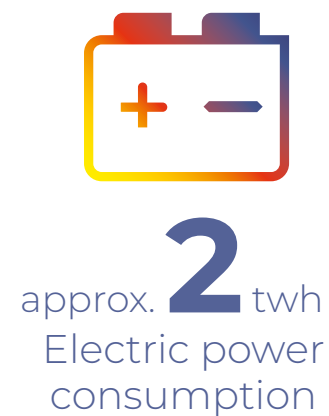
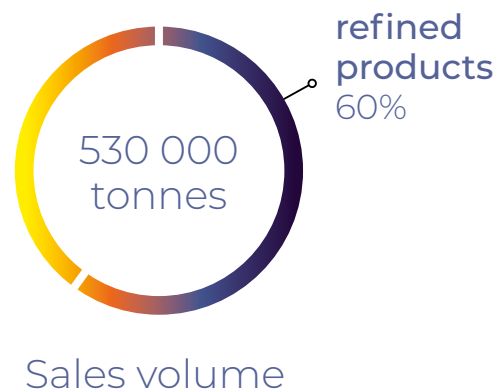
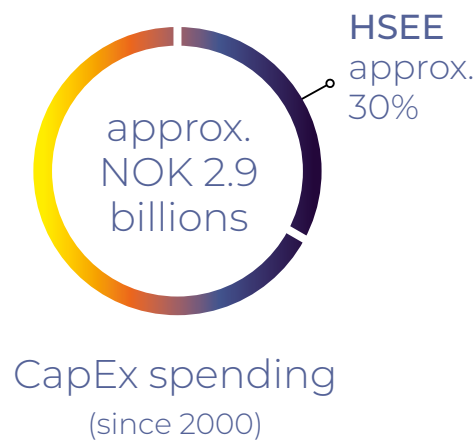


Sustainability report 2019





Highlights 2019

The importance of steel in a zero emission society

Steel and manganese alloys are critical elements in order to achieve the zero emission society and manage a massive emission reduction.

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NewERA energy recovery

The pilot facility has been ordered.

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Study of dust volume and air quality in Porsgrunn

Novel research project in collaboration with Yara and NORCE.

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Expanding the use of Silica Green Stone

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About Eramet Norway

VISION

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

GOALS

In our sector, we aim to be:



- We work in a learning environment -

Eramet Norway is a world-leading producer of refined manganese alloys for the global steel market, with its three smelters in Porsgrunn, Sauda and Kvinesdal, in addition to its research and development department (R&D) in Trondheim.

The plants in Porsgrunn and Sauda have been in operation for more than 100 years, while the smelter in Kvinesdal was established in 1974, and we are proud to be a part of the time-honoured industrial tradition in Norway.

Eramet Norway's main office is located in Porsgrunn, and the company has more than 520 employees across the three locations. In order to operate smelters in Norway, a significant distance away from our main markets in Europe and North America, Eramet Norway has established comprehensive networks, solid agreements and efficient logistics. As we move forward, we firmly believe that Eramet Norway delivers products that the world needs in its journey towards the future as a zero emission society and we do this in a resource efficient manner.

Eramet Norway is a part of the French corporation ERAMET, which operates in 20 countries and employs 13,000 people worldwide. ERAMET is a major international company within the areas of mining and metallurgical operations, and specialises in manganese, nickel, mineral sand and special alloys. Eramet Norway, which is a part of the mining and metals division, had a total revenue of NOK 6.5 billion, and the group's total revenue was NOK 36.2 billion in 2019.

"At Eramet Norway, we look towards the future with ambitions of further growth and increased value creation, which will benefit our customers, owners and employees, as well as respond to the demands for a greener future."



by
Bjørn Kolbjørnsen
CEO, Eramet Norway

Eramet Norway is proud to be one of the world's most efficient producers of manganese alloys in terms of both economic competitiveness and climate and environmental standing, a position we have acquired through years of systematic knowledge building, targeted investments and continuous organisational development. This work will never be completed, and we will continue to set, and work towards, new ambitious improvement goals within the fields of technology and working methods.

Focusing on health and safety

Our highest priority is the health and safety of all who work for us. Our goal is that everybody will leave the workplace in as good health as they arrived and be in good spirits after working in a positive working environment with friendly colleagues. A positive working environment is an absolute requirement, but it is not the only one. Our operations should not lead to any unnecessary adverse effects on our surroundings or the climate. Of these requirements, it is the climate challenge that has received too little attention during the last decades, but this is now changing.

Reducing our climate footprint

Eramet Norway is today one of the producers in our sector with the smallest climate footprint per tonne of manganese alloy produced because of the natural advantage we have through the access to hydroelectric power. It is expected that the energy demand will increase

The goals are set,
the direction is clear,
we're on our way!

worldwide and as a result, it is crucial that our industry, and society as a whole, are ensured access to renewable energy. However, clean energy alone is not enough. Eramet Norway's goal is to reduce emissions per tonne produced by at least 43 percent before 2030, and by at least 80 percent before 2050.

The forest

In order to succeed with these massive emission reductions, we will be taking advantage of another natural resource: the forests. Eramet Norway is working hard to replace fossil fuel coke with biomass as the carbon source in our smelter ovens. This is ground-breaking work and we are dependent on a number of collaboration partners to succeed: forestry owners and others who refine these resources, so that we can become a part of a circular economy value chain, research institutions and knowledge centres both in Norway and abroad. In 2019, we developed a plan for a pilot study using bio-carbon at one of our furnaces in Porsgrunn. We will send an application to Enova for financial support in order to complete this project in 2020, something that we believe will trigger a positive investment decision from our French owners.

Research and development

We are also working with both R&D and investment projects to improve our process efficiency with the aim to reduce our consumption of electric energy and of carbon as a reduction agent in our process, and as a result, set

the stage for lower climate- and environment related emissions. The first step towards the construction of a full-scale energy recovery facility at the Sauda plant was taken in the autumn of 2019 when we placed the order for a pilot facility worth NOK 50 million. The pilot facility will be installed in the autumn of 2020.

In addition, we are looking into how we can increase the utilisation of our furnace gas, which is a mixture of CO and CO₂, and which ends up as CO₂ emissions. Here we have two options: We can come up with technological solutions where the furnace gas is used as a resource in other product chains or ensure that we can capture and store the CO₂ to avoid that it is released into the atmosphere.

In 2019, we decided, as part of the Eydeklyngen (Eyde cluster) CCS initiative, funded by Gassnova, to prepare for the construction of a test facility for carbon capture at our plant in Sauda. This work must be viewed in conjunction with the Northern Lights project, which goal is to develop a complete European business model for the capture, transport and storage of CO₂.

The projects mentioned here, in addition to approximately 50 other projects, make up our roadmap for climate, energy, environment, and circular economy, and these projects are the basis for how we are going to achieve our ambitious, yet necessary, goals to

reduce out climate and environmental footprint even further.

Knowledge and cooperation

Common goals, knowledge sharing and the development of new circular economy value chains will accelerate the creation of smarter production, greater resource utilisation and more sustainable solutions. We believe that the green paradigm shift represents a significant growth potential for our Norwegian land-based process industry. The world-leading climate and environment position we have in Norway give us an advantage, and the good collaboration we enjoy between national authorities, the industry sector and our employees will continue to be a requirement for success.

At Eramet Norway, we look towards the future with ambitions of further growth and increased value creation, which will benefit our customers, owners and employees, as well as respond to the demands for a greener future.

We combine our culture of improvement and innovation knowledge and every day learning with our active involvement in external networks. A sustainable industry plays a central role in the zero emission society of the future, and Eramet Norway will continue to be in the forefront to lead the way and will also in the years to come, remain among the world's most efficient producers of manganese alloys.

Eramet Norway is founded on long-standing industrial traditions. The three Norwegian processing plants are located in Rogaland, Agder and Telemark.



● TRONDHEIM
FoU-department

● Tizir, Tyssedal

● SAUDA

● PORSGRUNN

● KVINESDAL

Eramet Norway Porsgrunn

Established in 1913, the plant, with its central location at Herøya, is part of one of Norway's leading industrial clusters. This provides excellent prospects for further developments of processes and ways of working, for example, connected to circular economy.

Eramet Norway Porsgrunn has a flexible production facility that can produce various types of manganese alloys. With its two furnaces and refining plant, Eramet Norway Porsgrunn has an annual production capacity of 70,000 tonnes of silicomanganese and 105,000 tonnes of refined ferromanganese.



Porsgrunn

Population:

35 500



155

FTE

16

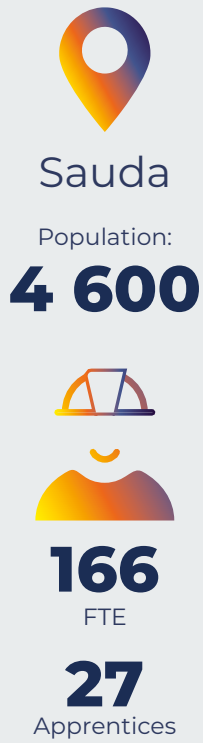
Apprentices



Eramet Norway Sauda

The plant in Sauda is built on proud traditions dating back to the beginning of the 1900's when the development of hydroelectric power in the Sauda water-course laid the foundation for the industry that still exists today. The plant actively contributes to the local community and is an important partner in business development in Sauda.

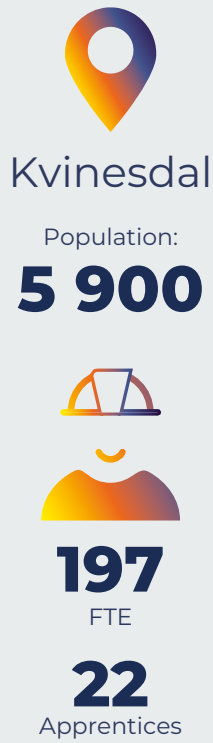
With its two 40 MW furnaces and refining facility, Eramet Norway Sauda is today a global leader in the production of refined ferromanganese that amounts to approximately 80 percent of the plant's annual revenue.



Eramet Norway Kvinesdal

Eramet Norway Kvinesdal, which began production in 1974, occupies a central location in the Lister region. The plant's compact structure with its three silico-manganese furnaces is well adjusted for an efficient production flow with an annual capacity of approximately 160,000 tonnes, where of a considerable portion is low-carbon silicomanganese.

A thermal power plant that produces approximately 90 GWh of electrical energy annually, was established on site as early as 1981, and excess heat from the production process is used both on site and sold to external customers. Stolt Sea Farm, located right next to the smelter plant, buy heated water from the plant and produces approximately 250 tonnes of turbot annually.



Eramet Norway's R&D department in Trondheim

The department's four employees work on developing and improving processes and uncover new solutions to produce more efficiently and to further reduce our climate and environmental footprint. Many of the research projects are supported by Norges Forskningsråd (The Research Council of Norway) and Enova.

The department collaborates with outstanding research organisations: Eramet IDEAS (the group's technology centre) and externally with institutions like SINTEF and NTNU in Trondheim. In addition, Eramet Norway is actively involved in projects together with Teknova AS, Elkem Technology, NORCE and Ferrolegeringsindustriens Forskningsforening (FFF).



Photo: Erik Børseth, Synlig design og foto AS / NTNU

Some of our research partners

NTNU

NTNU (Norwegian University of Science and Technology) is the country's largest and leading supplier of engineers, covering areas of technology that range from nanotechnology and IT, to petroleum technology and ship design. NTNU, which has its own research environments, works together with some of the country's most important technological and industrial companies.

SINTEF

SINTEF is a broad and multidisciplinary research organisation with international core expertise in technology, science, medicine and social science. SINTEF conducts contract research as an R&D partner for industry and administration and is amongst the four biggest contract research organisations in Europe.

Teknova

Teknova AS is a technology and science research institute. Its operations are aimed at contract research, technological development and innovation. The institute aims to develop knowledge and technology, and to create value for its users, society and its owners.

Teknova aims to create proximity and cooperation between the University of Agder, Agder Research and trade and industry in the Sørland region. Due to the international nature of its research activities, Teknova will develop a broad, international field of activity and international collaboration relationships.

FFF

This organisation was founded by the Norwegian ferroalloy industry in order to collaborate on research in ferroalloy processes and products. The aim of the FFF is to maintain the position of the Norwegian ferroalloy industry at the forefront in ferroalloy production and of electrometallurgical technology. Its largest member companies are Eramet Norway and Elkem, and together they contribute something like 80 percent of the organisation's subscription funding.

At the same time, the Norwegian Ferroalloy Producers Research Association (FFF) is the most important arena for joint research within the industry. In particular, Eramet Norway is a member of the Eyde cluster, where R&D occupies a central position.



Safety first, for everyone, always!

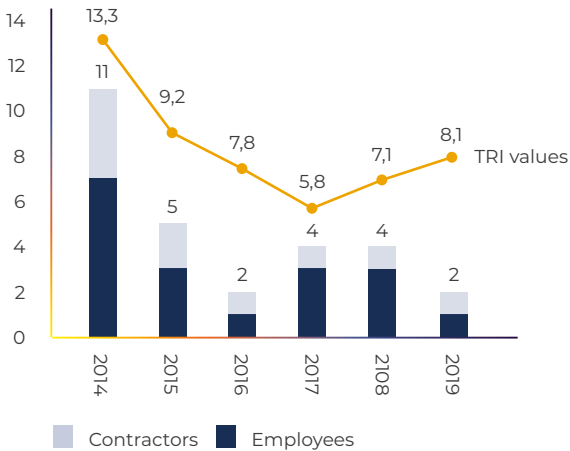


An excellent safety record is a requirement for our operations. Eramet Norway has not had any serious accidents in 2019 and within ERAMET the number of accidents has been reduced by 35 percent in 2019 compared to 2018, however, the group’s vision is zero injuries.

We work continuously and systematically to improve our safety record and this work involves more than physical measures such as barriers and protective equipment. The most important factor is that each and every one of us relate to our surroundings in a safe manner, and that this becomes a part of our workplace culture. One fundamental element in our safety approach is to analyse events in terms of their risk potential with the aim to obtain information on how to improve our safety barriers.

Our basic approach to safety is that results are achieved through the interaction between People, Technology and Organisation (PTO approach). The human factor revolves around knowledge, communication, attitude and sensitivity, while technology is for

Injury statistics



TRI: The number of injuries with and without absence per million hours worked.

The columns indicate the number of injuries with absence for both our own employees and contractors.

example equipment, process technology and design of physical barriers. The third factor relates to how safety is practised is organisation and things like organisational hierarchy, internal and external networks, leadership, workplace environment, values, standards, regulations and procedures.

"Lærende hverdag" (Learning organisation) is our approach to create interactions between people, technology and organisation, and through this process achieve the desired outcomes.

In 2019, we introduced the Green Zone concept in order to strengthening the human and organisational factors.

Green Zone thinking means that we, at all times, maintain a safety zone around ourselves and thereby avoid:

- **injuring ourselves**
- **injuring others**
- **damaging installations or equipment**

We will increase safety by assessing the potential risks in all situations.

Green Zone requires that we take the time to:

- **Map and understand the situation:** Look around. What could happen if anything goes wrong?
- **Evaluate the situation:** How to avoid unwanted situations? Do what the situation demands: Take 5, A Safe Job Analysis (SJA) or report measures that need to be taken.
- **Make the correct choice** based on these assessments in order to avoid injury to yourselves, other persons and to machinery or equipment.

Green Zone also includes taking care of people: our colleagues, fellow employees, friends and family. This is about creating a basis of trust so that we can talk to each other if we feel something is not quite right and create a culture where we are not afraid to speak up, where we have a good working environment and a safe workplace.



An integrated learning experience:

On-the-Job Training

"Neither the development of the programme nor the implementation of the pilot project would have been successful without the close collaboration between the labour unions and our many competent operators."

Marianne Synnes Kaasa,
HR director, Eramet Norway

Eramet Norway and the local labour unions were awarded a development grant in 2019 from the 'main organisations' joint action' (Hovedorganisasjonenes fellestiltak, LO / NHO). The NOK 2 million grant was provided to further develop our On-the-Job Training (OJT) programme, which was established as a pilot in 2017.

The training programme aims to increase the levels of proficiency within vocational skills and improvement and innovation competence among our operators and maintenance staff. This staff amounts to 70 percent of our employees and they play an important role in our continuous improvement efforts.

For a number of years, Eramet Norway has gradually implemented the Lean Method. These measures are collectively called Lærende hverdag (Learning Organisation). In association with this, the company recognised that it was necessary to increase improvement and innovation competence among both staff and managers in order to

speed up our improvement efforts. Increasing competency is a critical factor in order to achieve further improvements, increase quality and improve environmental efforts and to work smarter. The OJT programme is the educational aspect of Lærende hverdag.

One critical factor for the success of the OJT pilot was the close collaboration between the labour unions and our many competent operators. At the centre of the OJT method is the operators themselves who, with the help of a facilitator, to a large degree create the content of the training program, which ensures that the content is relevant for their jobs, the language is jargon free and the training can be an integrated part of an ordinary working day.

Launched in 2017, the OJT pilot focused on creating a custom-made programme of fundamental vocational knowledge for the operators in production and operations.

THE NEXT PART OF THE TRAINING PROGRAM

The next part of the training program that is now being developed will contain:

Environmental knowledge:

Global and local environmental objectives, emission permits, how the individual can contribute.

Improvement and innovation knowledge:

"The Eramet Way – our way of working", skills to transform an idea into something concrete, the Lean Method and techniques.

Specialised knowledge about operations:

More advanced knowledge regarding environmental installations and other important facilities, and increase the understanding of unwanted incidents and risk reducing behaviour.

OJT base knowledge for cold processes and maintenance (mechanical/electrical/automation).

This part of the project is scheduled to run until 2023.

OUR WAY OF WORKING

6. Sharing of learning

"Speak about improvements"

- We think over what we have learned in every day operations.
- We describe what we have learned.
- We share knowledge with colleagues and share learning with each other across areas and plants.

1. A safe learning environment

"Acknowledge and learn from our mistakes"

- People feel confident to make suggestions.
- There is a culture of listening and discussing with colleagues and managers.
- There is room for making mistakes and brainstorm for new ideas.

5. Continuous improvement

"La little bit better every day"

- We stimulate everyone to present new ideas and to develop through testing and failing.
- We learn to process ideas and provide feedback.
- The correct ideas are put into effect at the correct time.

2. Clear objectives

"Why are we here"

- Employees understand how their own efforts contribute to the company's goals.
- They see the connection between their own department and the overarching objectives.
- All employees have a good understanding of the operations and understand the big picture.

4. Self-directed teams

"Ensure good everyday operations"

- We have at all times a clear oversight of the goals in the various departments through regular meetings with the involved parties.
- One assesses status and in the event of deviation decides on corrective measures.

3. Best practices

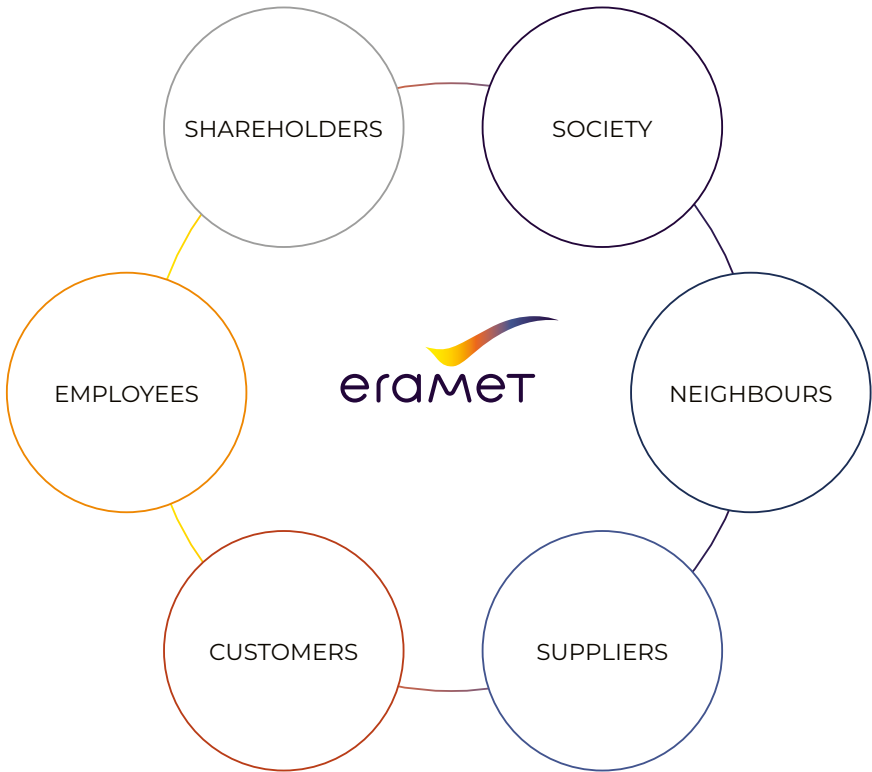
"What is good work?"

- There are established standards for good work.
- We follow standards and challenge these in a systematic fashion.



Our social responsibility

Eramet Norway aspires to be a driving force for development in the local communities where we operate. As a part of the ERAMET group, we have a clear focus on sustainability and corporate social responsibility.



Eramet Norway as a committed corporate citizen

Our operations influence, or are influenced by, many different aspects and interests. There is an expectation in today's information society that we take an active role as employer, supplier, partner and committed and contributive citizen in order to maintain our position as a world-leading Norwegian industrial company.

It is essential to have a good reputation in order to be viewed as an attractive workplace, partner, and supplier. It is also a prerequisite to be a company wanted in the future.

Eramet Norway is dependent on a good framework to be able to promote and expand our industrial operations in Norway, and this requires excellent communication with the relevant stakeholders, authorities and community partners.

Robust industrial regions

Eramet Norway believes it is important to facilitate community development and ensure robust industrial communities. To be located in, and operate from, rural communities come with some challenges that must be balanced in order for companies to be profitable. In addition, the local communities and regions must be robust.

This robustness is characterised by:

- An equitable and stable welfare service
- A competitive, profitable and adaptable commercial sector
- Good access to skilled labour
- A diversified labour market, accommodation and services

A requirement for further development of our competitive status is that the communities around us function well and meet the conditions of robust industry region.

Corporate social responsibility

Eramet Norway practices corporate social responsibility by ensuring that:

- Our clients receive their products on time and of the expected quality
- Our employees have a sense of security and predictability for themselves and their families
- Our shareholders receive an expected yield on their invested capital
- Our environmental impact is kept to the absolute minimum
- Our suppliers have a demanding customer
- We take the initiative to make changes in response to our surroundings



WHAT IS MANGANESE?

Located in group 7 of the periodic table, manganese is a metallic element with a steel-grey colour when pure. Manganese is hard, but is readily pulverised, and it is essential for making steel ductile and durable.

Where to find manganese?

There are large deposits of manganese on a global basis and the earth's crust contains approximately 900 ppm, which makes it the most common heavy metal after iron. Manganese is recovered primarily from the mineral pyrolusite (MnO_2), commonly known as ore.

More than 80 percent of manganese deposits are located in South Africa and Ukraine. Other important deposits are located in China, Australia, Brazil, Gabon, India and Mexico. In addition, manganese occurs on the seabed as nodules in deep oceans.

Eramet Norway uses primarily ore from the ERAMET partly-owned mines in Gabon, as well as ore from suppliers in South Africa. The plants in Norway recover the manganese and process it into ferromanganese and silicomanganese alloys. Eramet Norway exports all its production of manganese alloys, primarily to markets in Europe and North America, and the vast majority of our products is transported by boat.



We are one of the world's cleanest manganese alloy producers.



The importance of steel in a zero emission society

The world requires a drastic reduction of emissions to air and water in order to prevent major changes to the world's climate and significant loss of bio-diversity. However, even though the production of steel and manganese alloys is resource-intensive, these products are crucial for society's zero emission vision.

Main usages for steel



Steel is 100 percent recyclable and can potentially be recycled indefinitely without losing its properties.

Steel, and the manganese alloys used to make steel ductile and durable, is currently one of the world's most used construction materials in everything from energy and industrial installations to buildings, transport systems, cars and household appliances.

Steel is therefore an essential factor connected to economic development and prosperity in order to meet the many challenges associated with population increase, urbanisation, combating poverty and initiatives to

reduce the negative effects of natural catastrophes.

Approximately 10 kg of manganese alloy is used to produce one tonne of steel. Almost 90 percent of the world's total manganese alloy production is used in carbon steel, which is highly valued due to its durability and resistance to torsion.

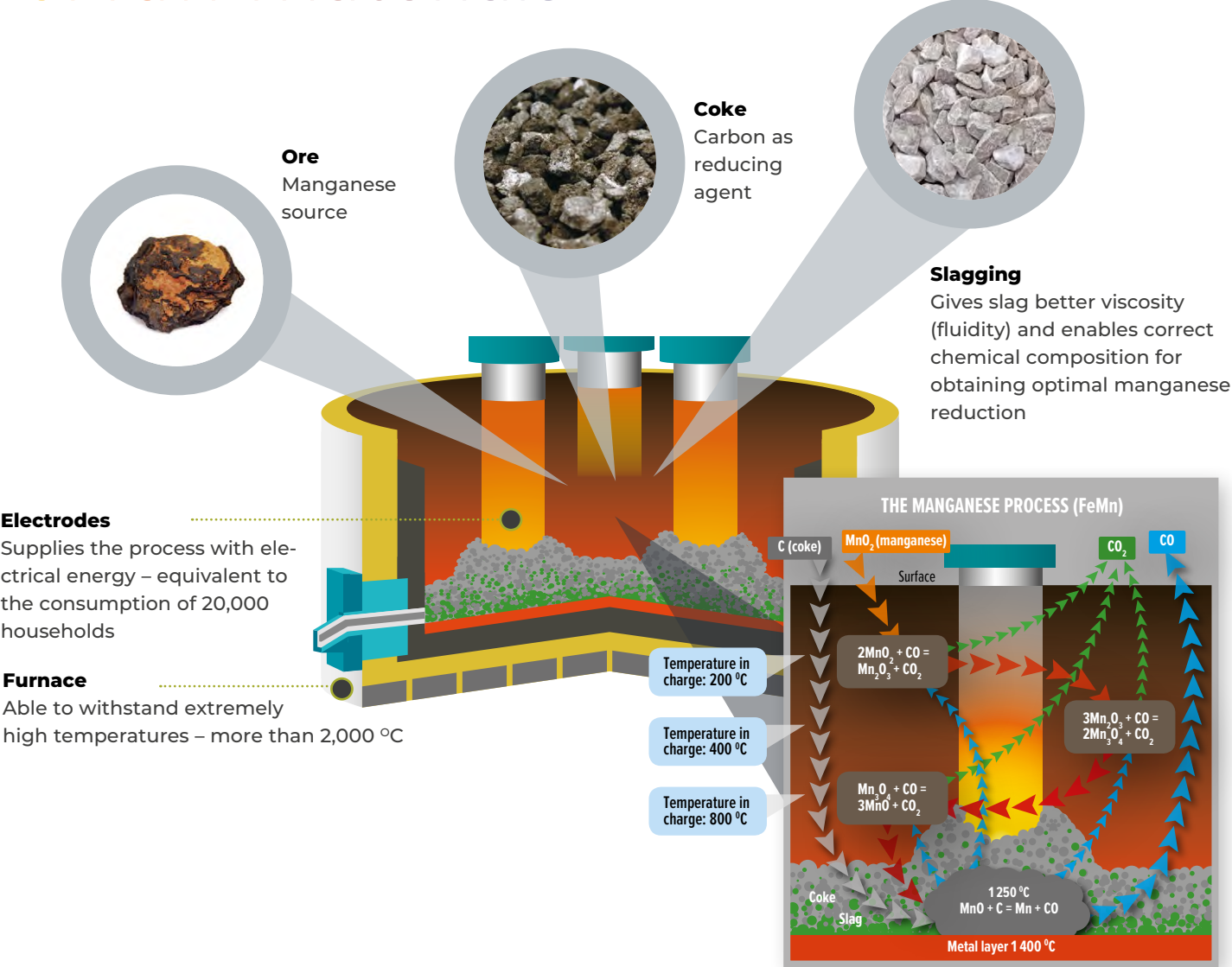
Steel is 100 percent recyclable and can potentially be recycled indefinitely without losing its properties, and in our major markets, Europe and

North America, approximately 80 percent of steel is currently being recycled. The consumption of steel has increased sevenfold since 1950, and it is expected that by 2050, the use of steel will increase by 50 percent compared to today's levels*.

Steel and manganese are crucial components in order to achieve the goals of the green paradigm shift and satisfy the zero emissions vision.

* Worldsteel Association: Sustainable Steel – At the core of a green economy, 2012

Production of manganese alloys and consumption of raw materials



Our most important raw materials

Eramet Norway uses significant quantities of raw materials in its production every year. These raw materials come from both foreign and domestic suppliers, and they are mainly:

- Manganese ore, with Eramet having access to its own mine in Gabon via its part-owned company, Comilog
- Metallurgical coke
- Quartz and limestone

Other inputs

Other important factor inputs are electrode paste and metallic silicon sources. During the smelting process, a number of internal products are manufactured, transferred internally or between the plants in order to be as resource efficient as possible.

Energy consumption

The combined electrical energy consumed in the smelting processes, including auxiliary power, was 1,970 TWh in 2019. The required amount of natural gas and propane used as thermal energy sources amounted to almost 720 tonnes. Eramet Norway is also one of the country's largest consumers of industrial gases, particularly liquid oxygen, in production processes.

World-class technology

Eramet Norway has a century of experience in manufacturing manganese alloys. This knowledge base, developed over generations, is Eramet Norway's most important asset. It is this expertise that has made the company a leader in smelting and refining manganese alloys.

Today, the refining process is an advanced, highly technological process that few other countries in the world are able to emulate. From the time an optimal mix of ore and coke is blended and sent to the furnace, and until the crucial refining process has been completed, precision and experience are essential. With the aid of an advanced control system, every stage of production is monitored in detail, and the laboratories take samples at regular intervals to test quality.



957 772
TONNES OF MANGANESE ORE

233 459
TONNES OF METALLURGICAL

92 263
TONNES OF QUARTZ

13 531
TONNES OF ELECTRODE
PASTE CONSUMED FOR THE
SØDERBERG-ELECTRODES

1,970 TWh
OF ELECTRICAL ENERGY
AND AUXILIARY POWER

720
TONNES OF NATURAL GAS
AND PROPANE

Our company in a global market

The process industry in Norway has more than 100 years of history and remains strong even though it is competing in the global market. Our success is based on decades of continuous focus on skill development, improvement and change, and harvesting the benefits of economies of scale and increased efficiencies in our processes, from the purchasing of raw materials, through production, to the sale of finished products.



Globalised purchasing

Like our finished goods, the raw materials and products that we purchase are exposed to global competition, and we remain active participants in markets on all the continents in order to locate the best and most cost-effective products.

The ERAMET group aspires to be a leader in all stages of its operations and has created a 'Lead Buyers' system for critical goods and major purchase categories. The system operates across all units in the group, and the objective is to assemble buying power, knowledge and understanding of the market, in addition, to ensure transparency and involvement in our purchasing processes. Today 15 'Lead Buyer'

systems within the ERAMET group handle purchases of about NOK 12 billion annually.

Sustainability requirements

There are strict requirements to be what ERAMET defines as a business partner of choice, and the purchasing department is no exempt. In addition to the regulations and legislations of the various countries where we operate, we must also observe a set of internal guidelines, which are the core of our work to secure a sustainable profile. In addition to challenging ourselves to become better, we also challenge all our suppliers.

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

For more information, please visit the group's website: www.eramet.com

The ERAMET group has a firm stand against corruption

Anti-corruption

The ERAMET group has a firm stand against corruption, and all countries in which the group operates have established anti-corruption legislations.

The ERAMET Executive Committee signed an anti-corruption directive in the autumn of 2018, and developed clear guidelines on anti-corruption and ethics. A comprehensive training module on anti-corruption and ethical guidelines is available for all ERAMET's employees.

All forms of corruption are strictly forbidden. Corruption is a risk against the group, both judicially, financially and against the corporation in general, as well as for its reputation.

The group work continuously to clearly demonstrate its ethical corporate culture in all operations, and the International Anti-corruption Day was marked on the 9th of December across the corporation. The information campaign, which was presented by email and on information screens across our locations, consisted of animations, posters and a video message from Ms Christel Bories, CEO, ERAMET.

Sustainability as a product

– marketing of our
climate footprint

Due to the increasing pressures from authorities, investors and consumers to reduce climate footprint, we believe there is only a matter of time before the markets will ask their suppliers to document their contributions.



Eramet Norway

One of the world's
greenest of manganese
producers

renewable
energy

Eramet Norway is one of the world's greenest producers of manganese alloys due to access to renewable energy, efficient production processes and advanced cleaning systems.

Eramet Norway is one of the world's greenest producers of manganese alloys due to access to renewable energy, efficient production processes and advanced cleaning systems. In addition, we have a continuous focus on research and development and

efficient
production
processes

competence development to improve our processes and operational procedures. As a company, we have a strong commitment to our planet and to people, while acting as a responsible economic partner, and we produce useful products for the future carbon neutral society in a resource efficient way.

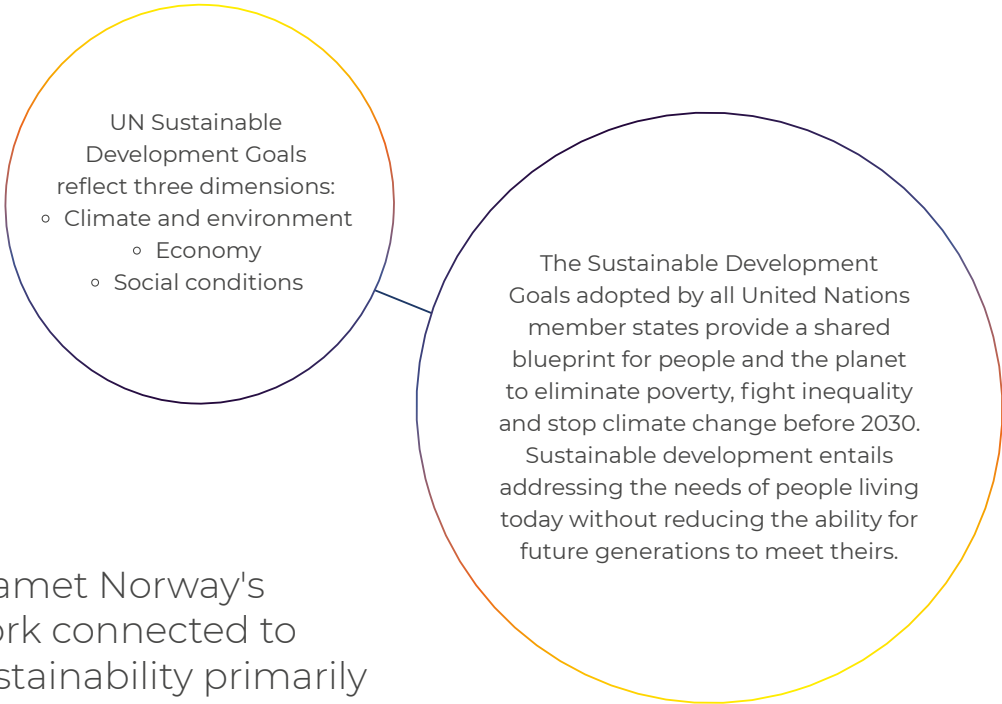
While we have yet to develop a consistent method and clear strategy for providing this information to our markets,

advanced
cleaning
systems

we aim to implement this within the next few years.

We believe that the environmental challenges we face as a society and the state of our planet will soon require increased transparency through the entire value chain. As a green producer of manganese alloys, we want to ensure that this information is easily accessible for our markets.

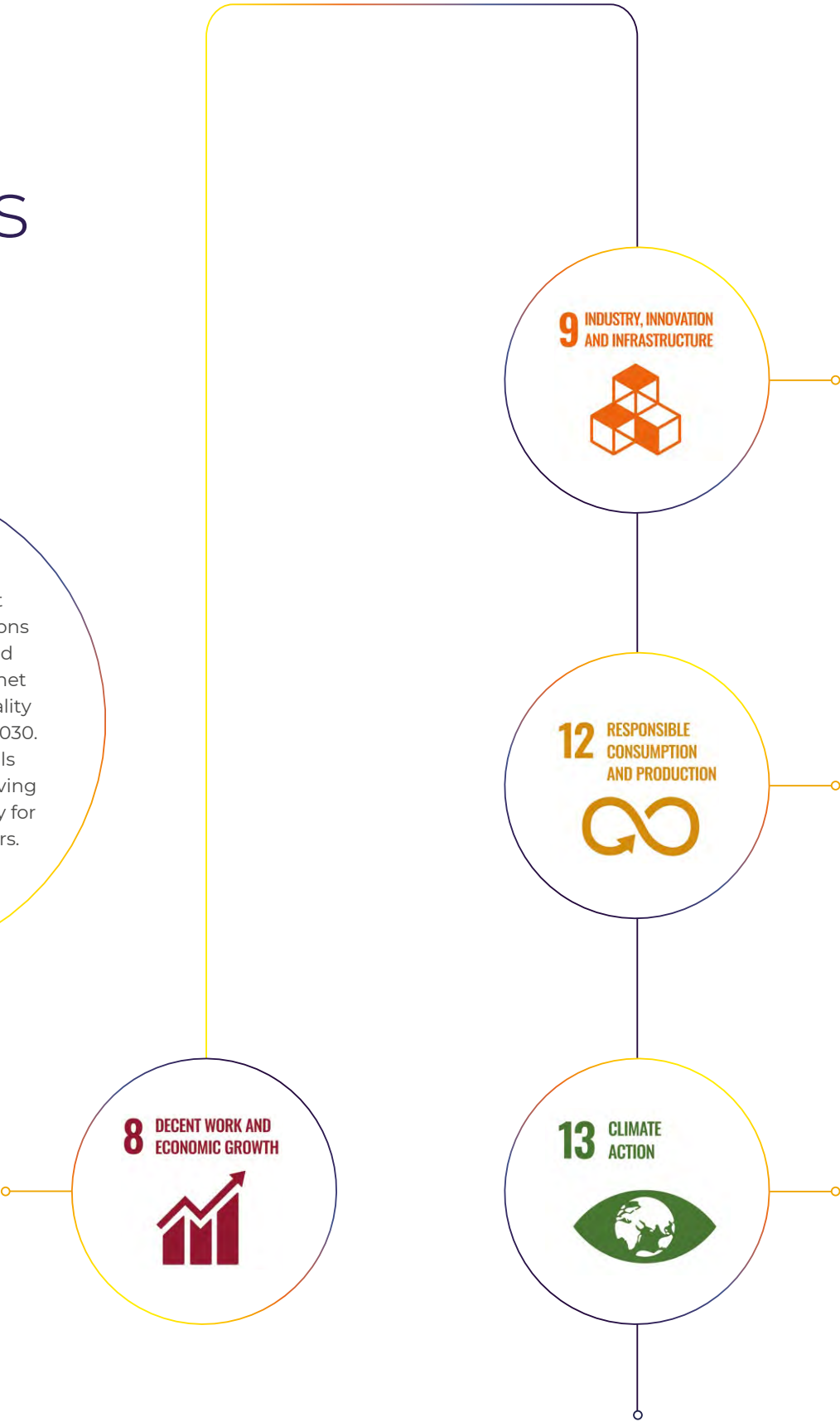
Sustainable Development Goals lead the way



Eramet Norway's work connected to sustainability primarily focus on the following goals:

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 a strong focus on health and safety for all who work for us. Our procurement processes ensure that suppliers are carefully evaluated to protect human and employee rights, the environment and other requirements that we have determined. By signing a contract with us, suppliers commit to provide information on their own subcontractors so that we can have insight into the entire value chain. Norway has a well-functioning three-party-collaboration between government authorities and employee- and employer organisations, as well as a comprehensive workers rights legislative framework, which together ensure 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, and steel is required for infrastructure and new industrial operations. Eramet Norway also contributes to economic growth based on sustainable industrialisation through research and development in order to continuously create cleaner and more environmentally friendly production technology. Infrastructure must be upgraded steadily in order to meet the future challenges associated with sustainability. Innovation and prioritising science and technology are requirements 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 always improve to become more resource efficient through recovery and recycling of energy streams and materials, as well as handling of chemicals. Responsible consumption and production involves doing more with less: reduce resource use, avoid climatic 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 are also working to achieve increased energy utilisation through continuous improvement of our process performances and operational activities, as well as developing new solutions for energy recovery and utilisation.

Climate and environment — our direction

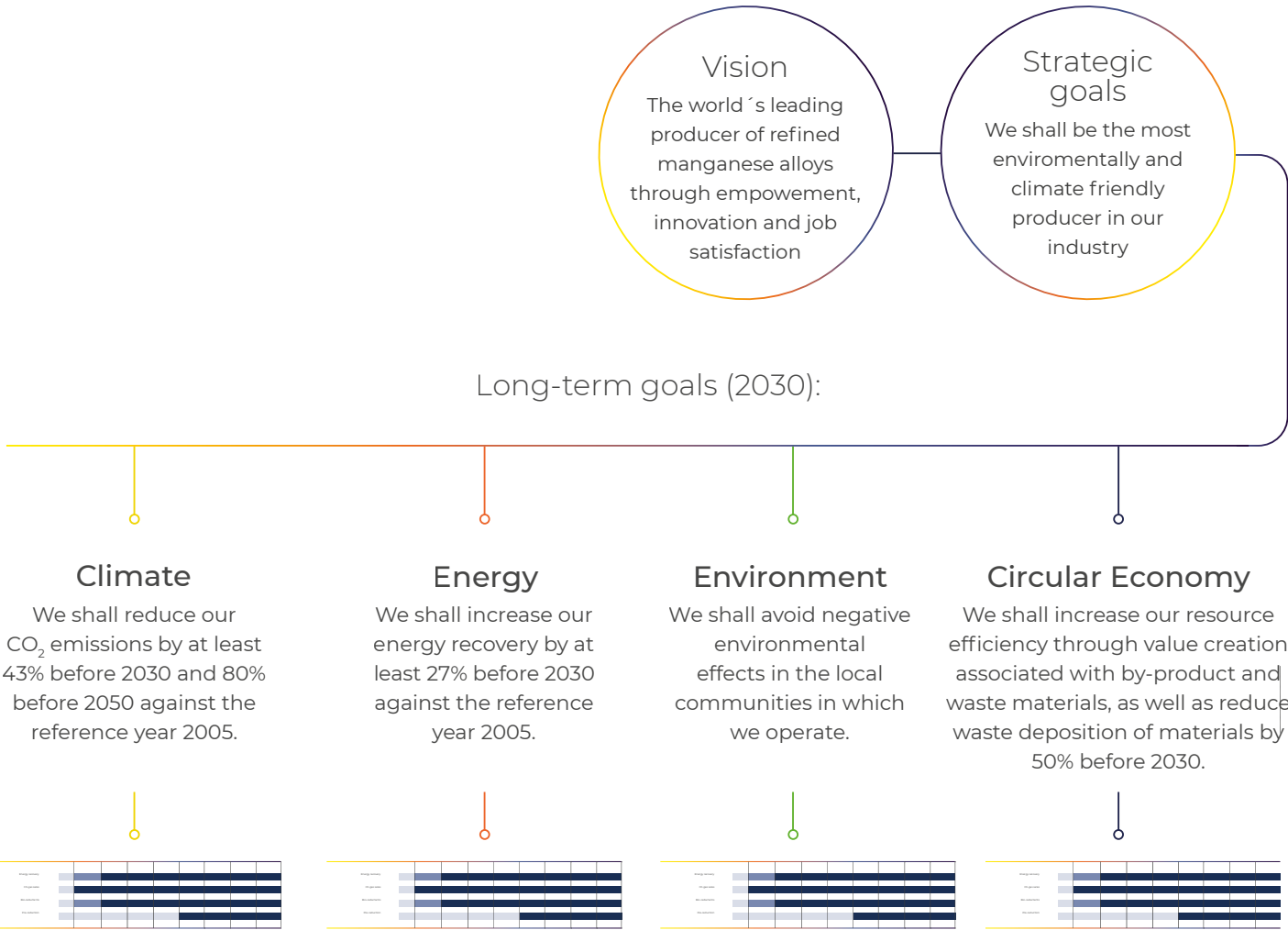
Our plants have been in operation for more than 100 years, and we are an integrated and active contributor to our local communities. As an industrial company located in Norway, we operate in accordance to strict national laws and requirements, and our emission permits are closely monitored and reviewed in collaboration with the Norwegian authorities. During recent years, climate and environment have received more international attention through for example the United Nations 17 Sustainable Development Goals and at top-level climate meetings.

As part of the ERAMET group, we are also committed to the group's roadmap for corporate social responsibility (CSR), which is based on the Sustainable Development Goals. The roadmap focuses on the following areas:



Eramet Norway's vision is to be among the world's most effective producers of manganese alloys.

In this report, we present our goals, in addition to important processes and projects within our roadmap, categorised according to the following goal areas: Climate, energy, environment and circular economy.



Roadmaps describing key development projects for each of the goal areas are updated annually.

- Eramet Norway's strategic goals are based on the view that having a leading position in climate and environmental matters increases our competitiveness and strengthens the company's profitability in the long term through:
- Better utilisation of our most important raw materials: ore, reduction agents and energy
 - Increased stability and process efficiency in our production processes
 - Increased revenue through circular economy solutions for by-products and waste materials
 - Reduced environmental related costs, for instance associated with quota costs and fees
 - Increased attractiveness which provides enhanced possibilities for future recruiting of competent and motivated employees, as well as collaboration with external networks
 - Access to financial support and arrangements for R&D and investment projects



Climate

A global agreement was reached at the 2015 United Nations Climate Change Conference in Paris, COP21, to limit the global warming to well below 2 °C compared to pre-industrial levels, with the aim to limit the temperature increase to 1.5 °C.

The agreement also calls for zero net anthropogenic greenhouse gas emissions to be achieved during the second half of the 21st century. These international goals were the basis for establishing Eramet Norway's roadmaps and long-term climate and environment goals.

Eramet Norway's long-term climate goal

We shall reduce CO₂ emissions by at least 43 percent within 2030 and 80 percent within 2050, compared to the reference year 2005.

CO₂-emission per sellable ton of production



Status climate emissions

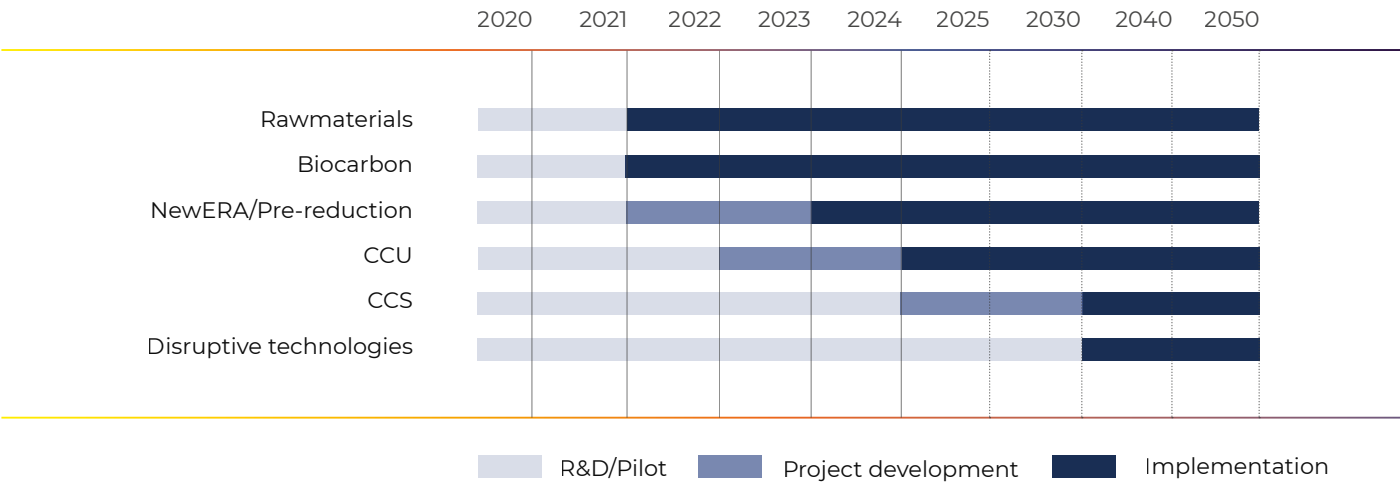
Eramet Norway's climate emissions have been stable during the last years. Our climate roadmap describes our priority projects to succeed in achieving our long-term goals.

R&D Focus Areas

In 2017, we assessed potential measures to reduce CO₂ emissions by criteria such as effectiveness and implementability. This initial study formed the basis for our further R&D efforts, and the «Multi Criteria Decision Analysis» model (MCDA) has been applied to define our priorities. R&D studied potential impacts of possible solutions in the short-, mid- and long-term range:

- Five-year perspective:**
Reduce carbon consumption through promoting the uses of resource and energy saving chemical reactions, under the term «pre-reduction», in existing furnaces.
- Ten-year perspective:**
 - Introduce a significant share of non-fossil or bio-carbon
 - Capture CO₂ through Carbon Capture and Storage (CCS) or Carbon Capture and Utilisation (CCU)
- Long-term:**
Develop ground-breaking technologies which may require a total business transformation

Our R&D approach will vary across the different areas, from engineering concrete solutions for implementation to “blue-sky” investigations of less mature technologies. Main initiatives and plans in our climate reduction roadmap are showed below.



Industrial trials have demonstrated a potential for reducing climate emissions by optimising the composition and mix of raw materials.

Eramet Norway is developing new bio-carbon qualities in collaboration with research institutions, academia and suppliers. The new raw materials must be adapted to our production processes. In parallel, we aim to develop a pilot facility to test available bio-carbon qualities, prepare further implementation and increase the share of bio-carbon used at our plants.

Regarding pre-reduction, we are considering new technology concepts in parallel with implementing our existing knowledge through the NewERA project in a three to five year perspective. Concerning CO₂ capture.

Eramet Norway has two main strategies:

1. As a part of the Eyde Cluster CCS initiative, we aim to identify the best suited capture technology and determine the conditions for a major scale development through a carbon capture pilot in Sauda
2. Together with relevant industrial partners, we are exploring potential new value chains with options for utilising furnace gas

We are also assessing ground-breaking technologies together with Eramet IDEAS and in cooperation with external competence institutions.

Projects

- **IPN Pyrogass:** The Norwegian Research Council's innovation project for development of bio-carbon adapted to Mn-production
- **KPN BioCarbUp:** The Norwegian Research Council's competence project for development of bio-carbon in metallurgical industry
- **KPN Reduced CO₂:** The Norwegian Research Council's competence project to reduce CO₂ emissions in metallurgical industry
- **EU Horizon 2020 PREMA:** Develop process to increase resource and energy efficiency
- **Climit Eyde CO₂ Tek:** Explore CCS technologies for the process industry
- **Danish cooperation project, Waste to Bio-carbon:** Development of bio-carbon adapted to Mn-production
- **ENO NewERA Program:** Development and implementation of new climate and energy technology for Eramet Norway



Bio-carbon

Eramet Norway decided to prepare a pilot facility to test the replacement of fossil reducing agents with bio-carbon at Furnace 10 in Porsgrunn. Hence, during 2019 we conducted a pre-feasibility study to examine how to handle bio-carbon materials through the production process.

As a mature manganese smelter is not designed to handle structurally weak raw materials as bio-carbon, we need to upgrade our material transportation systems to avoid negative environmental impacts. In 2020, we aim to develop a complete project and the plan for the test phase, followed by an application to obtain financial support from Enova.

Our goal is to be ready to carry out tests with commercially available bio-carbon in 2020/2021. A major introduction of bio-carbon represents a significant change to the process and needs to be thoroughly planned. Industrial testing is vital to gain the knowledge required to further our R&D efforts towards the 2030 goals.



The Eyde Cluster CCS initiative

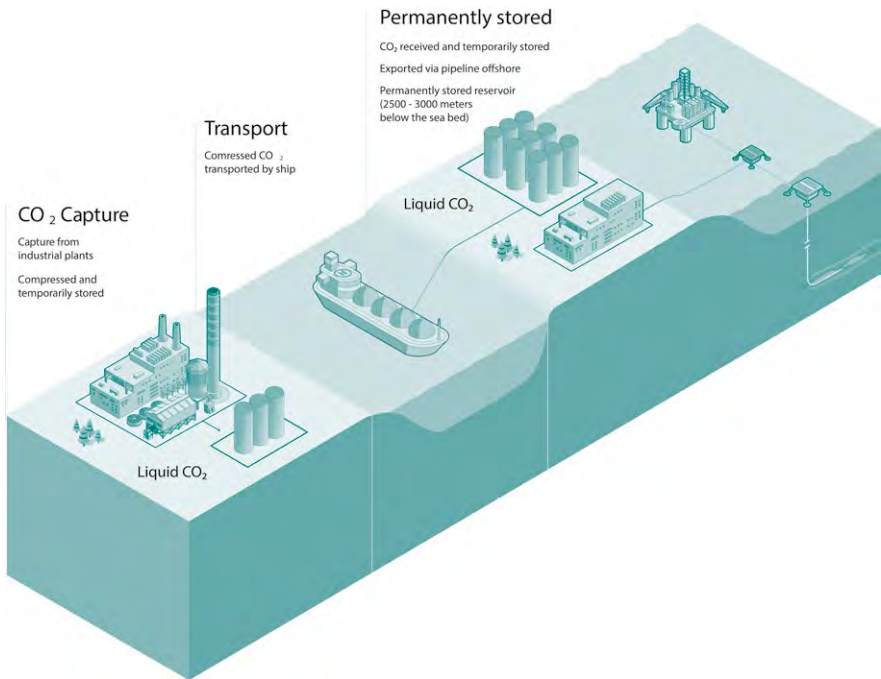
An implication of the low carbon economy is a higher demand for products with a small total carbon footprint, in other words considering the footprint from both production and use. Norwegian process industries are, and will continue to be, capable of supplying this demand with new, increasingly clean and innovative products and processes.

Carbon capture and storage (CCS) is fundamental in order to achieve the goals set in the process industry's roadmap; the goal is to reduce more than half of the industry's CO₂ emission. In order to be able to deliver this, it is crucial that the industry itself has a deep understanding of the potentials and pitfalls of capturing CO₂ sources. Because each site is unique with individual combinations of CO₂ concentrations, temperatures, other emissions and process heat availability, the project "Eyde CCS Initiative" was established in 2018.

The overall project goal is to install two carbon capture pilots within 2022 and to select technology for a permanent CO₂ catch solution, based on solid research, within 2024.

The partners are the Eyde Cluster, SINTEF Industry, SINTEF Energy Research and the industrial companies Elkem, Eramet, Returkraft, Alcoa and Saint-Gobain. The project is organised in four phases and is supported by Gassnova.

Results from the first project phase are presented in the report "CO₂ capture potential in the Eyde Cluster", available through NCE Eyde (<https://www.eydecluster.com/no/>).



Based on results from the first project phase, it was decided to continue to the next phase with the following goals:

- Describe the specifics of a scaled CO₂ capture pilot project designed for verifying technologies which fit industrial plants
- Increase the number of project partners and write an application for a three-year project for pilot testing of suited CO₂ capture pilots

After the required information was collected, the steering committee agreed to establish two pilots, one at Eramet Norway Sauda and one at Returkraft.

In order to develop a complete application for a pilot installation, we had to include a sub-project to make the final selection of CO₂-catch technology and suppliers. A more complete overview of capex and opex, and physical meetings with technology demonstrations were therefore required. Hence, the final selection of technology for the two plants was

postponed to the third project phase, which is now ongoing with the following goals:

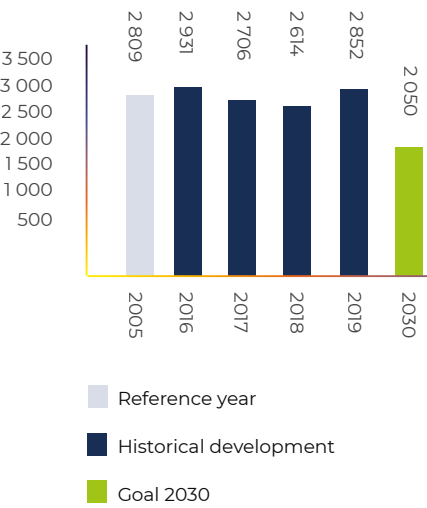
- Qualify CO₂ catch technologies for the two pilot test sites at Eramet Norway Sauda and Returkraft
- Describe plan for integrating CO₂ catch pilots at the two plants
- Prepare a CLIMIT-application to Gassnova for installation of the CO₂ catch pilot plants

As a part of the project, the Eyde CCS Initiative also collaborate with "The Northern Light project", a European CO₂-network aiming to develop a complete solution for the transportation and storage of CO₂ in underground reservoirs in the North Sea.

Energy

As a major consumer of renewable electrical energy, more efficient use will benefit both us and the society as a whole. While energy transformation may be the biggest climate challenge for the world today, for us efficient energy utilisation is about improving our competitive power. We will strengthen our focus on energy management and at the same time prepare projects that will significantly increase value creation and improve our energy position.

Net el.consumption per sellable ton of production (KWh per ton)



Eramet Norway's long-term energy utilisation goal:

We shall increase energy efficiency by at least 27 percent within 2030, compared to the reference year 2005

Status Energy utilisation

The diagram indicates that the energy utilisation varies from year to year. The main explanations are variations in the sales of CO gas to Yara in Porsgrunn and the maintenance pattern at the thermal power plant in Kvinesdal. Increased energy utilization is also vital for global reduction of climate emissions.



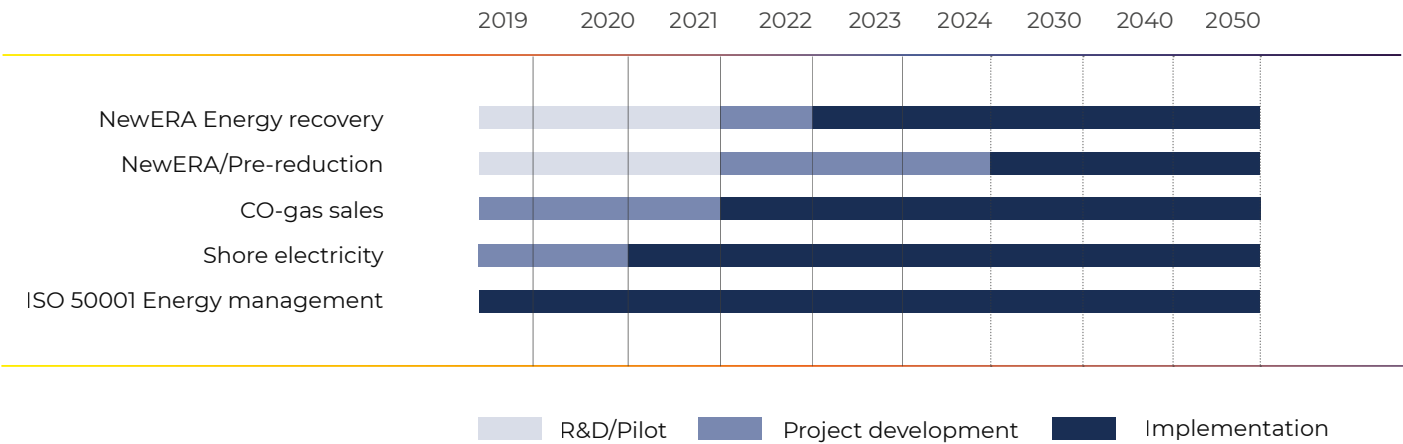
R&D Focus Areas

Through previous mapping of energy flows, we have identified two areas with significant energy efficiency potentials:

- 1. Energy consumption in the furnace process
- 2. Chemical energy in the off-gas

We are studying energy saving chemical reactions in the furnace, in particular pre-reduction. In addition, we aim to increase the usage of furnace gas, e.g. through energy recovery into electricity, use of heat for pre-treatment of raw materials and other internal purposes. Together with external partners, we are also exploring options linked to production of new products (CCU).

Eramet Norway is involved in several cooperation projects on pre-reduction. We aim to implement knowledge gained through the last decade through the NewERA project, see pages 43 and 44.



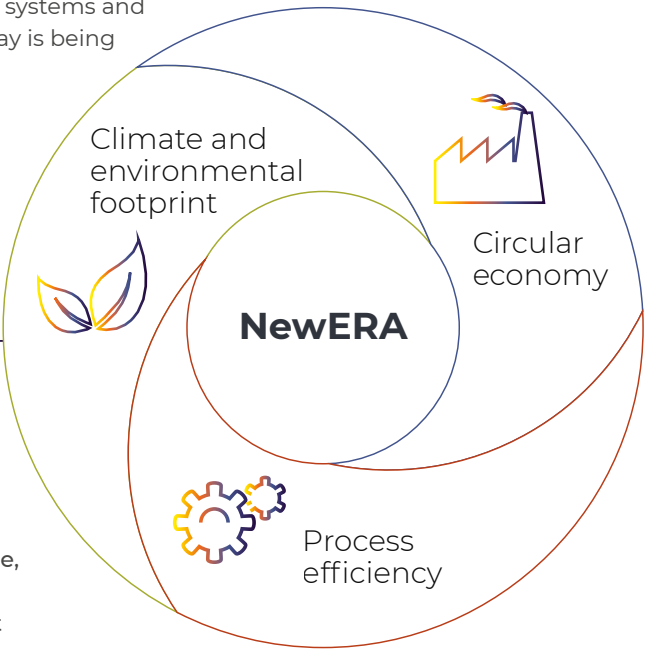
- Projects:**
- SFI Metal Production: the Research Council of Norway for research based innovation
 - EU Horizon 2020 PreMa: Development of process for improved resource and energy efficiency
 - FME HighEFF: The Research Council of Norway for a Centre for Environment-friendly Energy Research (FME)
 - NewERA Energy Recovery Unit (ERU). Part of the NewERA project

The NewERA-project

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

- Through this project, we will achieve:**
- **Increased process efficiency:** Lower specific consumption of electrical energy and reducing agents, also supporting increased level of production
 - **Expansion of circular economy solutions:** Higher utilisation of energy and raw materials, increased value creation
 - **Lower climate and environmental footprint:** Less emissions and reduced need for deposits

- Sub-projects:**
- **Energy recovery:** The furnace gas from the smelter in Sauda is today mainly flared. The plan is to run the gas through gas engines to generate electrical energy for external sales, and thermal energy for internal or external use.
 - **Ore quality:** The thermal energy from the energy recovery process is planned for reducing moisture in the ore. Next, the dried ore will be shifted to reduce the level of ore fines introduced at the furnace.
 - **By-products and waste materials:** Drying the ore will generate fines that will be briquetted together with fines from the metal crusher, filter dust from the cleaning systems and sludge, which today is being stored in deposits.
- Main goals:**
- Increase energy utilisation by at least 250 GWh, which equals the usage of 10 000 households
 - Improve furnace process stability and reduce specific energy consumption in the FeMn process by at least 6 percent
 - Reduce the specific carbon consumption, thus CO₂ emissions per ton produced, by at least 2 percent, about 7000 tons per year, which equals the carbon emissions from 3500 cars
 - Facilitate sustainable handling of by-products and waste materials



Collaborating with Sauda Fjernvarme
Eramet Norway Sauda is cooperating with Sauda Fjernvarme, a local company, to expand the utilisation of waste energy from the Sauda plant. Our full-scale energy recovery project will significantly increase the potential local value creation and Sauda Fjernvarme will actively search for possibilities to increase remote heating and use of thermal energy for new ventures.

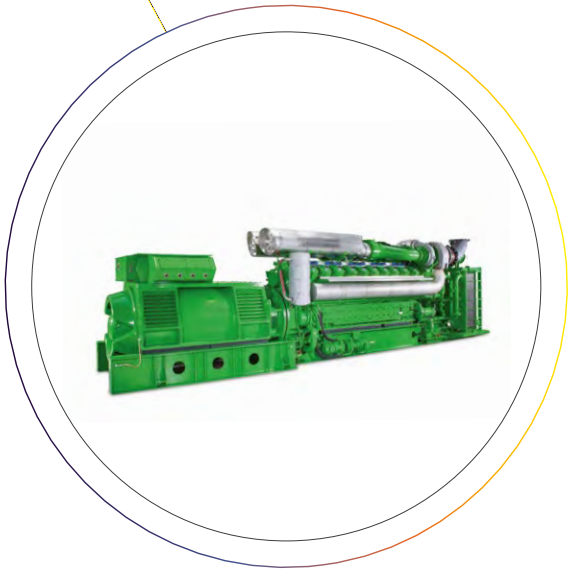
Eramet Norway and Sauda Fjernvarme are partners in the project Grønn vekst (Green growth), partly funded by Innovation Norway. The project's objective is to develop new industrial activity, increase value creation and create new jobs in Sauda.



NewERA
Energy Recovery-
The pilot gas engine
is ordered

The gas engine pilot project with a Capex estimate of NOK 50 million was approved in 2018. Based on offers received during the first part of 2019, we signed a contract with the international company Clarke Energy. The plan is to start installation of a 1.5 MW gas engine in Sauda during the autumn of 2020 and the testing period will start in early 2021. The further planning of a full-scale expansion is pending results.

Enova has supported the gas engine pilot in Sauda through its industrial pilot program.



Shore electricity

In June 2019, Enova awarded us a significant grant for the installation of shore electricity facilities at Eramet Norway's plants in Porsgrunn, Sauda and Kvinesdal, and ERAMET's plant in Tyssedal, TTI. The purpose of the project is to supply renewable energy to ship docked at our quays, thus stimulating the replacement of fossil fuels like diesel and heavy oils. All our plants transport the majority of its raw materials and finished goods by sea, with more than a thousand ships arriving at the Norwegian sites every year. With a 50 percent utilisation of the estimated potential, Enova has

calculated an annual reduction of more than 900 tonnes of CO₂. At full capacity utilisation, this will give an annual reduction of around 2000 tonnes of CO₂, which equals one thousand cars. Other positive environmental effects are:

- reduction of local pollution: Particles, NOx and SO₂
- reduction of noise linked to quay operations

The plan is to complete these installations at the Norwegian Eramet sites within 2020 and 2021.



Eramet Norway Kvinesdal power plant.

Energy Balance 2019

Eramet Norway's three manganese alloys smelters are all ISO 50001 certified and fully focused on systematic energy management to strengthen the sustainability aspect of our energy intensive operations.

Our energy consumption can be divided into three main groups (see below), in which «electrones» and «hydro-carbones» each represents 47 and 46 percent respectively, which equaled a total of 4.2 TWh in 2019. The remaining share is linked to the energy content of metallics (Si and Mn) used in our furnace and refining processes.

Energy consumption

The consumption of electrical energy, smelting and auxiliary power, a total of 1.97 TWh in 2019, consists of 0.56 TWh, 0.70 TWh and 0.70 TWh for the smelters in Porsgrunn, Sauda and Kvinesdal. Coke and anthracite are primarily used as reducing agent in our furnaces in order to transform the oxydic manganese in the ore to metallic manganese as in our end-

product alloys. However, the energy content in our reducing agents are included with a total of 1.92 TWh in our energy balance sheet.

Energy in products and energy recovered for other purposes

With a sellable production of 523 000 tons of Mn-alloys in 2019, our calculations indicate that 1.93 TWh is «baked into» our refined and standard products of FeMn and SiMn, corresponding to around 46 percent of the total energy introduced into our production processes.

Our challenge is to recover a higher percentage and use surplus energies in heat flows, e.g. in water and air. In 2019, the recovered energy amounted to ca 0.51 TWh, 12 percent of the energy provided. The corresponding figure for 2018 was 0.65 TWh and 15 percent.

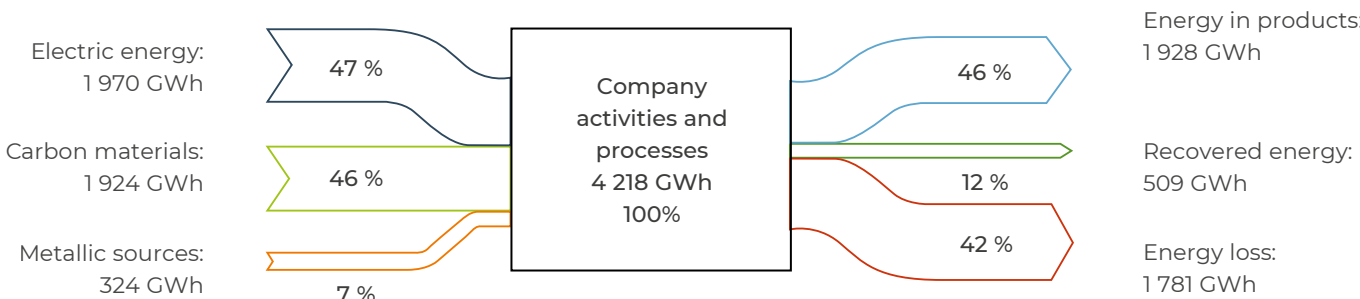
The net energy recovery of the Eramet Norway Kvinesdal power plant was 69 GWh. Deliveries of furnace gas to Yara's ammonia plant in Porsgrunn was due

to commercial reasons terminated in May, causing a significant negative impact. On the other hand, hot water deliveries to Stolt Sea Farm in Kvinesdal, the compressor heat recovery in Porsgrunn and the gradually increasing use of furnace gas for heating of refractories, buildings and heating provided externally in Sauda are all good contributions to our overall energy recovery record.

Our challenge

As a residual, we have almost 1.8 TWh as «energy loss» in 2019, as in 2018. Our energy management teams, one per plant, are working systematically to increase our energy recovery. Based on regular mapping and prioritation of energy aspects, we create annual improvement plans with improvements ranked by potential benefit and investment requirements. Naturally, our locations also have an impact of the demand for and usage of our of recovered energy.

Energy Balance Eramet Norway 2019



Environment

Eramet Norway's long-term environmental goal:

We shall avoid negative environmental impacts to the societies where we are located – no breach of permits

Our smelters are located in vibrant communities, close to neighbours and beautiful landscapes, which put extra pressure on our environmental behavior, especially linked to emissions of dust and noise levels. Major strides have been made since the 1950s benefitting both employees, local communities and the environment.

During the last few years, all our emission permits have been renewed with lower emission rates as expected due to increased climate and environmental challenges worldwide. Eramet Norway takes its corporate social responsibility seriously, and we continue our efforts to further reduce our environmental footprint for the benefit of both ourselves and our surroundings.

Status environmental emissions:
Data on emissions per plant are presented in pages 67-69.



R&D Focus Areas

As a part of our R&D work, our goal is to reduce fugitive emissions and emissions of Polycyclic Aromatic Hydro-carbons (PAH). Our most innovative development projects are developed in cooperation with research institutions, while continuous improvement efforts are implemented by internal resources at the plants.

Based on systematic mapping of fugitive emission sources, the R&D department develops flow models and carries out testing of numeric solutions. This method gives us data on efficient solutions with as little as possible “trial and error”.

PAH free electrodes are examined in our laboratory and then tested in an industrial setting to identify the needed adjustments.

We are also focusing on the development of monitoring methods and measurements models with respect to both fugitive emissions and PAH, mainly in cooperation with external research and competence institutions.

- Projects:**
- SFI Metal Production Centre for Research-based Innovation (SFI)
 - IPN PAHssion The Norwegian Research Council's innovation project for PAH measurement
 - IPN DUDes The Norwegian Research Council's innovation project for fugitive emission measurement
 - RFF ENSENSE Regional research fund project for air quality control



Installation of new
environmental
filter in Kvinesdal

New environmental filter in Kvinesdal

In 2019, the three SiMn furnaces at the Kvinesdal plant were encapsulated and an extra environmental filter was installed to reduce the dust emissions to the surroundings. As a part of the project, measures were also taken to reduce plant energy consumption by using the air which has a temperature of about 50°C to pre-heat the electrode mass.

The purpose of the project was to ensure optimal cleaning of the air emitted from the three furnaces. This project lead to an increase in the total capacity for cleaning of furnace gas and dust from tapping and casting activities to 450 000 m3 per hour. This has a positive effect on both channeled

and fugitive dust emissions, with an expected reduction of 7 tonnes per year. The new environmental filter is in accordance with existing BAT-requirements («Best Available Technology»), and the results will be monitored and followed up in cooperation with the Norwegian Environment Agency and our plant´s neighbours.

The project total capital expenditure was NOK 35 million. Several suppliers were involved in the project execution phase, and the furnaces were fully operational, hence, good communication between plant operations and the project teams was required, focusing on safety as well as

environmental performance. The project was successfully completed without any injuries. In order to identify further improvement potentials with respect to dust emission outside the furnace operations, a thorough study was conducted. In 2019, this study triggered a continuous environmental improvement effort. A task force with personnel from different departments cooperates closely to assess, decide and implement and this work will continue in 2020. One of the focus areas will be to improve the monitoring of leakages and emissions by the use of CCTVs. There is also an aim to test and improve online measurements of both channeled and fugitive emissions from the furnace buildings.





Dust spreading is influenced by particle characteristics, meteorology and topography.

Study of dust levels and air quality in Porsgrunn

Eramet Norway Porsgrunn decided in 2019 to perform a thorough novel study to examine the content and amount of dust in surrounding air and downfall. The study was conducted in cooperation with Yara and the independent research institution NORCE. The plan for the study was created on the request of the Norwegian Environment Agency (Miljødirektoratet, Mdir), based on measurements and data collected by Eramet Norway and NORCE in 2017 and 2018.

In Norway, local air quality is monitored by permanent measurement stations in selected municipalities. In Porsgrunn, several such stations are controlled by local municipal authorities, where of one is located in

Knarrdalstrand. Measurements from this station show results for particulate matter (PM2.5 and PM10), which are below the criteria for air quality, except for the spring period, where the increases are assumed to be due to road dust.

The study was approved by Mdir in early 2019. The measurements were taken with three instruments, which have never before been used in combination, at two different locations in the period from July to November 2019.

Current air quality regulations are based on EU's air quality directive. No limits for downfall are included in the regulations, however limits are established for particulate matter,

PM2.5 and PM10. There are also air quality criteria are recommended for other elements.

Previous measurements made by NORCE in 2017 and 2018 confirmed that there were no breeches of the limit values of PM2.5 and PM10 in these years. The preliminary results of the 2019 measurements indicates no breeches as well. Eramet Norway considers this as a good, although preliminary result. The final report is expected to be issued in the second quarter of 2020.

When the study is completed, NORCE will present the results to neighbours, the Porsgrunn municipality and Mdir.

In parallel with the air quality study, Eramet Norway Porsgrunn performed a thorough mapping in order to identify potential improvements with respect to reducing plant dust emissions. These two initiatives will be coordinated to develop an updated environmental action plan together with Eramet Norway's R&D department.

Configuration of instruments and measurement methodology

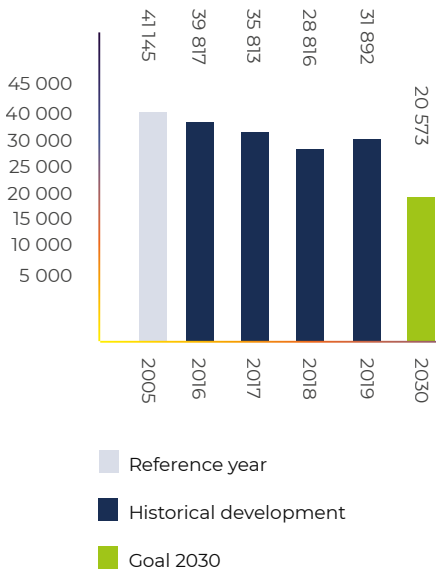


Circular Economy

For us, circular economy is about utilising all resources in the best possible way throughout the entire value chain as we handle millions of tons of materials in our production processes annually. Through knowledge development, continuous improvements and targeted investment projects, we aim to optimise our own processes to utilise purchased raw materials and energy to a larger degree and reduce emissions and depositing.

In order to achieve higher resource efficiency, we envision new value chains based on by-products and waste materials. This will also include expanding the potential for increased value creation in the interface between us and other industrial stakeholders, funding institutions and knowledge communities.

Volume of sludge to deposits



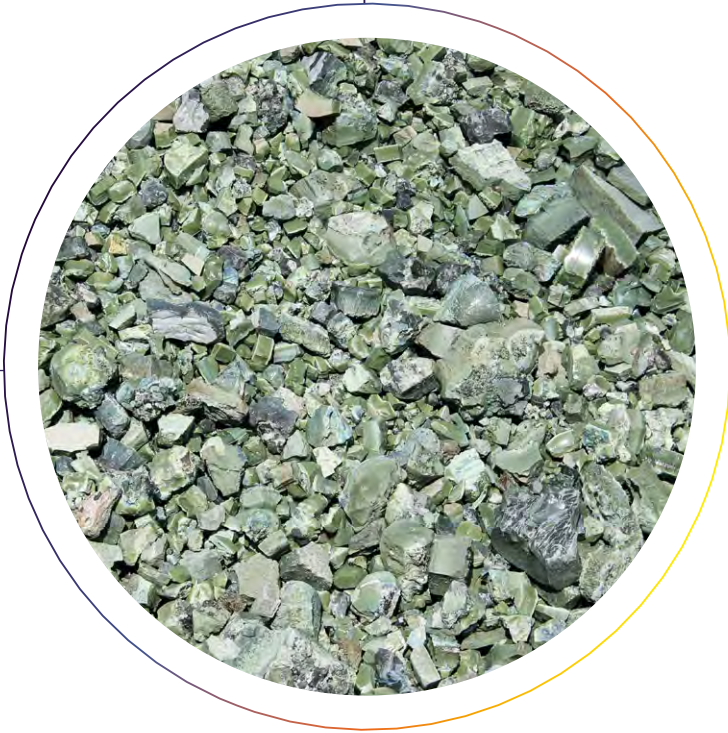
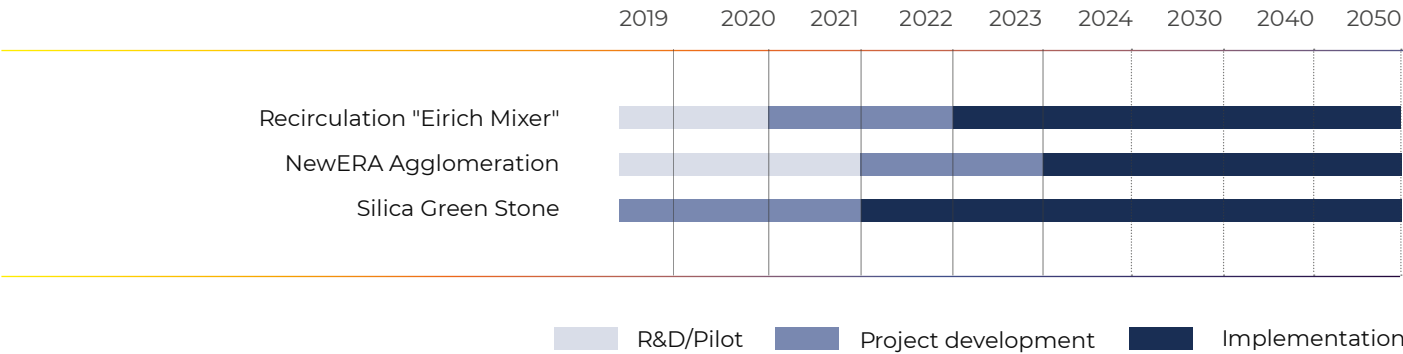
Eramet Norway's long-term goal:
We shall improve resource efficiency by increasing value creation linked to by-products and waste materials and reduce level of depositing by 50 percent within 2030.

Status Circular Economy
Deposited sludge volumes show a reduction during the last years. The main reasons are maintenance stops in Kvinesdal in 2018 and 2019, and improved process and cleaning conditions in Kvinesdal and Porsgrunn



R&D Focus Areas

Eramet Norway’s R&D department aims to develop alternatives to depositing, focusing sludges, which today amounts to the biggest volume by far. In parallel, we are exploring new applications for by-products, balancing value creation and sustainable operations. To assess the impact of our solutions, we need to connect with relevant academic communities and conduct life-cycle analysis (LCA).



Silica Green Stone product development

Samarbeidsprosjekter (delfinansiert av det offentlige):

- EU EIT Raw Materials Go-4-0: EU financed project, in cooperation with Eramet IDEAS
- EU EIT Raw Materials GUCCIs: EU financed project, new software for life cycle analysis (LCA)
- EU EIT Raw Materials GREENY: EU financed project, characterisation and improvement of crushing
- NewERA Cold Agglomeration Unit (CAU):): Part of the NewERA-project, se page 61.
- SFI Metal Production: The Norwegian Research Council's Center for Research based Innovation
- IPN CoSiManVal: R&D project, Silica Green Stone

We consider two main directions with regards to reuse of sludges, dust and fines:

1. We plan to produce pellets using sludge and dust in a high-intensity mixer in our Kvinesdal smelter. First step is to build a test station in 2020 in order to obtain knowledge and technical data required for a future up-scaled facility. We will apply for financial support from national funding agencies.
2. We work to develop a briquetting process, using fines from manganese sources and other products in the mix. Test briquettes have already been successfully used in Eramet IDEAS's pilot furnace in November 2019. Next phase of this development is to perform industrial trials in one of our furnaces in Kvinesdal.

An area of critical importance to our circular economy vision is to develop new applications for Silica Green Stone. See page 57-59.

The slag from SiMn production is one of Eramet Norway’s main by-products. In 2019, we obtained the trademark “Silica Green Stone” (SiGS). We hired the consulting company Bergfald Miljørådgivere to compile a number of previous tests and analyses and complete a report to compare Silica Green Stone product characteristics with other virgin or reused materials.

Eramet Norway produce ca 300 000 tonnes of Silica Green Stone annually, which for many years have been used as an input e.g. for clinker production, road construction and land or sea fillings. We believe research and development will expand existing application areas and contribute to new ones.

Silica Green Stone goes through a process in the SiMn furnace with temperatures close to 1600 °C. The

high temperature makes it a clean and applicable by-product with high resistance and durability. Thus, Silica Green Stone is a stable and strong product consisting of natural minerals as calcium and silicon. The product is gleaming, green and hard, comparable to natural volcanic rocks. Silica Green Stone does not contain organic pollutants and the content of heavy metals is below the values occurring naturally in the nature. The level of chloride and sulphate is low, with absence of harmful magnetic pyrite, fibrous minerals and free phase quartz.

The aim of Norwegian legislation is to prevent pollution from industry, to secure biodiversity and to develop new applications for materials previously considered as waste. UN’s Environment Programme concludes that the way humans use the land is one of the

main reasons why one million species are endangered. Huge land areas are earmarked for quarries, untouched nature disappears and the change is irreparable.

By using Eramet Norway’s Silica Green Stone instead of producing substitute products based on virgin resources, natural areas will be saved and emissions of greenhouse gases, dust, noise and other pollutants will be reduced.

The work done so far confirms that land storage and use of Silica Green Stone does not entail danger to human beings or pollution to the environment. In addition, the use of Silica Green Stone as capping under a layer of shell-sand in water does not cause environmental risk.

Research and development of new applications

In 2019, the cooperation with Norcem to increase the use of Silica Green Stone both in clinker production and as input for various cement blends were strengthened. The world uses a lot of cements and it is expected to increase in correlation to population growth. Since limestone is a limited resource, Norcem is using a share of Silica Green Stone in its production process.

Silica Green Stone is considered an interesting raw material in concrete and agriculture as well based on feedback from the University of Agder (UiA), available literature and other available data. As a result, Eramet Norway has decided to increase its R&D efforts to investigate these new potential applications.

Use of Silica Green Stone in cement and concrete

In 2019, UiA completed a mapping of potential use of other slag products for use in production of cement and concrete. Blast furnace slag from global iron production is to a large degree used to reduce CO₂ emissions and that this type of slag is included in current standards for cement and concrete in ordinary building standards. In a new study commissioned by the UN Environmental Programme Sustainable Building and Climate

Initiative indicates that about all blast furnace slag is used in such a way, but that this equals about 1/3 of the total production from the metal industry which it is assumed can be used in a similar fashion. Initial tests indicates that Silica Green Stone has a potential to be used as a cement substitute. However, the use of this in construction concrete will require a so-called technical approval or a modification of current standards. Work is currently under way to address this.

Eramet Norway established a research cooperation with UiA, and together with SINTEF and other industry companies, started a two-year IPN project (Innovasjonsprosjekt for næringslivet). The IPN project is partly funded by The Norwegian Research Council and aims to study how the characteristics of the Silica Green Stone can impact concrete qualities. The project will include studies of current cement and concrete standards, which possibilities and limitations may occur, and the potential for obtaining future changes in standards. The project also includes assessing the addition of Silica Green Stone into concrete not used for load-carrying products, which is not covered by current standards. In addition, life cycle costs and climate footprint by using Silica Green Stone as an input factor will be studied.

Silica Green Stone used for road construction, E39 Mandal East - Mandal City.

Silica Green Stone for soil improvement

Newer research has indicated that silicon is vital for the growth of plants, to increase crops and reduce plant diseases. Silicon makes the stem stiffer and the leaves harder, thus protecting plants against fungal disease and insects. A tougher climate also requires more robust plants.

Silica has no known harmful effects on nature and animals, and may therefore reduce the need for polluting pesticides. Silica also reduces the absorption of the pollutant cadmium (Cd) in grass, thus making the food healthier.

However, plants can only absorb silica dissolved in water, so called «bio available silica». Silica Green Stone contains silica as «amorphous silica», which is highly soluble in water. The combination of silica and water solubility makes Silica Green Stone a suitable product for agriculture. Access to silica is particularly important for rice, sugar cane and grain production. Bioavailable silica is today a limited resource in soil several places around the world, and due to its many qualities it is vital to get this material back into the ecological cycle.

Eramet Norway is investigating new applications linked to soil improvement for Silica Green Stone.





Pilot furnace in operation during the campaign in Trappes in November and December 2019



NewERA briquetts tested in the pilot campaign

NewERA – Briquetts in the furnace melting process

In November and December 2019, the group’s technology centre Eramet IDEAS performed a test project in its pilot furnace in Trappes, France, in order to investigate effects linked to recirculation of briquettes made by by-products and waste materials in our smelting furnaces.

The objective of the test project was to determine the best way to recirculate briquettes made by Comilog ore fines and other by-products containing manganese, as a replacement for a share of virgin ore, which is currently

used in our furnaces. To prepare the pilot campaign, 10 tonnes of “NewERA briquettes” were produced, consisting of ore fines, filter dust, metallic fines and sludge.

The test project results confirmed previous findings and supported our hypothesis that a partly replacement of Comilog ore by «NewERA briquettes» in our furnaces will have no negative process effects.

The project also contributed positively to creating a greater understanding for

critical conditions connected to storage, handling and transportation of the briquettes. The pre-feasibility project was financially supported by Enova from 2016 to 2019.

Our recommended the way forward is to conduct an industrial scale triale at our furnaces in Norway to confirm the results achieved in the test project. In addition, industrial testing will provide data and knowledge needed to plan the construction of a full-scale briquetting plant and to adapt internal raw material handling systems.



HSEE policy for a sustainable Eramet Norway

Goals

Eramet Norway will conduct its business to minimise the impact on health, safety, the environment and the climate throughout the value creation chain. The production of metals, materials and other products shall take place through resource-efficient processes that safeguard this consideration.

Eramet Norway aims to be an environmentally and energy-conscious company, with a secure 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 should 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. Environmental, energy 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 an integral part of this, as well as ensuring that practices comply with laws, regulations and recommendations within their area. 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 himself and his 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 an integrated part 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 should therefore receive special attention.

Prevention

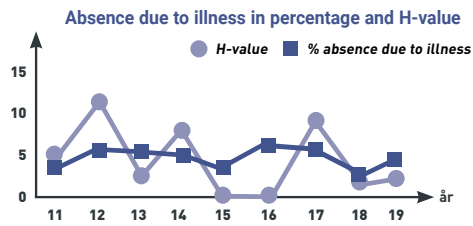
Risk assessments should be the basis for procedures and practices, and should be a fundamental part of anticipation of changes and investment planning. Potential hazards must be identified and assessed. Adverse events such as near-accidents, accidents, health damage, environmental damage, energy loss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

Follow up

In order 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.

Sauda

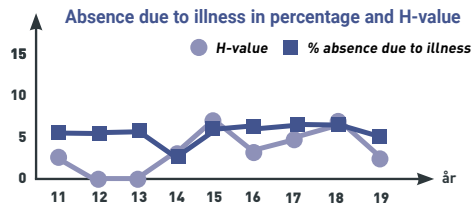
Injury figures H1 and absence due to illness



CATEGORY	2019	2018
Absence due to illness	6,7 %	3,6 %
Injuries with absence	1	1
Injury figures H1 (H-figures)	2,7	2,0
Undes. incidents - environmental	37	94
Complaints from neighbours	17	11
Violation of discharge permit	1	0

Porsgrunn

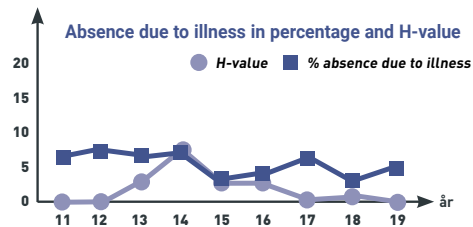
Injury figures H1 and absence due to illness



CATEGORY	2019	2018
Absence due to illness	5,1 %	6,0 %
Injuries with absence	1	2
Injury figures H1 (H-figures)	2,5	6,9
Undes. incidents - environmental	8	37
Complaints from neighbours	36	47
Violation of discharge permit	2	1

Kvinesdal

Injury figures H1 and absence due to illness



CATEGORY	2019	2018
Absence due to illness	5,2 %	4,6 %
Injuries with absence	0	1
Injury figures H1 (H-figures)	0	2,6
Undes. incidents - environmental	4	28
Complaints from neighbours	2	2
Violation of discharge permit	4	1

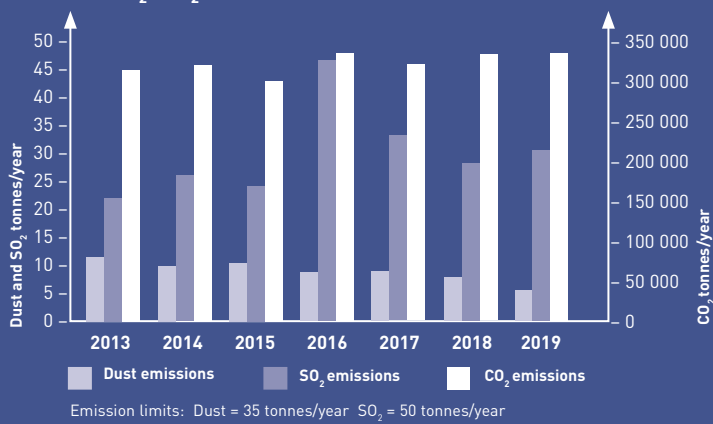
* External workers



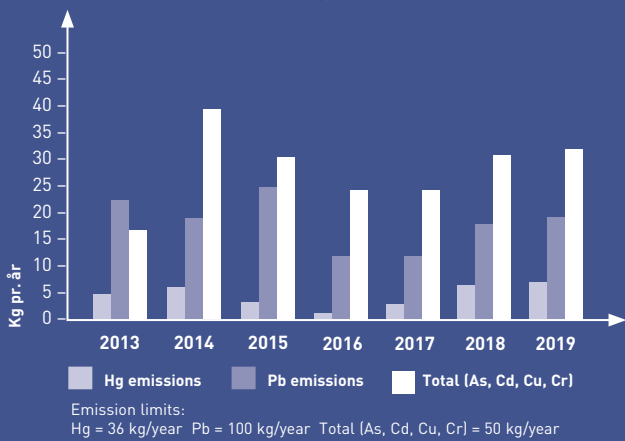
Since 2000, Eramet Norway has invested more than NOK 800 million in safety and enviromnmental projects

Eramet Norway Sauda

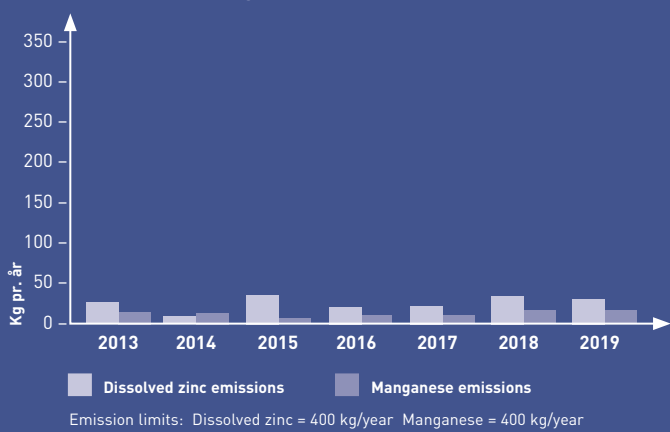
DUST, SO₂, CO₂ emissions to the air 2013-2019



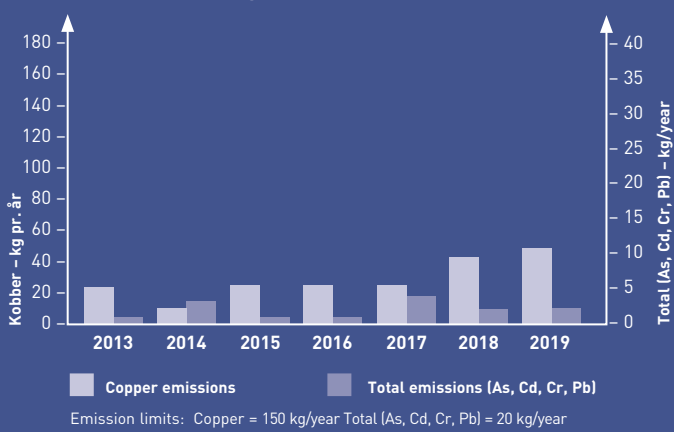
Hg/Pb/Total (As, Cd, Cu, Cr) emissions to the air 2013-2019



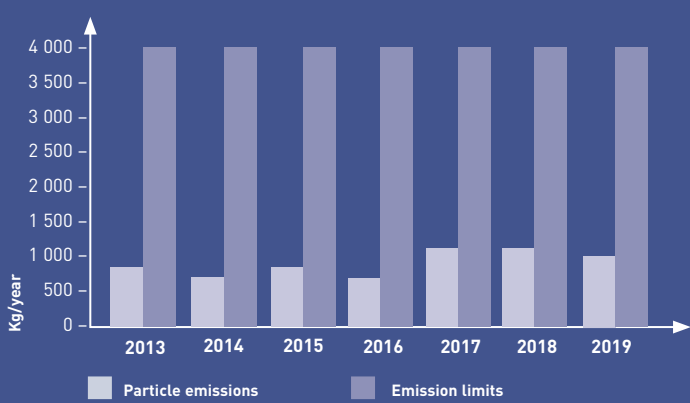
ZINC/MANGANESE emissions to Saudafjorden 2013-2019*



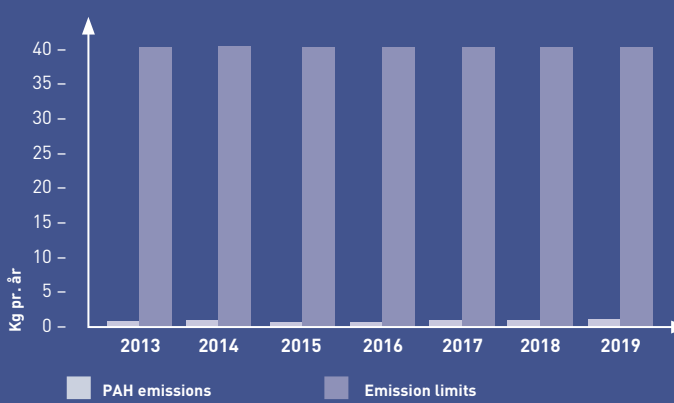
COPPER/TOTAL (As, Cd, Cr, Pb) emissions to Saudafjorden 2013-2019*



PARTICLES emissions to Saudafjorden 2013-2019*



PAH emissions to Saudafjorden 2013-2019*



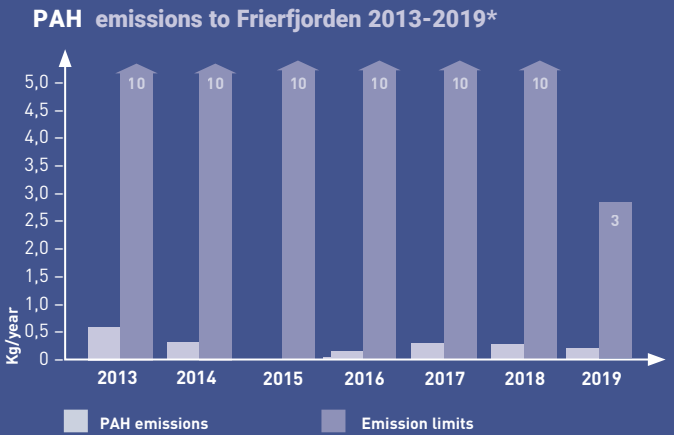
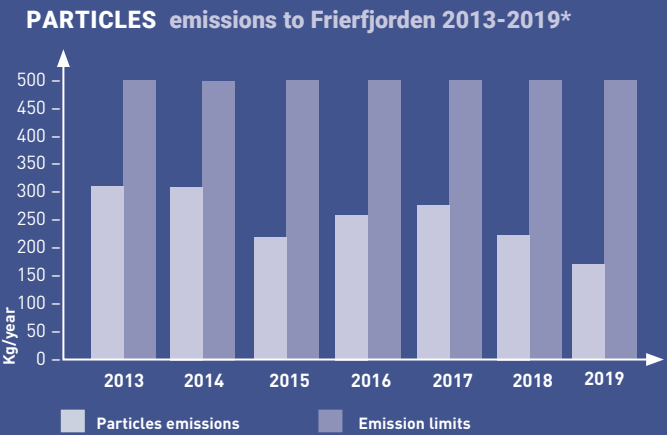
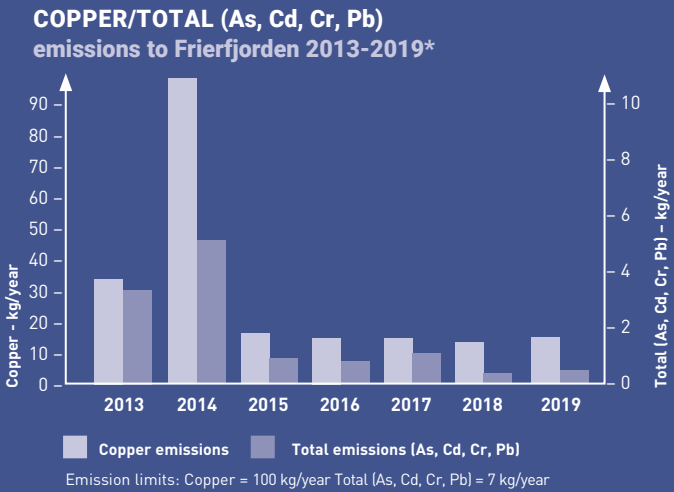
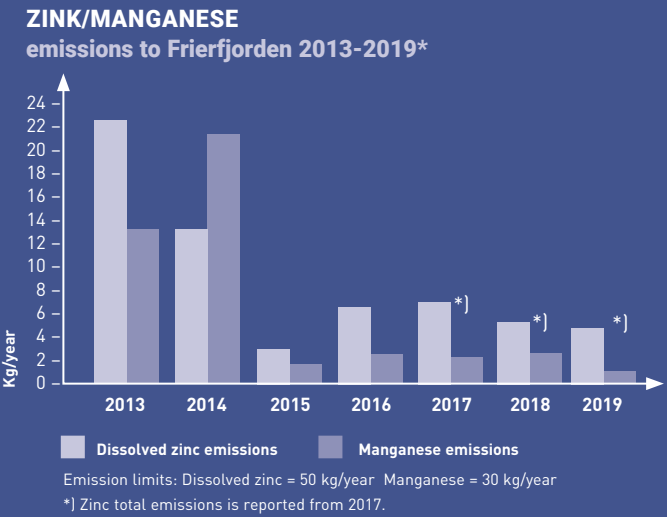
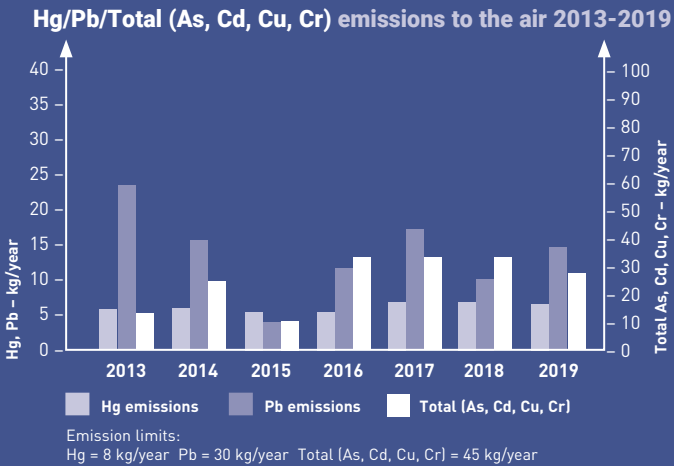
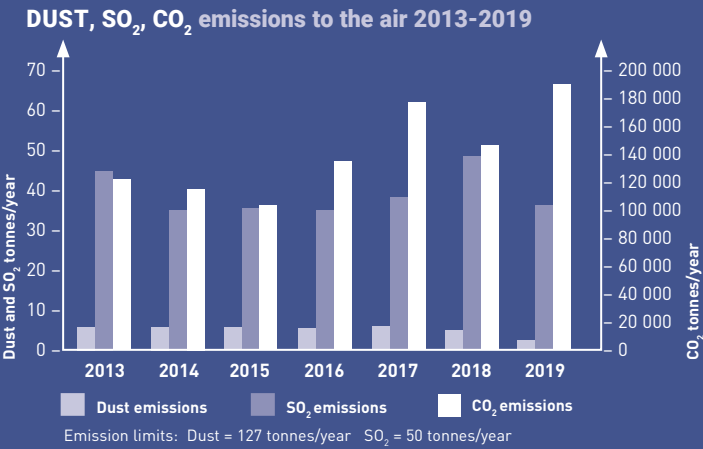
* Emissions from purifying plants.

Waste

CATEGORY	2019	2018
Slag	0 tonnes	0 tonnes
Sludge and dust (landfill)	9 333 tonnes	3 633 tonnes
Residual waste	90 tonnes	153 tonnes
Metal waste	324 tonnes	159 tonnes
Hazardous waste	68 tonnes	58 tonnes

CATEGORY	2019	2018
Paper and cardboard	7 tonnes	7 tonnes
Wood waste	491 tonnes	175 tonnes
Plastic	5 tonnes	5 tonnes
Asphalt	0 tonnes	0 tonnes

Eramet Norway Porsgrunn



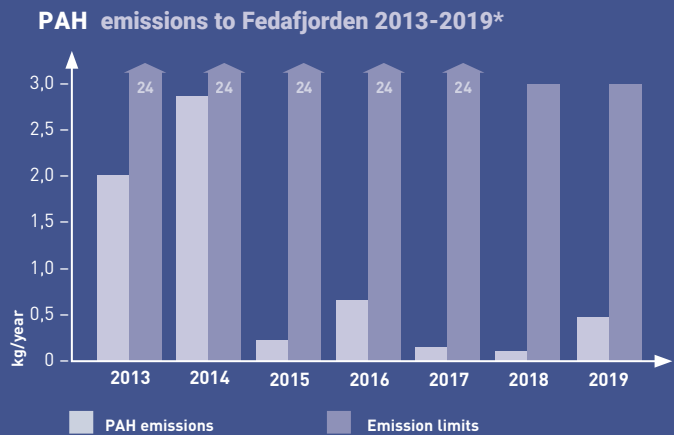
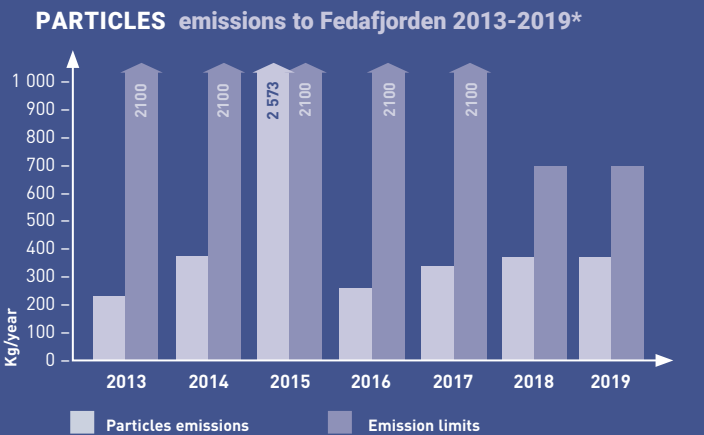
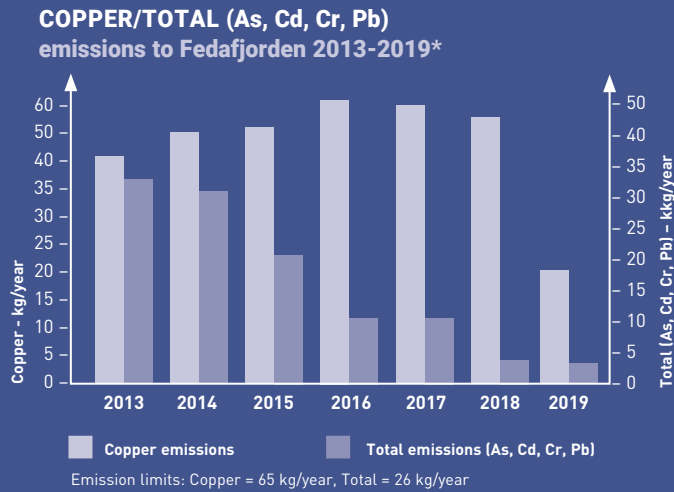
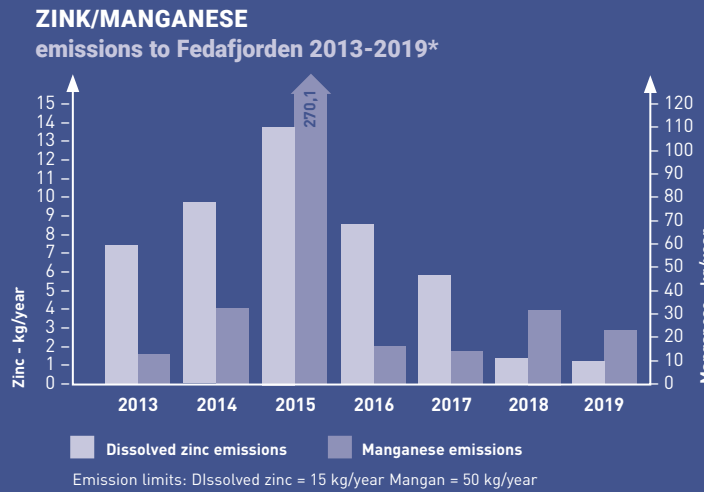
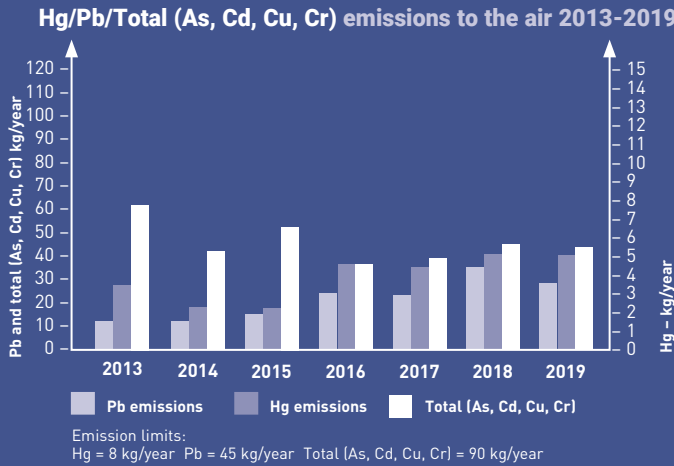
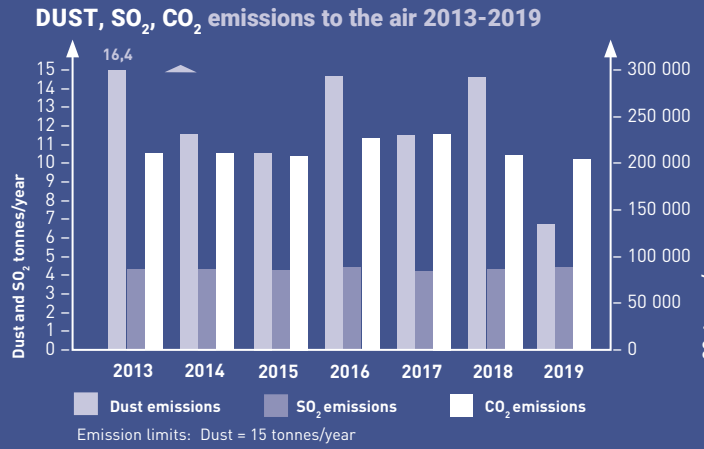
*Emissions from purifying plants.

Waste

CATEGORY	2019	2018
Silica Green Stone	91 943 tonnes	98 811 tonnes
Sludge and dust (landfill)	4 665 tonnes	5 858 tonnes
Residual waste	174 tonnes	168 tonnes
Metal waste	160 tonnes	171 tonnes

CATEGORY	2019	2018
Hazardous waste	14 tonnes	9 tonnes
Paper and cardboard	5 tonnes	3 tonnes
Wood waste	143 tonnes	156 tonnes
Mixed rubber waste	26 tonnes	17 tonnes

Eramet Norway Kvinesdal



*Emissions from purifying plants.

Waste

CATEGORY	2019	2018
Silica Green Stone	204 796 kg	216 651 kg
Sludge and dust (landfill)	17 894 tonnes	19 325 tonnes
Residual waste	101 296 tonnes	95 tonnes
Metal waste	32 tonnes	1 tonnes

CATEGORY	2019	2018
Hazardous waste	255 480 kg	223 775 kg
Paper and cardboard	6 020 tonnes	5 930 tonnes
Wood waste	95 820 kg	75 520 kg
Plastic	16 240 kg	13 311 kg

Environmental revenue 2019

Environmental revenue from sale of CO gas to Yara´s ammonia factory at Herøya in Porsgrunn, sale of manganese dust and sale of electrical energy at Kvinesdal.

Sale of CO gass to Yara in Porsgrunn

14,9
MNOK

Sale of manganese dust

112,3
MNOK

Sale of recovered energy at Kvinesdal

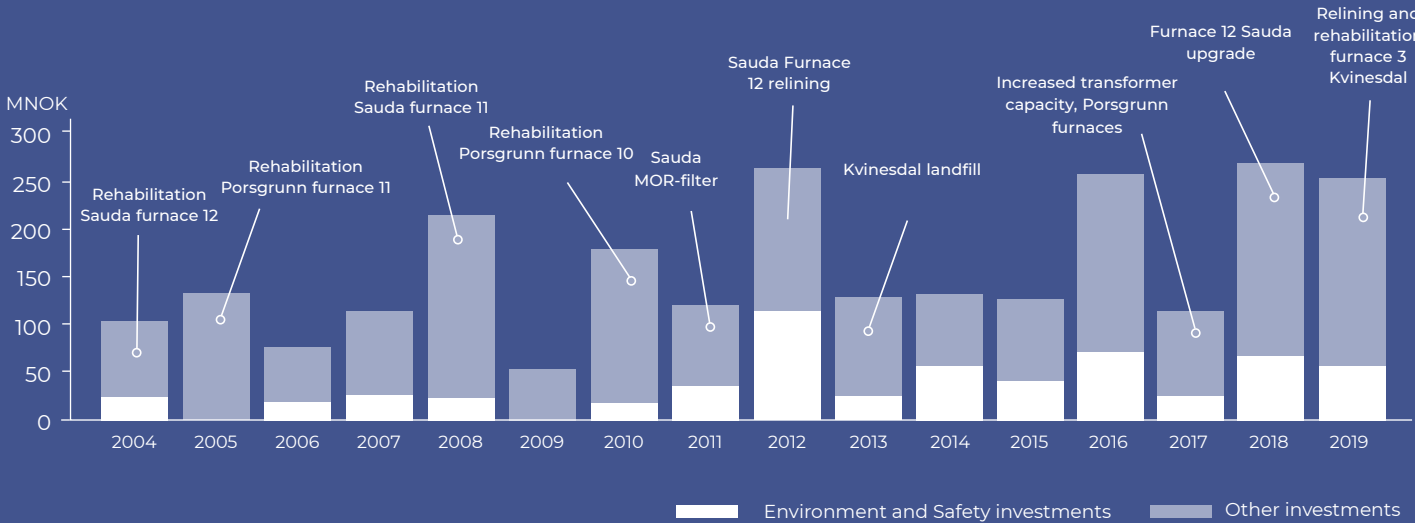
43,2
MNOK

Investments 2008-2019

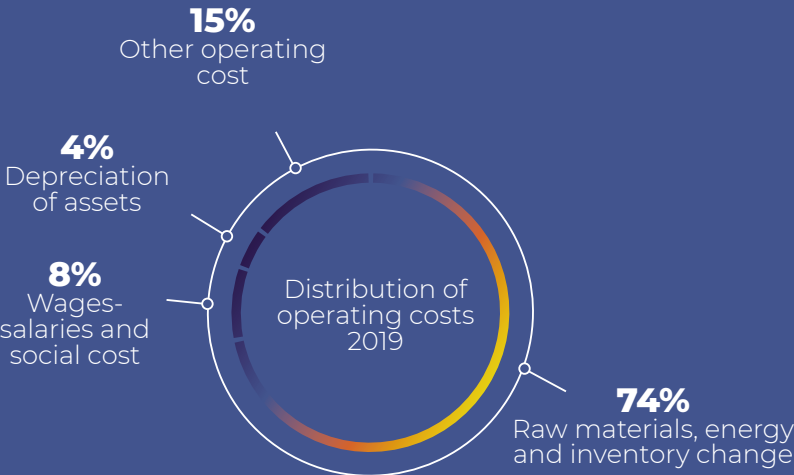
Yearly investments in MNOK for Porsgrunn and Sauda during the period 2008-2019, and Kvinesdal for the period 2010-2019.

2 PLANTS (PORSGRUNN, SAUDA)				3 PLANTS (PORSGRUNN, SAUDA, KVINESDAL)									
Year:	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Sum*
Environment and Safety investments	25	11	18	43	113	37	55	45	67	21	69	63	825
Other investments	192	40	166	81	144	103	86	92	187	94	199	195	2 079
Total investments	217	51	184	123	257	140	141	137	254	115	267	259	2 904

* The total figure includes from year 2000.



Profit and loss statement for 2018 and 2019



	Last year 2019			Previous year 2018			Change	%
TURNOVER	6 539			6 803			-264	-4 %
Raw materials, energy and inventory change	-4 629		74 %	-4 243		73 %	-386	-9 %
Wages-, salaries and social cost	-471		8 %	-459		8 %	-12	-3 %
Depreciation of assets	-229		4 %	-243		4 %	14	6 %
Other operating costs	-952	-6 281	15 %	-892	-5 837	15 %	-60	-7 %
CURRENT OPERATING INCOME (COI)	257			965			-708	-73 %
Interest-/financial cost		-151			-102		-50	-49 %
Corporate taxes		-22			-196		173	89 %
NET RESULT	83			668			-585	-88 %

Turnover and COI

Figures of the Sauda, Porsgrunn and Kvinesdal plants in MNOK.

History of the Sauda, Porsgrunn and Kvinesdal plants. Figures are in MNOK.

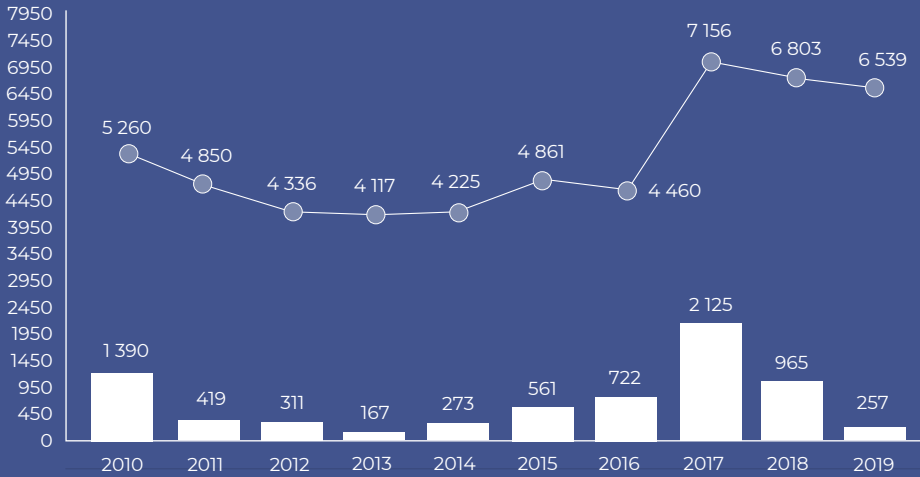
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
COI	1 390	419	311	166	273	560	722	2 125	965	257
Turnover	5 260	4 850	4 336	4 117	4 224	4 861	4 460	7 156	6 803	6 539
COI margin	26,4 %	8,6 %	7,2 %	4,0 %	6,5 %	11,5 %	11,5 %	29,7 %	14,2 %	3,9 %

Turnover 2019 (MNOK)

6 539

COI 2019 (MNOK)

257



Figures in MNOK

Operating results

Turnover

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