
2023
Sustainability
Report
tenova

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A Message from Our CEO

Dear Stakeholders,

As we reflect on the past year and set our sights on the future, Tenova's unwavering commitment to sustainability and innovation remains at the forefront of our strategic direction. At Tenova, we firmly believe that the real value we bring to the sustainability table lies in our human capital, as the specialized competencies of our team are our greatest and most valuable asset. It is because we have the people with the right skills that we are able to make such significant strides, designing technologies that help our clients face today's challenges.

As a matter of fact, we have developed a product portfolio that is not only robust but exceptionally aligned with the urgent sustainability challenges of our times: our technologies are strategically positioned at the heart of today's sustainability arena, offering services that are a perfect match for our clients' environmental requirements and goals, while upholding the highest safety standards for both our workers and the users of our technologies. By providing our clients with the essential tools they need to decarbonize and reduce local pollution, Tenova is contributing substantially to the global transition toward more responsible practices.

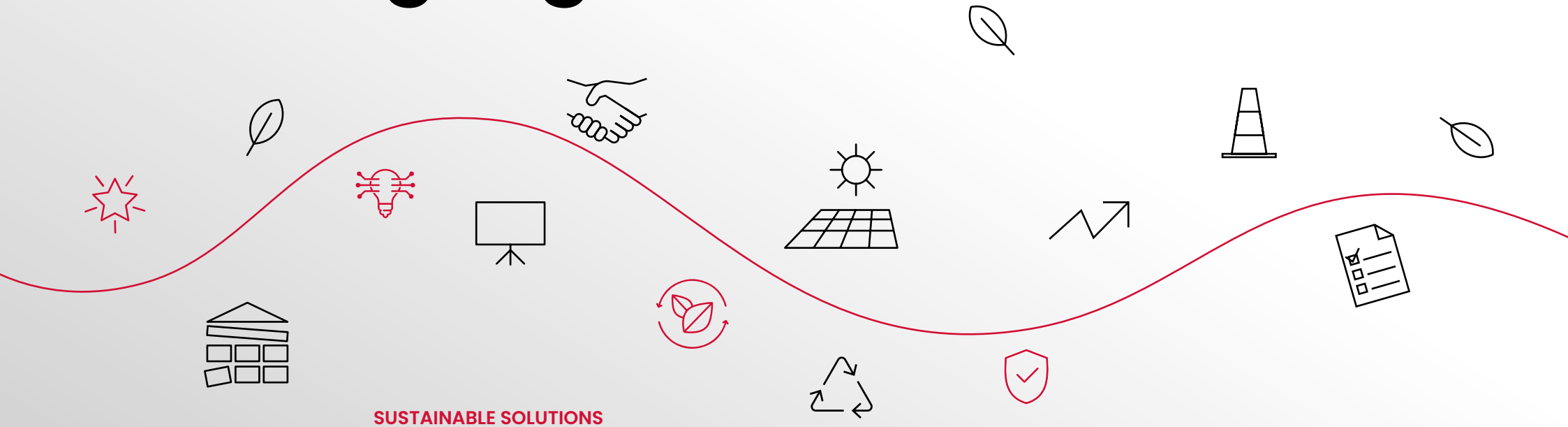
On the governance front, we have recently relocated the Internal Audit Department, which is now functionally reporting directly to the Board, independent of the CEO's approval. This significant development not only underscores our commitment to transparency but also ensures that even my actions as CEO are subject to transparent review. This is emblematic of Tenova's distinctive governance model—a testament to our private company ethos.

Our role as Tenova is clear. We can proudly say that we are fulfilling it by developing accessible and cost-effective technologies that allow for decarbonization. These endeavors empower our clients to face today's sustainability challenges head-on while also prioritizing safety, as the technologies we deliver are not only effective but also designed to ensure the safety of users. We are committed to a steadfast continuity in our ambition, objectives, and strategic direction, all aimed at furthering sustainable practices for the betterment of our planet and society. Your ongoing trust in Tenova energizes us to push the boundaries of what is possible.

Thank you for your continued support.

Sincerely,
Roberto Pancaldi
Chief Executive Officer

2023 Highlights



SUSTAINABILITY APPROACH

- Identification of material topics through **materiality assessment** in 2022
- Driving purposeful actions within our **Sustainability Framework**, including energy efficiency initiatives, circular economy solutions, and sustainable innovation

SUSTAINABLE SOLUTIONS AND INNOVATION

- Expansion of our facilities at TenovaLAB for the installation of a **water electrolysis unit** connected to **solar panels**
- Successful use of an injection technology: **OnlyPlastic**, a process able to produce steel from the residues of waste plastic treatment plants

ENVIRONMENTAL IMPACT OF OUR OPERATIONS

- Installation of a 980 kW **new-generation photovoltaic plant** for our production site in Castellanza, Italy. Our 1,781 superior performance and highly reliable high-efficiency monocrystalline silicon panels will be able to generate up to 1,000 MWh annually, which is around 30% of the Campus' annual energy consumption

EMPLOYEE ENGAGEMENT AND DEVELOPMENT

- Rollout of new mandatory **Health and Safety training at project sites** – BU Upstream Italy as pilot project
- Participation in local **Career Fairs** for attracting new high potential professionals
- Implementation of **employees' wellness** services and awareness through ad hoc disseminations and programs

COMPLIANCE AND RESPONSIBLE SOURCING

- Confirmed **zero substantiated complaints** concerning breaches of customer privacy and loss of customer data
- Regular **risk assessment** of potential hazards or risks associated with each site and work activity

About this Report

This document is Tenova's second Sustainability Report for the fiscal year 2023. In this report, any reference to "Tenova" is to be intended as inclusive of Tenova S.p.A. and its fully consolidated subsidiaries operating within the framework of the Tenova metals business[1]. As such, **the scope of this report does not include TAKRAF and DELKOR, companies operating in the mining business.**

This Sustainability Report outlines Tenova's sustainability approach, policies, actions, and performance achieved during the reporting year. The contents reported were identified on the basis of the results of the materiality assessment carried out in 2022, as explained in **"Our Material Topics"** (Pg. 13).

Tenova has reported the information cited in this document and in its **GRI Content Index** for the period **1 January – 31 December 2023** with reference to the GRI Standards, published in 2021 by the Global Reporting Initiative (GRI). Data from previous year is included where available and relevant to ensure comparability over time.

The **reporting scope of human resources, health and safety, financial, and compliance data** refer to Tenova S.p.A. and its fully consolidated subsidiaries within the framework of the Tenova metals business.

The **reporting scope of the environmental data** refers to the main Italian offices, located in Castellanza and Genoa, as well as the production workshop in Castellanza. Any changes to this scope, or limitations and exclusions are clearly indicated in the document. To ensure data reliability, the use of estimates has been limited as much as possible. Those used, if any, are appropriately reported and based on the best available methods.

Tenova is committed to provide the highest level of accountability related to non-financial disclosure and will publish a sustainability report on an annual basis, improving the reporting process and overall data accuracy.

This report is available on the Tenova website at **sustainabilityreport.tenova.com**.

For more information and feedback regarding this Sustainability Report, please contact **sustainability@tenova.com**.

1 For a full list of subsidiary companies, see GRI Content Index.

About Tenova

Tenova. Sustainable solutions for metals and mining.

Tenova, a Techint Group company, provides sustainable, innovative, and reliable solutions in the metals and – also through TAKRAF and DELKOR brands[1] – mining industries.

Headquartered in Italy, with over 2,400 employees across 18 countries, Tenova Group partners with global clients to design and develop innovative technologies and services that improve their business today and into the future, generating cost savings, energy reductions, limiting environmental impact and improving employee working conditions. Our collaborative working model ensures we are at the forefront of the industries we work in which we channel into positive transformations for our clients.

To learn more about our fully integrated range of sustainable products, technologies, and services for the metals and mining industries visit **tenova.com**.

1 TAKRAF and DELKOR are not included in the scope of this report.

1. Our Brands

tenova

tenova HYL

tenova PYROMET

tenova ADVANCED TECHNOLOGIES

NOVA ANALYTICAL SYSTEMS A TENOVA COMPANY

tenova LOI THERMPROCESS

tenova ITALIMPIANTI

tenova I2S

Pomini TENOVA

tenova MATERIAL HANDLING

TAKRAF

DELKOR [1]

1 TAKRAF and DELKOR are not included in the scope of this report.

2. Our Technologies

Tenova Group strives to innovate continuously for its clients in the metals and mining industries, focusing on **quality, energy savings, and reducing pollution and CO_2 emissions. We support sustainable development** by leveraging a comprehensive suite of lower emission products, technologies, and services that can provide clients with unmatched breadth and flexibility to **meet their needs today and well into the future**. We invest heavily in research and development to continue innovating technologies and business models that will continue to help clients optimize their production process, reduce costs, improve quality, and increase production volumes.

Our wide range of technologies includes:

Iron & Steel

Tenova offers a fully integrated range of high-quality products, technologies and services for the steel making route, from iron ores and scrap to secondary metallurgy. Tenova is also on the leading edge offering innovative solutions for circular processes and environmental control.

Aluminum

From twin-chamber melting furnaces to advanced processing technologies and high-quality roll grinders, the group supplies its clients with cutting edge solutions for a range of aluminum needs. Tenova is the leading supplier for aluminum treatment lines for the automotive industry, with several processing lines successfully in operation for most major aluminum producers. Confirming its commitment to sustainability, Tenova is a valuable partner providing top engineering solutions for aluminum melting and recycling.

Hydrometallurgy

Tenova Advanced Technologies (TAT) is our global brand which specializes in hydrometallurgical processing, with a special focus on lithium and phosphate processing and solvent extraction.

Pyrometallurgy

Tenova also designs and supplies high-capacity Alternate Current (AC) & Direct Current (DC) furnaces and complete smelting plants for the production of ferroalloys, platinum group metals and base metals.

Rolling & Grinding

As a full-service, experienced partner, Tenova is also a world leader in the design and supply of roll grinders and roll shop equipment for steel and non-ferrous metals such as copper, aluminum, as well as for paper mills, guaranteeing the highest standards in terms of material quality, thickness tolerance, and flatness.

Port Equipment

Under the brand Tenova Material Handling, the company supplies standard and custom material handling equipment, with a particular focus on the loading and unloading of marine terminals.

The technologies portfolio of TAKRAF and DELKOR - which are not included in the scope of this report - encompass run-of-mine and bulk material handling as well as liquid/solid separation and beneficiation.

3. Our Journey

1945 Founding of Techint

1988 Techint acquires Pomini

1994 Techint acquires Intersteel Technology, gaining Consteel®

1996 Techint acquires part of Italimpianti and incorporates Tagliaferri

1997 Techint Technologies is established

2005 Techint Technologies acquires the Goodfellow Efsop® process control system and sets up HYL Technologies

2006 Group acquires LOI Thermprocess, which merges with Italimpianti. Pyromet and Key Solutions join the group

2007 The group rebrands as Tenova and acquires TAKRAF[1]

2008 Core Furnace Systems in North America joins Tenova

2011 Tenova expands into Vietnam, Sweden, and Thailand and acquires Nova Analytical Systems in Canada

2012 Tenova acquires the DELKOR Group[1]

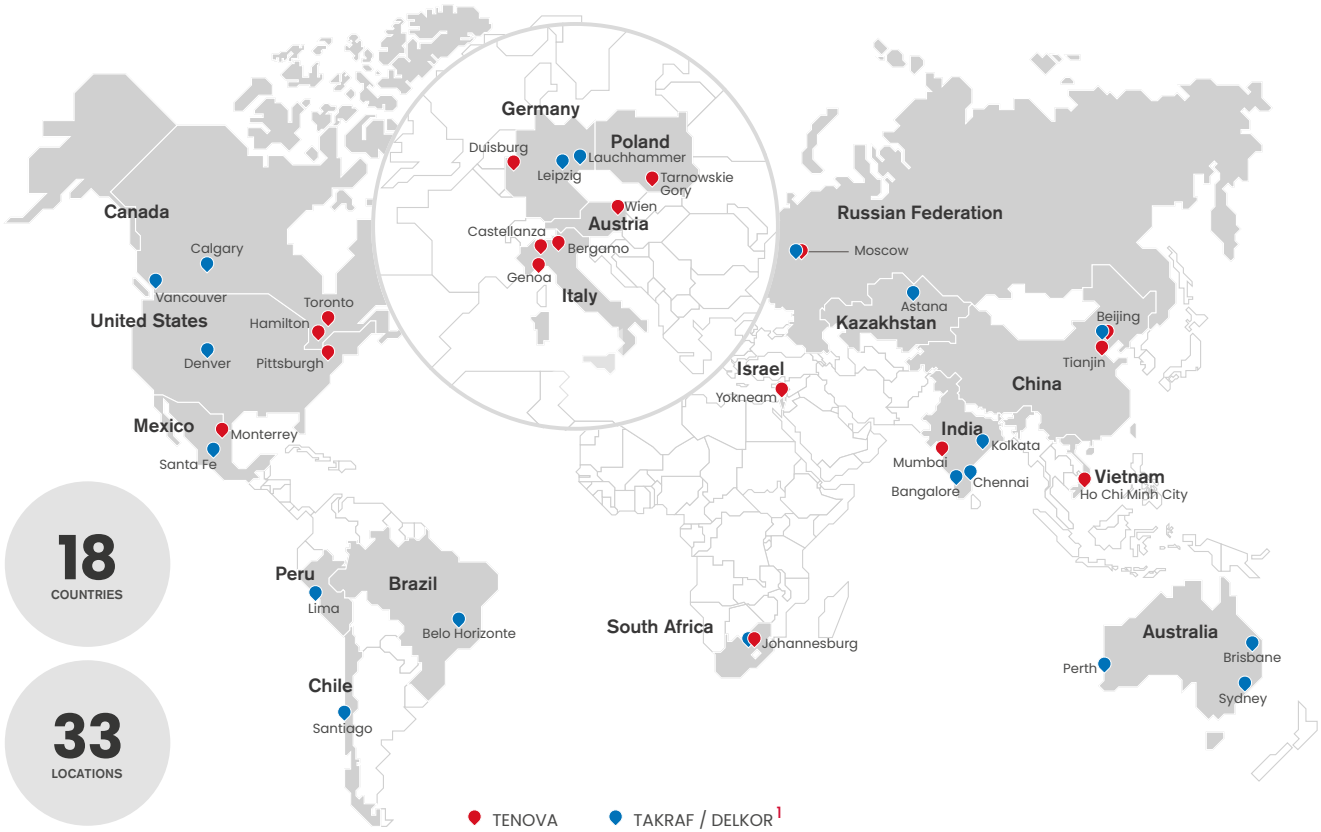
2020 Tenova reorganizes itself with TAKRAF and DELKOR brands focused on mining and Tenova focused on steel and metals[1]

1 TAKRAF and DELKOR are not included in the scope of this report.

4. Our Global Presence

We have grown through **strategic acquisitions and organic expansion**, while staying true to our mission to **be among the best players in our market**. Tenova Group is headquartered in Castellanza, Italy, and has locations in 18 countries, providing customized products, technologies, and services for our clients based on their operating locations and local as well as regional regulations.

Where we are



1 TAKRAF and DELKOR are not included in the scope of this report.

Our Sustainability Strategy

Our business strategy is built on **four commitments** and grounded in driving sustainable solutions for our clients and communities:

Sustainability – identifying opportunities to streamline industrial processes, resulting in increased efficiency;

Innovation – devising novel solutions to age-old problems;

Reliability – using our in-depth expertise to ensure our solutions last well into the future;

Safety – making workplaces safer.

1. Our Material Topics

We performed our first **materiality assessment** in 2022 to identify the most relevant environmental, social, and governance (ESG) topics. This assessment, as well as the whole reporting project, was coordinated in-house by our dedicated, interdisciplinary **Sustainability Project Team**, supported by the **Operative Committee** – which includes representatives from all Tenova Business Units and Functional Areas – and overseen by the **Sustainability Steering Committee**, which validated the results of the assessment (see **Governance and ESG Management**, pg. 57).

The methodology used included quantitative and qualitative elements. The first part was carried out with a survey covering 25 ESG topics completed by over 200 internal and external stakeholders, which was then followed up by stakeholder interviews to gain more granular insights.

As part of our **Sustainability Framework**, we have organized our material topics under **three pillars** to guide our strategy and action planning.

Tenova's Material Topics[1] are:

Environment	Social	Governance and Business resilience
Energy transition	Health and safety	Business ethics, anti-corruption, and compliance
Energy efficient technologies	Product safety and quality	Transparency and reporting
Environmental impact of products and services	Employee well-being	Responsible procurement
Circular economy	Employee hiring and retention	Human rights
Climate impact of operations	Employee benefits and compensation	C-level accountability for ESG issues
Waste disposal and recycling	Employee training and development	Sustainable behavior promotion
Sustainable innovation and R&D	Diversity, inclusion, and equal opportunity	Sustainability advocacy
Digital transformation of processes		

Tenova will update this first assessment in the following years, by performing a double materiality assessment as prescribed by the CSRD (Corporate Sustainability Reporting Directive) and ESRS (European Sustainability Reporting Standards).

1 For a list of definitions of material topics, please see the "Material Topic Definition" paragraph in the Appendix.

2. Our Sustainability Framework

After identifying our priority issues through the materiality assessment, we developed a **Sustainability Framework** to drive purposeful action on our material issues and clearly demonstrate our **sustainability ambition**.

For this scope, we activated a **participatory process** involving leaders and key internal stakeholders to co-design this sustainability framework including a shared sustainability ambition. This is the resulting ambition:

"We lead the way towards the sustainable transformation of our industry.

We enable our people, clients, suppliers, and stakeholders to grow and innovate while caring for the well-being of our planet.

We contribute to a resilient and fair world by operating responsibly."

This ambition represents the overarching mission that Tenova is committed to activate along the main focus areas and sustainability actions under **three major pillars**, which relate to our impact on the ESG topics:

- **We Transform Business**
  Helping our clients and suppliers transform to operate within planetary boundaries
- **We Build Trust**
  Empowering our employees and reinforcing mutual trust with all our stakeholders
- **We Act Transparently**
  Being transparent within our organization and with our stakeholders

Transformation, Trust, and Transparency are the three concepts underpinning these three pillars. It is no coincidence that they all start with the "T" of Tenova – this underscores our intention to deeply embed sustainability within our business. Presenting our pillars using "we" statements makes them more concrete while adding our personal Tenova touch.

We take action on our material topics as organized in the following Framework. In order to strengthen our Sustainability Framework, we prioritized the **Sustainable Development Goals (SDGs)** that Tenova contributes to and focuses on, reported at the bottom of the pillars.

Sustainability ambition

We **lead the way** towards
the sustainable **transformation**
of our industry.

We **enable** our people, clients, suppliers,
and stakeholders to grow and innovate **while caring**
for the well-being of our planet.

We **contribute to a resilient and fair world** by operating responsibly.

The pillars

WE TRANSFORM BUSINESS

Helping our clients and suppliers transform to operate within planetary boundaries.

WE BUILD TRUST

Empowering our employees and reinforcing every day mutual trust with all our stakeholders.

WE ACT TRANSPARENTLY

Being transparent within our organisation and with our stakeholders.

The focus areas

- Developing sustainable solutions & technologies
- Investing in sustainable innovation, R&D, and Digital Transformation
- Accounting responsibly for our direct environmental impact

- Providing a safe working environment
- Caring for our employees & providing equal opportunities
- Managing talent, empowering and training employees
- Developing safe-by-design technologies
- Strengthening our collaboration with communities and stakeholders at large

- Operating an ethical business
- Communicating our impact openly and responsibly
- Engaging suppliers for a sustainable and resilient supply chain, and providing supply chain transparency
- Embracing sustainable finance principles

3. Stakeholder Engagement

Our **key stakeholders** are shareholders, employees, suppliers, clients, business partners, trade associations, peers and competitors, community members, academics, and the media.

We engage with our stakeholders through direct outreach, events, and by soliciting their feedback through avenues like our materiality assessment. We prioritize communication with our stakeholders because we carefully consider their perspectives on how our business impacts them. For further information on Tenova's stakeholder engagement practices, please refer to the section **"Stakeholder Engagement"** in the Appendix.

We are members of several global associations in the metals industry. Tenova is an executive committee board member of the: European Steel Technology Platform (**ESTEP**), Italian Association for Metallurgy (**AIM**), Lombardy Intelligent Factory Association (**AFIL**), and Association for Iron and Steel Technology (**AIST**)'s Mexico Chapter, Association for Iron and Steel Technology (**AIST**) in the USA, and **VDEh Steel Institute**, in Germany, through which we highlight ESG issues that are important to our industry.

We Transform Business

Helping our clients and suppliers transform to operate within planetary boundaries

The metals and mining industries must evolve to significantly reduce their carbon emissions in order to limit global warming to internationally-agreed limits. Tenova is helping drive this transformation by developing innovative technologies that not only help our clients deliver better products but also drastically reduce their environmental impact. In our efforts to transform our industries, we are also transforming our own business by seeking opportunities to reduce our environmental impact and operate more efficiently.

In this section, we report on how we help our clients reduce their own environmental impact through our varied portfolio of products, technologies, and services, with a focus on digital transformation. Lastly, we report on our own energy consumption and related emissions.

1. Driving Value for Our Clients

Our portfolio of solutions is principally dedicated to the sustainable transformation of the metal and mining industries. We create value for our clients by providing innovative technologies that ensure efficiency, resulting in better performance, less waste, and lower carbon emissions. We provide technologies that support the transition to cleaner fuels, utilize energy more efficiently, and recover and reuse previously wasted material. In developing these solutions, we are not only serving our clients, but are also working hard to accelerate our sector's transition to a lower environmental impact.

1.1. Energy Transition

The iron and steel industry is one of the largest emitters in terms of global direct energy-related CO_2 emissions[1]. The steelmaking industry is moving towards **natural gas-based and hydrogen-based iron reduction as substitutes for carbon-based processes**. However, current raw material supply chain shortages and the geopolitical tensions affecting natural gas availability make this transition challenging.

Tenova is fostering a **shift in the energy paradigm** in the metals industry by promoting the use of **hydrogen-ready technologies** to its clients for the transformation process of their business. This is also carried out by means of partnerships and collaborations with gas supply operators, electrolyzer manufacturers, and other third parties that support a green energy transition.

Tenova also contributes to the energy transition by **promoting the use of electric and hybrid vehicles**, in order to reduce emissions, improve air quality and a healthier environment for our communities and employees.

1 International Energy Agency (IEA), "**Iron and Steel Technology Roadmap: Towards more sustainable steelmaking**" (2020).

Electrical Steel

As the world invests in electrical vehicles and improves the electrical grid infrastructure, the appetite for **electrical steel grades** is growing substantially. Electrical steel is required for transformers, for the expansion of the electricity infrastructure and for rotating machines such as wind turbines and electrical motors. Tenova has developed **numerous technological advancements to make electrical steel even more efficient**, including several technological developments in the annealing, pickling, decarburization, flattening, and coating operations required in strip processing.

Indirectly, Tenova's technologies influence downstream technologies as well, enabling our customers to more efficiently produce metals that are critical to facilitating the energy transition. One example is **electrical steel**, or **silicon steel**, which makes up roughly 1-2% of total crude steel production globally. Electrical steel is an **iron-carbon alloy with silicon** as its primary additive. It is highly valued for its ability to conduct magnetic fields, minimizing power losses.

CASE STUDY

Improvements in Silicon Steel

As the demand for silicon and magnetic steel increases due to growing demand for electric vehicles, Tenova's R&D team has been hard at work to develop technologies to improve the silicon steel-making process. In addition to our suite of technologies for silicon steel, we have been working on improving the magnetic properties of silicon steel through hot band cold rolling and new descaling processes, like laser and other mechanical descaling. Our research intends to find the optimal process to improve surface finishing and enhance magnetic properties.

DRI and ENERGIRON

The partial or total use of hydrogen for **DRI (Direct Reduced Iron)** production is an excellent source of carbon reduction. This solution is already widely adopted in the industry and has become the standard for the **decarbonization of integrated steelmaking** (i.e., steelmaking from ores as raw materials).

ENERGIRON is an innovative HYL Direct Reduction technology, jointly developed by Tenova and Danieli. It has been designed to use **different types of reducing gas sources or pure dihydrogen** to reduce iron ores into metallic iron used in melting facilities to produce a wide range of **high-quality steels**. ENERGIRON plants efficiently reduce any iron pellet or lump into "energized" hot or cold DRI or hot briquetted iron with controlled metallization and carbon levels. ENERGIRON offers unparalleled flexibility: even with the same process scheme configuration, the client can select the best energy source — natural gas, reformed gas, syngas from a coal gasifier or even coke oven gas — without any modification and control the amount of embodied carbon. ENERGIRON plants meet the **most stringent environmental regulations** as well. Because of its unique features, it has the lowest carbon footprint of any ironmaking technology, with the further advantage that selectively removed CO_2 can be sold. Additionally, the water byproduct of the reduction reaction, easily condensed and removed from the gas stream, can be used as cooling water in a zero-water consumption circuit.

DRI plants are typically coupled with **electric arc furnaces (EAF)** for the melting of DRI and its transformation into sellable iron or steel, in which the use of electrical energy substitutes chemical energy (which creates CO_2 emissions). The world's most productive DRI-fed EAF in the world was produced by Tenova and we are currently embarking on building a second one.

SAF and Open Slag Bath Furnace

Open Slag Bath Furnace (OSBF) is the perfect solution for melting high carbon DRI to produce hot metal. The electric furnace — a **Submerged Arc Furnace (SAF)** in this case — works using Søderberg electrodes operating with a very short electrical arc or "brush arc". It can tap hot metal into torpedo cars. The resulting slag has the same composition as blast furnace slag. The slag produced is similar to blast furnace slag and can be sold to the cement industry. The work done on OSBF slag treatment has identified a potential alternative processing route for the treatment of black slag, discussed in more detail below.

Mineral wool applications

Historically, the mineral wool flow sheet has included Cupola furnace technology, a process with high carbon emissions. Tenova has identified the use of a bespoke hybrid SAF design (using graphite electrodes) to replace Cupola furnaces. This technology change has the potential to reduce mineral wool carbon emissions by up to 90% depending on the electrical energy carbon footprint. Tenova offers this technology to existing mineral wool producers (as a retrofit) or producers planning to expand their mineral wool production capacity.

iBLUE®

The emissions from the conventional blast furnace-basic oxygen furnace or oxygen converter (BF-BOF) route represent the greatest potential for CO_2 reduction in the steelmaking industry: the BF-BOF route from iron ores produces two tons of CO_2 for each ton of steel produced (while the EAF route from scrap produces 80% fewer emissions). As of 2019, 71% of global steel was produced via the BF-BOF route, while only 29% was produced via the electric (EAF) process. Tenova's proven technology to **substitute any Blast Furnace** is iBLUE® which enables the **production of Liquid Pig Iron via the BF-BOF route** while massively reducing emissions. iBLUE® combines the production of high carbon DRI with an electric arc melter to produce hot metal and granulated slag. iBLUE® can also utilize BF grade pellets as raw material, making this solution the perfect substitute to blast furnace technology. The use of green hydrogen in the reduction process can further **minimize greenhouse gas emissions**. This represents a less costly option to produce pig iron with a negligible carbon footprint and results in minimal disruption to the operations of an integrated steel plant that plans to shift towards green steel production.

In 2023 Tenova started a test campaign on an industrial size submerged arc furnace for the production of hot metal with positive results. Increasingly, iBLUE® is establishing itself as the sustainable alternative to Blast furnaces to convert integrated steel mills with existing BOFs into "green metal plants". In addition to the environmental advantages, iBLUE® allows steelmakers to maintain existing steel grades production procedures and quality control: from this perspective, implementing iBLUE® does not require the qualification of the production process and it is highly recommended for high quality steel grades, exposed automotive parts etc.

A number of projects and studies have started in 2023 with steelmakers in different parts of the world that may lead to the construction of new iBLUE® plants in the near future.

Combustion Systems for Furnaces

Traditional hot rolling heat treatment and melting processes utilize fossil feedstocks resulting in a high carbon footprint for final products like long or flat products. Tenova is committed to developing and deploying **clean-burning hydrogen-based solutions** for reheating and heat treatment furnaces. Since 2008, we have specialized in the development of **regenerative and self-regenerative burners** that provide at least a **10% reduction in CO_2 emissions** using fossil feedstock. However, Tenova's regenerative burners are **hydrogen-ready**: whenever green hydrogen becomes readily available, our clients can immediately swap to the clean-burning fuel and drastically reduce their carbon emissions without any additional adaptations to their equipment.

We have also integrated this latest technology into our line of **SmartBurners** to provide up-to-the-minute data on the operating efficiency and processes of our burners to ease inspections and maintenance. Our **Industrial Internet of Things (IIoT)** framework offers a complete set of process diagnostics, KPIs to control key parameters like the combustion ratio, leakage of switching valves, and combustion quality. Our multi-megawatt TSX SmartBurner family for reheating and non-ferrous melting furnaces is fueled with a mixture of natural gas and hydrogen – it can run on 100% hydrogen as well. Our 200-kilowatt TRKSX (Tenova Self-ReKuperative Flameless) SmartBurner also uses a variable fuel mixture of natural gas and hydrogen and works in flame and flameless mode, helping to keep **nitrogen dioxide emissions well below the strictest limits.**

In 2021, we reached a key milestone in this endeavor by developing the first burners for heat treatment furnaces using up to **100% hydrogen**, while keeping NOx emissions below even the strictest limits. Tenova's regenerative flameless burners combine the lowest NOx emission levels with high temperature combustion air preheating, while allowing a drastic reduction of CO_2 emissions through high combustion efficiency. That means our products provide clients with improved plant sustainability even before cleaner fuels become available.

In a collaboration project with one of our customers, Tenova LOI Thermprocess proceeded with advanced heating hoods, featuring the patented **Ultra low NOx HPH®-flameless concept** and increased air preheating temperatures to 600°C, achieved up to 12% energy and CO_2 savings. In production trials, the project aimed at decarbonizing steel production by gradually shifting the fuel gas supply for the heat treatment of hot-rolled narrow strips **from natural gas to 100% hydrogen**. Despite the higher combustion temperature, the flameless concept resulted in low NOx emissions.

To assess the impact of increased hydrogen use on the overall system, a mobile natural gas/hydrogen mixing station was employed. This allowed us to test different gas mixtures during annealing cycles. To this end, Tenova developed the THSQ Burner family that is capable of working with any hydrogen/natural gas mixture by keeping consistent thermal performance and Nox emissions. The tests consistently confirmed that Tenova LOI Thermprocess' Ultra low NOx HPH®-flameless bell-type annealing plant is well-suited for hydrogen use.

TenovaLAB

We continuously invest in new research and development activities to create cutting-edge technologies that provide low-carbon solutions to our clients in the metals and mining industries. For this reason, Tenova has invested in its own R&D facilities by installing an **experimental laboratory in our headquarters in Castellanza**. Our TenovaLAB carries out experimental industrial activities for the development and testing of all burner technologies. Equipped with **four test furnaces** of different thermal power, TenovaLAB allows our R&D team to close the loop between our in-house modeling and simulation capabilities and the engineering of industrial products. On-site product testing, like thermal and emissions measurement, enables us to fine-tune product specifications, minimizing technology risks for our clients. Furthermore, TenovaLAB allows our customers to see our products in use in real operating conditions.

During 2023, we continued to expand our facilities at TenovaLAB with preparatory works for the installation of a 1.5 MW **water electrolysis unit** directly connected to the solar panels roofing of our Pomini factory. This expansion is partially financed with a HorizonEU grant to demonstrate the green hydrogen production/utilization chain at full industrial scale, from electrolyzer generation of hydrogen to the blending with natural gas in the furnace combustion system.

CASE STUDY

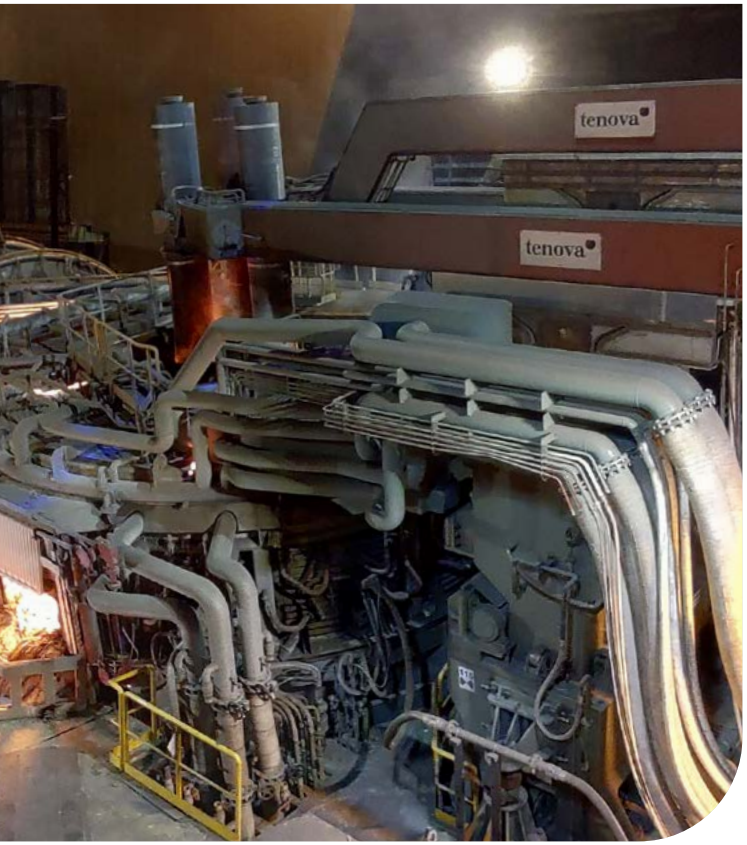
Partnering with Clients for a Low-Carbon Future

As our economies move towards net-zero emissions, steel companies have a major role to play in emissions reduction. Tenova is constantly innovating to develop low-carbon solutions for the metals industry:

- We partnered with Snam, Europe's largest energy infrastructure operator, to conduct joint strategic studies and market analyses to implement green hydrogen projects in the metals industry. The aim is to bring integrated, turnkey commercial solutions tested in industrial plants to implement a substantial reduction of CO_2 and NOx emissions in metals production processes – from melting up to thermal processing of long and flat products.
- We have partnered with Tenaris and Snam to pilot green hydrogen steelmaking at Tenaris Dalmine's pipe mill on our "Dalmine Zero Emissions" project. The project marks the first industrial-scale application of hydrogen in Italy to decarbonize the steel sector. The project aims to generate hydrogen and oxygen by installing a 20 MW electrolyzer and will likely include the construction of a storage site for the accumulation of high-pressure hydrogen and the use of oxygen in the melting process. The results of the project could significantly reduce CO_2 emissions related to electric arc furnace steelmaking.

1.2. Energy Efficiency

In cases where it is not yet feasible to transition to cleaner fuels, we have developed a suite of technologies to help our clients use their existing fuels more efficiently or adapt their existing processes, thus reducing their emissions. One such example is our Ferrochrome Multiple Preheater technology which reduces electrical energy consumption by preheating the ores before they enter the furnace using the furnace waste gases, recovering the energy otherwise lost to the environment.



Consteel® & EMS

In use for over 30 years and in 80 sites across all continents, our **Consteel® Electric Arc Furnace (EAF)** has proven its value to clients around the world. Consteel® is a process by which raw feed materials, in particular scrap, are preheated and charged continuously into an EAF and melted by immersion in the liquid steel present in the furnace. The EAF operates in constant flat bath conditions, a key advantage over conventional batch processes where scrap is melted by the direct action of the electric arc. **EAF gases are used to preheat the incoming scrap and feed materials**. Their composition is controlled and sent to a fume-cleaning plant in conditions suitable for the complete combustion of carbon monoxide and other pollutants without any fuel consumption. This process produces liquid steel with high productivity, a short and adjustable heat cycle, and the lowest power cost compared to any other EAF installation using conventional or other alternative steelmaking technology.

Although 30 years have passed, the technology is still considered modern. Recently Tenova introduced additional features, like the **Electro Magnetic Stirring (EMS)** technology, to improve energy consumption and refractory lining life.

CASE STUDY

Multiple Pre-heater, for FeCr production

In 2023 Tenova, together with one of the worlds largest Ferrochrome producers, successfully commissioned and tested Tenova's patented multiple pre-heating system. The system utilized the chemical energy contained in the furnace off-gas as a fuel to pre-heat the chromite feed materials. This technology reduces the electrical energy requirement (directly decreasing the operating cost per ton product) and it has the added advantage of improving furnace stability.

iRecovery® Captures and Reuses Thermal Heat

Today, process optimization and energy efficiency to reduce emissions are more important than ever for steel producers. Tenova began working on this over a decade ago, well before other companies were thinking about sustainability in the industry. We developed the **iRecovery®** system for recovering thermal power from EAF waste flue gas and using it as an energy source. This energy comprises the biggest fraction of the primary energy input in the EAF process yet typically goes to waste. iRecovery® captures the thermal energy created by the off-gas and uses it to produce steam to power steelmaking and other activities. In Brescia, for example, our client ORI-Martin uses iRecovery® at their steel plant. The captured heat from their plant heats 2,000 homes in wintertime and powers 700 homes in the summer, reducing 10,000 tons of CO_2 every year. In 2023, Tenova developed iRecovery solution for application at high pressure, till 60bar(g). The solution increases the applicability of iRecovery in the transformation process of steelmaking from BF-BOF to DRI-EAF through integration into the existing steam network.

1.3. Circular Economy

Industrial processes create numerous byproducts. Our solutions contribute to the circular economy by enhancing their recovery and reuse through our technologies.

Auto catalyst and battery recycling

Melting furnace technology is used to recycle the PGM's (Precious Group Metals) contained in spent auto catalysts. As the first generation of electric cars reaches the end of its cycle, there is a **real opportunity to recover valuable materials contained in various electric car systems** (mainly the battery and auto catalyst). Tenova offers both **hydro and pyrometallurgy process paths to recover these materials.**

Extracting value from black slag

Black slag is a by-product of the EAF steelmaking process. Due to the oxidizing operating mode of the EAF, the slag contains up to 30% FeO. An Open Slag Bath Furnace (OSBF) is the perfect solution for processing the black slag, and due to the reducing environment of the OSBF, the slag may be modified to produce pig iron and a white slag that is suitable for sale to the cement industry. The technology is complementary to the DRP-EAF processing route and is not a substitution for the primary steelmaking process. This initiative is developed in conjunction with the work done on slag valorization initiative.

EAF-LF (Electric Arc Furnaces - Ladle Furnace)

The primary production of steel from virgin iron ore is highly energy intensive. This can be mitigated without loss in quality by using ferrous scrap mixed with DRI/HBI and other virgin iron units (pig iron / hot metal) when necessary. Quality and availability of steel scrap are therefore an important factor, especially considering the trend in the quality of world steel scrap shows a decrease in quality. Having this in mind, we are conducting research and implementing the **new Industry 5.0 technologies** to manage low-quality scrap in furnaces and improve EAF flexibility and economic impact in favor of better sustainability. EAF steel production is already an integral part of the circular economy.

Tenova is implementing innovative approaches to increase the recycling process, replacing the use of injected coal in the EAF with alternative materials that are byproducts from other industrial processes, like polymers from waste plastic and by treating EAF process residues, such as slag and fume dust to recover both metal and mineral fraction for internal use or application in other industries.

Dry Slag Granulation

Tenova has developed a **ladle furnace slag granulation solution**, which uses forced air steam flow to rapidly cool and solidify slag. The fast cooling transforms the slag from liquid to solid which enables the possibility to re-use the slag as raw material in construction industry. Our solution decreases workers' exposure to harmful chemicals in slag, reducing water use, and reducing the need for virgin lime. Further, Tenova extended its dry-granulation technology to EAF slag obtained by high alloy steel production process and slag produced by the DRI/EAF process.

In 2023 Tenova was awarded with the first contract for the installation of the LF dry slag granulation solution system in Italy, which will process more than 20.000ton/year of slag. This plant is a first of a kind, it will be equipped with the most modern artificial intelligence algorithms to assist production optimizing the granulation process. The granulated product will then be utilized for the preparation of chemicals for the construction industry.

Lithium Recovery

Lithium is widely used in metallurgical processes to promote metal melting, eliminate the formation of oxides, and absorb impurities. Its growing use **in clean energy technologies**, like solar arrays and electric vehicle batteries, make it a crucial metal for achieving a net-zero future. Building on this potential, Tenova engineers have explored various processes to produce lithium more efficiently. **Tenova Advanced Technologies (TAT)** adapted its SX technology for producing **lithium from primary sources** to produce recycled **lithium from batteries**. The new process can be applied across all feed streams, originating from any source, including solar, hard rock, recycled waste, and process waste streams, to produce high quality lithium hydroxide. The key characteristics of this process are the **high efficiency of extraction**, superior to the traditional process, and a **lower use of water**.

1 *European Steel in Figures*, Eurofer, 2019, eurofer.eu

Twin-chamber furnaces for aluminum

Aluminum's many useful qualities have made it ubiquitous across all areas of modern life. Additionally, its recyclability makes it a highly valuable material. **Recycling aluminum uses only 5% of the energy it takes to mine virgin material** and creates fewer emissions. Tenova has created new technologies to further enhance the environmental benefits of recycling aluminum. Our **Twin-Chamber Melting Furnace (TCF®)**, a **Tenova LOI Thermprocess** technology, enables the remelting of organically contaminated aluminum or other scrap metal without pre-treatment. Its dual chamber design includes a post-combustion process to completely incinerate contaminants and use the resulting energy generated for furnace processes, thus reducing consumption of external energy. Our TCF® technology has **30 installations worldwide**, producing approximately a combined 1,500,000 MT of liquid aluminum every year. And for existing casthouses, the application of TCF® to the recycling of post-consumer scrap can significantly reduce the overall CO_2 emissions of the plant, as the process generates only 80 kg of additional CO_2 per ton of liquid aluminum.

Magnesia Metal from Coal Ash

As global demand for magnesium metal rises, Latrobe Magnesium Limited (LMG) in Australia is using Tenova's technology to harvest magnesium metal from fly ash byproduct – a hazardous waste material deriving from brown coal power generation. Originally developed to have a zero-waste pickling process during steelmaking, our pyro hydrolysis process was adapted to LMG's unique situation to recover magnesium metal. The related emissions from this technology are roughly half of those of conventional magnesium production plants. Launched in 2022, LMG is currently building its 1,000 tones per annum magnesium demonstration plant in the Latrobe Valley of Victoria integrating the Tenova Spray roaster unit. From the production experience acquired through this initiative, LMG eventually intends to develop a commercial scale operation producing 10,000 to 40,000 tons of magnesium metal per year.

1.4. Impact Monitoring

As a responsible company in the metallurgy field, we recognize the importance of monitoring the impact of our products and services on the environment and human health. We are committed to improving our processes and products to ensure their impact is accounted for along their entire life cycle.

Pomini Digital Texturing™

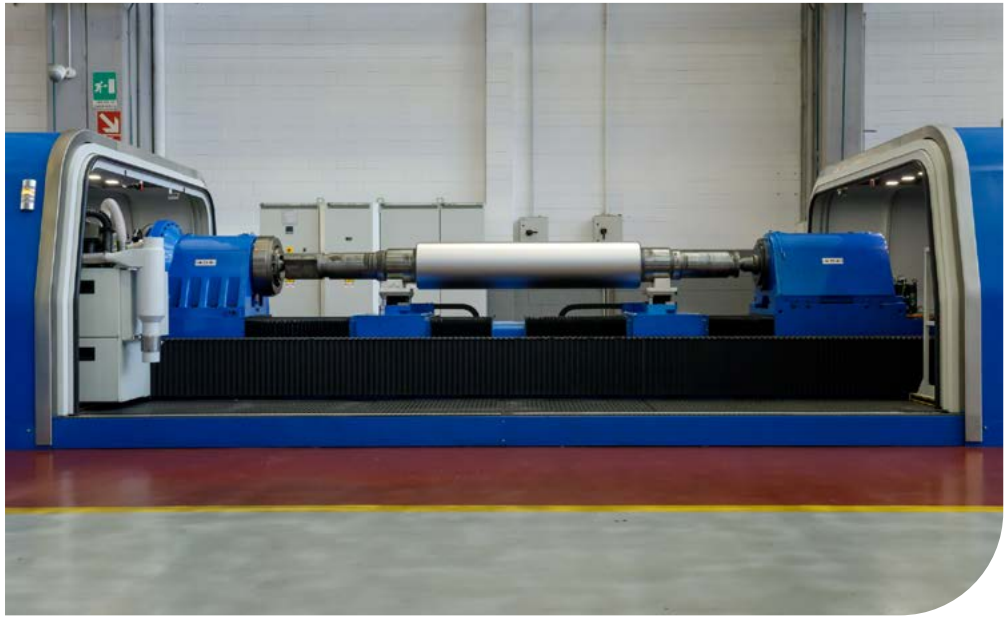
Our **PDT™ Pomini Digital Texturing™ process** covers an extensive range of **surfaces for work roll texturing** in cold rolling mill applications for both the **steel and aluminum** sectors. With up to four state-of-the-art lasers and no need for ancillary equipment, the process requires **minimal power consumption**. A simple digital process, based on modern **fiber-optic laser heads**, PDT™ enables an unparalleled range of surface possibilities compared to any other existing texturing technology.

PDT™ offers **benefits beyond energy efficiency**. It does not have adverse impacts on human health. Other texturing technologies may require, as a post-process in many applications, the use of significant quantities of hexavalent chromium, a highly carcinogenic material which can be difficult to remove from the environment. PDT™ makes it possible to significantly reduce, and even completely **eliminate hexavalent chromium**, making it a much safer and less toxic alternative.

Looking ahead, Pomini Tenova foresees **several exciting potential uses** for the revolutionary PDT™ technology. One potential use we are currently exploring is in the field of electrolyzers, designing a machine that converts water into hydrogen to be used as a clean-burning fuel – a key enabler of a low-carbon future. A second area of development is in electric vehicle batteries. We are exploring the use of PDT™ on aluminum foil to obtain a reduction in intrinsic resistance characteristics through texturing. We look forward to sharing more about these and other potential applications in the future.

PDTTM becomes "Product Category Rule" through Life-Cycle-Assessment (LCA) as per ISO 14025:2006

In 2021, Pomini Digital Texturing™ (PDT™) became the first machine in the metal surface finishing sector to complete a lifecycle analysis (LCA). As a result, the technology was certified as complying with the ISO 14025:2006 standard. The LCA analysis was registered on the EPD® Portal – the platform of the International EPD® System, the world's leading global LCA program operating in accordance with the ISO 14025, ISO/TS 14027, and ISO 14040, among others, standards – and is **now accessible to all users**. Subsequently, thanks to the experience gained through the LCA process, Pomini Tenova led the creation of the "Product Category Rule" – the rules, requirements, and guidelines to develop a high-quality EPD for a specific product category, ensuring that functionally similar products are assessed and compared in the same way when measured through an LCA.



1.5. R&D and Sustainable Innovation

We not only improve existing technologies for metals industries, but also design and produce new technologies that reduce the environmental impact of our clients' facilities while improving production efficiency and performance. Our solutions reduce CO_2 emissions to some of the lowest levels in the metals industry. We create cutting-edge technologies that **reduce fine particles**, NOx emissions, dioxins, and other hazardous substances. We strongly believe in the potential of alternative and renewable energy sources, incorporating them into our solutions wherever possible. We have already put **hydrogen-ready technologies** on the market, and many of our solutions are designed around the concept of **recovery, reuse, and circularity**, from dispersed energy to reutilized residues and more, fostering an effective circular economy.

Our innovation process begins with **research, an open-ended creative ideation phase**, followed by development, where ideas with high potential are transformed into prototypes of future products. Finally, once tested and finalized, the product is produced and marketed to customers. This process cuts across a number of teams and Business Units, including engineering, functional units, sales, and more. Our attention to sustainability has been a successful driver of business growth for Tenova. We are coordinating our **R&D&I efforts across Business Units and Product Lines**, to find integrated, synergistic solutions through collaboration.

Our R&D&I focus areas for 2022-2024 are **energy transition, local environment, process flexibility and efficiency, raw materials and residual valorization, safety, and final product quality**. We have identified how each of these focus areas contributes to the **Sustainable Development Goals (SDGs)**. The SDGs serve as a useful guide for businesses and society to align on to advance sustainable development. To further our impact, we also participate in national, regional and EU working groups on sustainable topics like circular economy and decarbonization to generate projects, roadmaps, and partnerships.

2022-2024 R&D&I Focus Areas and SDGs

Energy Transition		**Process Flexibility / Efficiency (OPEX)**		**Safety**	
Local Environment		**Raw materials / Residual valorization**		**Quality of final product**	

OnlyPlastic

OnlyPlastic, an **EU project funded by the Research Fund for Coal and Steel** started in 2019, demonstrated the possibility to substitute fossil carbon used in EAF steel shops with a Secondary Reducing Agent (SRA) obtained from the residues of waste plastic treatment plants and is compliant with the Technical Standard UNI 10667-17. It overcame drawbacks observed in previous experiences.

Preliminary investigations during OnlyPlastic identified injection as the most efficient way to use SRA, leading Tenova to develop a new family of wall-mounted lances specifically designed to promote iron oxide reduction and slag foaming processes with low-density and high reactive materials.

Tenova's new injection technology demonstrated the sustainability of producing steel by means of alternative carbon carriers without affecting the slag foaming and the EAF process stability with a **lower environmental impact** in terms of CO_2 emissions and reduction of landfilling wastes.

CyberMan4.0

In 2018, **Pomini Tenova** joined a cluster of other European organizations on **CyberMan4.0** — a Cyber-Physical System-based approach for intelligent data-driven maintenance operations applied to the rolling area. The consortium of the CyberMan4.0 project consisted of **five companies and three research institutes** located in Italy, the Netherlands, and Germany. We worked on four use cases: two in Roll Shop operations and two for the production of long laminates.

CyberMan4.0 was designed to develop an **innovative Integrated-Maintenance-Model4.0**, supporting the transition from traditional preventive maintenance to predictive maintenance. To properly maintain equipment, data collection is necessary but not sufficient: in collaboration with Tenova Digital, CyberMan4.0 created a **cloud-based system** that can cross-reference the data of several plants and, using algorithms, predict possible anomalies in order to schedule maintenance at the right moment. The project successfully prevented equipment downtime, resulting in greater efficiency and productivity. It also increased quality by reducing waste, and extended the useful life of cylinders, which reduced the overall use of oil and energy.

Burner 4.0

In 2023 we completed the final activities of EU-funded research project Burner 4.0 under the Research Fund for Coal and Steel (RFCS) grant. Burner 4.0 aimed at leveraging Industry 4.0 technologies to improve industrial combustion systems across many different areas such as design, manufacturing, control and process optimization, operating life, and maintenance. Additive manufacturing, Internet of Things, smart sensors, data analytics for process optimization, and predictive maintenance have been introduced to current burner systems to find breakthrough innovations. Funded by the **European Commission**, Burner 4.0 started by identifying materials and shapes for 3D printing of critical burner components for heat treatment furnaces.

From the R&D activities in Burner 4.0 Tenova developed the first industrial series of its SmartBurner platform. **SmartBurner**'s IIoT framework offers a complete set of process diagnostics, KPIs and KHIs that enable important process parameters like combustion ratio, leakage of switching valves, and combustion quality to be controlled and facilitate burner inspections and maintenance interventions.

HyTecHeat

In 2022 Tenova secured Horizon Europe funding on a project aimed at demonstrating blended green hydrogen / fossil fuel firing in industrial furnaces. Titled HyTecHeat, the projecy aims at leveraging these hybrid heating technologies by evaluating the effects on the quality of steel products, on the refractories and in general on heating processes. Several industrial tests on real industrial burners performed at three European sites will facilitate the hydrogen transition of the steel sector. The demonstrator at TenovaLAB has been selected as representative for hydrogen application in industrial reheating furnaces.

Initially, Tenova will adopt a combination of numerical modelling and experimental testing in order to develop industrial burners able to use hydrogen as a fuel, both pure and mixed with other standard fuels in variable amounts. Furthermore, Tenova will provide an industrial scale example of a combustion system equipped with green hydrogen feeding, in order to validate the technical feasibility of such combustion systems when applied to industrial furnaces.

The industrial equipment currently installed at TenovaLAB's premises allows characterizing full scale combustion systems burning natural gas. The adaptation of the laboratory to hydrogen utilization can be pursued using two alternative approaches: hydrogen trailer or on-site production. The first option has some limitations, mainly concerning the duration of the test due to the limited capacity of the trailer. Therefore, in order to support the development of new hybrid combustion systems the use of continuous hydrogen production unit is necessary. Since the goal is the use of hydrogen produced with renewable electricity (green hydrogen) the adoption of an electrolyser can be considered as a natural consequence. For this project, we're planning on installing a 1.5 MW alkaline electrolyser. The hydrogen produced is then fed to the H2-Ready TLX burner prototype (350 kW) that is installed on the test furnace, able to work in real industrial conditions with natural gas/hydrogen blends and also by using oxygen-enriched air. A combustion control system is installed on a PLC that exchanges control and safety signals with the PLC of the electrolyzer and the pressure loop of the hydrogen buffer. This allows to decouple hydrogen production and hydrogen use, allowing the hybrid combustion system to closely follow the furnace thermal power request, while overcoming the problem of limited turndown of the electrolyzer.

This demonstrator illustrates the technical requirements posed from the utilization of green hydrogen at any industrial site, namely:

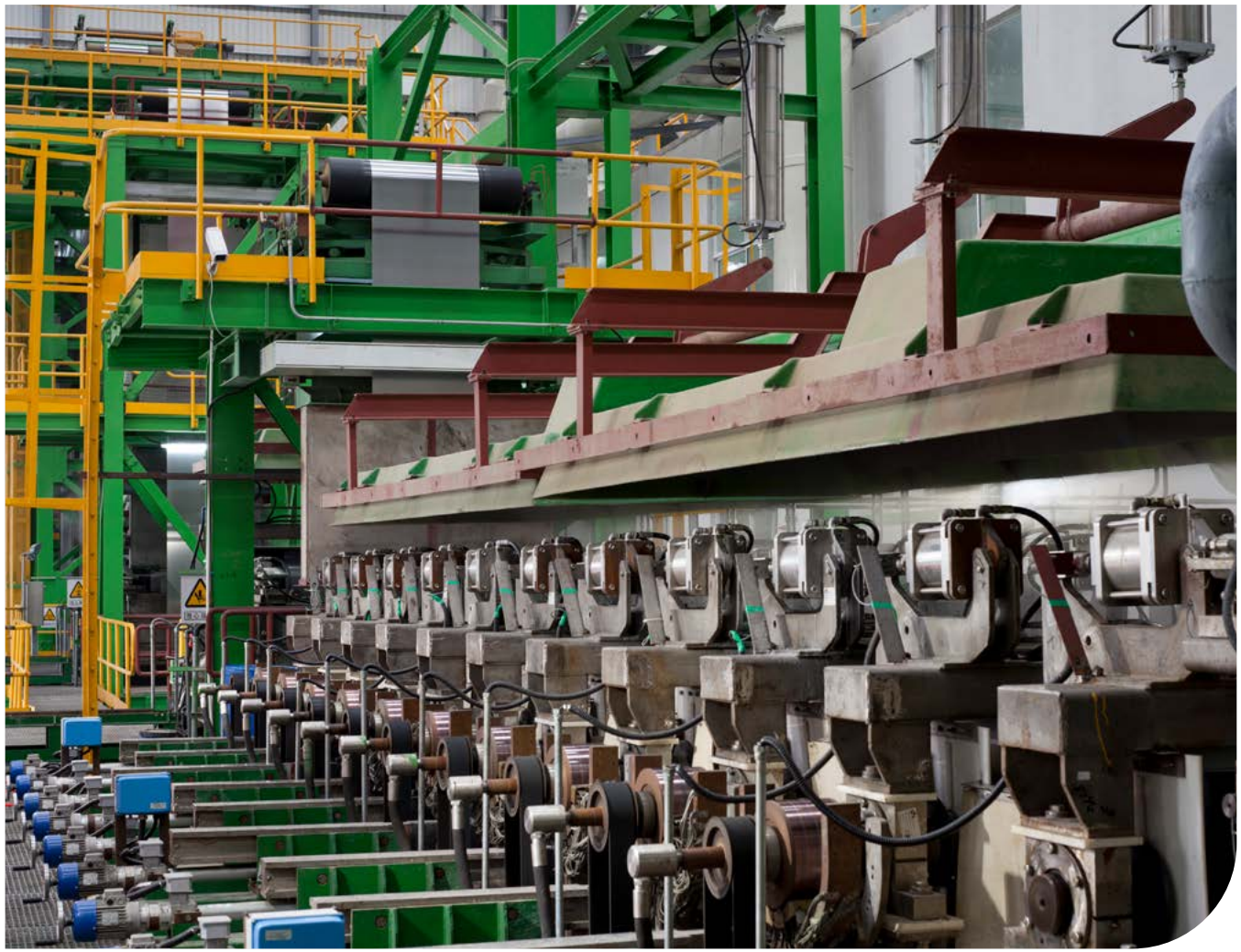
- flexibility of hydrogen production/use;
- proper control of the combustion system with the presence of an electrolyzer for green hydrogen production;
- possibility to store the extra amount of green hydrogen produced for later use.

Insoluble Anode Tin Coating and Chromium-Free Passivation

Due to its anti-corrosive qualities, tin is used as coating in many steel applications, such as food canning and pipes. **Tinning**, however, is the **most complex and sophisticated strip processing line**. In the most advanced lines, tin plating is performed using insoluble anodes where, in older plants, the dissolution of tin results in the generation of large quantities of sludge — with a high loss of tin, a valuable commodity, in the sludge.

Tin coatings are also often passivated using chromium to prevent oxidation. **Hexavalent chromium**, however, can have negative health impacts on workers and its use will soon be banned by the EU.

Tenova's **insoluble anode tin coating process** greatly **minimizes the amount of sludge** produced and, hence, the loss of tin, and its **chromium-free passivation process** provides tin passivation without the harmful effects of chromium. The resulting tin coating also provides more uniform coverage and better edges while more efficiently utilizing the tin. Other benefits are the **reduction of manpower** for anode handling and therefore an increase in safety during operation, the generation of fewer fumes, better process control, more flexible campaigns, and the lowest tin coating thickness reachable on the strip.



2. Digital Transformation

Digital technologies have the potential to revolutionize the metals and mining industries. This is why Tenova has not only integrated digital solutions into many of our technologies but has also assembled a digital strategy and team to stay ahead of the curve. Our strategy places customer value and sustainability at its center, helping us stay focused in this rapidly evolving space. It leverages AI, machine learning and data analytics to increase efficiency and reduce environmental impacts for our clients.

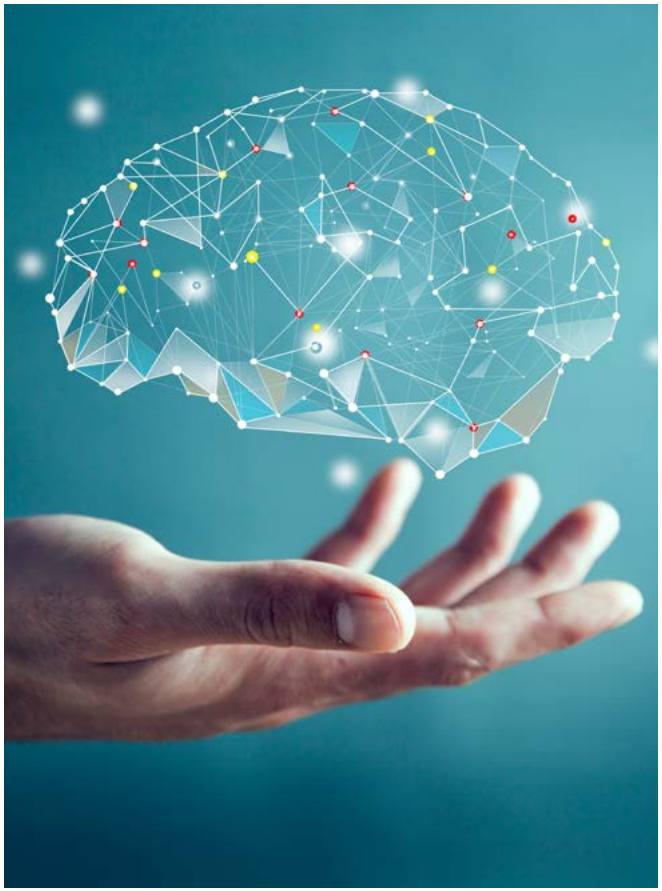
Adopting a Digital Mindset

To continue to optimize productivity through our new hybrid working model, we encourage our employees to adopt a **digital mindset** — seeking digital solutions to solve problems across categories from smart working to Industry 4.0 integration. The ambition of our digital mindset is to **promote a deep cultural change** wherein our teams understand and harness the pioneering modern technologies that are revolutionizing our industries.

We have deployed specific tools and technologies to educate and inform our employees. We have several technological systems in place to support remote collaboration within Tenova and our business partners as well, including the Project Collaboration Portal and the Supplier Portal, all accessible on multiple, user-friendly devices.

Our project management platform provides an accessible central repository of all project information, such as relevant documents, procurement plans, setting Tenova's team for success. For the near future, we are planning to enhance the platform with AI features to reduce repetitive processes, therefore increasing efficiency.

We value the introduction of new tools and support our employees with additional training to familiarize them with these innovations, enhancing their connection with one another, while also emphasizing the importance of protecting sensitive information through high cybersecurity awareness and a thorough understanding of Tenova's procedures and guidelines. We have also successfully realized the **first pilot project using GenAI** (generative artificial intelligence). The adoption of such a novel technology, which is advanced enough to be used in industrial environments, will enable our employees to optimize their daily work and to focus on activities with real added value.



"Acciaio_4.0" Plant of the Future

The **Cluster Fabbrica Intelligente**, or Italian Smart Factory Cluster, is an association sponsored by the Italian Ministry of Scientific Research with the aim of implementing a strategy based on research and innovation for the competitiveness of Italian manufacturing. To promote the development of digitally-enabled factories, the Cluster launched its Lighthouse Plant challenge. Lighthouse Plants are factories that are already operational and ready to become smart factories by using Industry 4.0 technologies like big data, IoT and artificial intelligence.

Tenova **ORI Martin's "Acciaio_4.0"** plant was one of four plants accepted as a Lighthouse. "Acciaio_4.0" aims to develop a **Cyber Physical Factory** that will allow the vertical, horizontal, and transversal integration of the entire steelmaking process, making it more efficient, flexible, and sustainable. As the industrial technological partner, Tenova designed innovative models of integrated processes for the plant, using smart sensors (IoT) and gathering data in cloud systems to develop machine learning applications, remote support, and predictive maintenance, taking into consideration environmental sustainability, people's safety and data security.

In 2023, the project was concluded with the deployment of a list of digital packages in the ORI Martin's steel plant. The image below shows the benefits of the digital packages developed and deployed.

Production cost reduction

Traceability & sustainability of the production process

Greater flexibility

Increased safety in the workplace

Support Client Engagement

In addition to the digital features embedded in our products, we want to provide our clients with the best possible service, so we have created several systems to help employees communicate effectively with clients. Customers have access to a **Tenova Digital Portal** where they can request support for specific products and order spare parts. The portal is regularly updated with new features. Some of the proprietary digital tools we have developed include:

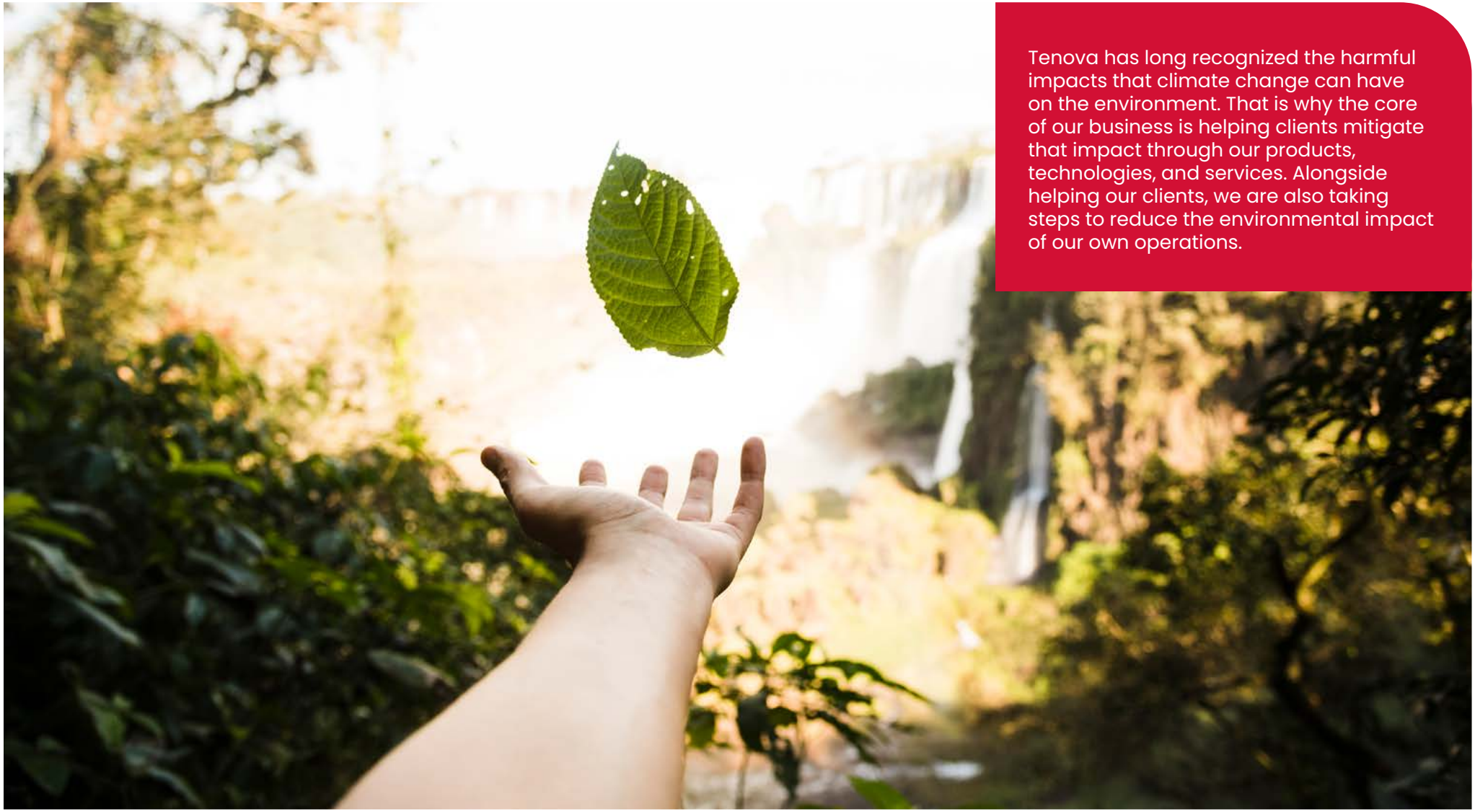
- **Tenova IIoT Platform** is the IIoT platform developed in partnership with Microsoft, which facilitates communication with our customers. The purpose of the platform is to retrieve plant data and analyze them to develop new services and AI applications which help customers use and maintain their equipment;
- **Tenova EDGE** is the field gateway developed by Tenova which allows to connect our customer's plant to Tenova IIoT Platform in a standard and secure way. This EDGE device has also the capability to host and automatically manage the update of developed machine learning models and AI applications;
- **Tenova adVISOR**, a virtual assistant that provides suggestions on product maintenance and operation. It can be used on a mobile device and provides real-time updates. The tool's remote assistance feature, available on mobile and wearable devices, offers support to field operators;
- **Tenova Catalog Creator**, which enables customers to easily select spare parts with fewer mistakes by connecting to the customer's portfolio database, accurately identifying the correct part.

As well as projects related to the Digital Transformation of Processes, Tenova strives to develop digital solutions that reduce the environmental impact of our customers' plants, and launch these solutions on the market.

Notable launches have included the inauguration of TenovaLAB, established to conduct experiments and R&D in burner development, facilitating the completion of the Smart Burner platform. Additionally, the adoption of the Tenova IIoT platform enables the application of Tenova's proprietary mathematical models, including those used for the thermal simulation of reheating furnaces. This innovative use of models also allows us to provide new services to our customers: for instance, the thermal model of reheating furnaces could be used by our customers as simulator in order to gain insights on possible improvements in the equipment operation.

One of the new features introduced to the Tenova IIoT Platform is the **Emission Impact Dashboard**. This tool is designed to track the emissions produced by the cloud services utilized by the platform. Consequently, it enables the monitoring and demonstration of the environmental impact of Tenova's products and technologies across the entire value chain, extending beyond the equipment installed at customer sites.

3. Environmental Impact from Our Operations



Tenova has long recognized the harmful impacts that climate change can have on the environment. That is why the core of our business is helping clients mitigate that impact through our products, technologies, and services. Alongside helping our clients, we are also taking steps to reduce the environmental impact of our own operations.

3.1. Our emissions and energy use

26%

2024 Goal

Reduction of Scope 2 emissions (market-based) of **450 tCO_2e** by 2024 (*)

(*) equivalent to a 26% reduction (baseline 2022)

Tenova's own energy consumption and direct CO_2 emissions stem largely **from our corporate offices and a few productive sites** and laboratories located in Italy (Castellanza), Poland, Canada, and Israel. Due to the minor scale of our in-house production, **our direct carbon impact is negligible**.

In this report our primary energy consumption and direct CO_2 emissions are disclosed, in particular those relating to our **main Italian offices, located in Castellanza and Genoa**, as well as the **production location in Castellanza**.

We currently do not measure or disclose environmental data for our sites in Poland, Canada, or Israel, although Tenova will evaluate structuring a monitoring process to also gather this data in the coming years.

In order to reduce our direct CO_2 emissions, we have committed to reducing our energy and gas consumption across all of our Italian sites and HCFC plants (cooling systems). To achieve this, in 2018 we set up an energy measurement system that monitors utility usage at our most energy intensive site in Castellanza, as well as an energy and gas consumption working group to identify opportunities to reduce our usage.

During 2023, we undertook several energy efficiency initiatives including:

- Investment approved for the complete renovation of Avancorpo and Crono buildings (also from an energy efficiency perspective). The Avancorpo renovation will be completed in 2024, while Crono by 2026;
- Impact analysis, in terms of carbon footprint, of purchasing a nitrogen production plant instead of the delivery of cylinder packages;
- Replacement of lamps with LEDs;
- Monitoring and mitigating HCFCs leaks;
- Encouraging employees to work from home two days per week to reduce transport emissions;
- Encouraging employees to adopt sustainable behavior.

Looking ahead, we have also invested in the development of a 980 kW new-generation photovoltaic PV system for our production site in Castellanza that generates around 1 MWh/year of electricity. Since September 2023, the 9,000 sqm solar field installed on the roof of the Pomini workshop has been running smoothly.

We have chosen to deploy 1,781 superior performance and highly reliable high-efficiency monocrystalline silicon panels. The system, with a power of 980 kWp, will be able to generate up to 1000 MWh annually, which is around 30%, accounting for close to 80% of the factory's requirements.

The plant is currently producing more than its theoretical output: considering the four-month period (Q4) from September to December, we have produced approximately 247 MWh, compared to an approximate theoretical output of 198 MWh.

90% of the energy produced by the solar field will be used on the campus, while the remaining 10% will be sold back to the grid. The solar field is set to power our forthcoming electrolyzer which will create hydrogen from water for industrial applications, further reducing the impact of this green hydrogen source. We are also considering sustainable building approaches as we renovate older facilities, in particular our Castellanza site.

Our Energy Use[1]

GRI 302-1 Energy consumption within the organization

	2022		2023	
	Total	Total in GJ	Total	Total in GJ
Fuel consumption from non-renewable sources	**-**	**16,284.6**	**-**	**14,349.8**
Fuels used for productive purposes	**-**	16,153.7	**-**	14,190.9
Natural gas	449,653.0 mc	16,135.7	391,923 mc	14,183.7
Diesel	500.0 litres	18.0	202 litres	7.2
Fuels used for fleet vehicles owned by the organization or long-term leases (only company use)[2]	**3,645.0 litres**	**131.0**	**4,467 litres**	**159.0**
Diesel	3,645.0 litres	131.0	4,467 litres	159.0
Electricity consumption	**3,672,192.0 kWh**	**13,219.9**	**3,786,477.0 kWh**	**13,631.3**
Electricity purchased	**3,672,192.0 kWh**	**13,219.9**	**3,501,157.0 kWh**	**12,604.2**
Purchased electricity from non-renewable sources	3,672,192.0 kWh	13,219.9	3,501.157,0	12,604.2
Electricity produced	**3,672,192.0 kWh**	**13,219.9**	**285,320.0 kWh**	**1,027.2**
Electricity self-generated from renewable sourcessources	**0**	**0**	**285,320.0 kWh**	**1,027.22**
Total energy consumption within the organization	**-**	**29,504.5**	**-**	**27,981.2**

When looking at the fuel consumption for production purposes in 2023, there was a decrease, highlighting Tenova's efforts in this field. However, due to the increase of business travels for on-site tasks, fuels used for fleet vehicles owned by the organization has grown.

1 Data related to energy consumption and Scope 1 and 2 emissions refers to Tenova's Castellanza and Genoa sites

2 Data related to fuel use for fleet vehicles owned by the organization or leased long-term (mixed use) is currently not available

Our CO_2 Emissions

GRI 305-1 Direct (Scope 1) GHG emissions
GRI 305-2 Energy indirect (Scope 2) GHG emissions

	Unit of measure	2022	2023
Scope 1 GHG emissions	tCO_2eq	278.9	247.7
Scope 2 GHG emissions – location based[1]	tCO_2eq	902.3	988.3
Scope 2 GHG emissions – market based[1]	tCO_2eq	1,676.6	1,160.1

Our other air emissions[2]

GRI 305-7 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions

	Unit of measure	2022	2023
Particulate matter (PM)	kg	5.8	4.4
Chrome[3]	kg	<0.01	0.01

1 A location-based method reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data). A market-based method reflects emissions from electricity that companies have purposefully chosen (or their lack of choice).

2 Data related to significant air emissions refers to Tenova's Castellanza site. Data based on chemical analysis at the emissions. The monitoring of air emission is not continuous, therefore the available data was used to estimate total emissions during the year.
3 0.0132 kg in 2023 and 0.0000528 in 2022

3.2. Waste and Water

In addition to energy and electricity, we strive to **reduce our use of other resources** including water, as well as minimizing our generation of waste.

Our **waste collection and disposal** comply with all local regulations. Given that most of our operations are in office buildings, with a few small manufacturing locations, most of the waste we produce is non-hazardous. Our industrial waste is managed by authorized third-party companies.

We are committed to finding ways to **reduce the amount of waste we generate**, repurposing waste in-house when possible, and recycling as much as possible in order to minimize waste sent to the landfill. We have increased the number of waste collection points in our office locations and all employees receive training on correct separation of waste to improve landfill diversion. We also compact our waste to reduce its overall volume. Additionally, we have installed **water refilling stations** and offer reusable, dishwasher-safe cups to encourage the use of reusable bottles over single-use plastic ones. Since installing the stations in October 2022, we have prevented the use an estimated 6,500 plastic bottles.

We are currently exploring ways to improve the separation of waste types. Looking ahead, we aim to conduct in-depth research on our waste's pathways downstream to further improve our diversion rate.

Waste Generated[1]

GRI 306-3 Waste generated

	Unit of measure	2022	2023
Hazardous waste	tons	62.5	118.7
Non-hazardous waste	tons	179.2	197.5
Total weight of waste generated	tons	241.7	316.2

GRI 306-4 Waste diverted from disposal

	Unit of measure	2022	2023
Hazardous waste diverted from disposal	tons	53.0	110.2
Recycling	tons	53.0	110.2
Non-hazardous waste diverted from disposal	tons	179.0	194.1
Recycling	tons	179.0	194.1
Total weight of waste diverted from disposal	tons	232.0	304.3

GRI 306-5 Waste directed to disposal

	Unit of measure	2022	2023
Hazardous waste directed to disposal	tons	9.55	8.55
Incineration (without energy recovery)	tons	0.1	2.7
Landfilling	tons	9.4	5.8
Non-hazardous waste directed to disposal	tons	0.2	3.4
Landfilling	tons	0.2	3.4
Total weight of waste directed to disposal	tons	9.7	11.9

1 Data related to waste generated refer to Tenova's Castellanza and Genoa sites

CASE STUDY

Improving Coolant Filtration

In 2022, Pomini Tenova piloted a process to more effectively separate solids and liquids during the grinding process.

Coolant-lubricant used during the grinding process produces a waste byproduct that is filtered so it can be recirculated and reused. The filtration process requires a magnet and paper filter which separate solids from liquids. We tested using a magnet of 9,000 g strength, versus the existing 850 g magnet. It provided roughly double the separation capacity, extending the usable life of the coolant-lubricant. Additionally, the waste sludge that results from the filtration process was tested as a secondary raw material input for use in foundry applications. Its use significantly reduced residual moisture in briquettes. This innovation provides not only an environmental benefit by extending the useful life of coolant-lubricant but reduces costs related to the disposal of waste sludge.

We are currently pursuing a circularity project in partnership with **Sfridoo** to analyse the feasibility of an industrial briquetting process involving the installation of a pilot briquetting machine at the Castellanza workshop. We will then proceed to the feasibility of the project for implementation at customer sites.

We manage our water use in compliance with current legislation.

At our Castellanza site, water is withdrawn from on-site wells to load fire extinguishers, irrigate landscaped areas, and load hydraulic power units to test roll grinders. If water is mixed with oil or other solvents, it is discharged temporarily into a tank and subsequently disposed of as wastewater, following regulatory guidelines. For our Genoa and Castellanza sites, water for daily employee use is withdrawn from the aqueduct and discharged into the sewer. Water withdrawn from wells and discharged water are monitored through chemical analysis on an annual basis. Wastewater is monitored through chemical analysis every six months. Data is shared with management every year. In 2022, a drought in Italy required us to replenish our site wells, resulting in an increase in water use compared to the previous year. As this emergency has subsided, in 2023 water use has returned to the average levels, even showing a moderate reduction in comparison to 2021, thus aligning with our environmental commitments.

Water Use[1]

GRI 303-3 Water withdrawal
GRI 303-4 Water discharge
GRI 303-5 Water consumption

	Unit of measure	2022	2023
Total Water withdrawal	Megaliters	41,169.00	24,804.00
Groundwater – Freshwater (≤1,000 mg/L Total Dissolved Solids)	Megaliters	27,410.00	15,160.0
Third-party water – Freshwater (≤1,000 mg/L Total Dissolved Solids)	Megaliters	13,759.00	9,644.0
Total water discharge	Megaliters	9,064.00	9,733.0
Third-party water – Freshwater (≤1,000 mg/L Total Dissolved Solids)	Megaliters	9,064.00	9,733.0
Total water consumption	Megaliters	32,105.00	15,071.0

1 Data related to water withdrawal, consumption and discharge refers to Tenova's Castellanza and Genoa sites, which are not located in water stressed areas (Source: World Resources Institute, Aqueduct Water Risk Atlas, www.wri.org/our-work/project/aqueduct). During 2023 and 2022 there were not significant changes in water storage.

Considering the climate impact and waste management of Tenova's operations, in 2023 the company committed to:

- the **extension of the Energy Metering System** to improve the monitoring of utility consumption, already achieved by 2023 (e.g., monitoring of calories absorbed by water pre-heating processes for canteen food preparation, monitoring of new FTV production and feeding back into the grid of non-self-consumed energy);
- the **renovation of a building** currently in class G (Crono) by 2026;
- the **construction site for an H_2 electrolyser** for research and development activities (fed in particular on Saturdays and Sundays by production surpluses from the photovoltaic plant) by 2024.

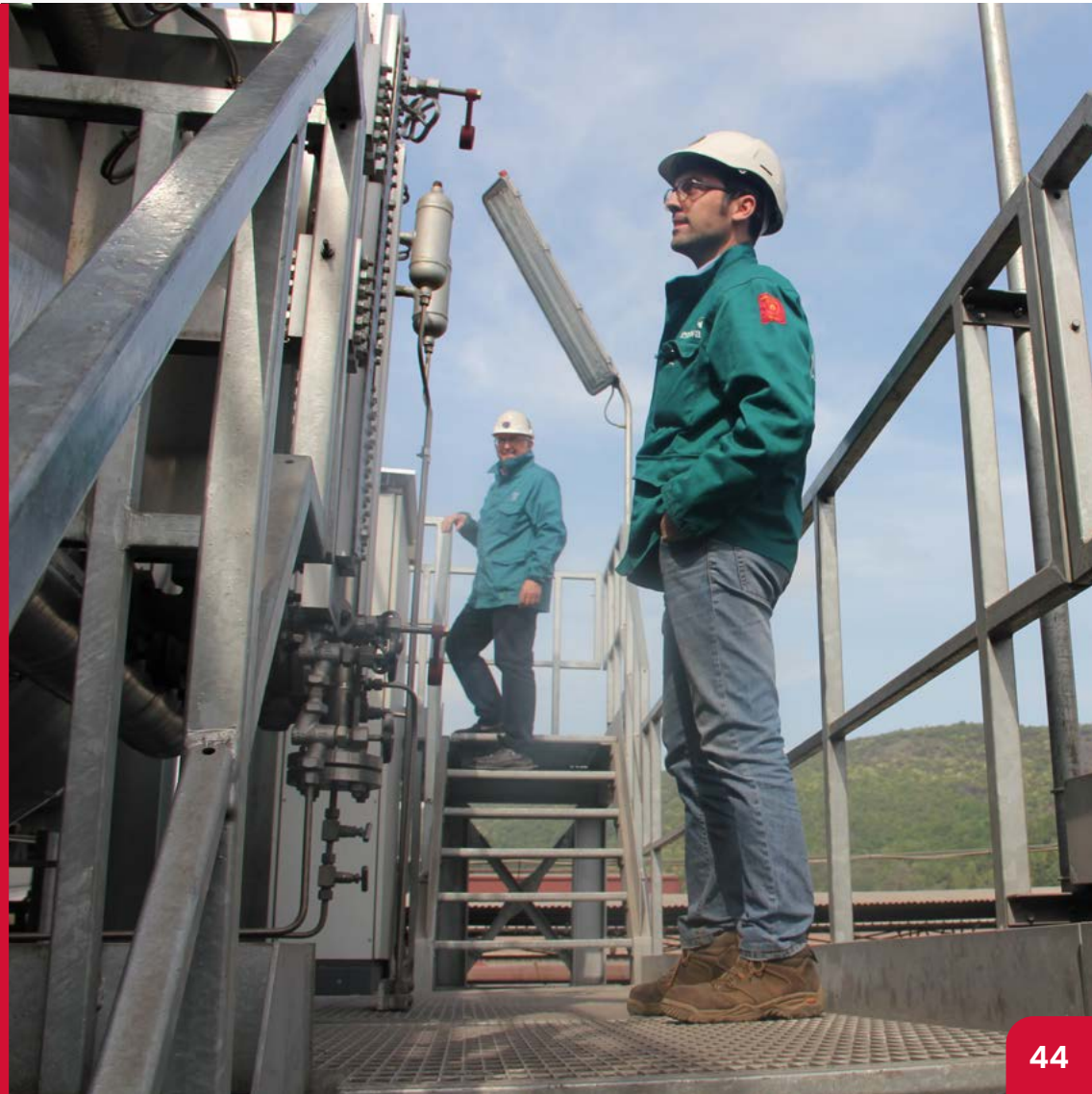
We Build Trust

Empowering our employees and reinforcing mutual trust with all our stakeholders

At Tenova, we believe trust is our license to operate. We build trusting relationships with all our stakeholders, from our employees to our clients. For us, trust is based first and foremost on safe and reliable technology that enables long-lasting client relationships. Our commitment to safety is distilled into two focus areas: **"Safety First"**, promoting a culture of safety among our people; and **"Safety by Design"**, designing robust safeguards directly into our technologies.

Creating a safe workplace is just the baseline. We also want our teams to thrive. We provide them with market-leading benefits, pathways to growth, and equitable access to opportunities. In this section, we detail the programs we have put in place to make Tenova a workplace and enterprise that fosters trust.

We also report on how we empower our employees by creating a safe and supportive workplace and develop trust with our customers and other stakeholders through proven, reliable technologies and services.



1. Safety, Well-Being, and Personal Development

1.1. Occupational Health and Safety

Safety is paramount at Tenova. From worksites to production facilities, from technology labs to office headquarters, we make the mental and physical well-being of our people and those they interact with a top priority.

No matter where our facilities are located or which local laws govern them, **we always apply the most stringent international safety regulations** available. Tenova S.p.A.'s Health, Safety, and Environment system is certified to **ISO 45001** standards, the most rigorous global standards for environmental and occupational health and safety. The system covers all workers and processes, including design, manufacturing, and commissioning of equipment, plants, and ancillary machines.

All **new employees of Tenova S.p.A.** are required to complete a **two-hour safety induction course**, as well as additional required trainings depending on their role. We schedule and conduct regular safety training sessions and provide all our people with **Basic Safety Rules** to govern day-to-day activities. We also **distribute a Tenova Project Site Safety Rules booklet** across our company to ensure all our entities are operating at the same high level of standards and to promote safety awareness among all personnel. Employees are empowered to stop work in the case of unsafe activities and anonymously report safety risks to their representative, their manager, or directly to the Health and Safety team. Reported incidents are investigated, root causes are identified, and corrective action is taken.

Our **training programs** prepare our people to identify, evaluate, mitigate, and – wherever possible – eliminate safety risks. In 2022, at our locations in Italy, we rolled out rigorous mandatory training for project site personnel. We also continuously analyze error reports, warning flags and near misses, including any incidents that might help us improve Health, Safety, and Environmental Management protocols.

We regularly carry out a **risk assessment of work sites and activities** conducted by internal health and safety team members and external consultants. The assessment includes inspection of work sites and interviews with employees to identify potential hazards or risks associated with each site and work activity. A **company doctor** is on-site at each of our Castellanza and Genoa locations. The doctors organize annual health checks and contribute to our risk assessment. From these various inputs, we identify priority actions points. This process is periodically audited by ISO 19011/45001-accredited auditors.

Safety Day

Since 2015, we have hosted an annual Safety Day held every year on the World Day for Safety and Health at Work, April 28. Safety represents one of the core commitments of the company and permeates every single activity and project, with the aim to safeguard the health and integrity of all employees and other stakeholders collaborating with us. This is why safety is at the heart of Tenova's culture – with the motto Safety First – as well as of our technologies – what we call Safety by Design.
In 2023, we organized a dissemination event on **skin pathologies** "Melanoma and the prevention of skin cancers" at our Italian offices.

To help maintain the rigor of our health and safety standards, we host a permanent **health and safety working group** that meets monthly to assess our illness and injury data, consider new regulations, and recommend changes to management. We also run **regular audits** that measure and review existing safety standards as part of our standard work routine. We report our progress to all stakeholders, reinforcing the company's open work culture, strengthening accountability and making sure improvements are ongoing.

The organization facilitates workers' access to non-occupational medical and healthcare services and programs. Tenova provides the employees with:

- **welfare services** (e.g. convention with Humanitas hospitals for discounts related to health services);
- **annual flu vaccination**.

Work-related injuries

GRI 403-9 Work-related injuries

Employees		
	2022	2023
Number of fatalities as a result of work-related injury	0	0
Number of high-consequence work-related injuries (excluding fatalities)	0	0
Number of recordable work-related injuries[1]	4	1
Number of hours worked	644,815	755,514
Multiplier	1,000,000	1,000,000
Rate of fatalities as a result of work-related injury	0	00
Rate of high-consequence work-related injuries (excluding fatalities)	0	00
Rate of recordable work-related injuries	6.2	1.3

Workers who are not employees but whose work and/or workplace is controlled by the organization[2]		
	2022	2023
Number of fatalities as a result of work-related injury	0	0
Number of high-consequence work-related injuries (excluding fatalities)	0	0
Number of recordable work-related injuries	5	4
Number of hours worked	585,599	206,802
Multiplier	1,000,000	1,000,000
Rate of fatalities as a result of work-related injury	0	0
Rate of high-consequence work-related injuries (excluding fatalities)	0	0
Rate of recordable work-related injuries	8.5	19.3

1 The main types of work-related injuries are related to fall of materials, fall from height, mechanical activities, uneven ground, animal attack, grinding activities.
Workers can contact directly their representatives (RLS), Direct Manager or QHSE Dept to report work-related hazards/hazardous situations. The RLS are required to manage anonymously the report. Finally there is the Supervisory Body who can be contacted. The processes used to investigate work-related incidents include incident notification, investigation and corrective actions, according to an internal procedure.

2 This safety data refers to the following workers:
- Workshops Tenova workers and subcontractors involved in the production (no maintenance companies).
- Temporary sites Tenova workers and subcontractors involved.

Workers operating in the offices are not included.

Progress on Tenova's Health and Safety Commitments	
Main areas	2023 status
Improving near miss reporting and related **remedial actions** among Tenova Entities	• Number of near misses are now reported in the **executive summary of presidency meeting** and are part of the agenda. In 2024 we will also report the description and remedial action. • **Requested to all Tenova companies to pay more attention to the near miss recording**, notification, and investigation.
Creating more harmonized **H&S procedures** among Tenova Entities	• In 2023, we planned to implement a **new procedure and training on health and safety for the management of project sites**. The procedure is not yet officially issued, as it is currently being tested on some projects managed by Upstream Business Unit. It will be issued in 2024 together with other corporate procedures.
Training breaks to improve training on the job and training in case of job changes	• **Some training breaks were organized in 2023 on specific issues** (e.g. use of specific tools or job changes). • The entire QHSE team has attended **specific training courses** enabling the the training breaks that will be organized going forward.
Ergonomic improvement in the choice of **PPEs**	• In 2023 we tested some brands and Types of Safety Shoes, we will launch the new supply of Cofra Shoes starting Q1 2024.
Same safety clothing for all Tenova entities	• The initiative will be implemented in the coming years.

1.2. Talent

1,534 Tenova employees as of December 31st, 2023[1]
15 average hours of training per employee in 2023

In order for Tenova to succeed, our talent must have the latest skills in an industry that is constantly evolving. We pride ourselves on providing a **supportive work environment where employees can grow and develop in their careers**. In 2023, we experienced a 17% new employee hires and a 7% of employee turnover rate, demonstrating employee job satisfaction.

We consider ourselves a **learning company** – we upskill and reskill our employees through on-the-job training, cultural exposure, and education. We support their professional development through numerous **training and upskilling programs** that span all employee levels, including:

INTERNSHIPS

We offer internship opportunities all over the world to students who are studying towards a toward undergraduate and postgraduate degrees, so they can gain hands-on experience. Moreover, we collaborate with local high schools for school-work rotation initiatives at our headquarters departments, in particular in our Pomini workshop. Interns are able to gain hard and soft skills by interacting with Tenova employees.

T-READY

Launched in 2019, T-Ready is the talent development program targeting recent graduates. The two-year program assigns new hires to a global Techint Group office for the first year and Tenova headquarters for the second. They follow an individual development path supported by a dedicated tutor.

HIGH TECH PROGRAM

Our High-Tech Program is a two-year, global internal training program for a select pool of high-potential, talented young people. The program aims to train the pool in managerial and business skills.

TENOVA CORPORATE ACADEMY

Our in-house academy provides specific training around the four pillars that are central to Tenova's needs: institutional corporate guidelines, technical training, managerial training and linguistic training. A core focus is on keeping employees up to date with the latest trends in innovation, leadership, and business, such as digitization, sustainability, and process innovation.

DEVELOPMENT CENTER

Tenova's Development Center provides employees with access to a digital platform where they can take self-guided courses to improve business, interpersonal, and leadership skills.

1 Number of employees not including TAKRAF and DELKOR.

We also provide one-on-one support to employees through peer mentorship. Our **Leadership Mentorship** program pairs mid-level employees with senior executives to improve their leadership skills and create a pipeline for the leaders of tomorrow. Our **Reverse Mentoring** program pairs a junior and senior employee to bridge the generation gap, foster digital and technical skills, and improve Tenova's internal networks.

In 2022, we updated several of our training path courses, later consolidated during 2023, including sessions on digital products and services, soft skills for sales, retaining our culture while hybrid working, and global trade and commerce. We also revamped our **Tenova Corporate Academy**, streamlining the programs into the four areas mentioned above as well as expanding the catalogue with the Tenova Leadership Lab, an experimental digital space for managers and employees to connect with each other, develop new competencies, reflect on work contexts in which these competencies are actionable and experiment with new situations and ways of operating.

In 2023 we have **launched dedicated hubs worldwide** in order to give our colleagues around the world the chance to participate in person in the soft skills training paths provided by the Tenova Corporate.

Moreover, we enhanced our **High-Tech Program** with a three-day intensive training program. Looking ahead, we plan to continue to formalize training as a part of each employee's Tenova journey by creating individual development plans as part of performance reviews and identifying a core set of learning programs for each employee level, starting at onboarding. In 2023, our employees collectively completed more than 23,000 hours of training.

The areas of talent attraction, retention and fostering of job expertise, as well as employee training and development, represent a pivot for our success. This is why we aim to strengthen our commitment in these two domains even more going forward.

At the same time, we are working also on our **employer branding** to **attract new high potential professionals by participating to local Career Fairs** held at the most important Universities around the world, as well as being involved in sector associations, like AIST, in order to network with professionals and access the training opportunities they offer.

1.3. Benefits and Well-being

We know that attracting and retaining the right talent includes creating a package of benefits that proves our commitment to creating an equitable and supportive workplace. This begins with a competitive salary. Our **compensation policy** sets common rules for determining salaries and raises to ensure fair treatment of all employees.

All full-time employees receive a full suite of **standard benefits**, in line with local standards in their country of residence. Tenova has always been sensitive to employees' benefits and well-being; therefore, Tenova complies with local rules and follows high well-being standards. Employee well-being extends beyond standard salary and benefits which is also why we offer employees **additional benefits and services** based on regional norms.

For example:

- In **Italy**, we provide employees with access to a campus gym and cafeteria, shuttle transport to our offices, annual influenza vaccinations, and more;
- We provide educational support for employees' children, supplemental life insurance, travel insurance, and counseling services, among others;
- In **India**, we subsidize transport to our campuses, provide access to an on-campus cafeteria, and more;
- In the **US** we provide free access to the company gym, fresh fruit every day and every Friday we have breakfast together in the library with donuts or bagels;
- In **Germany** and the **US**, we offer standing desks.

Moreover, this year we have reintroduced the Christmas party both in Tenova Corporate and in Tenova Inc. because it is a very important tradition that was very appreciated in the past years but was paused due to Covid.

The well-being of our employees is reflected above all by the working environment in which they carry out their daily activities, which must be a pleasant and comfortable working atmosphere. Our offices are modern and bright, with a large open space area, including kitchen and cooking island, which also promotes (in-)formal exchange among colleagues.

CASE STUDY

Pulse Survey 2023

Tenova regularly carries out an internal feedback survey, a tradition established by the Techint Group. After our most recent survey in 2021 (EOS), we revamped our commitment to check our employees' engagement status through the Pulse Survey, conducted in June 2023.

The Pulse questionnaire, similarly structured to EOS 2021, included 8 questions clustered in categories such as internal communication, employees' satisfaction, management, and an additional open question for suggestions and opinions.

The results (based on 79% of response rate) showed high scores in most of the clusters analyzed, demonstrating a consistent improvement in all the areas taken into consideration, as well as a good level of internal engagement. According to our employees, Tenova remains a company where people feel valued and recognized.

1.4. Diversity, Inclusion, and Equal Opportunity

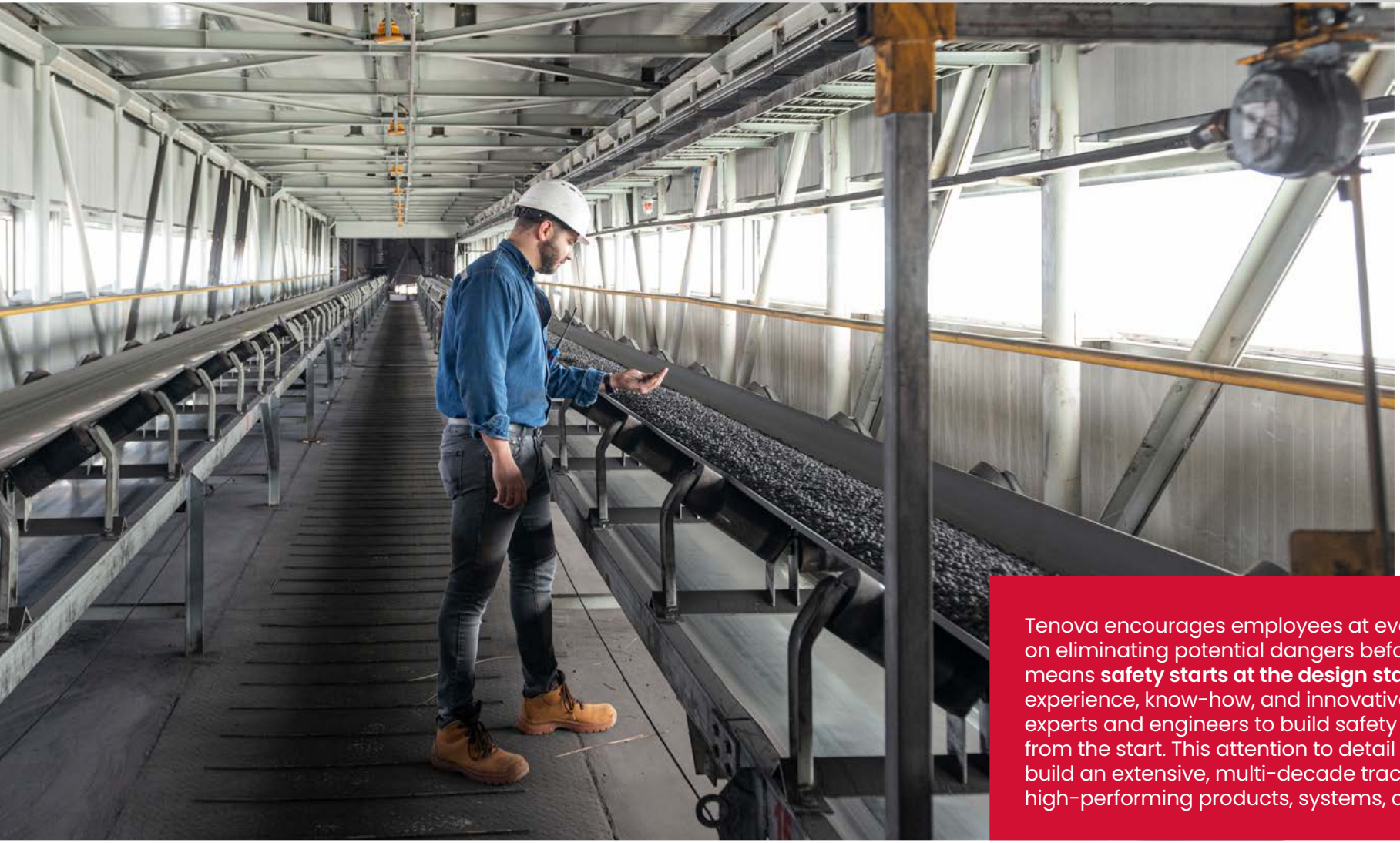
	Employees	As of 31st December 2022	As of 31st December 2023
by gender	Male	82%	82%
	Female	18%	18%
by region	Africa	4%	4%
	Americas	17%	19%
	China	9%	9%
	Europe & CIS	57%	55%
	Middle, Far East & Oceania	13%	13%
by age range	under 30 years old	10%	12%
	30-50 years old	54%	53%
	over 50 years old	36%	35%

We strive to create an environment where **all our employees feel respected and treated fairly**, regardless of gender, religion, origin, nationality, age, sexual orientation, or disability. We adhere to all local and national regulations relating to equal employment opportunities in all jurisdictions where we operate. While we universally hold values related to fairness and equal opportunity, as stated in our **Code of Conduct**, we also tailor our diversity and inclusion programs by country, taking into account specific, regional socio-historic contexts. For example, our South Africa offices have a policy to promote diversity related to the country's history of apartheid. In India, we maintain a committee against sexual harassment to make the workplace safe and welcoming for female employees. We also promote diversity at the recruitment stage of employment to ensure we attract the widest possible array of candidates. Tenova is working to **enhance gender diversity** among our staff as well.

To support our diverse employees and communities, we hold regular **awareness-raising events and campaigns** to educate and engage employees on diversity, inclusion, and equal opportunities. For example:

- On **November 25, 2021,** we held our first campaign in honor of the **International Day for the Elimination of Violence Against Women** to raise awareness about this issue. In 2022, the initiative continued with the motto "Stand up, Don't Stand by," encouraging support for victims through the 5 Ds approach. In 2023, the initiative was renewed with a week-long campaign with the motto "Put yourself in my (red) shoes." Employees received materials to create their own red shoe origami, which were then displayed on their office desks as a testament to our commitment to the cause;
- In 2023, we organized a **two-day training program on Female Leadership** for Tenova S.p.A.'s women employees, in collaboration with an expert in diversity management and leadership. The initiative aimed to raise awareness about the challenges and opportunities for women in management, focusing on diversity and inclusion, as well as leadership skill training/development in complex organizational systems;
- In 2023 Tenova Inc. and its Charity Committee supported the **Women's Center & Shelter of Greater Pittsburgh (WC&S)**. The Association provides assistance to survivors of domestic abuse in the Pittsburgh area, guiding them through different stages of their journey and addressing their unique needs;
- During **Jewish holidays**, our Tenova Advanced Technology site in Israel supports local non-profits helping children and people with disabilities by purchasing calendars and gifts from them to give to our employees;
- In 2023, we participated in the **Women in Steel conference** in Pittsburgh, organized by AIST – Association for Iron & Steel. The aim of the conference is to support the recruitment, engagement, and professional development of women in the global steel industry. Over the course of two days, the event featured three panel discussions, two keynote speakers, and leadership skills training to enhance attendees' personal and professional growth.

2. Safety by Design



Tenova encourages employees at every level to focus on eliminating potential dangers before they emerge. This means **safety starts at the design stage**, leveraging the experience, know-how, and innovative approaches of our experts and engineers to build safety directly into products from the start. This attention to detail has enabled us to build an extensive, multi-decade track record of safe and high-performing products, systems, and facilities.

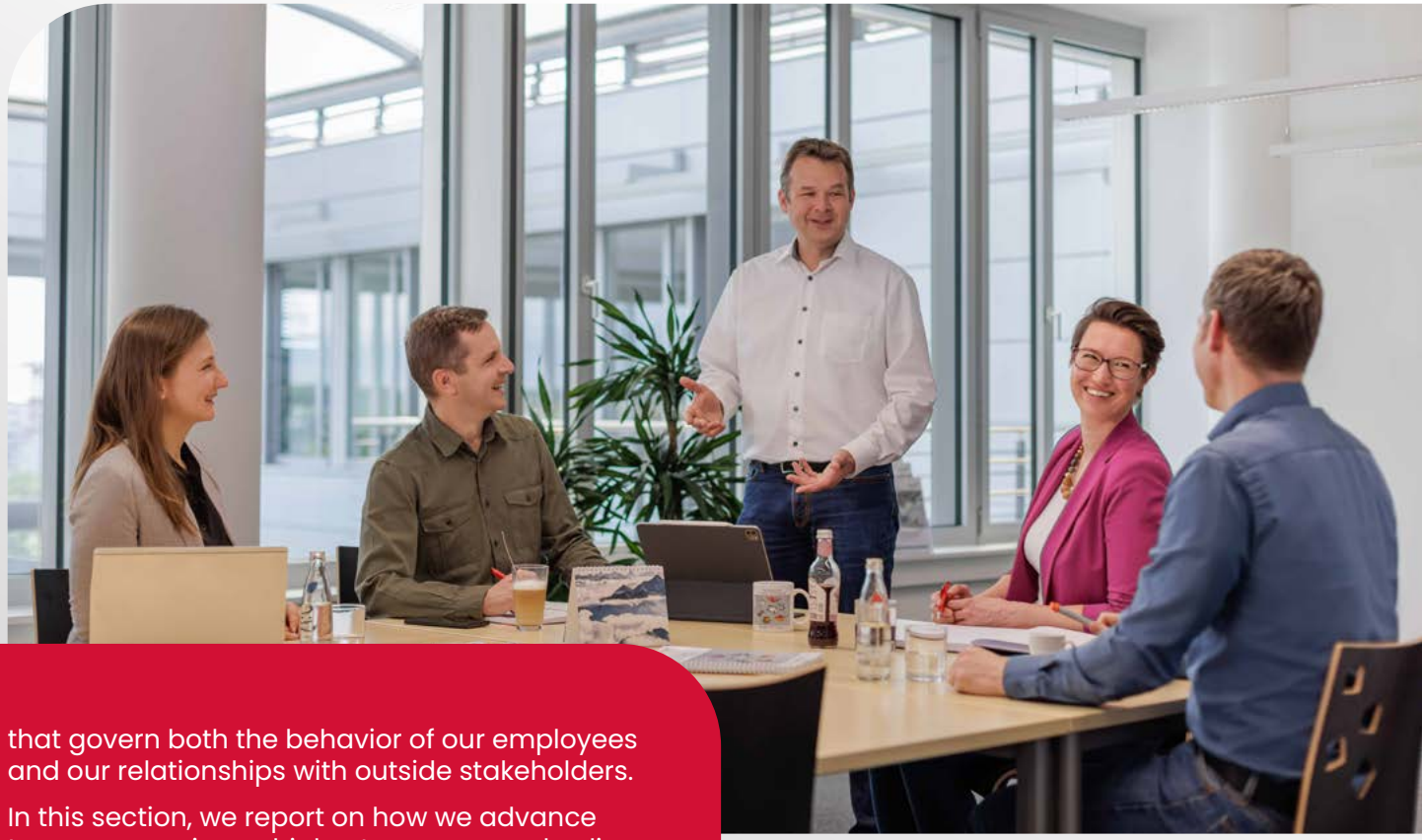
2.1. Safe Technology for Clients

A tech-forward approach, focused on digital technologies, data gathering, data analysis, and dedicated training, enables us to deliver products with considerable safety advantages. We build monitoring features – including robotics, smart sensors, and AI – directly into our products. We collect digital data on facility performance and production errors, and compile digital report cards for maintenance effectiveness and troubleshooting. These innovations provide real-time and predictive analytics to **enable clients to prevent accidents** before they happen and reduce potential harm to their employees. For example:

- our **iBOF Intelligent ISDSR Slop Detection System** closely monitors vibrations in the BOF route and alerts technicians when the risk of slopping, or an overflow, increases past a given threshold. iSDS® technology significantly reduces the number of slopping events through effective prediction of such occurrences and advance alarming to the furnace operators. Accurate slop prediction is a critical tool in the BOF operation that provides an additional protective system to increase yield and productivity while reducing operating costs and minimizing fugitive emissions. Preventing slopping reduces potential harm to workers from direct contact or slop emissions and reduces product loss;
- our **Water Detection System (WDS) predicts leaks** with a high degree of accuracy.
  The WDS monitors leaks and alerts plant operators when higher than normal water conditions are present in the EAF. Tenova's WDS is the only commercially available system that is capable of continuously analyzing EAF off-gas for both H_2 and H_2O vapor. The real-time EAF process information and NextGen® off-gas hardware include full spectrum analysis of the water conditions in the EAF, which are evaluated for abnormalities compared to standard levels;
- our **Submerged Arc Furnaces (SAF)** provide more reliability and safety when processing **Platinum Group Metals (PGM)** concentrates than other furnaces. Because they use electricity as an energy source, our SAFs provide high process efficiency at low energy utilization levels. Furthermore, Tenova has developed a patent that covers the use of graphite with copper cooling to prevent the sulfide corrosion of the copper cooling elements in a furnace sidewall. The use of graphite helps to protect the copper cooler from the corrosion caused by free sulfur present in the furnace sidewall adjacent to the concentrate feed layer.
  Advances in robotics have enabled Tenova to develop an automated casing addition solution for Soderberg electrode casing addition. Poor casing addition practices are one of the main contributors to electrode failure; the new development therefore has multiple benefits – not only does it remove personnel from a potentially hazardous environment, but it contributes to a more stable plant operation;
- **MEGtec™**, Tenova's alternative cooling medium system, drastically reduces the risk of explosions due to leaks from furnace equipment such as sidewall coolers, taphole block and electrodes. Minimal equipment changes to the existing equipment are needed, and the technology is well suited to adoption in existing operations;
- **Pomini Digital Texturing™ (PDT™)**, presented in the "Impact monitoring" paragraph, is inherently fire risk free, and fully enclosed, thus reducing the exposure of workers to internal processes;
- our **SAFE+ (Safe Plus) EAF** configuration permits operators to remain in comfort area, and detect several possible critical situations like water leakage. The introduction of several robotized operations and remote control of the furnace improves the working condition of operators in the Meltshops area;
- Tenova is launching "**SafeForPorts**", a pioneering initiative that will leverage VR and AI to revolutionize port operations prioritizing safety in the maritime industry, over the next years. The project is embedded in the framework of "call for proposals" issued by the Istituto Italiano di Tecnologia (IIT) under the banner of RAISE (Robotics and AI for Socio-economic Empowerment) and implemented under the National Recovery and Resilience Plan.

We Act Transparently

Being transparent within our organization and with our stakeholders



At Tenova, we believe in leading by example. We recognize that the leadership position we have earned in the metals industry comes with important responsibilities. We aspire to be a trustworthy partner for our stakeholders and a driver for exemplary behavior within our industry. Therefore, we have chosen to adopt comprehensive, far-reaching internal policies that govern both the behavior of our employees and our relationships with outside stakeholders.

In this section, we report on how we advance transparency in our highest governance bodies and policies, ensuring our employees behave in ethical and principled ways that reflect our company's values.

1. Governance and ESG Management

Tenova Group is headed by **Tenova S.p.A.**, based in Italy and led by a five-member **Board of Directors**, including our Chairman and key persons leading relevant disciplines including HR, Finance and Accounting, Business and Markets bringing a diversified range of experiences. With reference to local Tenova Group companies, Boards of Directors are generally composed of the local business manager, the head of the relevant BU and the local CFO. Each Board of Directors makes strategic decisions on the organization's direction and considers sustainable development. Alignment of activities with our values and mission are determined by the Boards of Directors and the CEO.

The Tenova S.p.A. Board is supported by two management committees, the **Compliance Committee** and the **Risk Committee**. Additionally, Tenova S.p.A. is supported by the **Supervisory Body (Organismo di Vigilanza)**, in accordance with Italian Legislative Decree n. 231/2001. Management of our ESG issues sits with the Risk Committee.

Sustainability is at the heart of our business and our values. We have created **three management bodies** to benchmark our progress, create goals, monitor progress, and cascade accountability across the organization:

- our ten-member **Sustainability Steering Committee** devises our overall strategy on sustainability and sets our goals. It determines the right partners to achieve our goals and creates an action plan;
- the Steering Committee is supported by the **Sustainability Project Team** which manages projects created in the action plan, coordinates with relevant partners, monitors progress against KPIs, and keeps projects running on schedule;
- finally, our **Operative Committee** communicates the strategy, goals, and action plan across the organization and cascades responsibility for projects to the appropriate groups within Tenova.

Progress against our goals and action plan is reported to the Board's Risk Committee by the Sustainability Steering Committee at least twice a year. Ultimately, our **C-level executives** are accountable for progress against our sustainability vision, so we tie their annual compensation incentive to performance on sustainability.

Tenova Board of Directors as of December 31st, 2023[1]

GRI 2-9 Governance structure and composition

Member name	Gender	Executive and non-executive members[2]	Competencies relevant to the impacts of the organization
Andrea Alberto Lovato	M	EXECUTIVE	Business and markets
Federico Metzger	M	EXECUTIVE	Human resources
Roberto Pancaldi	M	EXECUTIVE	Business and markets
Gianfelice Rocca[3]	M	NON-EXECUTIVE	Strategy, business
Michele Zerbi	M	NON-EXECUTIVE	Administration, finance, internal controls

GRI 405-1 Diversity of governance bodies[4]

Tenova Spa Board of Directors	2022		2023	
	Number	Percentage	Number	Percentage
By gender	**5**	**100%**	**5**	**100%**
of which female	-	0%	-	0%
of which male	5	100%	5	100%
By age group	**5**	**100%**	**5**	**100%**
under 30 years old	-	0%	-	0%
30-50 years old	1	20%	1	20%
over 50 years old	4	80%	4	80%

1 All Board of Directors members are not independent and do not belong to under-represented social groups. Furthermore, they all have a tenure of 1 year and represent their main stakeholder of reference, which are the shareholders.

2 The term "Executive" is used according to the definition provided by the "Codice di Autodisciplina delle società quotate"

3 He is a Board Member in 2 listed companies and in various companies of Techint Group or other institutions in the education realm.

4 The reported data refer only to Tenova S.p.A.

2. Compliance and Ethics

The metals industries are closely regulated and Tenova is committed to continuing to comply with all local, regional, and national regulations in the localities in which we operate. In Italy, Tenova S.p.A. adopted an **Organization, Management, and Control Model** in accordance with the requirements of Italian Legislative Decree Number 231/2001 and the criteria established by the main trade associations. The Model is defined and tailored based on risks specific to Tenova S.p.A. and updated through periodic risk assessment activities.

All Tenova employees are required to conduct business activities in compliance with Tenova ethics and integrity values, existing guidelines, rules, and internal regulations. Every employee is expected to honor our **Code of Conduct**, including being transparent about conflicts of interest in compliance with **Tenova Transparency Guidelines**, immediately notifying the company (in writing) of potential issues, and acting at all times in a transparent, proper and honest manner in order to best protect the company's interests.

The **Compliance Committee** oversees our internal control system, which is designed to reinforce our existing compliance-oriented corporate culture. The system consists of a set of principles, rules, and procedures designed to guarantee efficient and effective management of all business processes. Our **Compliance Department** supports the definition of the system's processes and controls, while our **Internal Audit Department** provides independent, objective analysis designed to evaluate and improve system effectiveness.

As part of our ongoing commitment to fair and transparent business practices, in 2017 we joined the **Metals Technology Initiative (MTI)**. Hosted by the **Basel Institute on Governance**, MTI provides a forum for members to develop anti-corruption compliance practices and safeguard fair competition in the metals industry. MTI members pledge to prohibit bribery, maintain robust internal control systems, compete fairly in the market, address key ethics risks in the industry, and share best practices.

Code of Conduct

Our **Code of Conduct** outlines our expectations for employee behavior, guaranteeing ethical and responsible conduct company-wide. This includes appropriate interactions with clients, suppliers, and third parties in general, as well as rules against any type of discrimination, and more. **All employees are required to accept our Code of Conduct** at the end of the recruitment and hiring process, as well as periodically during campaigns aimed at reinforcing the awareness of the Code and its principles. Our **Tenova Anti-Bribery Policy** outlines values, principles, and responsibilities that we adopt to fight corruption. We additionally comply with the OECD Anti-Bribery Convention, the UN Convention Against Corruption, the U.S. Foreign Corrupt Practices Act, the U.K. 2010 Bribery Act and Italian Legislative Decree 231/2001. According to **Tenova Transparency Guidelines**, employees and Board Members are also required to declare any conflicts of interest whenever they occur during their tenure. We have set a goal for 100% of employees to complete a conflict-of-interest declaration. In 2019 and 2020, we ensured that 99% of existing employees had completed one. Thereafter, new hires are required to complete one when they are onboarded. As it is an ongoing process, we estimate 95% or more of our employees have completed the declaration to date.

We also have a **whistleblowing procedure** open to all Tenova personnel and external parties. Reports can address issues of conduct relating to entities, employees, and external collaborators with which the company operates or maintains business relations.

The confidentiality and data protection rights of whistleblowers are guaranteed and good faith whistle-blowers are protected from retaliation. Information on how stakeholders can make a report are available on **Tenova's website** and through our intranet site.

With regards to the areas of Business ethics, anti-corruption and compliance, Tenova S.p.A. has issued a new edition of the mandatory e-learning course related to Italian Legislative Decree 231/2001, to all Tenova employees in Italy, starting from November 15th 2023. The course has been completed in December 2023 by 99% of the employees. Specific periodic monitoring actions are in place to reach a 100% completion rate.

Data Privacy and Security

Protecting the data of our employees, customers, and partners, and securing our infrastructure from cyberattacks is a top priority for Tenova. We adhere to the highest standards of **data privacy and security** in the countries where we operate, including GDPR.

Cybersecurity

We have several policies aimed at **mitigating cyber risk**, including a mobile device management policy, access control policy, and security incident procedure. We have a **Cybersecurity Roadmap** that outlines key safeguards we maintain and identifies potential threats as they arise. Risks we monitored closely in 2022 included data loss prevention, security information, and event management. We utilize tools such as AI and machine learning to help us continuously monitor for and identify potential security risks.

In 2023, no substantiated complaints concerning breaches of customer privacy and losses of customer data occurred at Tenova companies included within this report's scope.

3. Our Supply Chain

Tenova is a global company with a **global supply chain**. We operate and purchase inputs from around the world, respecting all legal regulations related to procurement in the countries we operate in and purchase from. We expect our supply chain partners to also adhere to all relevant regulations. We approach sourcing from two angles: **strategic sourcing** and **supply chain risk management**. Strategic sourcing prioritizes moving procurement closer to customers and creating longer term contracts for critical components that we purchase in high volumes. Supply chain risk management prioritizes diversifying supplies of key components, enhancing due diligence of existing suppliers, and taking more direct action related to transport and expediting. To address these risks, we prioritize suppliers that have achieved ISO certification which has strict rules related to health, safety, environmental compliance, and more.

In 2023, considering suppliers surveyed in 2022 and those who publish a Sustainability Report, 52% of the purchased volume was screened using ESG criteria. This sample is representative of all major procurement legal entities or areas, including Italy, Germany, the U.S., India, China, and South Africa.

This step was the first in our new Sustainable Supply Chain Roadmap to 2025. The ambition of the roadmap is for Tenova to annually determine actionable steps to enhance our supply chain with best practices regarding environmental, social and governance criteria.

Tenova Sustainable Supply Chain Roadmap to 2025

2022	2023	2024	2025
ACTIVITIES			
• Analysis of current Tenova Supply Chain (SC) versus ESG criteria • Fine- tuning of **SC Raodmap** • Design of **Supplier Questionnaire** • Tests with shortlisted suppliers to be ESG rated	• Drafting of Tenova **Sustainable SC Program** and Awareness Handout • **Performance Monitoring System**	• Publishing of Tenova **Sustainable SC Program** • Distribution of **SC ESG Awareness Handout** • **Supplier Qualification and Rating procedure** update • Training to shortlisted suppliers • Audit of shortlisted suppliers • Increase of rated, audited and trained suppliers • Data and Trend Analysis	• Tests on selected bids • Procedure for bid awarding also based on ESG Rating • Integration of **Supplier Portal: Qualification and Bidding Module** • Awarding of bids weighting **ESG Rating**
RESULTS			
• ESG Principles and Rating Definition	• Comprehensive portfolio of rated suppliers	• Non-Financial Reporting (NFR) • First Publishing of Sustainable Supply Chain Program	• Tenova Sustainable Supply Chain fully operational

4. Human Rights

Tenova pays particular attention to **respecting the culture of the people we work with**, both internally and externally. Our final goal is to create a working environment where equal opportunities, personal development and equal pay are offered regardless of location. We prohibit discrimination based on gender, religion, origin, nationality, age, sexual orientation, or disability. We also adhere to all human rights laws in the countries in which we operate.

Tenova allows collective bargaining and supports **workers' right to freedom of association**. For our unionized employees, we abide by rules set by the national collective labor agreements in the countries in which we operate, such as the defined notice period. We also condemn child and forced labor and avoid working with suppliers that do not strictly prohibit the use of child or forced labor.

Appendix

1. Material topic definitions

ENVIRONMENTAL TOPICS	
Energy Transition	Developing technologies that ultimately facilitate the low-carbon transition in the steel sector. For example, by developing technologies that run on clean energies, by designing technologies that can work now on current energy and will also be compatible with more sustainable energy sources in the future.
Energy Efficiency Technologies	Developing technologies that reduce the energy consumption in the processes - by maximizing the energy efficiency and/or recovery, compared to other existing technologies.
Environmental Impact of Products and Services	Promoting technologies that have the lowest possible environmental impact.
Circular Economy	Proposing technologies that ultimately promote circularity, that enable to recover residues and to produce new secondary raw material.
Climate Impact of Tenova's Operations	Assessing, managing, and reducing the overall impact of Tenova's own operations (fuel combustion of company's offices, workshops, vehicles etc., purchased electricity for own use etc. – the so-called Scope 1 and Scope 2) on climate change - calculate GHG emissions, diminish electricity consumption, maximize energy efficiency, rely on green energy, etc.
Waste Disposal and Recycling	Measuring and managing waste, handling waste responsibly, acknowledging and making efforts to minimize waste. Includes assessment of all recycling opportunities and actions to implement recycling everywhere possible.

SOCIAL TOPICS	
Health & Safety	Ensuring a healthy and safe workplace for all employees and for those who may be affected by the company's activities. Includes incidents' tracking systems, training, identification of risks rates of injury, health and safety education and processes. Improvement of health and safety as a company value.
Product Safety & Quality	Developing and offering technologies that are ultimately safe to operate and follow the highest possible quality standards.
Employee Well-Being	Ensuring a good working environment for Tenova's employees, including a comfortable workplace and a supportive company culture. Well-being relates to all aspects of working life.
Talent Attraction, Retention & Fostering Job Expertise	Attracting new talent, retain existing one and encourage the development of expertise. This can be achieved by a stimulating working environment, fair compensation, sufficient benefits etc.
Employee Benefits & Compensation	Ensuring fair and equitable treatment to all employees in terms of benefits such as health insurance, retirement provisions, and guaranteeing access to innovative ways of working when possible. Includes fair compensation.
Employee Training & Development	Offering programs for developing employee skills and assisting with employee transitions. Ensuring that employees receive regular performance and career development reviews.
Human Rights	Ensuring that human rights are respected in own operations and throughout the whole value chain. Taking corrective actions where signs of non-compliance are discovered.
Diversity, Inclusion, & Equal opportunity	Cultivating and supporting a diverse, inclusive and equitable company culture that fosters gender equality. Includes employee diversity, non-discrimination, equity in career opportunities, compensation and social inclusion efforts.

GOVERNANCE AND BUSINESS RESILIENCE TOPICS	
Business Ethics, Anti-Corruption & Compliance	Operating business in an ethical way in Tenova's own operations but also in relations to its partners and suppliers. Includes Tenova's compliance to environmental, financial, and social norms and regulations.
Sustainable Innovation and R&D	Integrating sustainability in innovation and R&D strategies and define specific KPIs to quantify the efforts to foster sustainable innovation.
Digital Transformation of Processes	Developing and nurturing employees' digital mind-set, foster digital transformation processes within the company and implement digital technologies and processes to optimize production and reduce health and safety risks.
Transparency & Reporting	Applying the best standards of transparency and accuracy in reporting activities. Foster a transparent company culture.
Responsible Procurement	Applying responsible procurement practices. Proceed to a sustainability screening of suppliers, looking at both environmental and social performance. Taking corrective action in response to negative social or environmental impacts in its supply chain.
C-level Accountability of ESG Issues	Taking accountability at C-level (first-line management) for the integration of the sustainability strategy. Having members of top management that are competent in sustainability. Linking their remuneration to the achievement of sustainability objectives.
Sustainable Behavior Promotion	Promoting sustainability and sustainable habits / practices to employees. Part of the compensation is linked to the sustainability performance of employees.
Advocate for Sustainability	Driving sustainable change on the demand side, and raise and influence partners' and clients' awareness and habits in terms of sustainability.

2. Stakeholder engagement

A constant and solid relationship with all our stakeholders is fundamental for us and for the creation of shared value. For this reason, we dialogue and collaborate with our stakeholders through several engagement activities. The following table shows a map of our engagement activities carried out in 2023.

OUR STAKEHOLDER ENGAGEMENT ACTIVITIES IN 2023	
Stakeholder	**Type of engagement**
Employees	
	• Internal Audit, for review of processes and procedures (including follow-up related to audit engagements) • Onboarding programs for new hires • Introduction to internal policies such as Code of Conduct and Waste collection for new hired • Career paths: Job Fairs, Online webinars, Assessments • Company intranet • Compliance training on specific procedures /processes /systems /tools • Regular Town Hall Meetings to communicate on company performance, general issues and an opportunity for a Q&A session • Well-being partnership (Humanitas Mater Domini Hospital) and initiatives for Tenova's employees' families i.e. Scholarships for Tenova employees' children (Italy), Christmas presents for employee children under age 12 (Italy) • 25th of November, Women in Steel Conference, Women's Leadership Course • AIST (Iron & Steel Technology) Foundation: a non-profit organization which represents a network of steel knowledge and expertise, constituted of 16,000 members from more than 70 countries • Employee Pulse Survey 2023 • Internal stakeholders-management-RLS • Tenova Leadership Lab and local hubs
Suppliers	
	• Daily business interactions • Co-operation to develop and improve the main technological equipment for digital texturing • Involved in the Supplier Questionnaire • Code of Conduct • Compliance due diligence on specific categories of suppliers • Seasonal and annual training • Ethics and Compliance page in the **Tenova website**; • Compliance due diligence on specific categories of suppliers • HSE qualification process includes the utilization of the SCRM portal for the upload and verification of qualification documents which are then validated trough a scoring system (from 1 to 6)

OUR STAKEHOLDER ENGAGEMENT ACTIVITIES IN 2023	
Stakeholder	**Type of engagement**
Customers	
	• Identification and development of joint projects • Participation in working groups • Project collaboration • Employee well-being and development partnerships • Papers and publication • Industrial briquetting process involving the installation of a pilot briquetting machine at the Castellanza Site
Peers	
	• MTI (Metals Technology Initiative)
Industry associations	
	• Active participation in roundtables discussion • Exchange best practices • Annual meetings • WEB conferences • Co-develop training/learning programs • Definition of initiatives or projects in collaboration • Involvement in Meeting organised by ABB for Energy Efficiency Symposium • Confindustria Varese and Assolombarda - in-depth discussion of specific topics • MS&T23 (Materials Science & Technology) in Columbus, Ohio
NGOs	
	• Open dialogue and specific initiatives with local relevant stakeholders
Academia	
	• Training programs • Osservatorio PoliMi • Job Fairs Webinars • Lectures • Innovation events • Company presentation at Universities and High schools • Trainee opportunities • AIST Steel Intern Scholarships (participating as evaluators)
Regulatory bodies/Government	
	• Open dialogue • Institutional meetings • Participation in projects of public utility

3. Our Sustainability Performance

WE TRANSFORM BUSINESS

GRI 306-3 Waste generated

	Unit of measure	2022	2023
Hazardous waste	**tons**	**62.5**	**118.7**
120109* - Emulsions and solutions for machinery, halogen-free (D15)	tons	35.3	64.2
120301* - Aqueous washing solutions (D15)	tons	12.3	47.3
120107* - Mineral oils for machines, halogen-free (R13)	tons	6.7	2.4
120118* - Metal muds (grinding, sharpening and lapping muds) containing oils (D15)	tons	7.9	1.8
180103* - Waste that must be collected and disposed of by applying special precautions to avoid infections (D15)	tons	0.0	0.0
080111* - Waste paints and varnishes, containing organic solvents or other dangerous substances	tons	0.2	0
200121* - Fluorescent tubes and other waste containing mercury (R13)	tons	0.1	0.1
Non-hazardous waste	**tons**	**179.2**	**197.5**
170405 - Iron and steel (R13)	tons	25.8	23.6
150103 - Wooden packaging (R13)	tons	41.2	59.3
120101 - Filings and shavings of ferrous materials (R13)	tons	63.1	47.6
200304 - Sludge from septic tanks (D08)	tons	0.0	0.0
150106 - Packaging in mixed materials (R13)	tons	37.4	37.4
150101 - Paper and cardboard packaging (R13)	tons	10.8	12.0
150203 - Absorbents, filter materials, wiping cloths and protective clothing, other than those mentioned in heading 150202 (R13)	tons	0.2	0.1
170411 - Cables, other than those mentioned in item 170410 (R13)	tons	0.0	2.4
120121 - Spent tool bodies and grinding materials, other than those mentioned in item 120120 (R13)	tons	0.0	0.2
160214 - Disused equipment, other than those referred to in items from 160209 to 160213	tons	0.1	0.6
200307 - Bulky waste	tons	0.2	0
160604 - Alkaline batteries (except 160603)	tons	0.0	0.1
Total weight of waste generated	**tons**	**241.7**	**316.2**

Source of conversions and emission factors used

Conversion factors	UK Government GHG Conversion Factors for Company Reporting (DEFRA), Conversion Factors 2023
Emission factors – Scope 1	Ecoinvent attributional, version 3.6
Emission factors – Scope 2 Location based	Ecoinvent 3.8 market for electricity, low voltage, IT, scope 2
Emission factors – Scope 2 Market based	Association of Issuing Bodies (AIB), European Residual Mixes 2022

WE BUILD TRUST

Employee composition[1]

GRI 2-7 Employees

Employees (HC) by employment contract and by gender	As of 31st December 2022	As of 31st December 2023
Total number of employees	**1,386**	**1,534**
of which female	253	282
of which male	1,133	1,252
Total number of permanent employees	**1,324**	**1,466**
of which female	239	265
of which male	1,085	1,201
Total number of temporary employees	**62**	**68**
of which female	14	17
of which male	48	51
Total number of full-time employees	**1,365**	**1,496**
of which female	240	262
of which male	1,125	1,234
Total number of part-time employees	**21**	**38**
of which female	13	20
of which male	8	18
Employees (HC) by employment contract and by region	**As of 31st December 2022**	**As of 31st December 2023**
Total number of employees	**1,386**	**1,534**
Africa	57	63

1 Non-guarantee employee hours are not tracked in Tenova as of today. Part-time and full-time employees are tracked only in Tenova S.p.A. (Italian perimeter).

Employees (HC) by employment contract and by region	As of 31st December 2022	As of 31st December 2023
Americas	238	293
China	121	135
Europe & CIS	790	841
Middle, Far East & Oceania	180	202
Total number of permanent employees	**1,324**	**1,466**
Africa	57	63
Americas	237	292
China	85	93
Europe & CIS	766	817
Middle, Far East & Oceania	179	201
Total number of temporary employees	**62**	**68**
Africa	-	-
Americas	1	1
China	36	42
Europe & CIS	24	24
Middle, Far East & Oceania	1	1
Total number of full-time employees	**1,365**	**1,496**
Africa	57	63
Americas	238	292
China	121	135
Europe & CIS	769	805
Middle, Far East & Oceania	180	201
Total number of part-time employees	**21**	**38**
Africa	-	-
Americas	-	1
China	**-**	**-**
Europe & CIS	21	36
Middle, Far East & Oceania	-	1

Diversity and Equal Opportunity

GRI 405-1 Diversity of governance bodies and employees

Employees (HC) by employee category and gender	As of 31st December 2022		As of 31st December 2023	
	Number	Percentage	Number	Percentage
Executives	**17**	**100%**	**17**	**100%**
of which female	1	6%	1	6%
of which male	16	94%	16	94%
Managers	**122**	**100%**	**125**	**100%**
of which female	12	10%	14	11%
of which male	110	90%	111	89%
Middle managers	**221**	**100%**	**235**	**100%**
of which female	25	11%	30	13%
of which male	196	89%	205	87%
White collars	**920**	**100%**	**1,042**	**100%**
of which female	215	23%	236	23%
of which male	705	77%	806	77%
Blue collars	**106**	**100%**	**115**	**100%**
of which female	-	0%	1	1%
of which male	106	100%	114	99%

Employees (HC) by employee category and age range	As of 31st December 2022		As of 31st December 2023	
	Number	Percentage	Number	Percentage
Executives	**17**	**100%**	**17**	**100%**
under 30 years old	-	0%	-	0%
30-50 years old	4	24%	2	12%
over 50 years old	13	76%	15	88%
Managers	**122**	**100%**	**125**	**100%**
under 30 years old	-	0%	-	0%
30-50 years old	46	38%	46	37%
over 50 years old	76	62%	79	63%
Middle managers	**221**	**100%**	**235**	**100%**
under 30 years old	-	0%	-	0%
30-50 years old	116	52%	127	54%
over 50 years old	105	48%	108	46%
White collars	**920**	**100%**	**1,042**	**100%**
under 30 years old	120	13%	172	17%
30-50 years old	523	57%	568	55%
over 50 years old	277	30%	302	29%
Blue collars	**106**	**100%**	**115**	**100%**
under 30 years old	16	15%	18	16%
30-50 years old	56	53%	63	55%
over 50 years old	34	32%	34	30%

Employees (HC) by age range	As of 31st December 2022		As of 31st December 2023	
	Number	Percentage	Number	Percentage
	1,386	**100%**	**1,534**	**100%**
under 30 years old	136	10%	190	12%
30-50 years old	745	54%	806	53%
over 50 years old	505	36%	538	35%

New employee hires

GRI 401-1 New employee hires and employee turnover

New employee hires by gender, age group and region	2022		2023	
	Number	Rate	Number	Rate
By gender	**188**	**14%**	**260**	**17%**
of which female	28	11%	45	16%
of which male	160	14%	215	17%
By age group	**188**	**14%**	**260**	**17%**
under 30 years old	78	57%	104	55%
30-50 years old	92	12%	118	15%
over 50 years old	18	4%	38	7%
By region	**188**	**14%**	**260**	**17%**
Africa	12	21%	8	13%
Americas	50	21%	93	32%
China	9	7%	23	17%
Europe & CIS	91	12%	103	12%
Middle, Far East & Oceania	26	14%	33	16%

Turnover

GRI 401-1 New employee hires and employee turnover

Employee turnover by gender, age group and region	2022		2023	
	Number	Rate	Number	Rate
By gender	**114**	**8%**	**112**	**7%**
of which female	23	9%	16	6%
of which male	91	8%	96	8%
By age group	**114**	**8%**	**112**	**7%**
under 30 years old	16	12%	19	10%
30-50 years old	45	6%	45	6%
over 50 years old	53	10%	48	9%
By region	**114**	**8%**	**112**	**7%**
Africa	6	11%	2	3%
Americas	29	12%	38	13%
China	6	5%	9	7%
Europe & CIS	63	8%	52	6%
Middle, Far East & Oceania	10	6%	11	5%

Training and Education

GRI 404-1 Average hours of training per year per employee

Training hours provided to employees, by gender and employee category	2022		2023	
	Total hours	Average hours	Total hours	Average hours
Executives	**355**	**21**	**163**	**10**
of which female	66	66	57	57
of which male	289	18	106	7
Managers	**1,278**	**10**	**1,604**	**13**
of which female	56	5	261	19
of which male	1,222	11	1,343	12

Middle managers	**2,491**	**11**	**3,810**	**16**
Training hours provided to employees, by gender and employee category	**2022**		**2023**	
	Total hours	**Average hours**	**Total hours**	**Average hours**
of which female	226	9	713	24
of which male	2,265	12	3,097	15
White collars	**9,637**	**10**	**16,442**	**16**
of which female	1,808	8	3,659	16
of which male	7,829	11	12,783	16
Blue collars	**901**	**9**	**1,246**	**11**
of which female	-	-	54	54
of which male	901	9	1,192	10

GRI 404-3 Percentage of employees receiving regular performance and career development reviews

Employees who received a regular performance and career development review, by gender and employee category	**2022**		**2023**	
	Number	**Percentage**	**Number**	**Percentage**
Executives	**16**	**94%**	**15**	**88%**
of which female	1	100%	1	100%
of which male	15	94%	14	88%
Managers	**112**	**92%**	**118**	**94%**
of which female	12	100%	14	100%
of which male	100	91%	104	94%
Middle managers	198	90%	213	91%
of which female	23	92%	29	97%
of which male	175	89%	184	90%
White collars	**646**	**70%**	**745**	**71%**
of which female	166	77%	171	72%
of which male	480	68%	574	71%
Blue collars	**69**	**65%**	**71**	**62%**
of which female	-	0%	-	0%
of which male	69	65%	71	62%

Collective bargaining agreements[1]

GRI 2-30 Collective bargaining agreements

Employees (HC) covered by collective bargaining agreements	As of 31st December 2022	As of 31st December 2023
Percentage of total employees covered by collective bargaining agreements	**46%**	**44%**
Number of employees covered by collective bargaining agreements	635	680
Total number of employees	**1,386**	**1,534**

1 Collective bargaining agreements are in place only in Italy (CCNL Metalmeccanico) and in Germany (Work Council). For employees not covered by collective bargaining agreements, Tenova determines their working conditions and terms of employment following local labor laws.

TRANSPARENCY

GRI 205-2 Communication and training about anti-corruption policies and procedures[2]

Governance body members (Board of Directors) that the organization's anti-corruption policies and procedures have been communicated to	2022	2023
Number of governance body members that the organization's anticorruption policies and procedures have been communicated to	**5**	**5**
Number of governance body members	5	5
Percentage of governance body members that the organization's anticorruption policies and procedures have been communicated to	100%	100%

2 Activities managed or sponsored by HQ are included; local initiatives shared only where deemed necessary or appropriate by subsidiaries.

Governance body members (Board of Directors) that have received training on anti-corruption	2022	2023
Number of governance body members that have received training on anti-corruption	**1**	**2**
Total number of governance body members	5	5
Percentage of governance body members that have received training on anti-corruption	20%	40%

During 2023 a full renewal of the online course on the Italian Legislative Decree 231/2001 and the Internal Control Model of Tenova S.p.A. has been implemented; all italian employees have been involved, including Tenova CEO and CHRO (both members of the BoD).
The renewal of the Compliance Training Program will continue in 2024 in the remaining subsidiaries.

GRI 308-1 New suppliers that were screened using environmental criteria
GRI 414-1 New suppliers that were screened using social criteria

New suppliers that were screened using environmental and social criteria	2022	2023
Number of new suppliers that were screened using environmental and social criteria	**120**	**0**
Number of new suppliers	2,861	3,042
% of new suppliers that were screened using environmental and social criteria	4%	0%

Purchasing volumes from supplier screened using environmental and social criteria	2022	2023
Purchasing volumes from supplier screened using environmental and social criteria [in Euros]	**139,000,000**	**76,369,820**
Purchasing volumes [in Euros]	270,000,000	516,998,120
Percentage of purchasing volumes from supplier screened using environmental and social criteria	51%	15%

In 2023 more focus has been devoted to fine tune the questionnaire before the full scale roll-out. The % of purchased volume decreased because no new suppliers have been enquired in 2023 (in 2022 we selected the ones with highest volumes).

4. GRI Content Index

Tenova S.p.A. and its fully consolidated subsidiaries operating within the framework of the Tenova metals business has reported the information cited in this GRI content index for the period 1st January 2022 - 31st December 2023 with reference to the GRI Standards.
The scope of this report does not include TAKRAF and DELKOR companies operating in the mining business. For more detailed information please refer to the "About this Report".

GRI STANDARDS	DISCLOSURE	LOCATION
General disclosures		
GRI 2: General Disclosures 2021	2-1 Organizational details	Pg. 5-11
	2-2 Entities included in the organization's sustainability reporting	Pg. 5 The fully consolidated subsidiaries operating within the framework of the Tenova metals business, as of 31st December 2023, are the following: Tenova S.p.A., Tenova Industrial Technologies (Beijing) Co. Ltd., Tenova Goodfellow Inc., Hyl Hyl Technologies, SA de CV, Loi - Poland Spolka Z.O.O., Tenova Technologies (Tianjin) Co. Ltd., Tenova East Europe L.L.C., MVC (Metallurgical V.C.) S.A., Tenova Inc., Tenova Advanced Technologies Ltd, Tenova South Africa Pty Ltd, Tenova Technologies Pvt Ltd., Loi Thermprocess Gmbh, CFS Holding Corp.
	2-3 Reporting period, frequency and contact point	Pg. 5. This report was published in June 2024.
	2-4 Restatements of information	In this Sustainability Report no restatements of information from previous reporting period were made.
	2-5 External assurance	This Sustainability Report has not been externally assured.
	2-6 Activities, value chain and other business relationships	Pg. 7-11; 61
	2-7 Employees	Pg. 49; 53; 69-70
	2-9 Governance structure and composition	Pg. 57-58
	2-13 Delegation of responsibility for managing impacts	Pg. 57
	2-22 Statement on sustainable development strategy	Pg. 3
	2-27 Compliance with laws and regulations	During 2022 and 2023 there were no significant instances of non-compliance with laws and regulation nor related fines.[1]
	2-28 Membership associations	Pg. 16
	2-29 Approach to stakeholder engagement	Pg. 16; 66-67
	2-30 Collective bargaining agreements	Pg. 62; 76

1 Data are referred to the areas of responsibility of Tenova Compliance Committee (as defined in Tenova Compliance Committee Regulation) and the Compliance Department and, in some cases, are limited to Tenova S.p.A.

Material topics		
GRI 3: Material Topics 2021	3-1 Process to determine material topics	Pg. 13; 16
	3-2 List of material topics	Pg. 13; 64-65
Climate Impact of Tenova's Operations		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 36-37; 40; 43 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirement f.
GRI 302: Energy 2016	302-1 Energy consumption within the organization	Pg. 38; 69
GRI 305: Emissions 2016	305-1 Direct (Scope 1) GHG emissions	Pg. 38; 69
	305-2 Energy indirect (Scope 2) GHG emissions	Pg. 38; 69
	305-7 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	Pg. 39
GRI 303: Water and Effluents 2018	303-1 Interactions with water as a shared resource	Pg. 43
	303-3 Water withdrawal	Pg. 43
	303-4 Water discharge	Pg. 43
	303-5 Water consumption	Pg. 43
Waste Disposal and Recycling		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 40 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirement f.
GRI 306: Waste 2020	306-1 Waste generation and significant waste-related impacts	Pg. 40
	306-2 Management of significant waste-related impacts	Pg. 40
	306-3 Waste generated	Pg. 41; 68-69
	306-4 Waste diverted from disposal	Pg. 41
	306-5 Waste directed to disposal	Pg. 41
Health & Safety		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 44-46
GRI 403: Occupational Health and Safety 2018	403-1 Occupational health and safety management system	Pg. 45
	403-2 Hazard identification, risk assessment, and incident investigation	Pg. 45
	403-3 Occupational health services	Pg. 45
	403-4 Worker participation, consultation, and communication on occupational health and safety	Pg. 45-46 A formal joint management-worker health and safety committee is not present.
	403-5 Worker training on occupational health and safety	Pg. 45-46
	403-9 Work-related injuries	Pg. 47

Product Safety & Quality		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 54-55 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirements e and f.
GRI 416: Customer Health and Safety 2016	416-2 Incidents of non-compliance concerning the health and safety impacts of products and services	Pg. 54-55 During 2022 and 2023 there were no incidents of non-compliance with regulations and/or voluntary codes concerning the health and safety impacts of products and services. [1]
Employees Well-Being		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 51-52 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirements e and f.
Talent Attraction, Retention & Fostering Job Expertise		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 49-50 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirements b and f.
GRI 401: Employment 2016	401-1 New employee hires and employee turnover	Pg. 73-74
GRI 404: Training and Education 2016	404-3 Percentage of employees receiving regular performance and career development reviews	Pg. 75
Employee Benefits & Compensation		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 51 The information reported is compliant with requirements a, c, d of disclosure 3-3 from GRI 3: Material Topics 2021.
Employee Training & Development		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 49-50 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirements b and f.
GRI 401: Employment 2016	404-1 Average hours of training per year per employee	Pg. 74-75
Human Rights		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 62 The information reported is compliant with requirements a, c of disclosure 3-3 from GRI 3: Material Topics 2021.
GRI 406: Non-discrimination 2016	406-1 Incidents of discrimination and corrective actions taken	Pg. 62 In 2022 and 2023, there were no substantiated incidents of discrimination. Tenova is deeply committed to fostering a work environment that guarantees equal opportunities, personal development, and equitable pay, irrespective of gender, religion, origin, nationality, age, sexual orientation, or disability. Should any incidents arise in the future, both the HR Team and the Executive Team will respond swiftly and take necessary actions to address the situation.

Diversity, Inclusion and Equal Opportunity		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 53 The information reported is compliant with requirements a, c, d of disclosure 3-3 from GRI 3: Material Topics 2021.
GRI 405: Diversity and Equal Opportunity 2016	405-1 Diversity of governance bodies and employees	Pg. 53; 58; 71-73
Business Ethics, Anti Corruption & Compliance		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 59 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirement f.
GRI 205: Anti-corruption 2016	205-2 Communication and training about anti-corruption policies and procedures	Pg. 76-78 The information reported is compliant with requirements a, b, d, e of disclosure 205-2 from GRI 205: Anti-corruption 2021.
	205-3 Confirmed incidents of corruption and actions taken	Pg. 59-60 During 2022 and 2023 there were no confirmed incidents of corruption.[1]
GRI 206: Anti-competitive Behavior 2016	206-1 Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	Pg. 59-60 During 2022 and 2023 there were no legal actions pending or completed regarding anti-competitive behavior and violations of anti-trust and monopoly legislation in which the organization has been identified as a participant.[1]
GRI 418: Customer Privacy 2016	418-1 Substantiated complaints concerning breaches of customer privacy and losses of customer data	Pg. 60 During 2022 and 2023 there were no substantiated complaints received concerning breaches of customer privacy nor identified leaks, thefts, or losses of customer data.[1]
Sustainable Innovation and R&D		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 28-31
Digital Transformation of Processes		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 33-34 The information reported is compliant with requirements a, c, d of disclosure 3-3 from GRI 3: Material Topics 2021.
Transparency & Reporting		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 56-57; 59 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirements e and f.

1 Corporate Legal Dept. receives information flows about incidents/claims only when specific conditions are met. Incidents that do not fall under the indicated conditions are managed directly by the involved legal entity or function/department and, in any case according to the power of attorneys and the relevant approval and information flows.

Responsible Procurement		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 61-62 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirements b and e.
GRI 308: Supplier Environmental Assessment 2016	308-1 New suppliers that were screened using environmental criteria	Pg. 77
GRI 414: Supplier Social Assessment 2016	414-1 New suppliers that were screened using social criteria	Pg. 77
C-level Accountability of ESG Issues		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 18-22 The information reported is compliant with requirements a, c, d of disclosure 3-3 from GRI 3: Material Topics 2021.
Energy transition		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 18-22
Energy efficiency technologies		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 23-24 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirement f.
Environmental Impact of Products and Services		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 17; 27 The information reported is compliant with requirements a, c, d of disclosure 3-3 from GRI 3: Material Topics 2021.
Circular economy		
GRI 3: Material Topics 2021	3-3 Management of material topics	Pg. 14-15; 25-26 The information reported is compliant with disclosure 3-3 from GRI 3: Material Topics 2021, except for requirement b and f.

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