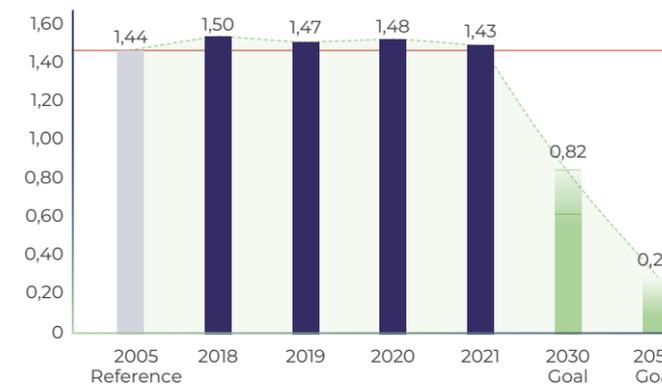
ERAMET NORWAY

Climate

In 2015, the UN Climate Change Conference in Paris, COP21, adopted a goal of keeping the increase in global average temperatures well below 2°C relative to pre-industrial levels, as well as strive to limit temperature rises to 1.5°C.

COP21 also decided that global anthropogenic greenhouse gas emissions between 2050 and 2100 should not be higher than what can be absorbed in nature and through carbon capture, storage and application. The society's climate and environmental goals are the basis for the establishment of Eramet Norway's roadmap for climate and the environment.

Climate emissions per tonne of saleable production (tonnes per tonne)



Eramet Norway's long-term objective:

We will reduce our CO₂ emissions by at least 43% by 2030 and 80% by 2050, compared with the reference year 2005.

Status of greenhouse gas emissions:

Eramet Norway's climate emissions have been stable during the last years, but in 2021, we achieved an improvement linked to use of slag formers in our smelting processes.

Our roadmap describes prioritised development processes and projects needed to succeed in reaching our long-term goals.

Good progress in Eramet Norway's projects

Our most important measures to achieve Eramet Norway's and the Group's objectives leading to 2030 and 2035 is to replace fossil reducing agents with biomass-based carbon, also called biocarbon. The goal of climate neutrality in 2050 will be achieved through carbon capture and storage (CCS).

Optimised raw material composition: The positive experiences we have had in terms of the use of slag formers have now been expanded to also include the production of low carbon silicomanganese (LC SiMn).

Biocarbon: The commercial agreement we signed with a supplier to provide Eramet Norway with industrial quantities of biocarbon adapted to manganese alloy production marked a breakthrough for us in 2021. The implementation is supported by Enova through the CO₂MBI project. A pilot scale production of a biocarbon of the right quality was made possible as a result of many years of research and development.

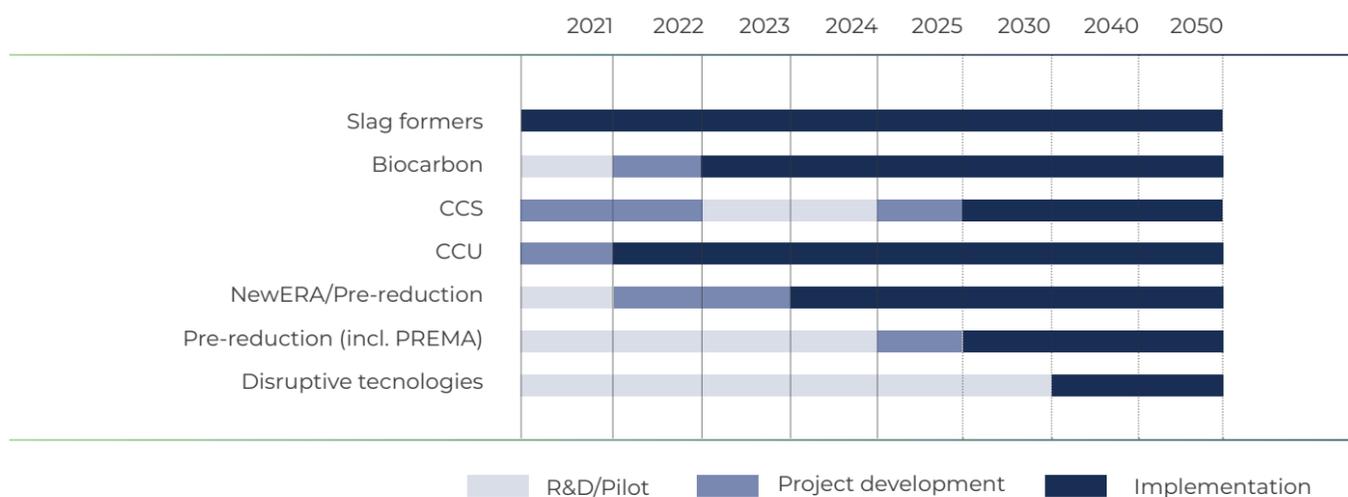
Carbon capture and storage (CCS): Our CCS project is the result of an initiative from Eyde Cluster in 2018. In 2021, we started a pre-project with the goal of building a carbon capture pilot in Sauda. The preliminary study is supported by Gassnova and is due to be completed in April 2022. Furthermore, a detailed study shall be carried out as the basis for an investment application in the latter part of 2022.

Carbon capture and utilisation (CCU): In 2021, we signed a letter of intent with the company Nordic E-Fuel, which is working on concrete plans to produce fuel based on furnace gas from our smelter in Porsgrunn. We are also in discussions' with other companies interested in utilising furnace gas from our smelters to produce valuable products. Through the project "CO₂ Watch", we will manage our CCU efforts by actively building knowledge and seeking opportunities.

NewERA Pre-reduction: The plan is to use thermal energy from the energy recovery plant to dry ore. Reduced humidity and uniform particle size should contribute to increased pre-reduction and lower specific consumption of energy and carbon sources in the melting process, also giving us a solid potential for cost reduction and increased production. The final phase of the project development, the detailed study, will be completed in 2022. The ambition is to prepare an investment application in early 2023.

R&D studies for increased pre-reduction: Better reduction leads to reduced energy and coke consumption. In 2021, we put in place a plan for financing a pilot furnace that will both support both the EU project PREMA for increased non-furnace reduction, Eramet IDEA's studies related to pre-reduction in furnaces, as well as the use of hydrogen as a reducing agent. The pilot furnace will be built in 2022, and the aim is to start the first tests by the end of the year. Large amounts of data on pre-reduction have been collected through various R&D collaborative projects. These will be used in model development as a basis for establishing and comparing solutions for industrialisation.

Disruptive technologies: These are technologies we are working on in the time perspective leading to 2040-2050, where we study new technological concepts without or with very low carbon consumption. A patent application was submitted for an innovative process with hydrogen. Several studies at Eramet IDEAS and SINTEF/NTNU have characterised hydrogen use in manganese alloys. The first grams of manganese alloys without carbon in the reaction process were produced by Eramet IDEAS, the group's technology centre, based on the concept described in the patent application.



CO₂MBI

Enables Eramet Norway's ambitious goals for 2030

Eramet Norway's goal is to reduce the specific fossil CO₂ emissions by 43% by 2030 compared to the reference year 2005. This corresponds to an annual cut of 370 000 tonnes CO₂ compared to Eramet Norway's emissions in 2020. In order to achieve this drastic cut in such a short period of time, studies have shown that the only possible way is to replace fossil carbon as a reduction material in our smelting processes with bio-based carbon reduction material, biocarbon. The level of maturity on alternative manufacturing methods for manganese alloys is considered to be low, technical risk is considered very high and the transition to a completely new manufacturing technology is associated with very high investment costs.

Since the mid-1990s, Eramet Norway has participated in continuous research and development activities on biocarbon. Through the Ferroalloy Industry Research Association (FFF) and with good support from the Research Council of Norway, we have gradually built the necessary expertise together with our research partners.

However, biocarbon has not been available in sufficient quality or quantity necessary for our large, closed furnaces for the manufacture

of ferromanganese (FeMn) and silicomanganese (SiMn). It proves almost impossible to fully replace the functionality of technically advanced reduction materials such as metallurgical coke with bio-based reduction materials. Through targeted innovation work, together with research and industrial partners, we have developed materials that recreate critical properties that we believe will work in our furnaces on a large scale.

Our plan is now to use biocarbon in our furnaces starting in 2023, which will entail significant process changes and thus great risk. Eramet Norway therefore applied to Enova in 2021 for financial support for risk relief, which was granted with an amount of up to NOK 62 million.

The CO₂MBI (CO₂ reduction in Manganese production using Biocarbon) project, which runs until the end of 2024, is based on technology developed in a wide range of research and development

projects as well as previous industrial trials, and we aim to demonstrate the suitability of biocarbon by optimising furnace operations. In the event of successful project execution, Eramet Norway will not only be on track to achieve its goals leading up to 2030, but the spreading potential will be great.

Collaboration with the Greenland Industrial Cluster

We participate in a collaborative project headed by the Greenland Industrial Cluster (GIC) for the study of CCUS (Carbon Capture, Utilisation and Storage) opportunities in Greenland.

GIC represents process industry companies from southeastern Norway in efforts to reduce emissions and become climate neutral by 2040. Among the measures the cluster is working on is to assess the potential for adopting comprehensive CCS. In particular, the GICCS project is working to

investigate the great potential for implementing CCUS from the major sources of emissions in Greenland, which represents a capture potential of more than 1,000,000 tonnes of CO₂.

Eramet Norway, together with the other industrial and research partners in Herøya Industrial Park, are working on defining a common carbon capture solution, valorising surplus energy and developing infrastructures for later CO₂ utilisation, transport and storage.



R&D Projects

- **CO₂MBI:** ENOVA supported project for industrial implementation of biocarbon
- **IPN Pyrogass:** The Research Council of Norway's project for the development of biocarbon adapted to Mn production
- **KPN BioCarbUp:** The Research Council of Norway's project for the development of biocarbon in metallurgical industry
- **KPN Reduced CO₂:** The Research Council of Norway's project to reduce CO₂ emissions in the metallurgical industry
- **BioCoke4FAI project:** A Norwegian-Polish collaboration aiming at developing an innovative and economically viable technology for bio-coke production for the ferroalloys industry, supported by The Norway Grants
- **Danish collaborative project Waste to Biocarbon:** Development of biocarbon adapted to Mn production
- **EU Horizon 2020 PREMA:** Project for improving resource and energy efficiency through an external pretreatment unit
- **Eramet IDEAS, Pre-reduction in furnace:** Project for reduction of carbon and energy consumption by process improvement
- **Eramet IDEAS:** Groundbreaking process with zero CO₂ emissions
- **GICCS:** A collaborative project by Greenland Industrial Cluster (GIC) for investigation of future CCUS potentials in the Greenland region
- **Eramet Norway's NewERA Program:** Development and implementation of new climate and energy technology for Eramet Norway's smelters
- **EGCC project:** Gassnova supported project for development of facilitating technology for carbon capture from gas engines



ERAMET NORWAY

Energy

As a major consumer of electrical energy, more efficient utilisation of energy will benefit both society and us.

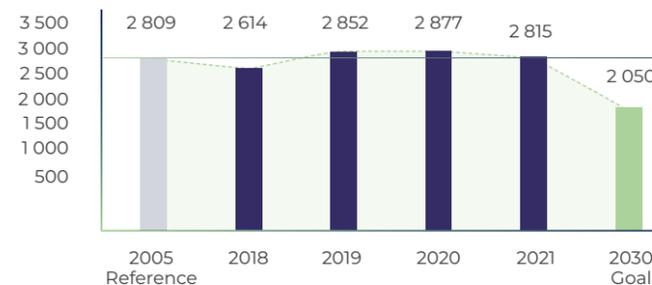
For the global community, the energy transition is perhaps the biggest climate challenge, and for us energy efficiency is about further developing our competitiveness.

We will strengthen our continuous work on energy management and at the same time prepare projects and measures that will give us a big boost in terms of value creation and energy position.

Eramet Norway's long-term objective:

We will increase our energy utilisation by at least 27% in 2030, compared to the reference year 2005

Energy utilisation (Net kWh per tonne saleable production)



Status energy utilisation:

The main explanation for the fact that our energy utilisation in the last three years has been lower than before is that the agreement to supply energy-rich furnace gas from the smelter in Porsgrunn to an external customer was terminated. It is viewed as realistic that this delivery will restart in 2022.

Towards higher energy utilisation

NewERA ERU (Energy Recovery): The pilot gas engine with a cost of more than NOK 50 million, was put into operation the summer of 2021 and has shown good energy performance during the test period, with environmental emissions and noise within the permit. The pilot installation was supported by Enova. The plan is to carry out the final phase of the pre-project in 2022, with the aim of submitting an investment application for a full-scale energy recovery facility by the end of the year. The future establishment of a carbon capture plant is an integral part of this work.

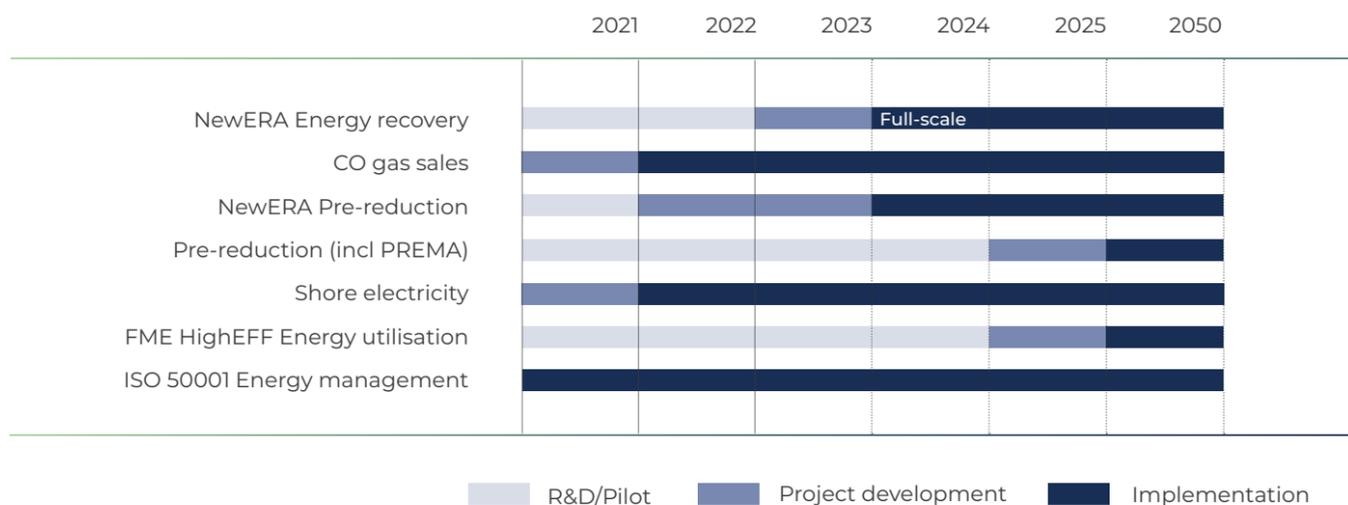
Sale of furnace gas: Large parts of the furnace gas from the plant in Porsgrunn were historically sold as an energy source to Yara's ammonia factory at Herøya. The agreement was concluded in 2019, and we are now working with several different players with the aim of finding new applications for our energy-rich furnace gas.

NewERA Pre-reduction: See description in the climate chapter.

R&D for increased pre-reduction, Including the PREMA project: See description in the climate chapter.

Onshore power: During 2021, we installed on-shore power facilities at our smelters in Kvinesdal and Sauda, while the facility in Porsgrunn will be installed in the first part of 2022. The project is supported by Enova. In cooperation with the shipping companies, we will continue to work to ensure the highest possible utilisation of our three facilities.

ISO 50001: The energy management teams of our three plants work continuously to identify and realise potentials for reducing energy consumption and increasing utilisation of available energy.



R&D PROJECTS

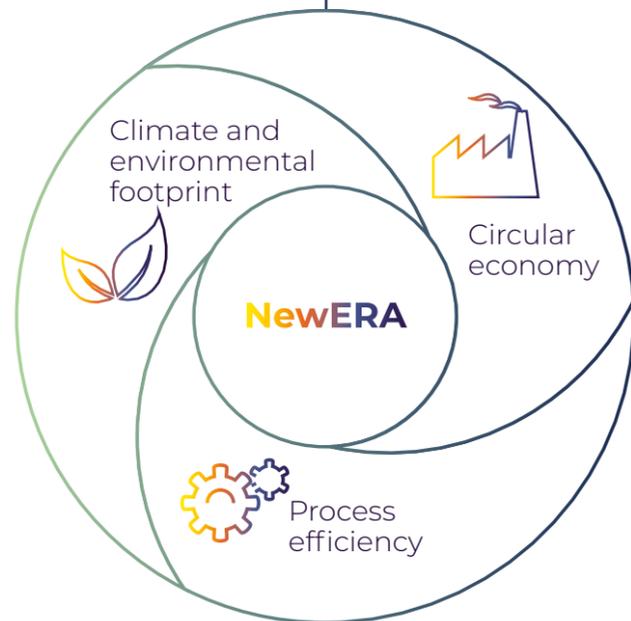
- **SFI Metal Production:** The Research Council of Norway's Centre for Research-based Innovation scheme, activities on optimising melting in furnaces
- **EU Horizon 2020 PREMA:** The EU project for development of process for improved resource and energy efficiency through a pre-treatment unit upstream of the furnaces
- **FME HighEFF:** The Research Council of Norway's Centre for Environment-friendly Energy Research
- **NewERA Energy Recovery Unit (ERU):** Eramet Norway's project for energy recovery.

NewERA Project

The NewERA project focuses on the development and implementation of climate and environmentally friendly technology with a significant potential for better energy utilisation. The project is an important part of Eramet Norway's roadmap for climate and the environment.

Through the project, we will ensure:

- **Increased process efficiency:** Lower specific consumption of electrical energy and reducing materials, as well as increased process stability and production
- **Improved circular economy:** Higher utilisation and value creation related to energy, by-products and waste materials
- **Smaller climate and environmental footprint:** Lower emissions and reduced need for landfills



Subprojects:

Energy recovery:

The furnace gas from the Sauda smelter is currently being used to a limited extent. The plan is to run this gas through gas engines to generate electrical energy for sale, as well as thermal energy for internal and external applications.

A key part of the project development is also to integrate a future carbon capture solution.

Increased ore quality:

The thermal energy from the energy recovery process will be used to reduce the moisture in ore. The ore will also be screened to reduce the level of fines before use in the furnaces.

Handling of by-products and waste materials:

Drying the ore entails generation of fines that will be briquetted together with fines from metal crushing, filter dust from the cleaning systems and sludge currently deposited.

Main objectives:

- 1 Increase energy utilisation by at least 250 GWh – equivalent to the consumption of more than 10 000 households
- 2 Increase the stability of the furnace processes and reduce the specific energy consumption in the manganese alloys production by at least 8% – reduced costs and higher production
- 3 Reduce the specific carbon consumption and thus CO₂ emissions per produced tonne by at least 3%, that is, approximately 10 000 tonnes per year – equivalent to the discharge from about 5.000 cars
- 4 Ensure sustainable handling of by-products and waste materials – reduced need for landfill and lower costs



The pilot for energy recovery is installed in Sauda.

Progress in 2021 – plans further:



Subproject Energy recovery

The pilot phase started in the late summer of 2021. The results from the first part of the test show promising results both in terms of energy performance and environmental standards.

The plan in 2022 is to complete the test work and carry out the last part of the pre-project with the aim of submitting an investment application for a full-scale energy recovery facility by the end of the year.



Subproject Ore drying and briquetting

Briquettes consisting of by-products and waste materials from our production processes were tested at one of our furnaces in Kvinesdal in an industrial scale in 2021. The test showed good results.

The final phase of the project development, the detailed study, will be completed in 2022. The ambition is to prepare an investment application in early 2023.



Pilot plant for energy recovery: Successful start of the pilot phase

Despite Covid-19 challenges, we were able, in collaboration with our partner Clarke Energy, to install the gas engine in the first part of 2021. The Jenbacher 620 engine was put into operation in July, while the testing phase started in September.

The results so far are very promising, with energy performance exceeding expectations and environmental results well within the limits of the emission permit. An important activity in the testing phase has been to ensure the training of our many skilled operators and specialists in Sauda.

The pilot phase will be decisive for the further planning of a full-scale energy recovery facility, where the objective is to prepare an investment application during 2022. Enova supports the project in Sauda as part of its industrial pilot program.



Eramet Norway Sauda cooperates with the company Sauda Energi to expand the use of waste energy from the smelter. Our energy recovery project will significantly increase the potential for further value creation. Sauda Energi will therefore in the years ahead actively seek opportunities for industrial utilisation of waste energy in the form of production processes that require access to large amounts of thermal energy.

Eramet Norway and Sauda Energi were among the partners in the project "Green Growth". We are continuing this work in 2022, and the goal is to develop new industrial activities as a basis for increased value creation and new jobs in Sauda.



Energy management

Our smelters are big consumers of electrical energy. We need 2 TWh, corresponding to the electricity consumption of about 100,000 households, making electrical energy our second largest cost element, after manganese ore.

All three Eramet Norway plants are certified in the ISO 50001 energy management standard. Eramet Norway Kvinesdal in 2010 became one of the first companies in Norway certified, while Eramet Norway Porsgrunn and Eramet Norway Sauda followed in 2014/15. The certification confirms that the work on energy efficiency has been put into a system. Interdisciplinary energy management teams with representatives from different departments have been established at each plant. Monthly meetings are held to follow-up significant energy aspects and improvement measures, and key figures (KPIs) related to energy consumption and utilisation are reported and reviewed in regular plant management meetings.

The energy management groups contribute to ensuring a focus on efficient energy utilisation, which provides benefits for both ourselves and society in general.

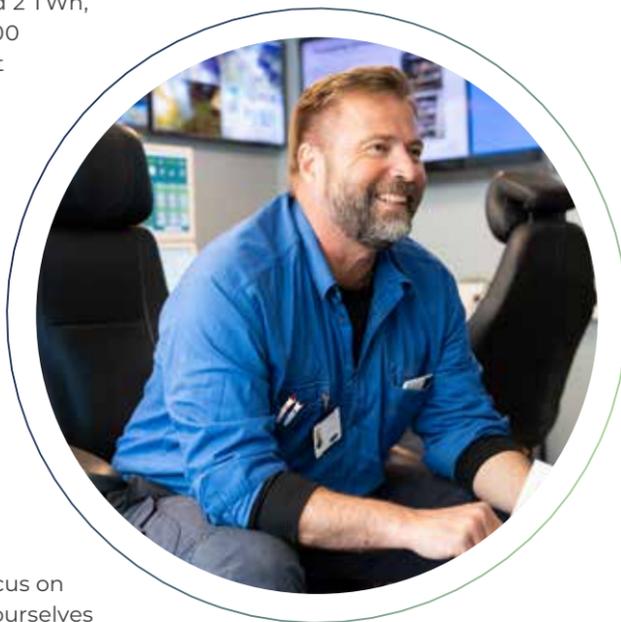


Foto: Per Inge Fjellheim

Efficient energy usage

Sauda Energi currently distributes hot water at about 85°C to parts of Sauda through its distribution network. This ensures environmentally friendly heating of buildings, swimming and sports facilities. At the same time, it keeps large parts of the city centre snow and ice-free during the winter. In the near future, more than 34,000 square metres of buildings will be heated via a 3.5 km long pipeline network connected to the customer's heating system.

Primarily, the hot water comes from the furnace cooling water systems. The water temperature is raised to 85 degrees through Eramet Norway Sauda's energy recovery system. Furthermore, the plan is to be able to cover power peaks by using boilers that recycle CO gas.

Recovered energy from industrial processes helps make the green shift a reality. As efforts to enable the zero-emission society progresses, the electrification of many sectors will require large electricity resources. In this context, district heating will play an important role in relieving the power grid. Taking into account that aluminum and ferroalloy plants account for 20% of Norwegian electricity consumption, a major contribution is made to achieving the IEA's two-degree target through more efficient utilisation of energy that has already been used.

Through the exploitation of industrial surplus energy, Sauda Energi contributes to a more forward-looking and sustainable industry

Recovered energy from industrial processes helps make the green shift a reality

Energy balance Eramet Norway

Eramet Norway's three manganese alloy plants have been ISO 50001 certified for several years and work systematically to ensure increased sustainability in our energy-intensive operations.



Energy consumption can be divided into three main groups, where "electrons" and "hydrocarbons" each represent 44 and 43% of the total of 4.5 TWh for used energy in 2021, which is somewhat higher than last year. The third group is related to the energy content from the consumption of metallics (silicon and manganese) for furnaces and refining.

Energy consumption

The consumption of electrical energy (smelting and auxiliary power) of 2.0 TWh was divided by 0.45 TWh, 0.73 TWh and 0.77 TWh for the smelters in Porsgrunn, Sauda and Kvinesdal, respectively. Coke and anthracite primarily have a role as a reduction material in the furnaces, so oxydic manganese in the ore becomes metallic manganese in our final products, but the energy content is included with 1.9 TWh in the energy balance setup.

Energy use and energy recovery

With a salesable production of 528 000 tonnes 2021, we find that almost 2 TWh of energy is baked in as energy in our products, corresponding to around 44% of the total energy supplied. How much do we manage

to recover from our energy flows? For 2021, we achieved approximately 0.47 TWh, which is around 11% of the added energy and approximately unchanged from the previous year.

The energy recovery plant in Kvinesdal produced net close to 79 GWh in the form of electrical energy. In addition, hot water deliveries to a fish farm and other enterprises in the local area together with internal applications make good contributions. Thus, the Kvinesdal plant, like in previous years, is the best of the three Eramet Norway plants on energy recovery.

Deliveries of furnace gas to Yara's ammonia plant in Porsgrunn were terminated due to commercial reasons in 2019, significantly worsening the energy balance of the Porsgrunn plant in 2020 and 2021. Work on the reestablishment of these deliveries is ongoing at the end of the year. In the autumn of 2021, an agreement for future delivery of furnace gas was signed with a new player at Herøya Industripark, and several other opportunities are being explored. Compressor heat recovery as well as the capture of hot water for heating and cleaning process equipment are

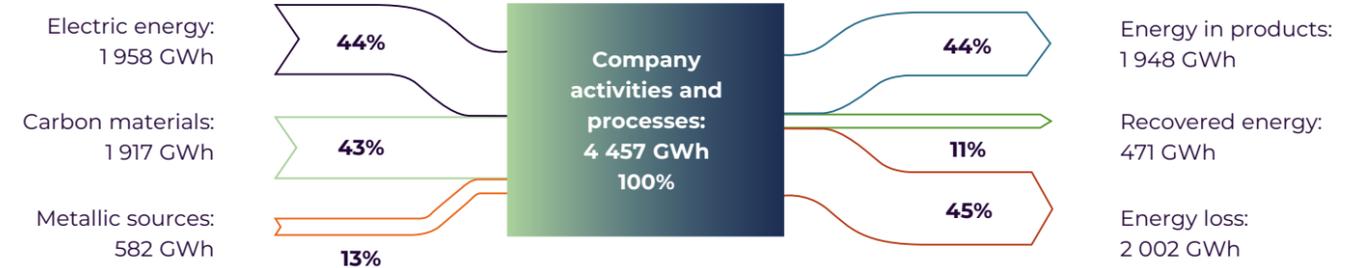
useful supplementations in a currently weak energy balance for the plant in Porsgrunn.

Internal use of furnace gas for refractory activities and building heating in Sauda plus external deliveries of hot water in Sauda are all good contributors to the plant's energy recovery. A pilot plant for electric energy production of furnace gas came picked up stream in Sauda in 2021 and 3-4 GWh was produced after start-up in the second half of the year.

Measures to increase energy recovery and utilisation

In each of the plants, energy teams are involved in the work on proposals for and implementation of improvement measures. These are ranked according to investment needs, execution time and profit potential. Public schemes through Enova contribute positively every year to the implementation of new measures at our plants.

Energy Balance 2021





ERAMET NORWAY

Environment

Our plants are located in vibrant communities, close to neighbours and beautiful natural areas. This places great demands on our environmental behaviour.

In recent years, the plants's emission permits have been renewed, and the emission limits have been significantly reduced.

We are conscious our role and will continue to work to reduce our environmental footprint and improve our overall resource utilisation for the benefit of our plants and our surroundings.

A number of activities are underway at each plant to achieve continuous improvement of production methods and optimisation of our cleaning facilities. In addition, we carry out studies and research & development projects to acquire new knowledge and take into use new and more efficient treatment methods.

Our current emission permits were last updated in 2020 and contain up to 100 value limits per plant for control of emissions to air, sea and ground. The permits are followed up thoroughly through frequent

sampling and extensive control by accredited and independent third parties. All results are reported to the Norwegian Environment Agency and are publicly available on their website.

Eramet Norway is certified in accordance with the international environmental standard ISO 14001 and has internal improvement goals that are more ambitious than the emission permits.

Eramet Norway's long-term objective:

We shall avoid negative impacts on the environment in the communities where we operate, and we shall not have violations of any emission permits.

Assessment of results 2021 and priority areas 2022

All three plants operate in accordance with emission permits that have changed significantly in recent years. The limit values are reduced in a number of areas.

Eramet Norway had overruns in 2021, which is not satisfactory. All overruns have been thoroughly investigated to determine root causes and implement improvements that result in lasting change. The incidents have been reported and the results of the investigations have been submitted to the Norwegian Environment Agency, and external and independent experts have carried out assessments of the environmental impact.

Improve all our cleaning facilities

Eramet Norway is continuously working to improve all cleaning facilities to achieve lower emissions. There are therefore several research and development projects underway at any given time, including collaborations with others.

In 2021, we worked to understand how the furnace operation affects the purification of process water at all of our plants. We have developed new treatment plants for surface and leaching water and a new mercury treatment concept in Kvinesdal. Projects have been approved for the construction of these treatment plants.

We have implemented a number of measures to reduce noise in Porsgrunn, and we have implemented new measures to reduce dust emissions at all plants.

The way forward in 2022

Priority areas in 2022 are to support the plants' project departments in the design and construction of new treatment plants for process water, surface water, sewage and mercury, as well as to continue our efforts to reduce noise and emissions of dust. In addition, we will carry out a program for identification of critical process indicators in all cleaning processes. We also work to increase digitalisation related to the control of treatment plants and monitoring of discharges.



R&D PROJECTS

Collaborative projects (partly funded by the public sector):

- **SFI Metal Production:** The Research Council of Norway's Centre for Research-based innovation, activities to characterise dust formation, PAH-emissions and measuring equipment
- **IPN PAHsson:** The Research Council of Norway's Innovation project for Measuring Polycyclic Aromatic Hydrocarbons (PAH)
- **IPN DUSTDetect:** The Research Council of Norway's Innovation project for measuring diffuse emissions
- **IPN NextGenSøderberg:** The Research Council of Norway's Innovation Project for PAH free electrode mass in the manganese industry
- **"Process, environment and products":** The Research Council's project supported by "Skattefunn" – Activities supporting R&D on reducing diffuse emissions

The NextGen Søderberg project

One of the most significant industrial inventions in Norway, the self-baking Søderberg electrode, celebrated its 100th anniversary in 2019. This is still the dominant technology for the manufacture of ferroalloys, and Eramet Norway operates some of the industry's largest electrodes at its three smelters.

The main challenge with the technology is the use of coal tar bark as a binder in the electros, which contains polycyclic aromatic hydrocarbons (PAHs), a group of substances that potentially have negative effects on health and the environment. It is therefore highly desirable to find environmentally friendly alternatives, and in line with ERAMET's strategy of being the most environmentally friendly manufacturer of manganese alloys, we have been a driving force in testing and qualifying alternative PAH-free electrode masses at our smelters since 2017.

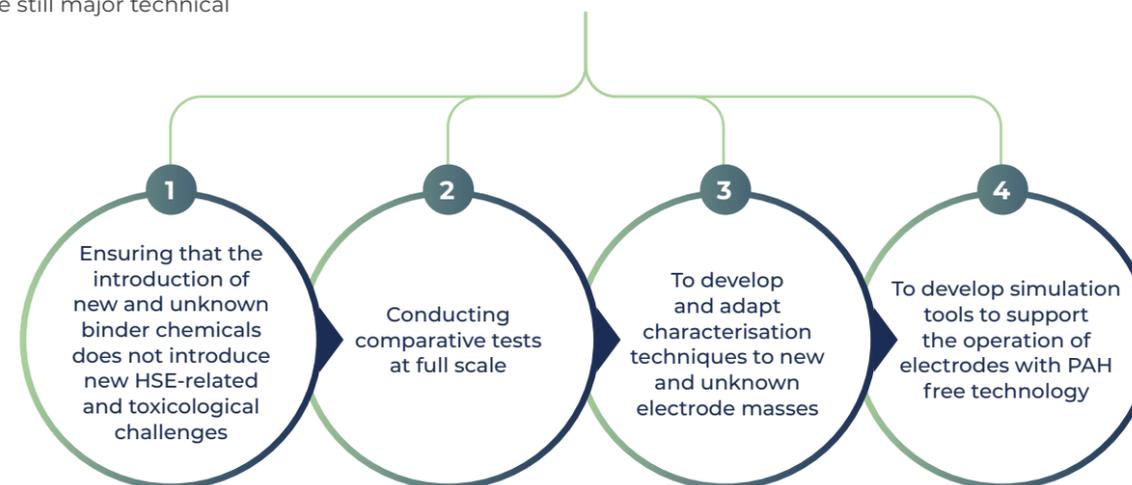
By taking great technical risk, Eramet Norway was the first manufacturer to conduct industrial experiments with PAH-free technology on large and hard-loaded electrodes. However, there are still major technical

challenges with this technology that must be solved before we can achieve the goal of phasing out PAH-containing binder substances without significant negative impact on production.

Towards the end of 2020, Eramet Norway was granted a four-year innovation project through the Research Council of Norway, 'NextGenSøderberg', where Eramet Norway together with its research partner SINTEF will work to develop the next generation of PAH-free Søderberg technology for the production of manganese alloys and thus ensure a sustainable future-oriented industry in Norway. The project's work packages are summarised in the innovation pyramid, where 100 years of experience in the operation of standard PAH-containing electrodes are the mainstay of development through;



Large and systematic excavation work has provided new insight into Eramet Norway processes through large projects supported by the Research Council of Norway, including SFI Metals Production and KPN Controlled Tapping. In this connection, we have gained access to full-scale electrodes with PAH-free technology that, through analyses, will provide important knowledge for the project.



Optimal design of fume extraction system for the Eramet Norway Porsgrunn MOR unit

ERAMET is the world's largest producers of refined manganese alloys. High carbon ferromanganese alloy (HC FeMn) which is produced by Submerged Arc Furnaces in Eramet Norway contains about 7% carbon.

Several steel producers ask for ferromanganese alloys with lower carbon content. In order to produce alloys with required specifications, refining of HC FeMn alloys is performed. Medium and Low Carbon (MC/LC) FeMn alloys are produced as a result of the Metal Oxidative Refining (MOR) process. In this process, depending on the desired product, dissolved carbon in the HC FeMn alloy is reduced from 7% down to 1.5%, 1% or 0.5% through blowing of oxygen gas into the molten metal. The MOR process is performed in a metal refining converter.

In the Porsgrunn site, the MOR converter is in a fixed position in a so-called oxygen blowing station. During the refining process, the HC FeMn metal which has been tapped from the furnace is poured from a metal tapping ladle into the MOR converter. When the refining process is done, the refined metal is poured out of the MOR converter into a ladle and being transferred towards the casting bed. Blowing of oxygen gas into the molten HC FeMn metal generates large volumes of fumes during the MOR process. Almost all generated

fumes during the refining process are captured using a powerful extraction system installed in the blowing station. Fume extraction capacity of the main MOR hood is more than 200.000Nm³/hr.

Although the fume extraction system used to be very efficient during the oxygen blowing step, it had a poor performance while pouring the liquid metal into and out of the converter. During pouring in/out operations, large amounts of uncaptured fume used to be released in the furnace hall. The results of an internal benchmarking of different sources of diffuse emissions in pointed at these fumes as one of the main sources of emissions at the plant.

The Porsgrunn plant team and the R&D department started a cooperative project with focus on making an optimal hood design for efficient capturing of the generated fumes during pouring of molten metal into and out of the MOR converter. In this project several designs were investigated based on Eramet Norway's systematic approach for optimal design of fume extraction systems. Computational Fluid Dynamics (CFD) modelling was implemented as a powerful technique in both making different designs for the hood as well as evaluation of each design under different operational conditions.

The root cause of inefficient capturing of the fumes during pouring operations was determined from the

results of the CFD modelling studies to be large distance between the inlet of the existing hood and the fumes sources in the MOR station. Based on obtained results from the modelling work, discussions with the project team in Porsgrunn and investigation of different possible solutions, it was concluded that an extra fume extraction hood was needed in order to solve the problem. Since the duration of the pouring in and out operation is very short, the hood was designed in a way that it can use the existing extraction capacity of an environmental fan (around 150.000Nm³/hr) which is used mainly for the furnace tapping operations. Therefore, there was no need for investment in a new fume extraction system.

The final hood design was installed in the MOR blowing station in the summer of 2021. The hood has been in operation since then with very high fume capturing efficiency. Our evaluations prove that almost no fume is released into the furnace hall during metal pouring into and out of the MOR converter using the new hood.

We believe that our systematic approach, which is based on considering all theoretical and practical aspects of the operations as well as using available internal and external competences on reducing diffuse emissions results in reliable and efficient solutions for our environmental challenges.

Metal Pouring into the MOR – Before



Metal Pouring into the MOR – After



Metal Pouring to MOR-converter



Photo: Per Inge Fjellheim

ERAMET NORWAY

Circular economy

Circular economy is about resource utilisation. Eramet Norway handles large amounts of energy and several million tonnes of materials annually through our production processes.

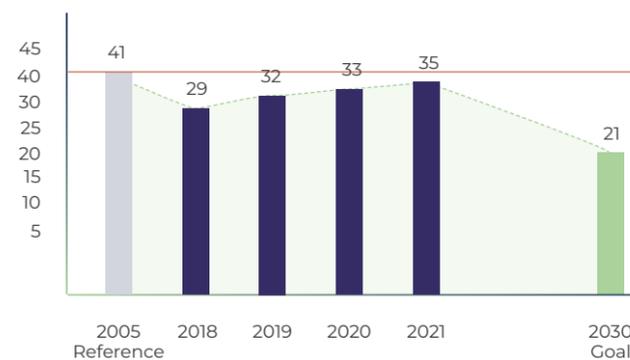
Through knowledge development, improvement work and targeted investment projects, we work to achieve the best possible utilisation of purchased input factors, generated by-products and waste materials.

The essence of the circular economy is increased resource efficiency and breaking the traditional link between increased value creation, improved extraction of virgin raw materials and increased waste volumes. We will therefore increase internal reuse and create new value chains based on side streams, by-products and waste materials so that we contribute to increased value creation in society in general. We cooperate with established and new industry players, the national public policy institutions and educational and research entities to achieve economic and environmental sustainability both in the short and long term.

Sustainable production and efficient cost management are two sides of the same coin. But it is important to recognise that in circular economy, most low-hanging fruits are already harvested, and that new projects require considerable technical, economic and social efforts. Transparency and collaboration are required to map available by-products and side streams, knowledge to identify new areas of application and research and industrial testing to develop new technology. Few projects in the circular economy generate substantial revenues in the short term.

Therefore, business leaders need to show courage and willingness to collaborate. In addition, the authorities must contribute through changes in regulations, framework conditions and financial incentives.

Volume of deposited sludge (1000 tonnes)



Eramet Norway's long-term goal:

We will increase our resource efficiency by increasing value creation related to by-products and waste materials and reducing deposited volumes by 50% by 2030.

Status circular economy:

Since the reference year, the volume of sludge has been reduced by about 15%, while furnace production has been increased by about 15%. In recent years, the volume deposited has increased somewhat due to improved cleaning processes that lead to increased precipitation of sludge.

Industrial tests to gain new knowledge

Eramet Norway's R&D department is developing alternatives to disposal, specifically aimed at sludge, which is by far the largest volume of disposal. In parallel, we are working to find new applications for by-products, both in terms of increased value creation and sustainability. To assess the impact of our proposals, we plan to connect to relevant professional environments and conduct life cycle analyses (LCA).



R&D PROJECTS

Collaborative projects (partly funded by the public sector):

- **EU EIT Raw Materials TripleLink:** EU-funded project, development of new software for life cycle analysis (LCA)
- **EU EIT Raw Materials GREENY:** EU-funded project, characterisation and improvement of crushing of products
- **NewERA Cold Agglomeration Unit (CAU):** Eramet Norway's project for agglomeration of by-products and waste materials
- **SFI Metal Production:** Research Council of Norway's Centre for Research-based Innovation, activities for testing agglomerates
- **IPN ValSiGs:** Project for the development of new applications of SiGS in the concrete industry, supported by the Research Council of Norway
- **Eramet Norway Kvinesdal:** Project supported by Innovation Norway for the construction of pellet plants for processing slag and further use in furnaces
- **Eramet Norway Kvinesdal:** Project supported by Enova for pilot production of granulated Silica Green Stone

■ R&D/Pilot ■ Project development ■ Implementation

We consider two main directions when it comes to reusing sludge, dust and fines:

1. For sludge and dust, we plan to produce pellets in a high-intensity mixer at our smelter in Kvinesdal. In the first instance, we want to build a test station to gather expertise and technical data as a basis for establishing a future large-scale facility. The project is partly funded through national public funding institutions.
2. For the treatment of fines from manganese sources and other products, we work as part of the NewERA project to develop a production process for briquettes. After successful testing in Eramet IDEAS' pilot furnace in 2019, we conducted industrial experiments in 2021 using "NewERA briquettes" at one of our furnaces in Kvinesdal. The experiments showed promising results both in terms of the strength and the reactivity of the briquettes. Project development will be continued through the ongoing detailed study to be completed in 2022 as the basis for an investment application in the first part of 2023.

Another key area in our work on circular economy is to develop new applications for Silica Green Stone (SiGS).

Silica Green Stone

– a material with great potential

One of Eramet Norway's by-products is silicomanganese slag, with the product name Silica Green Stone. Annually, Eramet Norway produces about 300,000 tonnes of Silica Green Stone, and until now it has mainly been used in road construction and as a filling material in construction projects.

Reuse of Silica Green Stone reduces energy consumption, greenhouse gas emissions, noise, dust and other contaminants compared to extraction and production from virgin raw materials.

The ambition to contribute to good circular economy solutions is one of our four priority areas to improve our climate and environmental performance. Through increased internal reuse and the development of new uses for by-products and waste, we will contribute to increased value creation without increased consumption of virgin raw materials and occupation of natural areas, which is an important reason why species are at risk of extinction and that biodiversity is threatened.

Stable, strong and clean

Silica Green Stone is exposed to temperatures up to 1600 degrees Celsius through the production process and is a stable, strong and clean material comparable to natural rocks.

A number of tests and analyses carried out by independent third

parties document that Silica Green Stone does not contain organic pollutants, and that the content of heavy metals is below the background values naturally found in nature.

Rawmaterial in production of cement and concrete

In recent years, the Norwegian cement producer Norcem has used Silica Green Stone as a raw material in the production of clinker. Eramet Norway and Norcem have also carried out surveys on the use of Silica Green Stone in mixed cements. This work will continue in 2022.

We participate in an IPN project "Innovation Project in the Business Sector" to investigate how Silica Green Stone's properties can be used as cement replacement in concrete, as well as in studies of current cement and concrete standards what opportunities and limitations lie in these and how to achieve necessary changes in standards. The research collaboration involves UiA, Sintef and other industrial companies. The project receives funding from the Norwegian Research Council and is due to be completed in 2022.

Soil improvement

A third area we are researching is the use of Silica Green Stone in soil improvement. Silica Green Stone contains silicon, which can affect growth and reduce plant diseases and thus lead to increased crops. Bioavailable silica is a limited resource in the soil in several places in the world, and it is therefore interesting to get the substance back into the ecological cycle. In addition, manganese and lime in Silica Green Stone can also contribute positively to plant growth.

Eramet Norway has carried out field trials in both 2020 and 2021, and new trials are planned in 2022.



Environmental data



Our CO₂ emissions are linked to our production volumes and are therefore relatively stable at all our plants. Eramet Norway has a climate and environmental roadmap with specific targets for reducing CO₂ emissions and concrete projects that will help us achieve the targets. The CO₂ reduction programme, including the use of biocarbon as a substitute for fossil coke and increased pre-reduction, will have an effect from 2023. In Porsgrunn, the resumption of furnace gas delivery to external companies is also expected to have an effect on CO₂ emissions from 2022.

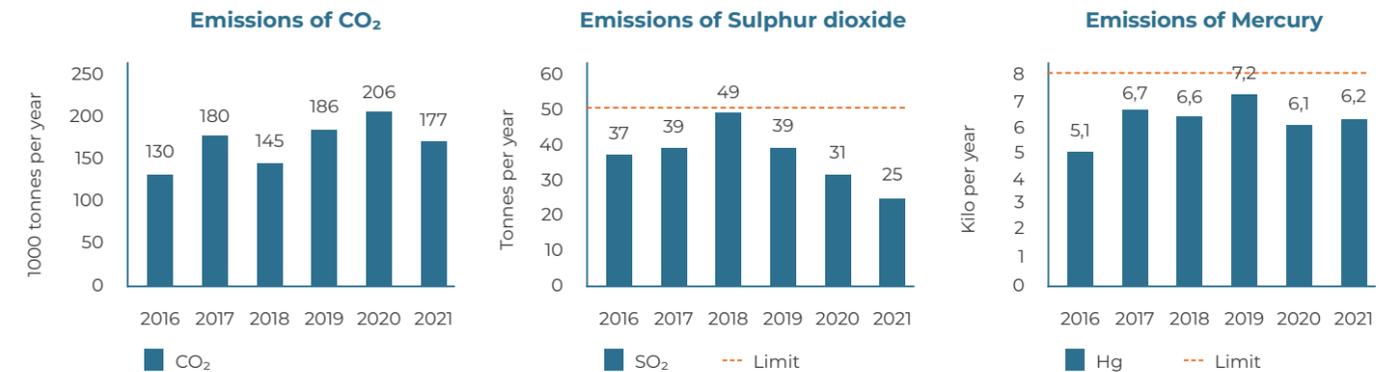
Although our production processes are basically the same across our plants, all cleaning facilities must be specially adapted to achieve the desired effect. This work is continuously ongoing through research and development, as well as targeted improvement work.

All our emission data are available in www.norskeutslipp.no

Eramet Norway Porsgrunn

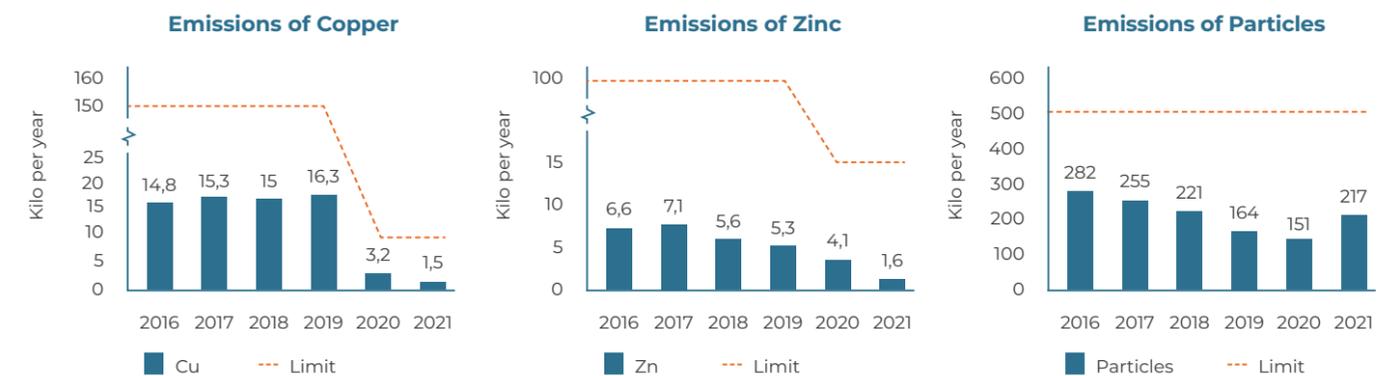
Emissions to air

Reported CO₂ emissions have increased in recent years. This is mainly due to the fact that deliveries of carbon-containing furnace gas to external customers were terminated in 2019. However, external deliveries are expected to resume in 2022. In light of the EU's Fit-for-55 guidelines, a new market is being created where the furnace gas can replace virgin fossil carbon in the production of fuel for long-haul transport (aircraft/ships), as well as in the manufacture of a variety of chemicals. Mercury emissions have been stable and below the permit for many years and are monitored through measurements controlled by external experts.



Emissions to sea

Emissions of copper and zinc to sea were historically low in 2020 and have been further reduced in 2021. In 2021, zinc emissions were reduced by about 70%, and copper emissions have been reduced by almost 90% compared to the average of the last three years. The first Eramet Norway pilot plant for improved treatment of process water was built in Porsgrunn in 2020. The development of the treatment concept is still ongoing, and industrialised solutions will be implemented both in Porsgrunn and at the other plants.



By-products and waste materials

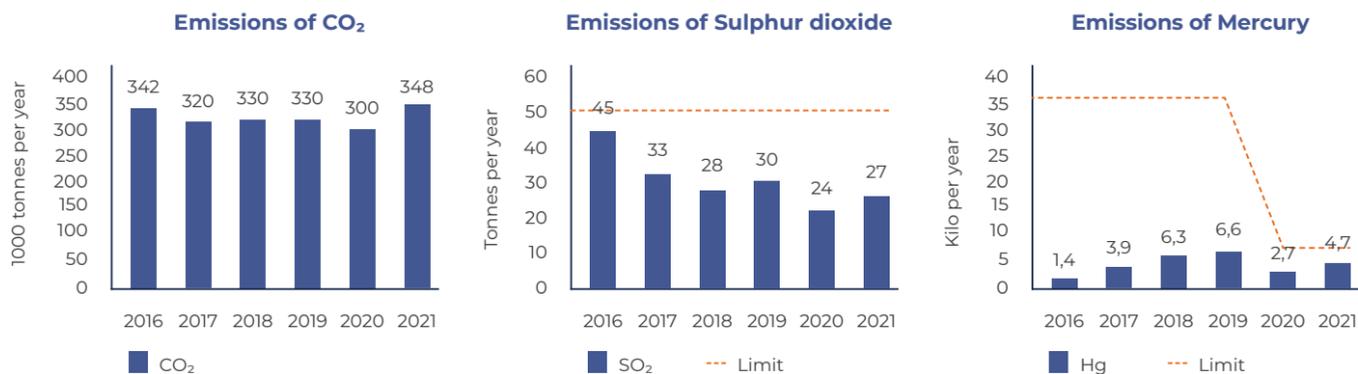
CATEGORY	2020	2021
Silica Greenstone	100 892 tonnes	73 558 tonnes
Sludge (deposit)	4 328 tonnes	4 491 tonnes
Residual waste	189 tonnes	154 tonnes
Metal waste	161 tonnes	283 tonnes
Hazardous waste	29 tonnes	14 tonnes
Paper and cardboard	4 tonnes	3,5 tonnes
Wood waste	129 tonnes	128 tonnes



Eramet Norway Sauda

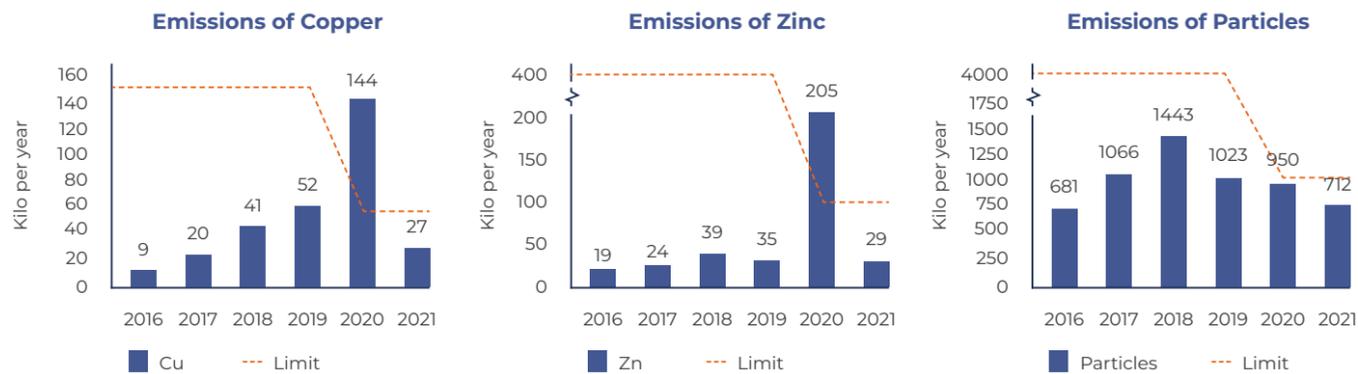
Emissions to air

In 2021, the annual limit on the discharge of manganese to air was marginally exceeded. The situation has been investigated, but the most likely reason is how total emissions for the year is calculated. For the time being, the measurement programme has been changed with more frequent controls by an external expert. Mercury emissions have been stable and below the permit for many years and are monitored through measurements controlled by external experts.



Emissions to sea

Emissions of copper and zinc to sea were very low in 2021. The plant's final treatment plant for process water was rebuilt in early 2021 in accordance with the new treatment concept, which was first tested in Porsgrunn. Results for 2021 have been reduced by up to 70% compared to the average emissions in the last three years. The process aiming at finalizing the specification for the new cleaning concept is now entering the final phase, enabling us to start designing and building an industrial solution. The positive developments we have had in recent years regarding reduced emissions of suspended substances continued in 2021. This is an area that will be further improved through continuous reduction of dust emissions, improvement of routines for cleaning outdoor areas, as well as improved surface water treatment.



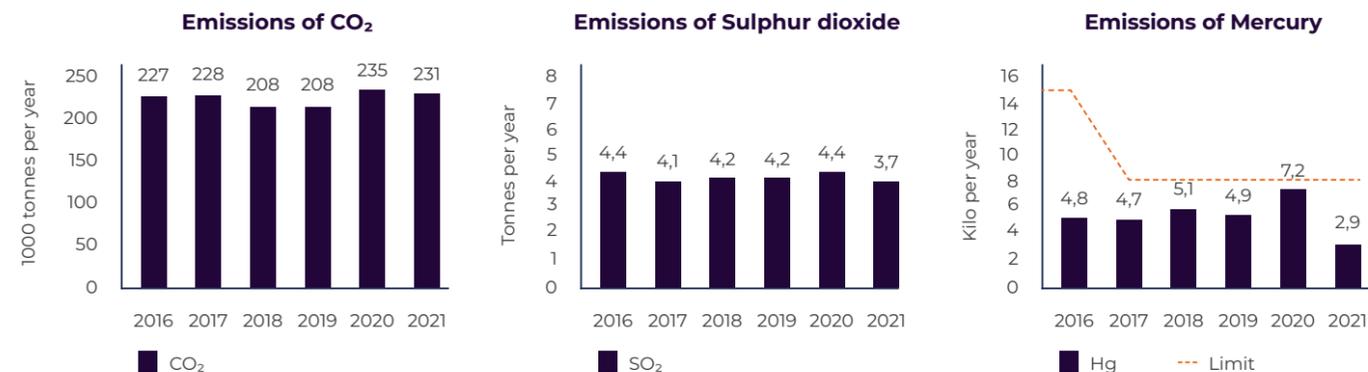
By-products and waste materials

CATEGORY	2020	2021
Sludge (deposit)	10 149 tonnes	9 481 tonnes
Residual waste	130 tonnes	134 tonnes
Metal waste	331 tonnes	301 tonnes
Hazardous waste	58 tonnes	34 tonnes
Paper and cardboard	7 tonnes	8 tonnes
Wood waste	203 tonnes	207 tonnes
Plastic	5 tonnes	3 tonnes

Eramet Norway Kvinesdal

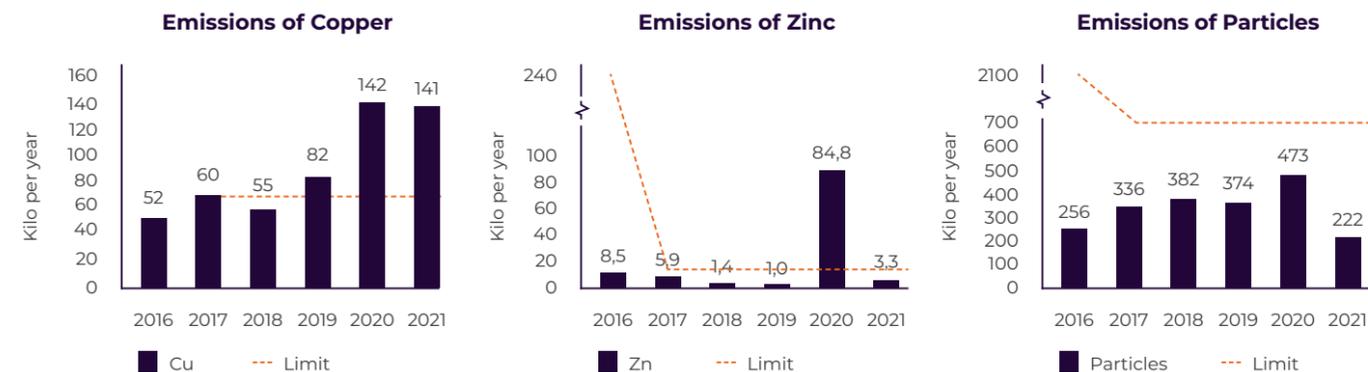
Emissions to air

In 2019, a new filter was installed to reduce dust emissions, and this has worked very well. In addition to significantly reducing emissions of dust, lead to air have been reduced by about 80% compared to the average of the last three years. Mercury emissions have been low and below permit for many years and are continuously monitored through measurements, as well as through control by external experts. After facing challenges with our treatment plant in 2020, the plant has worked very well in 2021. Continuous improvement of operating routines has contributed to the fact that emissions of mercury in 2021 were the lowest ever and about 50% improved compared to the average emissions in the last three years.



Emissions to sea

The annual limit for discharges of copper to sea was exceeded in 2021. The challenge linked to copper emissions started in 2020, requiring extensive investigations to understand root causes. The implementation of a new cleaning concept is planned in 2022. This process has contributed to increased knowledge about a number of indicators in furnace operations that in turn can affect cleaning effect. Through our work, we have also acquired valuable knowledge related to the specific needs for adapted solutions for purifying process water, even though the concept is basically the same for the three plants. This is knowledge of great value in our efforts to develop new treatment technology at all our three plants in order to deal with any future challenges and for further development of both furnace operations and treatment plants. Emissions of suspended substances have been significantly reduced and in 2021 were more than halved compared with the level for previous years. This is an area that will be further improved by reduced dust emissions, improvement of routines for cleaning outdoor areas and improved surface water treatment.



By-products and waste materials

CATEGORY	2020	2021
Silica Green Stone	219 335 tonnes	232 458 tonnes
Sludge (deposit)	17 673 tonnes	20 276 tonnes
Residual waste	83 tonnes	75 tonnes
Metal waste	0,1 tonnes	0,1 tonnes
Hazardous waste	93 tonnes	103 tonnes
Paper and cardboard	7,5 tonnes	5,6 tonnes
Wood waste	75 tonnes	56 tonnes
Plastic	15 tonnes	15 tonnes



HESE policy for a sustainable Eramet Norway

Goals

Eramet Norway will conduct its business to minimise the negative impact on health, safety, the environment, and climate throughout the value creation chain. The production of metals, materials and other products shall take place through resource efficient processes that safeguard this. Eramet Norway aims to be an environmentally and energy conscious company, with a safe working environment that protects its employees, facilities and values while at the same time reducing our environmental footprint. Systematic and continuous improvement of health, safety, environmental and energy performance shall be fundamental goals for all the company's activities.

Priorities

Health, safety, environmental and energy efficiency activities shall be an integral part of operations. Our most important consideration is to protect our employees and others affected by our business from work accidents and health injuries. All relevant laws and regulations, as well as other requirements the company adheres to, must be followed. Health, safety, environmental and safety aspects must always be considered and weighted when making decisions on investments, operating methods, and changes.

Responsibility

Managers at all levels have the overall responsibility, this also includes health, safety, environment, and energy. They are responsible for planning,

organising, training, and implementing the activities in their respective areas of responsibility and ensuring that health, safety, environment, and energy are integral parts of this, as well as ensuring that practices comply with laws, regulations, and recommendations within their areas. Managers should in their plans set specific improvement goals and seek collaboration with all employees to achieve them.

All employees are responsible for creating a secure internal work environment, protecting the external environment, and safeguarding the company's resources and equipment. Each employee is responsible for protecting him- or herself and colleagues, adhering to established instructions for completing tasks, and reporting as soon as possible in the event of adverse events or situations.

Improvement

Health, safety, environment, and energy are integrated parts of Eramet Norway's management system. Adverse events and improvement proposals must be addressed and form the basis for measures and continuous improvement. Incorporation of undesirable incidents forms the basis for implementing both corrective and preventive measures and shall therefore receive special attention.

Prevention

Risk assessments shall be the basis for procedures and practices and shall be a fundamental part of anticipation of changes and investment planning. Potential hazards must be identified and assessed. Adverse events such as near-accidents, accidents, health damage, environmental damage and energy waste should be recorded and investigated to find root causes and prevent recurrence.

Follow-up

To ensure compliance with laws and regulations and compliance with ERAMET's own environmental goals, policies and guidelines, a system for continuous registration, reporting and auditing shall be in place.

Eramet Norway shall annually publish a sustainability report.



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Our first priority is that everyone leaves work in as good health as when they arrived – and in a good mood after working in a safe environment with engaged colleagues.