

**VTT**

Annual and sustainability report 2022

# Making a sustainable impact



**beyond the obvious**



# VTT in brief

VTT is a visionary research, development and innovation partner and one of Europe’s leading research institutes. We bring together people, business, science and technology to solve global challenges. On this basis, we create sustainable growth, jobs and wellbeing and ultimately bring exponential hope to the world. We promote the use and commercialisation of research and technology in business and in society at large. We have 80 years of experience in cutting-edge research and science-based results. Carbon neutral solutions, sustainable products and materials and digital technologies are at the core of our activities. Finland’s national metrology institute and national standards laboratory MIKES is also part of VTT.

[Read more about VTT](#)

## Contents

<b>The year 2022</b>	<b>3</b>
Greetings from the Chair of the Board	4
Greetings from the President & CEO	5
VTT 2022 in figures	6
Success stories in 2022	7
Financial statements	8
<b>Strategy and impact</b>	<b>9</b>
Social impact	10
The seven challenges we focus on to create sustainable growth	13
Year of customer relationships	21
IPR	23
Cooperation and network activities	24
<b>Sustainability</b>	<b>26</b>
Sustainability at VTT	27
2,000+ top professionals	31
Stakeholder engagement	34
VTT and the environment	35
GRI index	37



**For VTT**, the year 2022 was a successful and highly work-filled year despite the global turmoil – or partly because of that.  
[Read more on page 5](#)



**In line with our strategy**, we engage in research with impact and far-reaching technological solutions.  
[Read more on page 10](#)



**VTT is an internationally** known and recognised research institute. Network expertise lies at the core of our activities.  
[Read more on page 24](#)



**Sustainability** perspectives are included in all stages of our work.  
[Read more on page 27](#)



# The year 2022

2022 was a year of numerous success stories for VTT. Our long-term work produced visible results. The number of customer projects increased, as did the average size of projects. Science and research are seen as a source of solutions to major global challenges.



## VTT is moving forward with good resources in a changing world

In 2022, VTT made records in research funding acquired and customer sales — so there is demand for what VTT has to offer. VTT is well positioned for a fast-changing future world with an increasing need for research to keep companies and societies going.

The year 2022 changed the world, possibly permanently. This is why companies and society also need more partners like VTT, who study and develop future solutions and help anticipate changes.

VTT has excellent capabilities for continuing its impactful work: its offering is increasingly needed by society and companies. In 2022, VTT's research sales grew to a higher level than ever before. VTT also succeeded well in acquiring external research funding.

### VTT's value for society increases

Good results are important not only for the implementation of projects but also for VTT's future. We want to create more projects with even higher impact than before through which VTT's value for companies and society at large is as high as possible.

During the year, we defined five new self-funded [research investments](#) for the next three years, which we announced in January 2023. They promote the green transition, resource wisdom and security of supply, and accelerate the renewal and competitiveness of companies.

The Russian war of aggression in Ukraine highlighted the importance of security policy and related research. The energy crisis will accelerate the green transition. VTT has a lot to offer when it comes to the world's energy challenges, including the already implemented development of small modular reactors for district heating.

### Credibility and reliability of critical importance

VTT received positive visibility in 2022, and its credibility and reliability in public debate and funding negotiations is very good.

This facilitates access to national and international tables where decisions are made, and VTT succeeded well in this respect. I believe that positive visibility will also affect the volume of re-search orders.

The ESG reporting obligation applies to VTT from the beginning of 2025, and VTT began preparing for the new legislation. The required indicators were already set for 2023, which ensures smooth reporting in due course.

COVID-19 confined most office workers to their homes in early 2022. Now that the situation allows working on site again, it is possible to increase the number of innovations. Creating something new requires encounters and collaboration. It is therefore important to bring the experts together, also physically. Workspaces must be inviting and safe so that people enjoy working in them.

According to the latest public image survey, VTT enjoys a high attractiveness rating as an employer and has one of the highest reputation ratings among public sector organisations. VTT's experts want to generate extensive impact, and our achievements are reflected in the success stories of VTT spin-offs and customer companies. VTT has excellent resources to continue generating success and sustainable, research-based business that meets the changing needs of society.

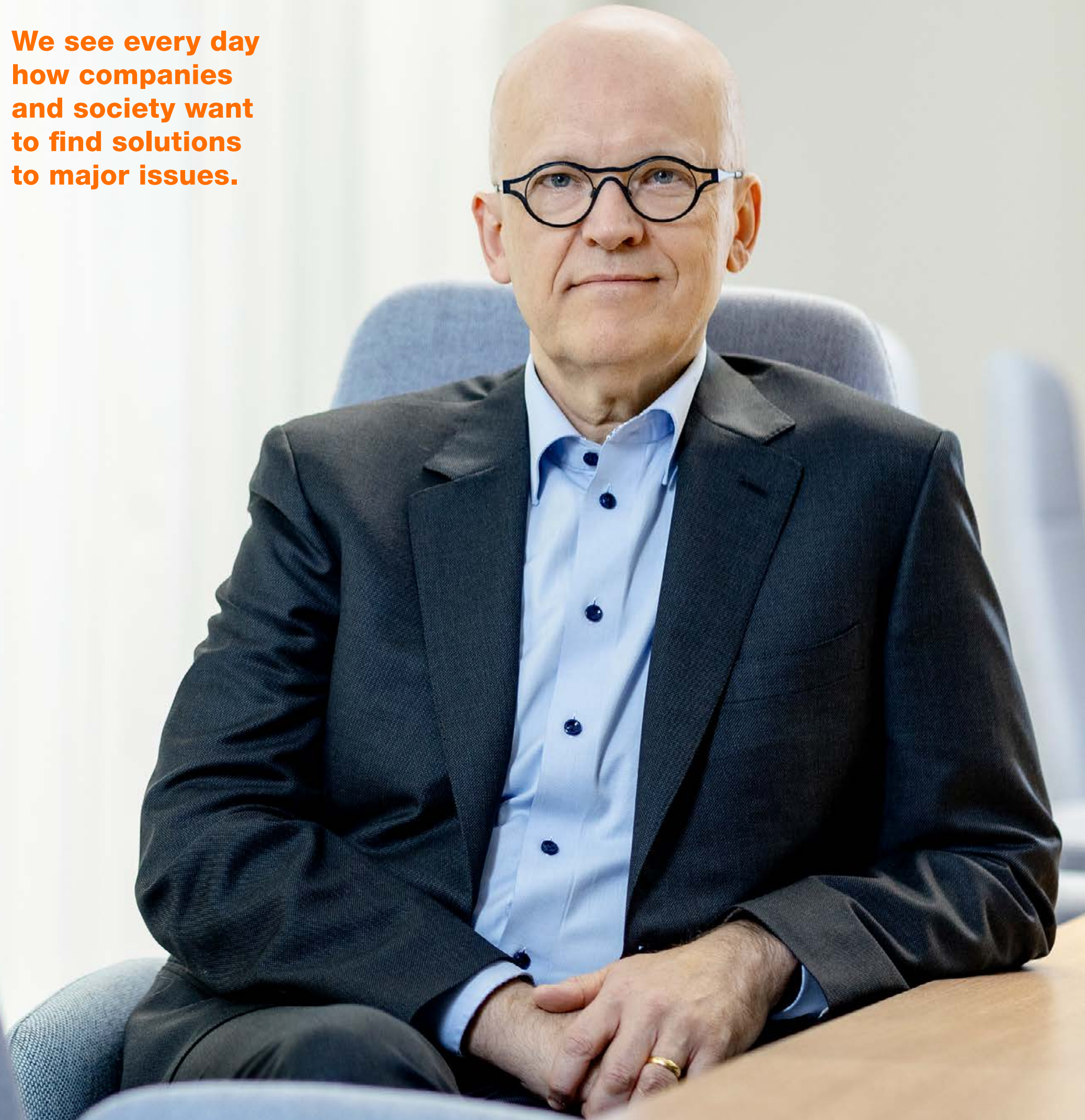
Chair of the Board  
**Pekka Tiitinen**



**VTT wants to generate more projects with even higher impact than before.**



**We see every day how companies and society want to find solutions to major issues.**



## Crises verify the importance of science

VTT's research results are reflected in concrete solutions that promote sustainable development and the green transition. During times of crises, the importance of science and research becomes evident as they create real solutions and instil hope.

The events of 2022 made us all stop and think about the most fundamental issues in life. Crises have very concretely highlighted the significance of research and innovation for society. Science and research are seen as a source of solutions to major challenges, such as climate change, sufficiency of materials and security of supply.

The operating environment changed rapidly during the year. The expected post-pandemic economic growth dwindled due to Russia's war of aggression, the energy crisis and inflation. Another matter that defined the year was the concern over the social situation, especially in Ukraine. However, it is illustrative of Finland's resilience that, despite everything, we have done well. Alongside the green transition, enhanced resilience and security of supply are areas where our customers want to develop. With our strategy work at VTT, we have ensured that our offering meets these needs. We steer our research activities in a challenge-driven and long-term manner to generate concrete solutions and hope.

During the year, we enhanced our expertise and developed new business models with our customers. The sales of customer assignments grew by 14%, and the average size of projects also increased. Our corporate responsibility made good strides in 2022 in areas such as clarifying our common mindset and objectives. Financially, the year was even better than expected.

VTT achieved many successes in 2022, resulting from our long-term efforts. The Carbonaide method for manufac-

turing [carbon-negative concrete](#) won the first prize in the innovation competition of the European Association of Research and Technology Organisations (EARTO). [Olefy technology](#) will revolutionise the world's circular plastic recycling. The application of [VTT's ProperTune](#) Integrated Computational Materials Engineering (ICME) toolbox is expanding to soft materials.

The challenge VTT had to face during the year was quite mundane; a great interest in research and its achievements generated a lot of work. However, VTTers feel that the work they are doing is meaningful. We see every day how companies and society want to find solutions to major issues. Meaningful work and expertise increase hope.

We mostly celebrated our 80th anniversary by working. However, in May we did have a party to celebrate our anniversary, which brought VTTers together after a long time. I prefer to look forward rather than back, but we will keep on approaching matters in the same way we have done in the past. We will engage in things to improve the future. In 2023, we will continue to focus on this core task. We will ensure that our strategy guides our everyday work in a deeper way than before. We will make sure that VTTers have opportunities to learn and develop.

Actions create hope. At VTT, we know that every day we can do work that helps solve crises today and tomorrow.

**Antti Vasara**  
President & CEO



## VTT 2022 in figures

VTT's impact is based on science, world-class expertise and collaboration. It is created when customers and society adopt the solutions we have developed together.

**Our more than 2,000 top experts are the cornerstone of our success.**

Companies and society are facing a new technological transformation, which we at VTT call the deep tech transformation. It is based on scientific breakthroughs and driven by companies making use of them.

The transformation offers new business opportunities in almost every sector. We want to be there to support our customers in seizing these opportunities.

The continued demand for our services shows that there is a need for VTT's expertise. Customer appreciation is reflected in both customer feedback and sales development.

Our more than 2,000 top experts are highly educated and internationally networked. Their expertise and wellbeing are the cornerstones of VTT's success. In 2022, our high-standard scientific publication activity increased with half of the publications written in collaboration with international experts and one fifth with companies. Innovations and their commercialisation require extensive collaboration.

The adjacent figures describe 2022 for VTT and our ability to create an impact on the world, transforming at an accelerating speed in a sustainable manner.

Operating income,  
EUR million

**261**

Number of employees

**2,213**

Doctors and licentiates

**701**

Scientific articles

**584**

Patent families

**~400**

Invention disclosures

**181**

The figures are for the entire VTT Group.

## Success stories in 2022

### Impactful management with the VTT model

Managing cities by relying on budget considerations only does not produce the best results. For this reason, VTT and the City of Espoo have developed a model in which management is based not only on financial figures but also on more versatile data that supports sustainable renewal.

“Companies, research actors and citizens in the region must be taken into account and the value of the decisions must be examined from their perspective”, **Kirsi Hyytinen**, Research Team Leader, underscores.

The project has already created impact maps and indicators aimed at developing a socially, culturally, economically and ecologically sustainable future.



### International experts praise VTT's work atmosphere

According to the International Talent survey of Universum and the City of Espoo, VTT ranked among the top companies in Finland in terms of an equal and diverse working atmosphere and recruitment process. The survey was responded by a total of 466 highly educated international experts.



“We want to foster the diversity and wellbeing of our employees. There are over 50 different nationalities represented among VTTers, and it is important for us that people can join us from different backgrounds”, says **Iris Lagerström**, Head of Talent Attraction and HR Digital Services at VTT.

### VTT sleep sensor won several awards

VTT's customer in the United States, Sleep.Me Inc., was awarded the CES Innovation Award in Las Vegas. The company's mattresses feature sleep sensor technology developed by VTT, which also won VTT's own Customer Excellence Award.

The diagnostically accurate sensors make it possible, for example, to identify sleep apnoea and monitor treatment at home. It can be used to prevent long-term illnesses without a significant need to increase health care resources.

The development team members at VTT are **Kari Kohtamäki** and **Juha M. Kortelainen**.

“This is a great acknowledgement for successful long-term cooperation done between research and customer solutions in health applications”, says Juha M. Kortelainen.



### Zero-emission concrete production method was awarded

Carbonaide, a manufacturing method for concrete developed by VTT, won the European Association of Research and Technology Organisations (EARTO) competition in the Impact Expected category. Carbonaide can reduce the climate load of a sector with traditionally very high emissions, as using the method renders the calculated carbon footprint of concrete thus produced negative.

“-60 kg of CO<sub>2</sub> per cubic metre of concrete. The carbon footprint of conventional concrete is approximately 250–300 kg of CO<sub>2</sub> per cubic metre”, Senior Scientist **Tapio Vehmas** says. Commercialisation of the method has already been investigated with the help of Business Finland, and it has been found to be feasible and profitable for all parties.

### Eggs without chickens are commercialised for food production

Egg white protein is one of the most used animal proteins in the world. VTT spin-off Onego Bio is commercialising the method developed at VTT, enabling the main egg white protein, ovalbumin, to be produced without production animals. Boosted by the seed funding of EUR 10 million raised by the company, Onego is now developing solutions to the challenges of global food production.

Unlike chickens, microbes can be fed with, for example, by-products from the forestry industry. Eggs without chickens are directed at the food industry where there is an enormous demand for egg white protein.

“We want to produce food or food ingredients more sustainably. It is wonderful to have the opportunity to try out these slightly crazier ideas here”, says Research Manager **Emilia Nordlund**.





# Financial statements

VTT Technical Research Center of Finland Ltd is a Finnish non-profit limited liability company owned by the state. The company falls within the mandate of the Ministry of Economic Affairs and Employment of Finland. According to the law VTT is an independent and impartial research organisation. VTT operates as a research, development and innovation partner to help the society and companies to grow through technological innovations.

VTT's reputation has developed positively during the financial year and the demand for customer projects grew despite the corona pandemic and the war in Ukraine. In 2022, the parent company's net turnover increased in all sectors. The domestic public and private sectors grew the most. However, the economic uncertainty is reflected in the cooperation with the companies. Finding new sales cases is more challenging and customer decision-making is slowing down due to the uncertainty caused by the weakening of the global economic growth. In addition, the global component shortage delays investments and high inflation increases costs.

VTT is building Finland's first quantum computer, for which VTT was granted a 20.7 M€ special government grant (investment grant) for years 2020–2024. The phase one 5-qubit quantum computer (HELMI) was fully operational and handed over to VTT in February 2022. HELMI is connected with the pan-European supercomputer LUMI, hosted by CSC. This is the first time in Europe that this kind of combination is opened for researchers. During 2022, the next phase, construction of a 20-qubit quantum computer, has started.

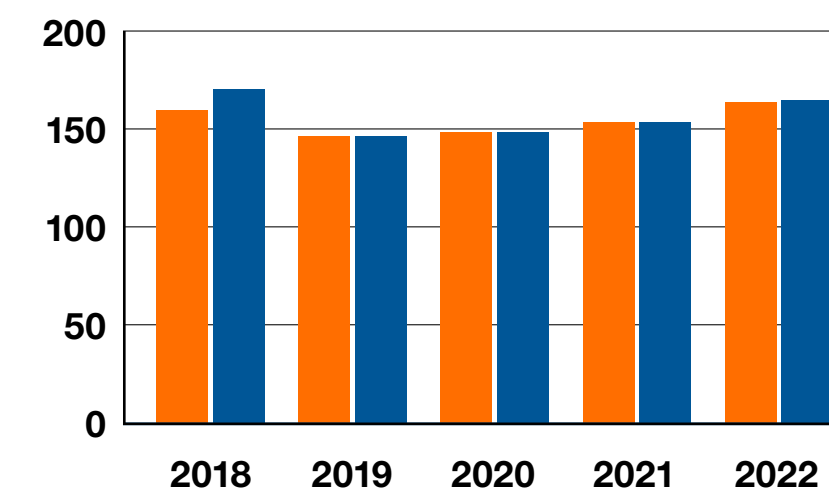
## Key financial figures

VTT Technical Research Center of Finland Ltd						
	VTT Group			Parent company		
	2022	2021	2020	2022	2021	2020
Net turnover (1,000 euros)	164,852	154,229	149,403	164,417	153,716	148,863
Other operating income (1,000 euros)	95,707	99,437	94,586	99,058	101,270	95,506
Government grant	83,841	83,579	84,425	83,841	83,579	84,425
Government special grant	1,327	1,493	2,133	1,327	1,493	2,133
Other	10,538	14,366	8,028	13,890	16,198	8,947
Operating result before special items* (1,000 euros) (operative, unaudited)	2,285*	7,257*	8,585*	6,484*	9,788*	10,492*
Operating result (1,000 euros)	4,856	13,966	11,351	9,056	16,498	13,259
Operating result (%)	2.9	9.1	7.6	5.5	10.7	8.9
Result of the financial year (1,000 euros)	4,396	12,071	9,578	3,664	11,590	11,475
Return on equity (%)	2.5	7.2	6.1	3.4	8.6	7.3
Equity ratio (%)	70.2	69.5	69.5	68.1	68.5	69.3

VTT Technical Research Centre of Finland Ltd's net turnover consisted of 58% public sector revenue (Group 58%) and of 42% private sector revenue (Group 42%). The domestic revenue accounted for 57% (Group 57%) and foreign revenue for 43% (Group 43%) of the net turnover.

\*Comparable operating result before special items does not include the government special grants for the decommissioning of FIR1 research reactor and restoration old hotcell facilities (2022: 0.5 M€, 2021: 0.5 M€, 2020: 2.1 M€), the partial derecognition of provisions for the restoration of old hotcell facilities and the Jules Horowitz reactor project included in Other operating income in 2022 (2.5 M€), nor the additional provision made for the decommissioning of FIR1 research reactor (-0.4 M€). Other operating income in 2021 included revenue from the derecognition of debt due to the reduction of the nuclear waste management liability (7.6 M€).

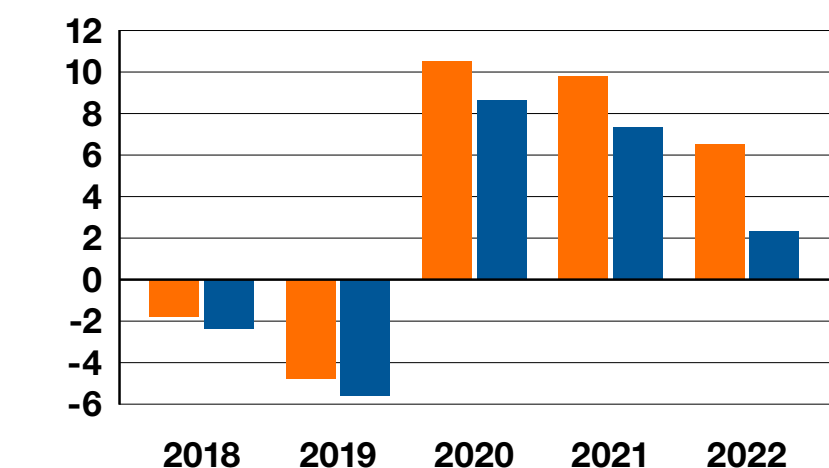
## Net turnover M€



The parent company's **net turnover increased 7%** during the financial year especially due to higher income in the domestic private and public sectors.

Parent company VTT Group

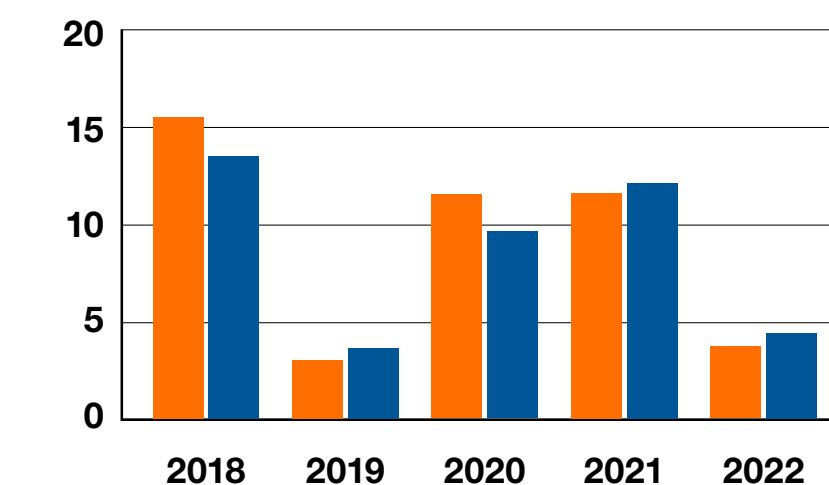
## Comparable operating result M€



The comparable (adjusted) operating result\* of the parent company and the Group **were positive**.

Parent company VTT Group

## Result of the financial year M€



The parent company's and the Group's **result of the financial year were positive**.

Parent company VTT Group



# Strategy and impact

The core of VTT's strategy is to find solutions to global challenges. By focusing on the selected systemic and technological challenges, we can maximise the societal impact of science and research.





## Putting impact first

In 2022, VTT advanced its strategy by presenting its vision of the future and identifying the challenges that guide its research efforts.

**VTT's goal is to find solutions to major global challenges.**

Our goal is to find solutions to global challenges. To implement VTT's strategy, we have selected a total of seven systemic or technological challenges we will focus on to maximise our societal impact through science and research. Read more about our challenge frame on [page 13](#).

In 2022, we crystallised the core of each of the seven challenges we focus on in our research activities. We promoted the transition to an even more challenge-driven approach in VTT's research activities by introducing the Objectives & Key Results (OKR) model in which the objectives guide the activities.

The objectives set for the whole year determine our strategic direction while the key results, set three times a year, tell us what needs to be achieved over the next few months for us to move in the right direction. OKR thinking helps us put our five strategic choices into practice across the whole organisation (see strategy figure on [page 12](#)).

With this new way of thinking and operating, we want to ensure that we will make bold and more strategic, future-oriented research openings in our work.

We start from the challenge, not from technology. The results of our work are visible not only as technological advances but increasingly often as comprehensive solutions. Significant results achieved in 2022 included the commercialisation of [egg protein without chickens](#) through the spin-off company Onego Bio and the opening of Helmi, Finland's first quantum computer, [for researchers' use](#).

### Far-reaching, concrete solutions

To operate in the way we do, we need high-standard competences, cooperation and networks. By ensuring these key elements, we guarantee that our research is reliable and sustainable and that we can provide far-reaching solutions conducive to generating new business.

We monitor the impact of our strategy using a set of long-term indicators covering the entire strategy period. We carry out continuous monitoring on an annual and

## Three main issues concerning VTT's strategy and impact

### IMPACT IN SOCIETY:

Always aim for impact. We bring together people, business, science and technology, to solve the world's biggest challenges, creating sustainable growth, jobs and wellbeing.

### HOPE AND ACTIONS:

Impact arises when science and new technologies generate practical solutions that help customers and society to deal with the climate crisis, achieve resource sufficiency, drive industrial renewal, provide safety and security, and enable a good life for all.

### PEOPLE AND TRUST:

Our top professionals conduct research and develop solutions in close collaboration with our customers on increasingly strategic and far-reaching projects. As a research institute, we are an internationally known and recognised ethical actor.

**Laura Juvonen** is Senior Vice President, Strategy at VTT.





**We want to produce concrete, far-reaching solutions – together with our customers.**

tertile basis (three times per year). We monitor annually, among other things, how responsible an actor VTT is considered to be, whether cooperation with VTT promotes companies' access to international networks, how much capital investments our spin-off companies collect and how productive our research infrastructure is.

We want to further improve VTT's capabilities to a level where we can significantly contribute to generating solutions to major challenges, such as the climate crisis or material shortage.

Our goal is to better understand our customers' business opportunities, help to find new growth and build sustainability through research. We aim to ensure that the impact of science and research is concretely visible in the surrounding society.

We are an active player in Europe, where we have more than 3,000 partners through the EU's Horizon Europe research community. Our networks also extend to other continents. We utilise them both in our own work and as we help Finnish companies to join international networks.

### People at the heart of change

To meet our goal of producing solutions to global challenges, we must be able to collaborate in new ways and learn novel ways of doing things. Our researchers' [future vision](#) for the next 80 years challenges us to think in new ways. The people at the heart of the change are our experts who put the strategy into practice.

We invest in people, development, high scientific standards and in building a shared corporate culture. In 2022, we recruited 400 new experts. In addition, we decided to launch a new doctoral and postdoc researcher programme in cooperation with companies and universities. We will continue to recruit top talents and promote the adoption of strategic, challenge-driven thinking throughout the organisation through training.

We also strive to continuously deepen our understanding of the environment in Finland, Europe and the world as a whole and to take more active part in social debate than before.

In 2023, we will proceed along the path of exponential hope, and we want to generate significant new openings using VTT's unique expertise.

Our strategy strengthens VTTers' experience of doing meaningful work that gives them an opportunity to influence what kind of a future we are building and with whom. When the value base is in order, it creates hope and trust both internally and externally. Our work is responsible and builds a sustainable future.





# Our strategy 2021–2025: The path of exponential hope

## OUR PEOPLE

Top professionals capable of systemic and technological breakthroughs that can bring about fundamental transformation.

The **choices** we make every day



1. Always aim for **impact**

2. Always create impact together with a **customer**

3. Always lead for **excellence**

## OUR PURPOSE

We bring together people, business, science and technology, to solve the world's biggest challenges, creating sustainable growth, jobs and wellbeing.

5. Always build the world's most **meaningful** place to work



4. Always drive **sustainable** business

## OUR AMBITION

We bring exponential hope to a world that needs to deal with the climate crisis, achieve resource sufficiency, drive industrial renewal, provide safety and security, and enable good life for all.



### THE CHOICES ARE SUPPORTED BY OUR VALUES:

- Respect
- Together
- Passion
- Forerunner



# Generating sustainable growth by focusing on seven key challenges

We want to focus all our expertise and energy on the systemic and technological challenges in which we can achieve the maximum impact. They are currently as follows:

Systemic challenges			Technological challenges			
<p><b>1. Carbon neutrality</b></p> <p>Reaching a carbon neutral economy in the coming decades</p>	<p><b>2. Productivity leap</b></p> <p>Achieving a 10-fold productivity leap</p>	<p><b>3. Societal resilience</b></p> <p>Securing society's functions, fiscal sustainability and wellbeing while demographics shift</p>	<p><b>4. Quantum leap</b></p> <p>Bringing about the quantum leap in computing</p>	<p><b>5. Super-performing materials</b></p> <p>Creating superior-performing materials and shortening their design cycle by 50%</p>	<p><b>6. Superior digital systems</b></p> <p>Unleashing superior performance and sustainability in digital systems</p>	<p><b>7. Synthetic biology</b></p> <p>Matching nature's engineering skills through synthetic biology and bioinspired production</p>
<p>Mobility, construction, the industrial sector and energy must all become carbon neutral so that we can mitigate the most serious impacts of the climate crisis. It is no longer just a matter of reducing emissions. We must also create new economic activities that are based on low-carbon and carbon-negative technologies and carbon reuse. Working together with our customers, we are promoting the transition to a clean energy system and helping the world to free itself from fossil fuels.</p>	<p>The need for sustainable materials and consumer goods is growing. The sufficiency of raw materials will be a major challenge facing the world.</p> <p>With effective solutions, renewable raw materials and the circular economy, we can ensure that there will be enough resources for everybody. Using new technologies, we can convert industrial by-products into valuable resources, recycle materials, introduce new production processes and create new renewable materials.</p>	<p>The environmental crisis, epidemics and other global challenges are making societies increasingly unstable. However, by using new technologies, we can anticipate and manage risks. Preparedness helps us to cope with emergencies, natural disasters and cyberattacks more quickly.</p> <p>Citizens can make decisions related to their wellbeing based on real-time health data. This also opens up opportunities for Finnish growth companies in the sector.</p>	<p>A quantum leap means a fundamental change in technology that may exceed the impacts of the digital revolution. Quantum technologies and algorithms can help to speed up the development of drugs and materials and open new paths to combat the climate crisis.</p> <p>We believe that quantum computing will become the mainstream data handling platform by 2030. We want to ensure that quantum computing also benefits society at large.</p>	<p>Material science lies at the very heart of our future. How can we ensure that there are enough resources on the globe? How do we replace fossil raw materials with renewable and carbon-neutral alternatives?</p> <p>We need new ways to design and produce materials. Synthetic biology and advanced materials science provide tools for developing sustainable biobased materials. Thanks to virtual material design, the duration of the development cycle can be halved.</p>	<p>Digital systems are at the core of organisations, and digitalisation has the potential to make most sectors more competitive and efficient.</p> <p>Digitalisation requires that processes are redesigned by integrating ICT (such as 5G, big data, artificial intelligence and sensors), robotics production and service environments. To ensure their competitive advantage, companies must invest in digitalisation.</p>	<p>Synthetic biology is set to revolutionise traditional biotechnology and replace some of the current production methods in the future. It can be used for producing durable materials, chemicals, pharmaceuticals and fuels. We can manufacture complex chemical compounds, smart materials and biological sensors.</p> <p>Biotechnology is also suited for the needs of the bio-circular economy by utilising, for example, waste streams as food for microbes. We can use cell factories to deliver products for bioreactors.</p>



## 1. Carbon neutrality



### Activities and strengths of VTT

We help to find the best solutions for making industrial processes carbon-free or carbon negative. In cooperation with industry, actors in the energy field and local government, we are developing new models for different parts of the energy value chain. We are a partner in the energy system transformation in which smart power networks, solar and wind power as well as small modular reactors are assuming an increasingly important role.

We offer carbon capture solutions for the industrial sector, transport, power generation and heating as well as for agriculture and forestry. Our emissions research services help the transport and logistics sectors to reduce their energy use and negative environmental impacts. We are an active player in many fields of applied battery research and in the development of biofuels.

We create solutions for the sustainable and smart design, construction, use and maintenance of buildings, infrastructure and cities. We support the transition towards a sustainable food system and health-enhancing nutritional solutions. We are partners in the development of plant biology, protein modification and food solutions.

We are helping Finland to meet its emissions targets with hydrogen-based technologies. We contribute to the emergence of exports of hydrogen economy products based on Finnish expertise.

**We help to make industrial processes carbon-free or carbon negative.**

### Case

#### Bread and heating from the corner shop

The supermarket S-Market Ritaharju in Oulu, operated by the Arina Cooperative Association, uses the waste heat from its refrigeration equipment for its own heating needs while also contributing excess low-emission energy to the district heating network. In addition to selling groceries, the market thus operates as a heat production facility, producing enough energy to heat 150 detached houses with a minimal carbon footprint.

VTT developed the basic idea for the concept and procured funding for developing it further. It is also responsible for the metering technology at the location, collecting measurement data and issuing reports on the performance of the solution.

“The concept alters the entire business model. The supermarket does not buy heating energy. Instead, the district heating company invests in the equipment inside the market and buys the resulting energy. The model produces great overall benefits and enables faster investments in low-emission energy”, explains **Tuomas Paaso**, Research Team Leader responsible for the project at VTT.



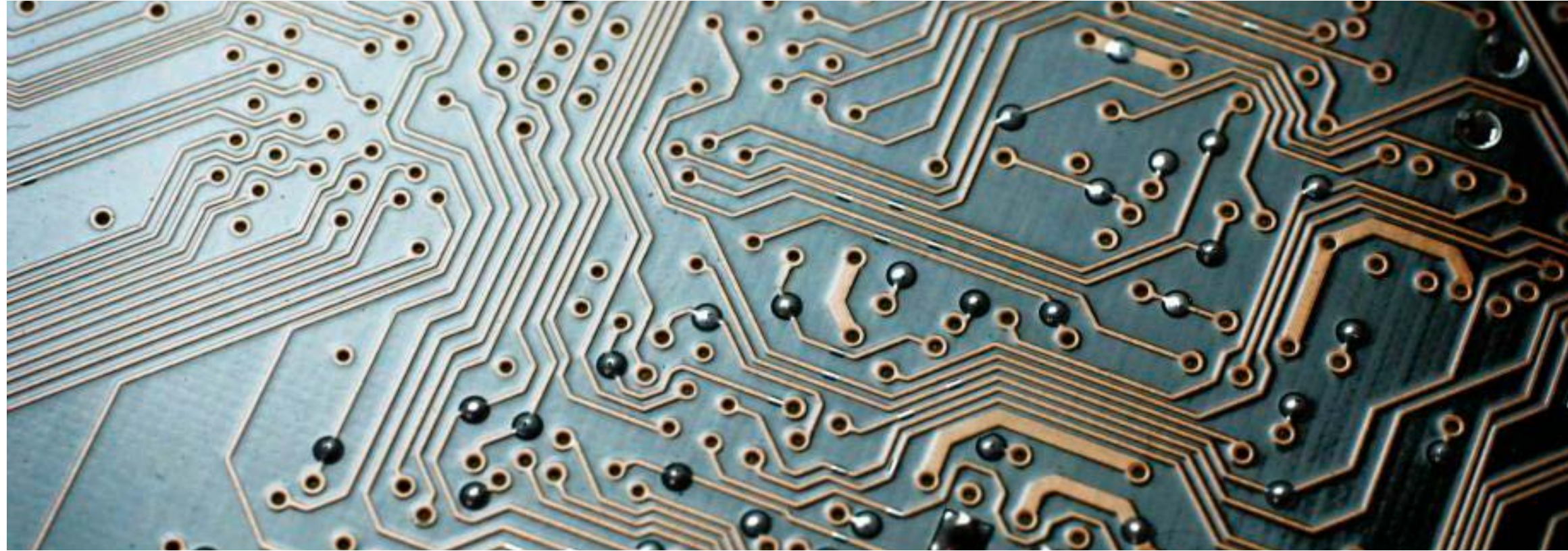
A grocery store in Oulu also serves as a heat production facility.

The use of the concept is expanding, and the development continues. In the future, the solution could lead to the use of district heating networks for energy storage.

[Read more](#) ➔



## 2. Productivity leap



### Activities and strengths of VTT

Key areas of research at VTT include finding renewable raw materials that are strong and easy to use, creating and sharing value in the circular economy, and recovering materials from challenging sources.

We are a research and innovation partner in the efficient recovery of valuable raw materials from side streams of industries and residential areas. We help to find new business opportunities in the recycling of materials that are difficult to process, such as plastics and chemicals. Metals and minerals can be produced and recycled in a sustainable manner from sources such as challenging ores. VTT has developed, for instance, a zero-waste concept for mines. We help our partners to increase the value added of forest industry products and thus to replace oil-based products in a sustainable manner.

We help to create development projects and new bioeconomy solutions based on renewable materials in Finland. With the business activities created around them, we are boosting the value of Finnish industrial exports.

VTT studies and assesses the impacts of changes in industrial work. Robotics and advancing automation, and even autonomous operations in production, will affect the nature of future industrial work. The change is driven by the shortage of skilled labour experienced by companies and the means found for remedying the labour shortage.

**We help to find new business opportunities from the reuse of materials.**

### Case

#### Green transition requires new ways of using metals

Better utilisation of the side streams and wastes of the mining and metallurgical industries is of paramount importance to achieve the green transition required by the energy crisis. The world situation has made the importance of energy self-sufficiency increasingly clear.

However, to function all fossil-free forms of energy, such as wind, solar and nuclear power, require metals found in our soil. The same can also be said for electric cars, laptops and smartphones. The need for metals is growing exponentially, but they are in shorter supply than ever.

VTT has established a two-year fixed-term research professorship in the industrial circular economy, utilisation of the side streams of the mining industry and hydrometallurgy. As of 1 October 2022, **Päivi Kinnunen**, a leading researcher in the field, D.Sc. (Tech.), docent, M.Sc. (Econ. & Bus. Adm.), has been appointed to the research professorship in Circular Economy of Energy Metals.



Metals and minerals can be produced and recycled in a sustainable manner from sources such as challenging ores and industry side streams.

“If we want to keep up with the technological development, we must not only find new ways to recover and utilise metals but also to reduce their use in batteries, for instance”, says Kinnunen.

**Read more** [➔](#)



### 3. Societal resilience



#### Activities and strengths of VTT

VTT boosts the resilience and cyber security of societies and organisations by helping them to use the necessary technologies. We provide risk analyses and action plans that ensure the functional capacity of welfare, education, security and defence systems in exceptional and disruptive situations.

We design scalable cyber security development programs and test environments. We provide solutions for acquiring, managing and sharing information so that citizens, companies and decision-makers can make the right decisions in changing circumstances. We safeguard the availability of critical natural resources, food and goods and their efficient and consistent distribution in emergency situations.

We develop measurement technologies to enhance the wellbeing of citizens. Using them, we can

help people to meet their personal wellbeing needs, help the health care system to move in the direction of preventive treatment and to evaluate the economic impacts of different technological solutions.

Our services include smart health and wellness solutions, diagnostics technologies, health care technologies and wearable technology.

**Resilience and cyber security can be boosted with the help of technology.**

#### Case

##### Tools for crisis resilience

An EU research project coordinated by VTT developed methods for boosting crisis resilience of society. The outcome was a practical toolkit aimed at those responsible for crisis management, communications and emergency planning.

Societal crises are particularly threatening for vulnerable people. Factors such as deprivation, homelessness and health challenges put people at greater risk both during and after times of crisis. The research project explored technological solutions for identifying and locating vulnerable people. By improving their access to information and developing the work of official bodies, we can support the capacity of these groups to function in crisis situations. This strengthens the crisis resilience of society as a whole.

The research results were used to shape recommendations for improving crisis resilience at the local, national and European level. These approaches can be utilised during both natural disasters and human-caused disruptions such as cyberattacks on critical infrastructure.

[Read more](#) ➔



The crisis resilience of societies can be improved with the help of technology.



## 4. Quantum technology



### Activities and strengths of VTT

VTT is a top expert in quantum technology, providing a full range of quantum technology services, such as quantum computing and practical quantum computing applications. We help organisations developing quantum technology in the scaling, integration and connection of the equipment. Our expertise covers superconducting, photonics and semiconductor platforms.

VTT has built Finland's first fully functioning quantum computer in cooperation with the Finnish quantum start-up IQM. With the ecosystem built around the quantum computer and quantum expertise, VTT helps Finnish companies to prepare for the quantum era. VTT coordinates a large European infrastructure project in micro, nano and quantum technology.

We help organisations develop quantum technology in the scaling, integration and connection of the equipment. We supply components to companies building quantum computers and produce practical equipment and software solutions. We speed up quantum software development with our expertise in AI, machine learning and cryptography. We help companies to adapt their offerings to the opportunities offered by quantum technologies and to create competitive products and services for international markets.

**VTT offers a full range of quantum technology services.**

### Case

#### Combining quantum and supercomputing takes science to a new era

VTT's quantum computer HELMI was connected with the pan-European supercomputer LUMI, hosted by CSC – IT Center for Science. This is the first time in Europe that this kind of hybrid service connecting a supercomputer and a general-purpose quantum computer is open to researchers.

The successful connection of HELMI and LUMI paves the way to a future where quantum computers and traditional high-performance computers work together, solving those most difficult of problems that neither can solve alone.

Quantum computing has significant potential for boosting innovation for the benefit of companies and society at large. Integrating HELMI and LUMI opens up opportunities for hybrid computing and accelerates the development of the required quantum algorithms and software. It shows us how technology can be utilised in various practical cases.

[Read more](#) ➤



VTT helps companies prepare for the quantum era.



## 5. Super-performing materials



### Activities and strengths of VTT

We are using AI to create new materials and significantly shorten the time required to develop them. We possess top talent in the development of synthetic biology and biobased, renewable and recyclable material innovations.

We know how to manage materials challenges and produce cost-effective solutions. We offer our customers services based on optimised materials planning and tribology studying friction and wear. VTT ProperTune® is an Integrated Computational Materials Engineering (ICME) concept. Optimising materials planning with multiscale modelling can replace expensive and time-consuming testing.

The more we can reduce the friction and wear of machines and equipment, the greater the savings of energy. Effective management of friction and wear

can extend the useful lives of equipment and components and boost their performance. We can find the best solutions for individual customers and applications by means of experimental research and comprehensive tribo-analysis.

**We utilise AI to create new materials.**

### Case

#### VTT halves the time required for materials design

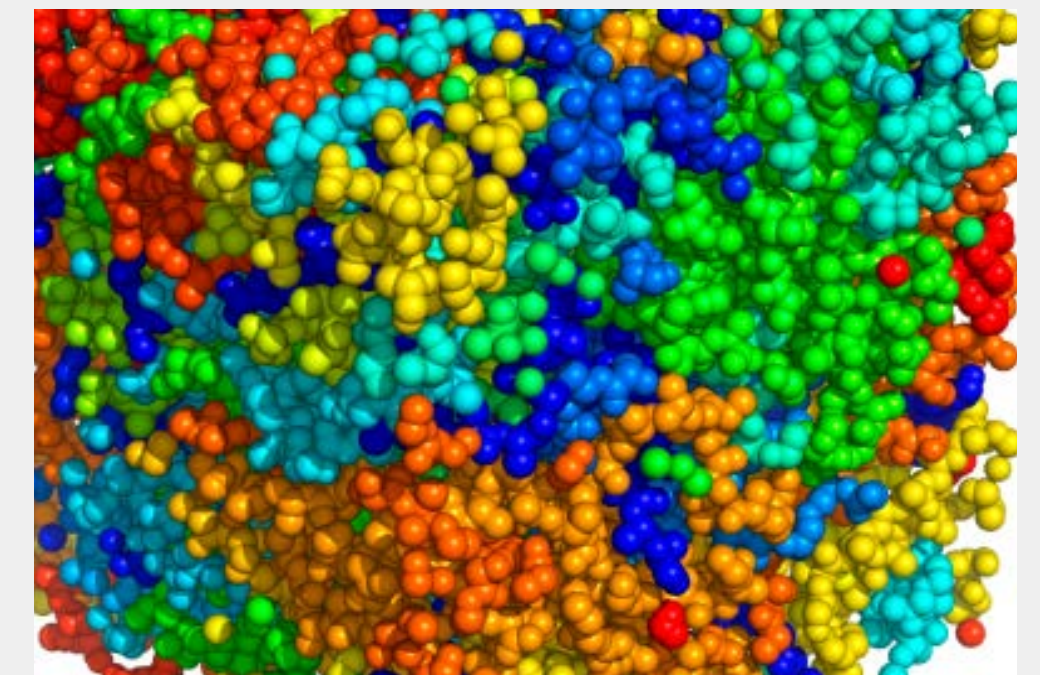
Due to resource scarcity and intense pressure to become carbon neutral, companies in industries like textile, packaging and construction are looking for environmentally friendly alternatives to replace the existing materials and to improve the performance of their products through new, improved designs.

VTT ProperTune® is an Integrated Computational Materials Engineering (ICME) concept. Optimising materials design with multiscale modelling can replace expensive, time-consuming testing and shorten the time-to-market for new products by an average of 50%.

In the future, the toolbox will be suited for modelling and designing of not only hard materials but also soft ones, such as wood, polymers and plastics.

“By taking product development and testing into the virtual world, we are able to create better products faster and more cost-efficiently than ever before”, says Research Team Leader **Antti Puisto**.

[Read more](#) ➔



Virtual material design brings products to the market faster than ever before.



## 6. Superior digital systems



### Activities and strengths of VTT

VTT develops integrated technologies for critical electronics and photonics systems, focusing on printed and flexible electronics applications in wearable and structural electronics. In photonics, we have developed measurement solutions that utilise edge computing, taking advantage of machine vision and spectroscopy for demanding measurements in the process industry.

Our aim is to create new technology-based growth companies in Finland and provide existing companies with a competitive basis for the future. These enterprises will utilise the innovations promoted by VTT and create competitive export products and the conditions for a profitable business ecosystem. We create business openings based on technologies in the microsector, nanosector, quantum field, photonics, printed intelligence, and by digitalising traditional industries. We leverage en-

vironmentally friendly materials in electronics products and reduce e-waste.

With the cross-disciplinary expertise possessed by VTT, challenges arising from digitalisation can be identified and customers can be provided with AI solutions tailored to their needs. Using VTT's equipment and methods, operators can determine how new technologies can be applied in their operations.

Tools based on AI maturity and robotics process automation help to identify how organisations can benefit from these technologies. The Future Radar process can be used in the development of radical innovations, and it also provides a road map for the digitalisation journey.

**VTT's expertise provides tailored AI solutions for customers' needs.**

### Case

#### Sustainable electronics reduce environmental load

As the amount of electronics increases, the use of raw materials in the sector is expected to double by 2050. The amount of electronic waste has also almost doubled over the past 16 years, and only 20% of the waste is collected efficiently. The EU therefore calls for more sustainable solutions from the electronics industry. VTT is responding to the challenge by combining printed electronics, bio-based materials and ecodesign thinking.

In the ECOtronic project funded by Business Finland, this expertise was used to assess the environmental load of electronics and to develop sustainable solutions and determine their feasibility.

Eight companies interested in sustainable electronics participated in the ECOtronic project. For example, the package industry operator Iscent received help in material selection and testing, and the health technology developer GE Healthcare in ecodesign and environmental impact assessment.

[Read more](#) ➔



The EU demands more sustainable solutions to reduce electronic waste.



## 7. Synthetic biology



### Activities and strengths of VTT

VTT is a top expert in synthetic biology and the development of cell factories. We use scientific breakthroughs to model DNA and create unprecedented biological organisms. We are on track to revolutionise food production or create new biobased materials outperforming fossil-based alternatives. We provide technological solutions to produce chemicals from biobased raw materials and by-products.

Modified microbes and plant cells, commonly called cell factories, can produce chemicals, polymers, proteins, materials and food. VTT develops cell factories for a variety of different biotechnological processes. We utilise AI and robotics in the design and construction of cell factories, which significantly speeds up the development of solutions.

VTT CellularFood service provides food sector actors

with expert assistance and research platforms for developing new food solutions. We use the best production organisms, such as moulds that efficiently produce proteins,

yeasts that are highly resistant to processing conditions and bacteria that get their energy from hydrogen. We produce substitutes for oil-based plastics and chemicals, as well as medically important molecules such as antibodies. We develop new food production methods that conserve both livestock and arable land. Leather-like materials and biotechnical dyes can be used to replace non-sustainable dyes in the textile industry, for example. We also utilise AI in the modelling of biomaterials.

**VTT develops cell factories for a variety of different biotechnological processes.**

### Case

#### Fighting hospital bacteria with cloudberry seeds using biotechnology

Increasing antibiotic resistance of bacteria is one of the biggest future challenges in medicine. A recent research project showed that compounds fractionated from cloudberry seeds have a significant antimicrobial activity against MRSA bacterium, a cause of hospital-acquired infection.

Ellagitannins from cloudberry significantly inhibited the growth of MRSA in test tube conditions and speeded up the recovery of a wound caused by these bacteria in a mouse model.

The efficacy of compounds fractionated from berries against microbes that cause wound infections was studied in a joint project of HUS Helsinki University Hospital, VTT, University of Turku and Hospital Universitario Principe de Asturias together with the research institute Fundación Jiménez Díaz from Spain.

Earlier studies by VTT have already shown that Arctic berries contain effective antimicrobial compounds. Research data can be used to find even more effective substances in plants.

[Read more](#) ➤



VTT has shown that Arctic berries contain effective antimicrobial compounds.



## The year of more strategic customer relationships

Together with our customers, we do meaningful work by developing products and services that create new business and create global impact as part of solutions to the world's biggest problems.

**The number of customer projects and the size of projects increased.**

In 2022, customers' interest in science and research continued to grow, even though changes in the operating environment created uncertainty in the early months of the year. In the spring, we focused on promoting the previously planned projects, but towards the end of the year the draw of new research projects was getting strong. The sales of customer assignments increased by 14% compared to the previous year. We have a total of 1,190 customer relationships and during the year, a total of 2,767 projects were under way as part of them.

The year of customer relationships 2022 was also excellent in the sense that there was a clear tendency towards building more strategic and long-term cooperation relationships. The objective was to generate revolutionary inventions and products with increasing significance as our contribution to solving the world's biggest challenges. This was reflected, among other things, in the increased size of the projects, which we also aimed at.

The discussions we had over the year had one unifying factor, sustainable development. Both domestic and foreign customers made research openings in the fields of climate change, energy efficiency, carbon neutrality, food sufficiency, and quantum and space technology. Companies have identified quantum technology and computing as future opportunities. In 2022, quantum technology clearly took new steps in commercial terms, generating new research openings and customer relationships as both jointly funded and commercial projects. Initiatives related to safety and security and space increased in the wake of geopolitical instability and the rise of ambitious global technology goals.

Our customers play a key role in development: through research investments, we can create value, and increase productivity and the positive handprint of science and research in the world. Research collaboration helps our customers to generate new, internationally scalable business and build a sustainable future.

Total number of customers

1,190

Share of domestic customers of VTT's net turnover

57%

Share of foreign customers of VTT's net turnover

43%

VTT's net promoter score (NPS)\*

70

The overall assessment given by VTT's customers of the project execution\*\* (on a scale of 1 to 5)

4.2

How easy it was to work with VTT, rate seen by customers (CES)\* (on a scale of 1 to 5)

4.6

\* NPS and CES are based on customer feedback survey.

\*\* The score is based on the customer impact survey.



## Case

### Wood fibre packaging as a substitute for plastic

Valmet is a leading global developer and supplier of process technologies, automation and services for the pulp, paper and energy industries. Metsä Group's innovation company Metsä Spring chose Valmet to design a new production line for novel 3D wood fibre products to develop a new type of packages.

Valmet chose VTT as a research and testing partner for the project. VTT supported Valmet on lab research, equipment design and choosing chemicals. We also tested materials and worked with production process development, especially regarding fibre suspensions. VTT also tested the demo production line's operation and functions.

The demo production line was established in Äänekoski. Now it produces 3D fibre packages directly from wet wood fibre pulp without intermediate steps. Moulded Muoto® fibre packages could replace traditional plastic ones, for example in food industry.

"VTT has unique wood fibre know-how that cannot be found anywhere else in the world," says **Sampo Immonen**, Head of Line R&D at Valmet.

An ambitious goal was reached in good collaboration within a tight schedule. It took only 2 years from the investment decision to start producing in the demo line in August 2022. The project won the national Quality Innovation Award 2022 in Finland.



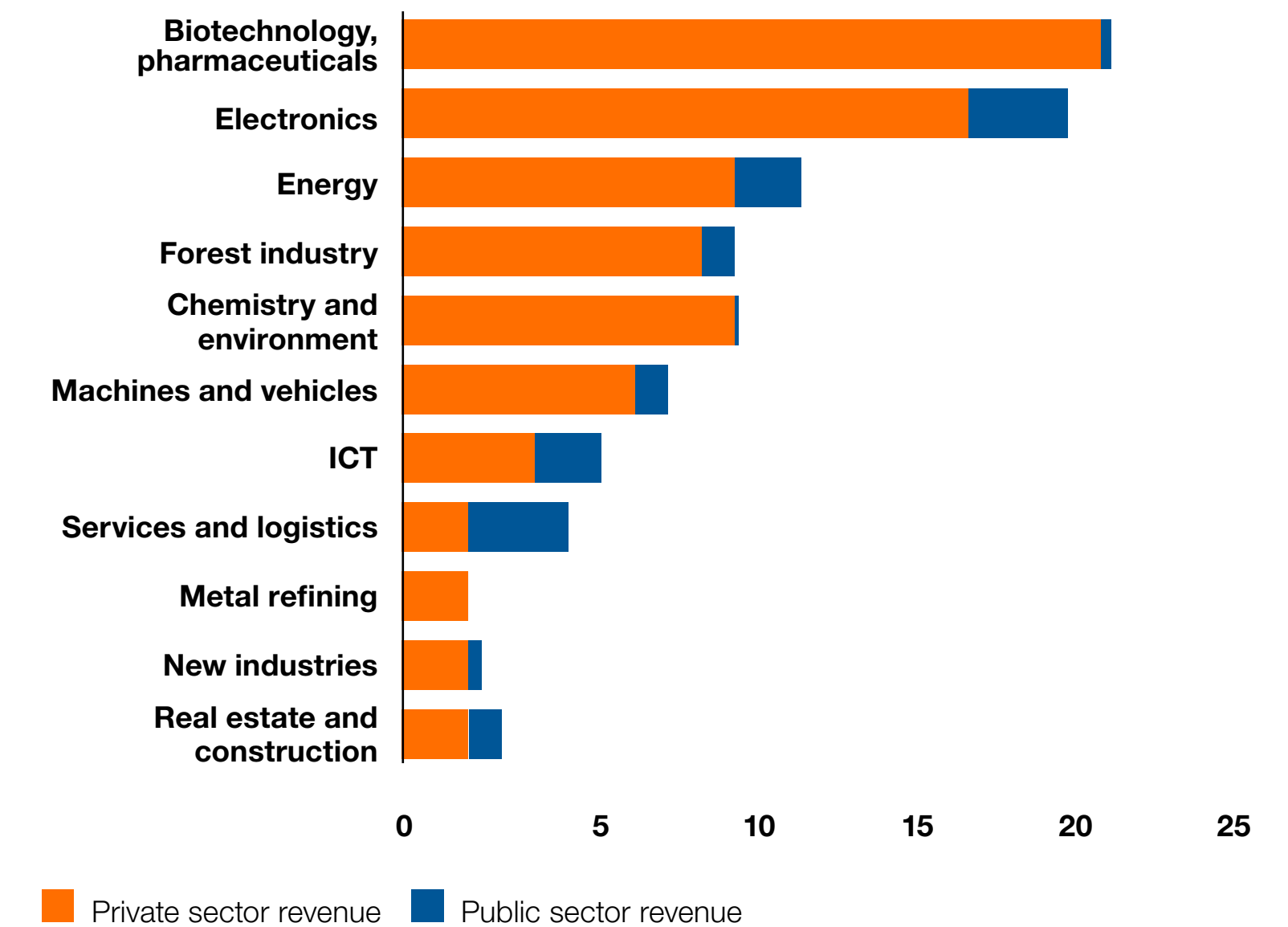
### Challenge-driven approach helps to find benefits

The challenge-driven approach of the VTT strategy works well from the customers' perspective. Through challenges, it is now easier for our customers to understand the potential benefits our research may offer and the way we seek solutions. It is also easier to communicate the benefits and our operating models when we can find concrete links between the challenges and the customer's needs, concerns or opportunities.

Customer satisfaction has remained very high. According to NPS surveys, companies feel that our work brings them added value and benefits, and they find working with VTT easy.

The share of foreign customers of our net turnover increased slightly faster than that of domestic customers. Companies seek solutions and commercial cooperation from where they can find the best expertise in a global scale, and VTT excels in many areas of research and development. Foreign commercial projects will further increase our international recognition. They also help us grow and ensure that top-level expertise will remain and develop in Finland. Serving domestic customers is important to us, and VTT is already well known for its long-term work.

### Customer solutions sales revenue\* (%)



\*Parent company, classification according to VTT's customer segments.

VTT opens up paths to the world through, for example, EU research networks and international publishing activities. For their part, congresses and other events are important channels for sharing information about VTT's projects and expertise. The COVID-19 era boosted the use of digital channels through which we get more and more contacts. Our international media visibility increased, thanks to, for example, the [coffee project](#) in cellular agriculture, resulting in a lot of attention for Finnish cutting-edge research expertise and new customer relationships.

Our customer work developed considerably in 2022. In 2023, we will proceed with an even more solution-driven approach. We will leverage the robust research infrastructure VTT has built over the years and huge data resources to make finding solutions increasingly efficient and sometimes surprisingly quick.



## Commercialisation of technologies and IPR protection

In 2022, technologies developed by VTT produced strong business potential for its customers: IPR worth EUR 3.5 million was invested in growth companies as contribution in kind, and VTT's commercial revenue from intellectual property rights amounted to EUR 4.0 million.

**For the first time, IPR revenue rose to EUR 4.0 million, and IPR investments as contributions in kind amounted to EUR 3.5 million.**

### Investments in the IPR portfolio are investments in the future

The invention activity picked up from the previous year, as seen in the number of invention disclosures, 181 in total, but the number of priority patent applications dropped to 32 in 2022. The decline in the number of priority patent applications was primarily due to the low invention activity in the previous year. VTT invested approximately EUR 2.1 million in its patent portfolio, which contains approximately 400 patent families. In 2022, VTT enhanced its efforts to utilise the IPR portfolio in the development of its business operations in order to improve customer value.

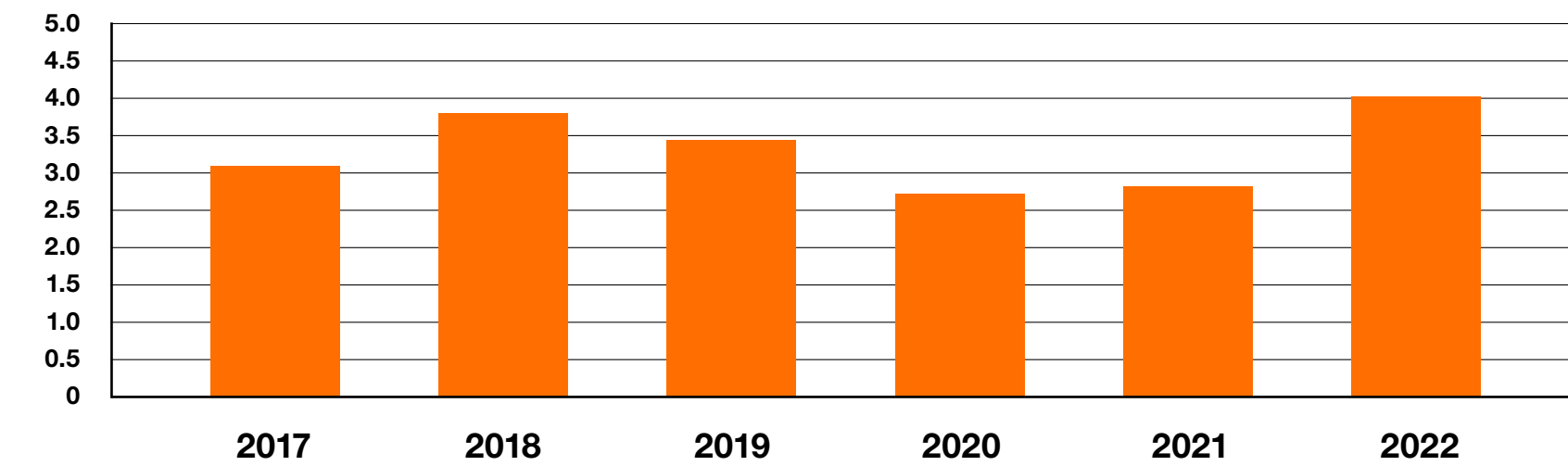
### Impact for customers

Licensing revenues from the commercialisation of technologies were historically high, generating EUR 4.0 million. As in the previous year, the most significant technologies were the health technology, process simulation software, spectroscopy, optics, and biotechnology. Amounting to EUR 3.5 million, the value of IPR investments in growth companies as contribution in kind was also higher than ever before. In addition to IPR, VTT creates impact for its customers by providing research projects and infrastructure.

### Strong cooperation creates value for customers

VTT deepened its strong cooperation between research, business development, and IPR to increase impact in selected spearhead areas. In 2022, special investments were also made in promoting IPR sales and bringing more added value to customers.

VTT's IPR revenue, MEUR



4.0

EUR million in IPR revenue

181

invention disclosures

~ 400

patent families in the patent portfolio



## Research, development and innovation is about cooperation

In 2022, we made efforts to promote an effective national RDI system, accelerated the dual transition with our partners in various ecosystems and joined new European organisations.

**VTT's vision paper on the most promising technologies offers a perspective on effective innovation policy in Finland.**

Collaboration and networking are at the core of our tasks. We actively cooperate with a variety of different Finnish stakeholders, such as companies, universities, other research institutes, providers of research funding, ministries, organisations and local and regional government. In this manner, we contribute to the formulation of common views on nationally important issues that require research and technical expertise. In cooperation with public-sector actors, we prepare reports and statements that support decision-making, while VTTers also serve as experts in advisory working groups.

During 2022, we participated in projects such as the national Artificial Intelligence 4.0 strategy work. We published a follow-up report to the Carbon neutral Finland 2035 – impact assessments of climate and energy policies and measures (HIIISI) on the adequacy of the Government's climate and energy policy decisions. We also participated in the Plastic Roadmap 2.0 update and prepared an international study on innovation partnership models and their success factors. We drew up statements on various issues, including the National Forest Strategy, the Digital Compass, the Climate Act and the European Chips Act.

We took active part in formulating the direction of the national RDI (research, development and innovation activities) policy. Together with a large group of experts, we compiled a vision of the most promising fields of technical expertise for Finland. We shared the expertise we have in the RDI environment with the parliamentary RDI working group at meetings with them and by providing a statement on the RDI Funding Act. We organised the TechDay 2022 event with Business Finland, Academic Engineers and Architects in Finland TEK and Technology Industries of Finland, in which we highlighted the importance of innovations, investments and expertise for building a sustainable and competitive Finland.



### We promote industrial renewal and Finland's sustainable competitiveness

We cooperate with companies in projects that promote sustainable competitiveness and create new business opportunities. Key parts of Finland's national innovation infrastructure are based on VTT's research infrastructure and development platforms, which are also networked at EU level. Companies can take part in the shared use of infrastructures and in this way create new export products and services.

In 2022, VTT's infrastructure development continued with the quantum computer when VTT's HELMI quantum computer was connected with CSC's LUMI supercomputer. This is the first time in Europe that this kind of hybrid service connecting a supercomputer and a general-purpose quantum computer has been opened to researchers.

Innovations that solve significant challenges arise effectively in ecosystems, which are network-type operational models. VTT plays an important role in promoting ecosystems. With ecosystems, VTT aims to boost the dual transition of sustainable development and digitalisation. In 2022, VTT played an important role in the expansion of the national hydrogen ecosystem. The Smart Otaniemi ecosystem also took significant steps forward towards becoming a national Smart City Innovation Cluster. We also



**VTT has received 13% of all HE funding awarded to Finland.**

carried out active ecosystem work in the field of defence and security of supply, including participation in the Digital Defence ecosystem launched in 2022.

**VTT is well-connected internationally**

VTT is an active and highly recognised network actor. In addition to national networks, we are also members of many European and international innovation communities. For instance, we are actively involved in the work of European public-private partnership technology communities and in the innovation clusters of the European Institute of Innovation and Technology (EIT). As an active member of EARTO (European Association of Research and Technology Organisations), we are well-placed to influence the European research and innovation policy.

In 2022, VTT was involved in launching a new space organisation of research institutes, EASTRO, which aims to influence the EU space research agenda. Furthermore, VTT joined EARMA (European Raw Materials Alliance) and AMI2030 (Advanced Materials Initiative) to strengthen its position in directing the European raw materials research agenda.

VTT plays a key role in promoting the networking of Finnish companies, universities and other actors and involving them in EU Framework Programme projects. Our strong role in the EU Framework Programme for Research and Innovation is reflected in the extent and international impact of the cooperation. VTT has actively participated in the funding application processes of the Horizon Europe (HE) framework programme launched in 2021. VTT remains the largest single recipient of EU research funding in Finland also in the new framework programme. VTT has received 13% of all HE funding awarded to Finland, and VTT accounted for almost 16% of the HE funding received by Finland through joint consortium projects. (Business Finland: Summary of Finland’s participation in Horizon Europe programme 9/2022.)

Using our strong networks, our customers and partners can benefit from international research and expertise.

**Open science is mainstream**

VTTers publish scientific articles and other publications on research topics related to global challenges. In 2022, the number of peer-reviewed scientific articles was on the increase with nearly 600 published articles, one third of them in international top journals of different fields. We also published conference presentations, books and articles in trade journals, almost 1,000 in total. More than 40% of the scientific publications were

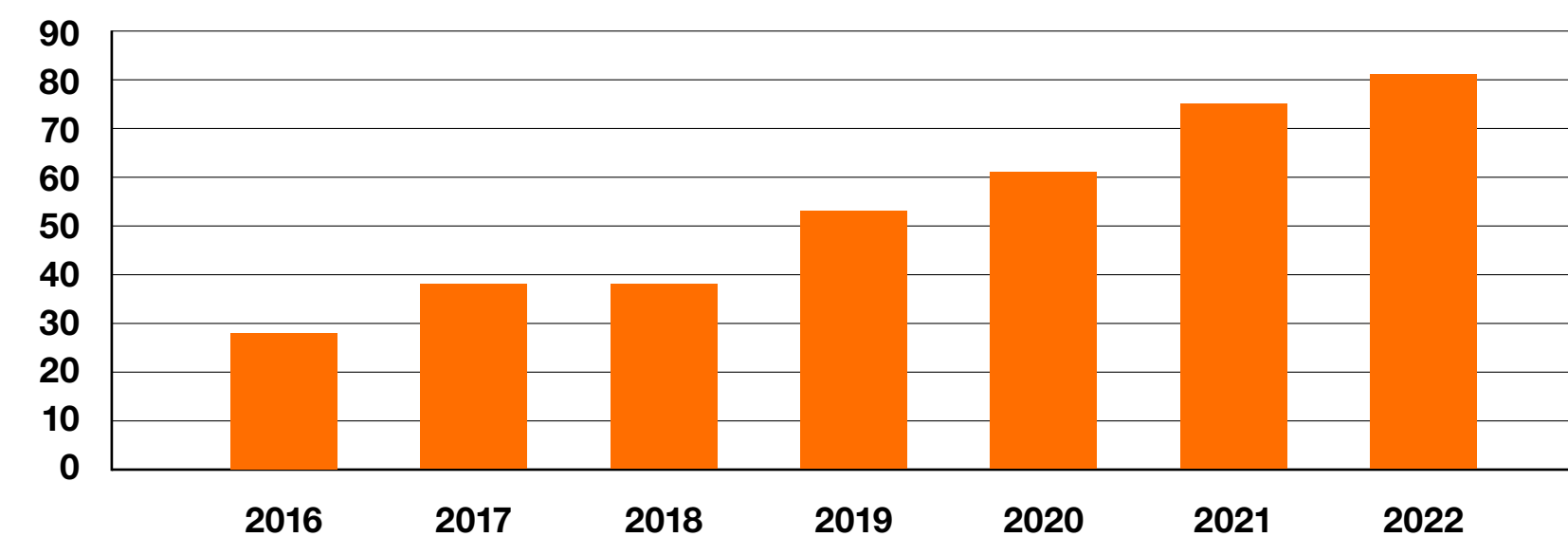
produced in cooperation with international partners. It is also characteristic of VTT that nearly one fifth of the publications were produced in cooperation with companies.

Open science and open access make publicly funded top science universally available. The proportion of universally accessible publications is growing each year. In 2022, about 81% of all scientific articles published by VTT researchers were universally accessible (in 2021, the figure was 74%).

VTT’s [Research Information Portal](#) contains the details of more than 80,000 publications produced by VTTers. Using a variety of different search criteria, you can find the experts, their areas of expertise and cooperation networks categorised by, for example, UN Sustainable Development Goals (SDGs). All open access publications are available directly in the system.

**Open access makes top science universally available.**

**Share of Open Access articles (%)**





# Sustainability

We generate the greatest impacts through the solutions and technologies we develop, and our customer work and its results. Those who develop the solutions, our employees, are top experts in their fields, and we want to take good care of them.





## Working together with our customers and research partners to achieve sustainable results

We monitor how sustainability is realised in all our activities, from research to everyday practices.

**We added human rights and labour rights as criteria for assessing country-specific risks.**

VTT is a research institute and in accordance with this, its core mission is to develop sustainable solutions and technologies for its customers and society at large. In other words, sustainability is realised every day through VTT's project activities, practical research work, support for research and sales. It is essential to consider sustainability at all stages of the project's life cycle, from preparation and launch to final evaluation.

### Sustainable solutions for our customers and society at large

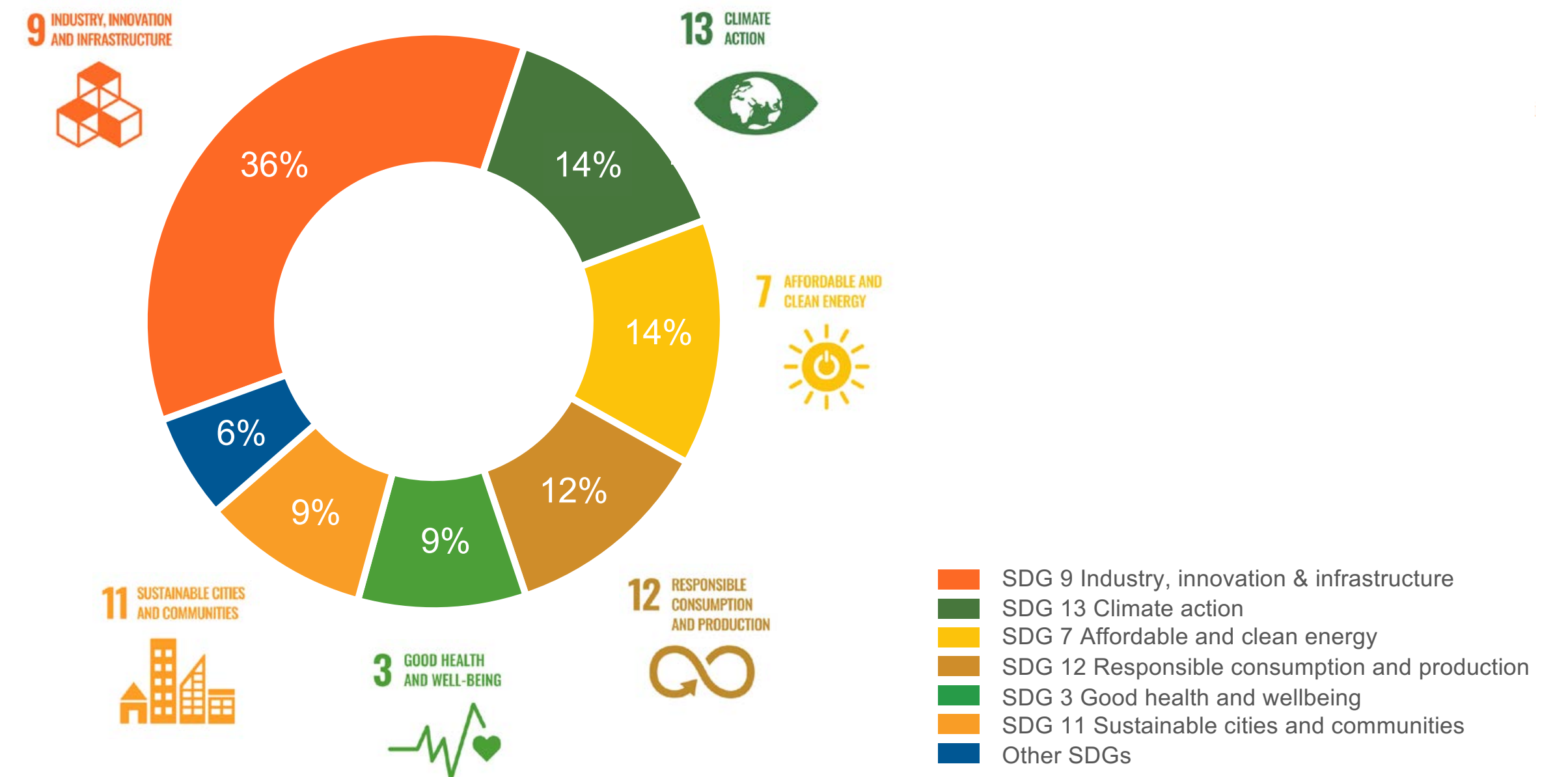
In 2022, we introduced an operating model and tools for project categorisation and follow-up in accordance with sustainability goals. We started collecting data on how our self-funded and jointly funded projects are geared towards reaching the UN Sustainable Development Goals (SDGs). SDGs offer a globally shared direction for solving sustainability challenges, and our research activities support the achievement of several SDGs.

We also included how our partners and customers ensure sustainability in their trade compliance verifications. This work will continue in 2023. We added human rights and workers' rights, among others, as criteria for assessing country-specific risks.

In 2022, we brought our customers and stakeholders together to discuss sustainability issues in sustainability-related seminars. For example, VTT's Strong, Stronger, Sustainable seminar discussed how to build responsibility through the whole production and supply chain of products and services, from raw materials to customers.

As part of VTT's goal setting process, we analysed the expectations, requirements and obstacles VTT is subjected to in the field of sustainability, such as ownership steering requirements, renewing regulatory and the needs of our key customers.

We also renewed our strategic key indicators to better cover our impact on supporting sustainability in society. For example, we collect measurement data on our customers' views on the sustainability impacts of projects they have carried out with VTT.





We support societal decision-making with expert opinions (statements, working group memberships and committee consultations).

### Safety as part of the wellbeing of our thriving professionals

We take care of VTTers in many ways. We place a high priority on safety and security and, in accordance with our occupational safety programme, a good level of safety is the minimum requirement in all our activities. Our safety objective is to ensure that all VTTers come to work healthy and leave work healthy.

1. VTT offers meaningful work that factors in the capabilities, resources and weaknesses of individuals (physical, psychological and social stress).
2. VTT provides a healthy and safe working environment.
3. Taking risks, deviating from safe procedures and ignoring instructions are forbidden.

We are a member of the Zero Accidents Forum. For us, the Zero Accident policy is not just about injuries but also about the following:

- Zero occupational diseases
- Zero tolerance for bullying and harassment
- Zero unaddressed incidents of violence and harassment
- Zero sick days resulting from work
- Zero burnouts
- Zero managers and employees who are unfamiliar with occupational safety issues

Anyone working in VTT's research premises must have a valid occupational health and safety certification. In the spirit of our shared workplace safety practices, the policy applies to both VTT employees and anyone representing our partners. The requirement applies to all work, except for work in offices and at computer terminals.

Calculated using the method of the Finnish Workers' Compensation Center, the lost time injuries frequency rate (LT13, three-day absence) in the parent company stood at 0.53 per million hours worked. Taking into account all injuries (including those causing 1–2 days absence and no absence), the Total Recordable Incident Frequency (TRIF) was 4.23.

The most common causes of injuries and accidents were physical impacts, slips and falls and chemicals. VTT did not register any serious workplace injuries among its own personnel during 2022.

Our KPI for the seriousness of workplace injury in the parent company was 6.5 sick days per accident.

The 'monthly safety observation' procedure increases awareness of safety issues. A significant observation or several observations of the same issue are considered in the procedure. The individual who reports the featured incident receives a small prize. Safety observations were made on issues such as working with fume hoods, protective equipment for visitors, interruptions in the water supply, labelling of chemical containers, electrical wiring, battery safety, trip hazards and connecting hoses.

At VTT, safety is integrated into everyday activities and provides a sustainable basis for responsible operations. We want to take care of our personnel and stakeholders. The ISO 45001 certificate granted to VTT shows that we have successfully achieved the goal.

As part of VTT's sustainability programme, we started to work for promoting DEI issues (Diversity, Equity and Inclusion) throughout VTT. We started by launching the [Gender Equality Plan](#) and conducting a self-evaluation analysis of diversity. We added a section on DEI issues to the Manager Toolbox coaching for new line managers. We also coached those responsible for HR, communications and sustainability teams in the basics of DEI thinking.

In the autumn, we compiled a diverse champions team around the theme, which will be provided in-depth coaching on the topic in spring 2023. The champions are committed to sharing their knowledge and expertise on the topic among their own stakeholders.

### Sustainable foundation of our corporate responsibility

We observe the Finnish Corporate Governance Code for listed companies with certain exceptions, which are described in our own [Corporate Governance](#) document.

At VTT, sustainability is led by an Executive Leadership Team member appointed to supervise sustainability matters, and the measures are coordinated by a task force and VTT's sustainability team, which meet regularly. In addition, the QEHS organisation is responsible for compliance with ISO 9001, ISO 14001 and ISO 45001 standards. We are responsible with our tax policy, and we report on our tax footprint in a transparent manner as part of our financial statements.

The EU's new Corporate Sustainability Reporting Directive (CSRD) will also affect VTT, requiring VTT to develop its sustainability reporting. The work began in 2022 with a double materiality analysis, as part of which we conducted extensive stakeholder interviews during the autumn. The double materiality analysis covers the company's impact on the environment and society as well as financial risks and op-

**Only 0.53  
workplace injuries  
in the VTT parent  
company / million  
hours worked.**



**We focused on sustainable supply chains.**

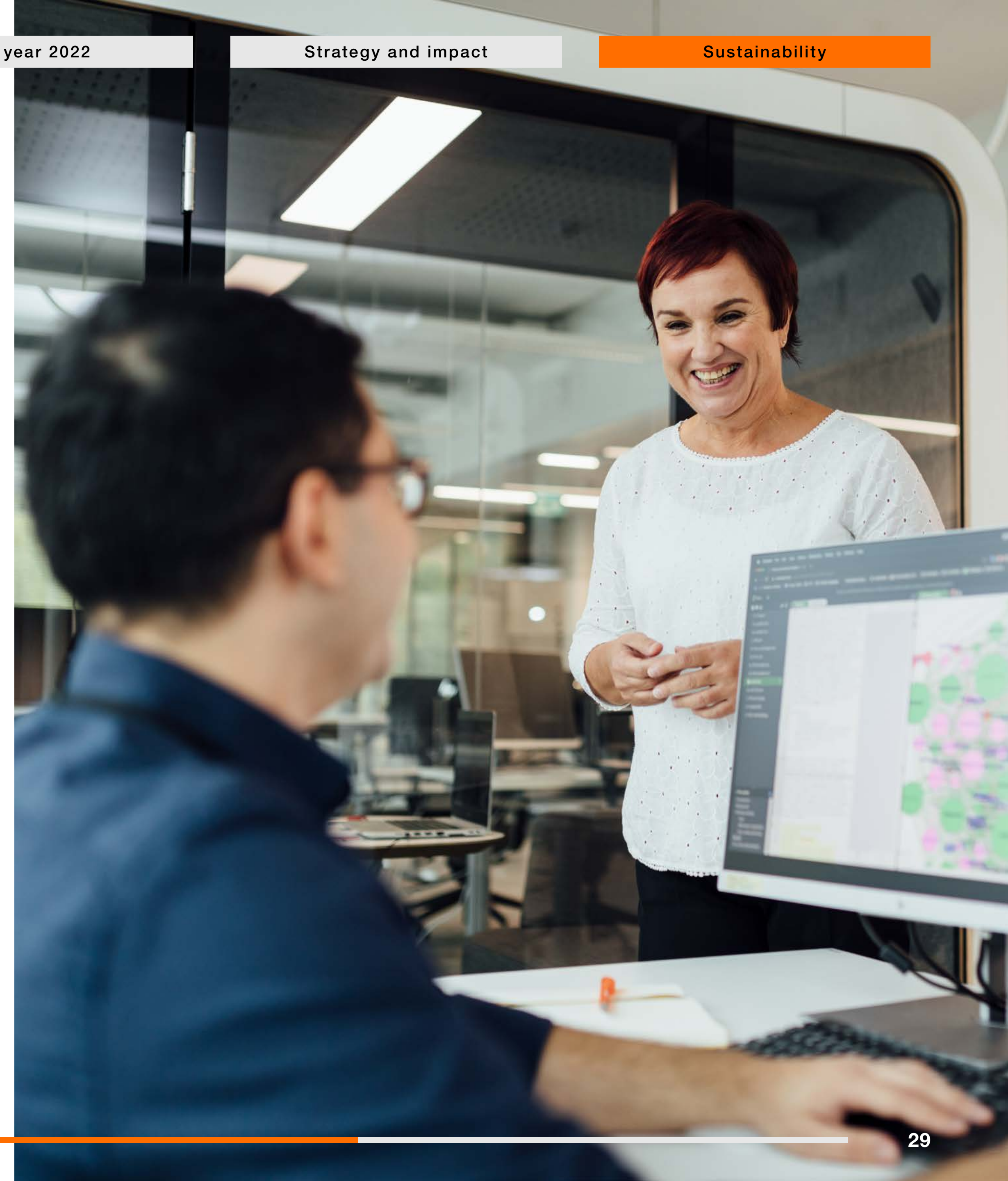
opportunities in relation to sustainability. The analysis approved by the Board of Directors was completed in early 2023.

We observe the Responsible Conduct of Research (RCR) guidelines of the Finnish National Board on Research Integrity. At the beginning of the year, we introduced our updated [Code of Conduct](#), in which we emphasise responsibility and ethical norms as cross-cutting themes in our business operations. The CoC was approved by VTT's Executive Leadership Team and Board of Directors, and all VTTers complete an online course on it every two years.

Each VTTer is committed to the ethical principles of impartiality, reliability, integrity and responsibility. In October 2022, we published an online course on research ethics for our employees, the completion of which is mandatory for most of our employees. In the research teams, we launched workshops on research ethics, safety and DEI (Diversity, Equity and Inclusion) focusing on the specific issues of the team and the research area in each theme. We have also invested in providing and making visible information on responsible research and innovation activities (RRI) in the form of video presentations available on the intranet.

VTT is involved in the UN Global Compact initiative on corporate sustainability. We are a member of FIBS corporate responsibility network, the Climate Leadership Coalition and the Climate Partners. In 2022, VTT actively networked with other research organisations in theme areas related to sustainability. We also emphasised everyday sustainability issues visible to the whole personnel.

We focused on sustainable supply chains, and this work will continue in 2023. To ensure the sustainability of supply chains, we developed sustainability criteria for key procurement areas. The assessment helps us identify risks related to responsibility and determine the appropriate sustainability criteria for different acquisitions. Typical sustainability criteria include the energy efficiency perspective and compliance with the environmental management system certificate in business operations. In addition, suppliers must approve [VTT's Supplier Code of Conduct](#). The application of sustainability criteria will be expanded in 2023.





# VTT's sustainability priorities

VTT's sustainability priorities have been selected on the basis of stakeholder interviews and a materiality analysis.

Sustainability is at the core of our strategy. VTT is a research institute and in accordance with this, its core mission is to develop sustainable solutions and technologies for its customers and society at large.

VTT's sustainability priorities are sustainable foundation, supporting thriving professionals, empowering customers and resilient society. The sustainability priorities have been selected on the basis of a materiality analysis and stakeholder interviews. VTT's sustainability programme, launched at the end of 2021, is built around these focus areas.

In 2022, the sustainability programme's key areas of action included impeccable ethics, sustainable supply chains, promotion of the UN Sustainable Development Goals, reform of sustainability reporting, responsible customer choices, the safety of staff, as well as diversity, equity and inclusion.

**Thriving professionals**  
We treasure safety, wellbeing, diversity and fair treatment of our brilliant minds.

**Empowered customers**  
We help our customers to unleash superior performance and productivity that lead to sustainable growth.

**Resilient society**  
We solve the world's biggest challenges through innovations, research and co-operation.

**Sustainable foundation**  
Our impeccable ethical principles and environmental performance form a solid basis for our research and business.

- 7 AFFORDABLE AND CLEAN ENERGY
- 8 DECENT WORK AND ECONOMIC GROWTH
- 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
- 12 RESPONSIBLE CONSUMPTION AND PRODUCTION
- 13 CLIMATE ACTION



## We invest in the professional excellence and wellbeing of our personnel

VTT is an expert organisation in which continuous learning and competence development are key priorities. In essence, our success is based on excellence in the selected areas and a culture with joy, curiosity and courage as its cornerstones.

**We want to ensure that all new VTTers are properly onboarded and feel that they are welcome just the way they are. It allows them to experience joy, curiosity and courage.**

In 2022, we advanced the work for our corporate culture and emphasised that every VTTer participates and has a role in building our culture – based on joy, curiosity and courage. We continued to actively develop competence related to emotional agency. The target group was expanded from line managers to the whole personnel. Together with our partner, we built an online coaching programme to support learning by having a learning buddy and by organising kick-off events and case clinics. A total of 350 people participated in emotional skills coaching during the year.

The emotional climate survey carried out in spring 2022, showed that the situation had improved in all areas compared to where we started from a year ago. This is an exceptional improvement. Our excellent results attracted great interest, and this theme brought us often into the public eye as a pioneer in the field, even internationally.

We promoted the practices of coaching style leadership by continuing the coaching & feedback training. We organised Manager Toolbox info sessions to provide new line managers with induction into everyday leadership practices. The training modules were attended 119 times. At the end of the year, we launched a virtual individual coaching process on the theme of leadership for the first group. Using a new leadership competence model, we defined what good leadership means at VTT.

We synchronised the operating model and tools used in goal and development discussions with the Objectives and Key Results (OKR) operating model used in our goal setting process.

### Onboarding and new skills

Many new people joined VTT through active recruitment, and providing them with proper onboarding is the key to making them committed VTTers. As the pandemic





situation eased, we reformed the way we arrange onboarding events, taking the needs of hybrid work into account. We welcomed newcomers using two different modules that promote networking and familiarise them with VTT's corporate culture. Nearly 300 new VTTers attended the Discover VTT events.

We continued active project management coaching, with 81 VTTers participating in it. Mentoring remained an important development tool. A total of 57 persons took part in our internal and external mentoring programmes. The LinkedIn Learning offering supported the competence needs of individual employees. We also started a career coaching pilot group.

At the end of the year, we again carried out the Navigator personnel survey, and the response rate remained as high (87%) as in 2021. The overall results were very good; our organisational culture score remained at an excellent level and our promoter score rose. Detailed survey results and measures to be taken on their basis will be discussed in early 2023.

**Supporting mental wellbeing and active lifestyle**

In wellbeing, we focused on increasing physical activity and continued our support for mental wellbeing. We continuously provide our personnel with a comprehensive package of wellbeing services and arrange different campaigns to encourage them to take care of their own wellbeing.

In late spring, after the break caused by COVID-19, we carried out health morning events in different localities with occupational healthcare and other partners. A total of 350 VTTers took part in the morning health checks, during which they could have their blood sugar, blood pressure, intraocular pressure and body composition measured. If the values deviated from the reference levels, we directed the participant to have further checks done at the occupational healthcare.

As spring progressed, we started guided kettlebell and pilates classes in different localities and an online class for those doing physical exercise at home. We also introduced the bicycle benefit for our employees, which was an offer 100 VTTers decided to accept during the year. Gyms in different localities were available for VTTers. And to encourage even more employees to adopt an active lifestyle, we offered guided light outdoor exercise during the midday offline hour. A total of 2,078 VTTers used the sports and cultural services provided by Smartum, and 57% of the benefits were used for sports services.

To support good ergonomics, we organised several events where occupational

55

different nationalities

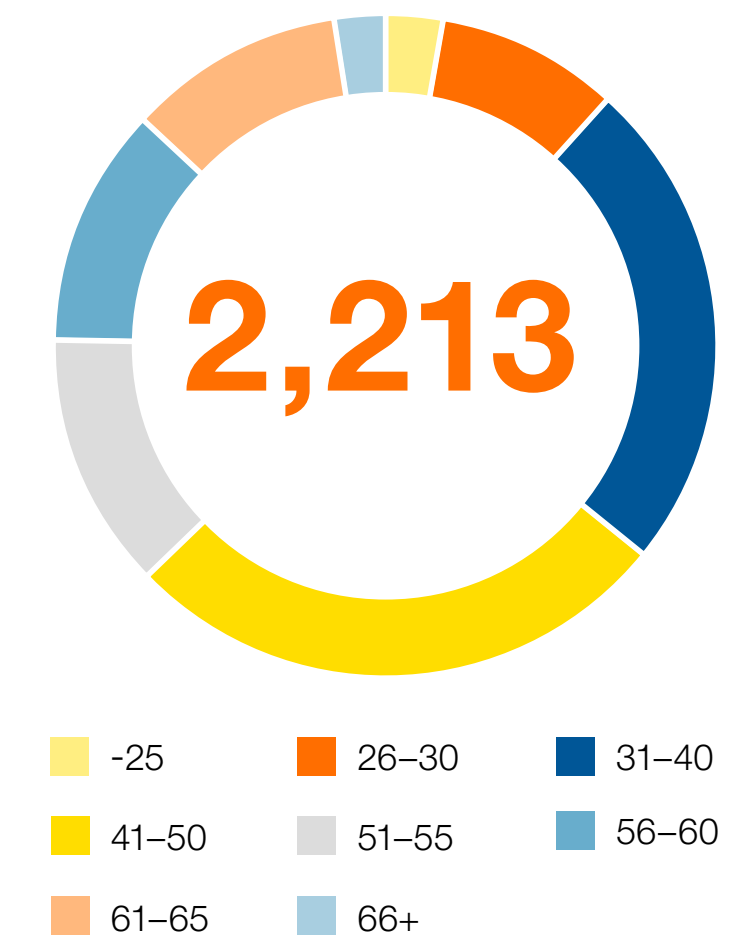
400

new VTTers joined our community

350

participated in emotional skills coaching

Employees by age





physiotherapists talked about good work ergonomics practices and models.

We supported mental wellbeing through lectures on various themes. For young employees, we offered a lecture arranged by an occupational health psychologist and the young people themselves, focusing on professionals at the beginning of their careers and on how they can promote both their own career development and coping at work.

Together with an occupational psychologist from the Finnish Institute of Occupational Health, we discussed returning to office work and hybrid work. Team leaders continued their peer support groups, which focused on supervisory work. Some of the groups were facilitated by an occupational health psychologist.

At the end of the year, we also organised a series of lectures on sleep, delivered by an occupational health sleep coach. The lectures focused on how important sleep is for promoting wellbeing and how to improve the sleep rhythm and sleep better.

We continued the operation of the Wellbeing Champion network established in 2020. It arranged events enhancing wellbeing and promoted the use of wellbeing tools.

In autumn, we offered flu vaccinations for our employees in four localities, and 1,132 VTTers took them.

VTT's pandemic coordination group continued its operation, updating instructions and informing personnel through different channels on a regular basis. The main goal was to ensure that all staff members remain healthy and safe.

### Multi-channel visibility at the core of employer image work

In 2022, we recruited 400 new VTTers, including trainees, of whom 86 were international recruitments. We engaged in regular multi-channel employer image communication to reach our most important target groups and make ourselves better known in different target groups. We built active cooperation with educational institutions, actively participated in events and organised them ourselves. We issued regular social and digital media content to support our employer image in line with our employer image strategy. Our employer image is based on our employer promise: Join us on a journey to a brighter future. VTT is an encouraging and inspiring working community for cutting-edge professionals. We focus on wellbeing.

To attract experts in the green transition, we organised a Green Transition recruitment campaign in August 2022 through which we hired 14 new talents for VTT. The campaign gained extensive attention on both social and digital media, bringing a total of more than one million views. The campaign produced more than 14,000 visits on our campaign website and more than 1,000 applications for green transition positions.



**We provide a comprehensive package of support services to promote employee wellbeing.**

VTT's Summer of Changemakers summer job campaign also reached excellent results: we received more than 2,600 applications for our summer jobs and hired 80 summer trainees through the campaign.

In the employer image survey carried out by Universum among students in spring, we were ranked 17th among natural science students and 27th among engineering students. In the professional survey in autumn, VTT was ranked fourth by natural science professionals and 15th by engineering professionals.

### Rewarding

Rewarding at VTT comprises financial rewards, support for wellbeing at work, corporate culture and development of expertise. Rewarding helps us to implement our strategy and to achieve our goals. We grant most of the financial rewards as recognition rewards in which the focus is on sustainability, promoting excellence and boosting impact. In 2022, the importance of sustainability was also emphasised in other rewarding schemes.

In 2022, a total of 407 VTTers received recognition rewards. The Customer Excellence Reward encouraging teams to achieve excellence in customer work is also an important form of rewarding. The award was granted to six teams (49 people). The Leadership Excellence Reward is intended for VTT management, and its criteria comprise company-level, business area-level and personal targets.



# VTT stakeholder interaction

VTT is engaged in a continuous dialogue with its key stakeholders. Customers, personnel, financiers, owners and the research community are our most important stakeholders.

In addition to engaging in direct communication and discussions with our stakeholders, we also collect information about their views in surveys and interviews, such as customer satisfaction, customer impact and personnel satisfaction surveys, by taking part in the Reputation&Trust survey and by collecting feedback on ownership steering.

Stakeholder group	Customers	Owner	Financiers	Personnel	Research community
Expectations	<ul style="list-style-type: none"> <li>• VTT helps its customers to boost their own expertise and capabilities.</li> <li>• VTT supports the identification and evaluation of new opportunities and accelerates research and product development.</li> <li>• Excellent customer service and smooth, flexible, and data-secure operating methods in projects.</li> <li>• Working with VTT helps customers to establish networks in research and innovation ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>• Being a state-owned company operating in the administrative branch of the Ministry of Economic Affairs and Employment, VTT has corporate social responsibility as its fundamental value.</li> <li>• Owners expect VTT to be a pioneer in the transition to a carbon-neutral circular economy, use of digitalisation, and responsibility.</li> <li>• Responsibility must be a consideration when we set our remuneration criteria.</li> <li>• VTT focuses its services on the strategic priority areas of the Finnish economy, strengthening national and international partnerships between the private and public sector and internationally attractive innovation clusters, and making Finland more appealing to foreign experts and investments.</li> </ul>	<ul style="list-style-type: none"> <li>• A mission-oriented approach and identifying the opportunities arising from global challenges now at the core of institutional and government activities.</li> <li>• With its policies, budgeting and research and development programmes, the European Union is at the forefront of mission-based and sustainability-based thinking, which is also strongly reflected in the funding criteria.</li> <li>• 'Inclusive and competent Finland – a socially, economically and ecologically sustainable society', the programme of Finland's current government, is also phenomenon-based. This is reflected in the expectations and requirements of domestic financiers.</li> <li>• Financiers expect VTT to act in a responsible and ethical manner in matters concerning research content and in its own operations.</li> </ul>	<ul style="list-style-type: none"> <li>• Interesting work content</li> <li>• Meaningful work</li> <li>• Professional development and the opportunity to develop</li> <li>• Competitive pay and other benefits</li> <li>• Good working conditions, good management and a good balance between work and leisure</li> <li>• Fair and just treatment</li> </ul>	<ul style="list-style-type: none"> <li>• Research cooperation in which the expertise and capabilities of the parties involved complement each other in an innovative manner</li> <li>• Cooperation in the use and development of research infrastructure</li> <li>• Research cooperation in innovation ecosystems and research projects</li> <li>• Responsibility in research activities and a focus on projects that promote sustainability and responsibility</li> <li>• Promotion of open science</li> </ul>
VTT's response	<ul style="list-style-type: none"> <li>• Customer satisfaction with our projects remained high (NPS 70).</li> <li>• According to our customer impact survey, 46% of the projects carried out in cooperation with VTT helped customers to integrate into international networks.</li> <li>• VTT promoted customers' responsibility and corporate responsibility (in 75% of the projects where responsibility was relevant).</li> </ul>	<ul style="list-style-type: none"> <li>• VTT promoted sustainable development and wellbeing in Finland by channelling research into the societal, systemic and technological challenges in which it could generate the maximum impact and solve some of the most challenging issues of our time.</li> <li>• Coordinated or implemented by VTT, a number of studies and research projects were under way under the auspices of the Prime Minister's Office. The projects improved the quality and impact of national decision-making by strengthening the knowledge base of the preparation and decision-making in policy matters concerning society at large and the implementation of the decisions.</li> <li>• VTT participated in the flagship programmes of Materials Bioeconomy, the Finnish Center for Artificial Intelligence and Photonics Research and Innovation funded by the Academy of Finland, and in the Centre of Excellence in Quantum Technology.</li> <li>• VTT plays a key role in a number of knowledge and innovation ecosystems that develop special sectoral expertise for Finland and create economic growth for them.</li> </ul>	<ul style="list-style-type: none"> <li>• VTT's strategy and research agenda are steered by the challenge frame. We produce solutions to systemic and technological challenges and support society in the challenges it faces.</li> <li>• Our strategy brings experts together to produce effective solutions to the climate crisis, resource sufficiency, industrial renewal, safety and security and good life.</li> <li>• VTT's research agenda is also in line with the UN's Sustainable Development Goals.</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous investment in fair and coaching-oriented management. Coaching programmes for coaching-oriented management and emotionally intelligent management intended for staff members in supervisory tasks.</li> <li>• Staff members' wishes for the development of work and competence and their wellbeing are highlighted in goal and development discussions.</li> <li>• The Navigator personnel survey provides an opportunity to hear staff members' views on their expectations and to what extent they have been realised. The results published at the end of 2022 were excellent.</li> <li>• In addition to VTT's reputation, interesting tasks that offer opportunities to develop yourself are highlighted as the key factors strengthening commitment in the personnel survey.</li> <li>• Investing in comprehensive physical and mental wellbeing and creating an extensive wellbeing programme help our staff members to cope at work and achieve the right balance between work and leisure time.</li> <li>• With its rewarding policy, VTT aims to ensure a fair, transparent and competitive approach to remuneration.</li> </ul>	<ul style="list-style-type: none"> <li>• Joint research projects and research collaboration with international research communities, organisations and companies</li> <li>• Joint scientific publications</li> <li>• Visiting researchers and professors</li> <li>• Partnership cooperation</li> <li>• Participation in international research seminars</li> </ul>



## Towards carbon neutral VTT

VTT's goal is to be carbon neutral by 2030. In 2023, we aim to set concrete targets for reducing emissions and define a more precise path towards the carbon neutrality goal.

**We continued to systematically reduce our energy emissions.**

In 2022, we continued to implement our carbon neutrality target in different parts of the organisation. The organisation's carbon footprint was selected as one of VTT's internal key indicators. We also started collecting carbon footprint data related to procurement and arranging events. In the future, when arranging competitive tendering, we will always ask the suppliers to provide calculated data on their emissions.

In the area of our research activities, we tested calculating carbon footprint and carbon handprint in a few early-stage research projects. The aim is to further develop project-specific environmental impact assessment and to identify projects for which a carbon handprint could be created in the future.

### **After the pandemic, attention to air travel and energy consumption**

The work-related international travel, which stopped almost completely during the pandemic, returned to its normal level in 2022. As expected, the growth in the number of flights increased VTT's other indirect emissions (Scope 3) compared to the previous two years. In 2023, we will continue to update our travel guidelines and consider how best to combine international cooperation and the targets for reducing emissions from travel.

During 2022, we continued our systematic work to reduce emissions from electricity and heat consumption (Scope 2) and to develop the calculation of other indirect emissions (Scope 3). Renewable electricity verified with a guarantee of origin covers 93% of VTT's electricity consumption. We launched an internal development project aimed at improving the monitoring of building-specific energy consumption so that we could set reasonable reduction targets in the future. For the time being, we decided not to offset our emissions but to invest in energy efficiency. We believe that we can still identify more areas where we can reduce consumption and, therefore, our emissions.





In 2023, we aim to set concrete targets for reducing emissions.



**We specify reduction targets**

In 2023, we aim to set concrete targets for reducing emissions and to define a more precise path towards a carbon neutral VTT. In the target setting, we will take into account both direct and indirect emissions and energy indirect emissions (Scope 1–3). We will actively monitor the development of international calculation guidelines and standards and update our own calculation methods and data collection.

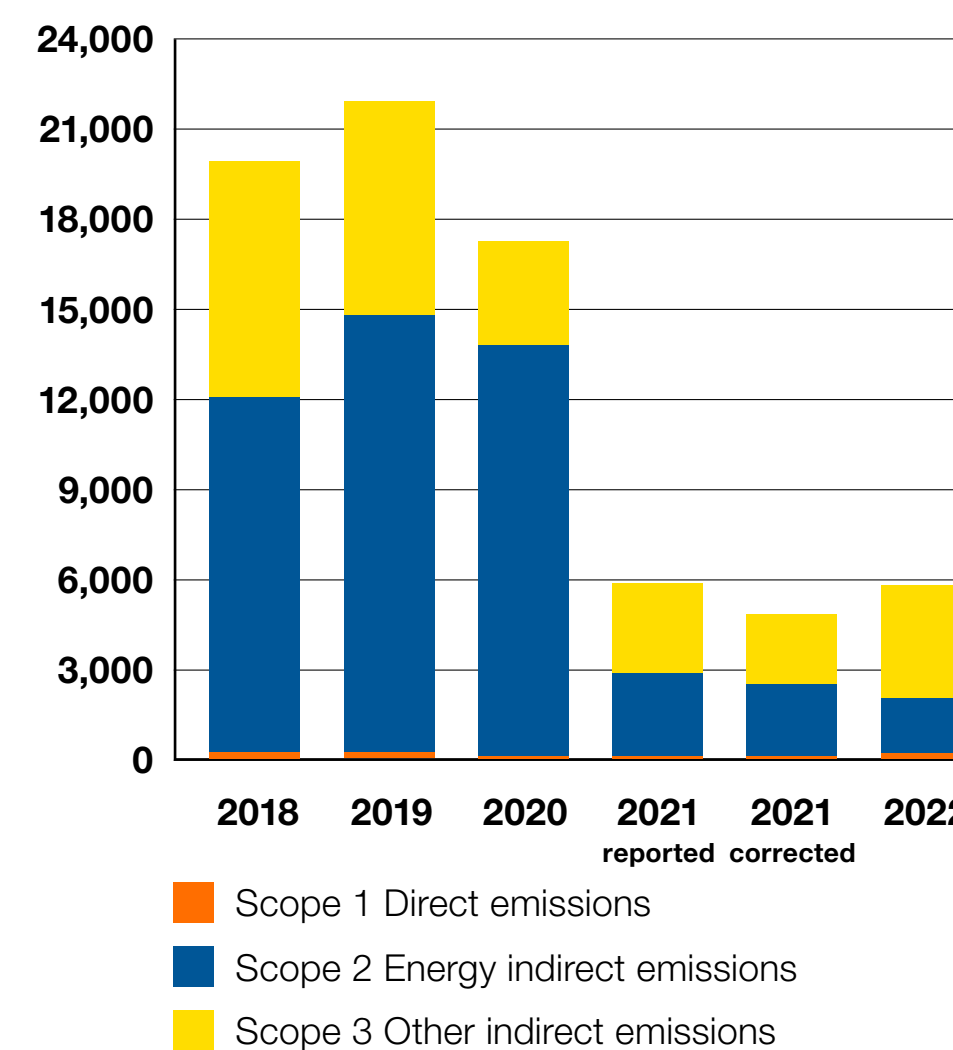
VTT's goal is to be carbon neutral by

**2030**

Share of renewable electricity verified with a guarantee of origin

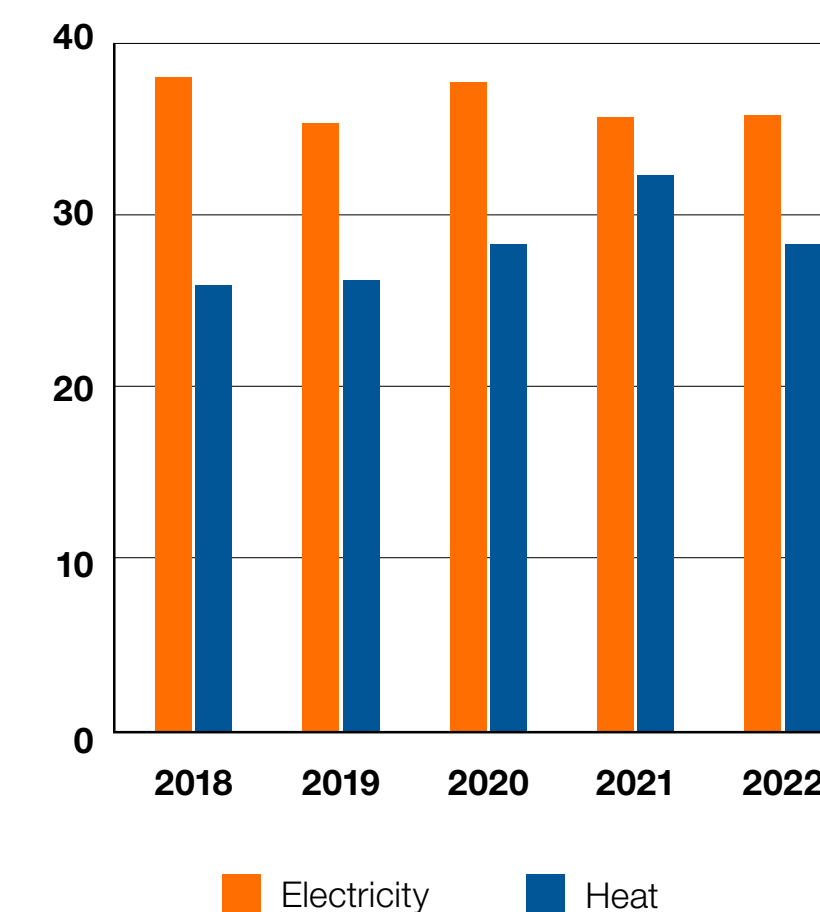
**93%**

VTT's estimated GHG emissions (as tonnes of CO<sub>2</sub> eq)\*



\* VTT's estimated GHG emissions (as tonnes of CO<sub>2</sub> eq) from years 2018-2022. Emissions from 2021 are reported with corrected information. Assessment was conducted according to the main principles of ISO14641-1 and the GHG Protocol.

Consumption of electricity and heat, GWh





# GRI index

GRI Standards disclosure		Location
<b>GRI 2: General disclosures (2021)</b>		
<b>Organizational profile</b>		
2-1	Organizational details	<a href="#">VTT as a company</a> <a href="#">Key facts of VTT</a> <a href="#">Contact details</a>
2-2	Entities included in the organization's sustainability reporting	<a href="#">Management approach</a>
2-3	Reporting period, frequency and contact point	Reporting period 1.1.2022-31.12.2022. Publication date 31.3.2023. Frequency: Annually. Contact point: <a href="mailto:kirjaamo@vtt.fi">kirjaamo@vtt.fi</a>
2-4	Restatements of information	No major changes
2-5	External assurance	No external assurance
<b>Activities and workers</b>		
2-6	Activities, value chain and other business relationships	<a href="#">VTT as a company</a>
2-7	Employees	<a href="#">Employees by contract types</a>
<b>Governance</b>		
2-9	Governance structure and composition	VTT's Board has audit and remuneration committees. <a href="#">VTT's corporate governance</a> <a href="#">Tax footprint, management and control 2022 annex</a> <a href="#">VTT Board</a>
2-10	Nomination and selection of the highest governance body	<a href="#">VTT Board</a>
2-11	Chair of the highest governance body	<a href="#">VTT Board</a>
2-15	Conflicts of interest	<a href="#">Tax footprint, management and control 2022 annex</a> , p. 4
2-19	Remuneration policies	<a href="#">Tax footprint, management and control 2022 annex</a>
2-20	Process to determine remuneration	<a href="#">Tax footprint, management and control 2022 annex</a>
<b>Strategy, policies and practices</b>		
2-22	Statement on sustainable development strategy	<a href="#">Annual report</a> , pp. 10-12
2-23	Policy commitments	<a href="#">Code of Conduct</a> <a href="#">Management approach</a> <a href="#">Operating system</a> <a href="#">Administration</a> <a href="#">Gender equality plan</a>
2-24	Embedding policy commitments	<a href="#">Code of Conduct</a>
2-25	Processes to remediate negative impacts	<a href="#">Whistleblowing channel</a> <a href="#">Tax footprint, management and control 2022 annex</a>
2-26	Mechanisms for seeking advice and raising concerns	<a href="#">Whistleblowing channel</a>
2-27	Compliance with laws and regulations	No compliance breaches have been identified
2-28	Membership associations	<a href="#">Annual report</a> , pp. 25 & 28-29 VTT is also a member of Palta ry.



GRI Standards disclosure		Location
<b>Stakeholder engagement</b>		
2-29	Approach to stakeholder engagement	<a href="#">Annual report</a> , p. 34
2-30	Collective bargaining agreements	100%, only top management is outside collective bargaining agreements
<b>GRI 3: Material Topics (2021)</b>		
3-1	Process to determine material topics	<a href="#">Management approach</a> <a href="#">Materiality matrix 2020</a> <a href="#">Double materiality assessment</a>
3-2	List of material topics	<a href="#">Materiality matrix 2020</a> <a href="#">Double materiality assessment</a>
<b>ECONOMIC STANDARDS</b>		
<b>GRI 201: Economic performance (2016)</b>		
201-1	Direct economic value generated and distributed	<a href="#">Annual report</a> , p. 8
201-4	Financial assistance received from government	<a href="#">Annual report</a> , p. 8
<b>GRI 205: Anti-corruption (2016)</b>		
205-2	Communication and training about anti-corruption policies and procedures	Anti-corruption is part of mandatory Code of Conduct e-training for all employees (completion rate 91%).
205-3	Confirmed incidents of corruption and actions taken	No confirmed incidents.
<b>GRI 207: Tax (2019)</b>		
207-1	Approach to tax	<a href="#">Tax footprint, management and control 2022 annex</a>
<b>ENVIRONMENTAL STANDARDS</b>		
<b>GRI 302: Energy (2016)</b>		
302-1	Energy consumption within the organization	<a href="#">Consumption of electricity</a> <a href="#">Consumption of heat</a>
<b>GRI 303: Water and Effluents (2018)</b>		
303-5	Water consumption	<a href="#">Water consumption</a>
<b>GRI 305: Emissions (2016)</b>		
305-1	Direct (Scope 1) GHG emissions	<a href="#">GHG emissions</a>
305-2	Energy indirect (Scope 2) GHG emissions	<a href="#">GHG emissions</a>
305-3	Other indirect (Scope 3) GHG emissions	<a href="#">GHG emissions</a>
<b>GRI 306: Waste (2020)</b>		
306-3	Waste generated	<a href="#">Amount of waste</a>



GRI Standards disclosure		Location
<b>SOCIAL STANDARDS</b>		
<b>GRI 401: Employment (2016)</b>		
401-1	New employee hires and employee turnover	<a href="#">New employee hires</a>
401-3	Parental leave	<a href="#">Parental leave</a>
<b>GRI 403: Occupational health and safety (2018)</b>		
403-1	Occupational health and safety management system	<a href="#">Management approach</a>
403-2	Hazard identification, risk assessment, and incident investigation	<a href="#">Management approach</a>
403-3	Occupational health services	<a href="#">Management approach</a>
403-4	Worker participation, consultation, and communication on occupational health and safety	<a href="#">Management approach</a>
403-5	Worker training on occupational health and safety	<a href="#">Management approach</a>
403-6	Promotion of worker health	<a href="#">Management approach</a> <a href="#">Annual report</a> , pp. 28 & 31-33
403-7	Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	<a href="#">Management approach</a>
403-8	Workers covered by an occupational health and safety management system	Whole VTT Group personnel are within OHS management system.
403-9	Work-related injuries	<a href="#">Work-related injuries</a>
<b>GRI 404: Training and education (2016)</b>		
404-1	Average hours of training per year per employee	<a href="#">Training expenses and days</a>
<b>GRI 405: Diversity and equal opportunity (2016)</b>		
405-1	Diversity of governance bodies and employees	<a href="#">Age structure and gender distribution</a> <a href="#">Share of men and women</a> In VTT's Board there are 3 women and 4 men.
<b>GRI 406: Non-discrimination (2016)</b>		
406-1	Incidents of discrimination and corrective actions taken	No confirmed incidents
<b>GRI 415: Public policy (2016)</b>		
415-1	Political contributions	No contributions have been rendered.



# bey<sup>0</sup>nd

the obvious