

# Annual report 2018





## VTT in brief

VTT is a visionary research, development and innovation partner. We help society to develop and businesses to grow through technological innovations. According to our brand promise, we challenge ourselves and our partners.

We have more than 75 years of experience of cutting-edge research and science-based results. Smart industry and energy systems, knowledge-intensive products and services as well as solutions for natural resources and the environment are at the core of what we do.

We are driven by global challenges that we turn into opportunities for sustainable growth. The National Metrology Institute of Finland, a national standards laboratory MIKES is part of VTT.

**VTT creates impact by matching innovations and business.**

Read more about VTT [>](#)

**VTT**  
beyond  
the obvi

ANNUAL REPORT 2018

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# Tackling the biggest challenges of our time

We strive to understand the needs and opportunities of businesses and society. We help to meet these needs by co-developing impactful scientific and technological solutions. In this way, we help our customers to succeed and promote sustainable growth and wellbeing in society.



# Greetings from the President & CEO

The year 2018 was a good year for VTT. Thinking back to everything that the year threw at us, I am proud to say that our customer work and research were successful on many fronts.

We have focused our attention on global challenges that we seek to overcome in order to have an impact and give benefits to our customers. Our goal is to be an agile and customer-centric service organisation.

Our chosen path has proven to be the right one. There are numerous examples of how our strategy helped to boost Finland's competitiveness and our customers' growth in 2018. One of the most notable recognitions for our work was the fact that the Finnish Government permanently increased our annual government grant by EUR 7 million as of the year 2019.

However, no one can afford to rest on their laurels in a world where both problems and competition are global. And we have no intention of doing so, as we pledged in August in our new brand promise: **"VTT – beyond the obvious"**. We have devised a number of ways to deliver this promise and also adopted a new visual look to reflect it.

The year 2018 was also successful in terms of our cooperation with our customers. Our sales grew and exceeded our targets. Maintaining excellent customer satisfaction was an important priority for us. We came through this challenge with flying colours,

and our work on a more customer-centric approach continues.

We continued to fine-tune our mission and emphasise the fact that our focus is on tackling global problems. We hosted a number of Growth Labs to brainstorm ways to turn challenges into opportunities with our customers, partners and decision-makers. Our specialists explore these opportunities in more detail in their **Growthcasts**. Our new **iBEX programme** is designed to give us an even more solution-orientated approach to research, and VTT is also actively building and developing innovation ecosystems in order to come up with new solutions. Our innovative technology incubator **VTT LaunchPad** continues to bring engineers, entrepreneurs and businesses together. Its aim is to create startups that can revolutionise industries based on our research.

VTT's pursuit of more competence is driven not only by our ever-changing operating environment but also by our new **Excellence Advisory Board**, which is comprised of international innovation leaders and which convened for the first time in October. I am grateful to these top experts for the time they have already contributed to VTT and therefore the whole of Finland. To quote the Chair of our Board Aaro Cantell, it is vital for Finland's success and competitiveness that VTT meets its goals.



I would like to thank all our customers and staff for a successful year. I also need to thank our extensive network of partners.

**President & CEO**

Antti Vasara

**"Our chosen path has proven to be the right one. Our strategy is helping to boost Finland's competitiveness and our customers' growth."**



# Greetings from the Chair of the Board

VTT's most important mission is to develop high-tech expertise in Finland and therefore to guarantee that Finland has both sufficiently versatile technological know-how and sufficiently profound world-class expertise in different industries and research areas.

**“VTT brings different operators together to work in closer cooperation on research and development projects.”**



Finland wants to be the best place for businesses to develop new products and services. Finland has world-class innovation ecosystems (competence clusters of businesses, research teams and other operators) in several fields, such as radio technology, machine assembly, the maritime industry, forestry and the energy sector.

## Strength and impact from ecosystems

According to its new strategy adopted in 2016, VTT strives to identify and strengthen the kinds of competence and innovation ecosystems that are, or will be in the future, vital for the regeneration and growth of businesses operating in Finland. VTT brings different parties together to work in closer cooperation on research and development projects. As technological challenges grow more and more complex, no business or research team is able to produce all the technological information or expertise it needs alone. Everyone depends on the competence and cooperation of various kinds of partners.

Innovation ecosystems have traditionally been regional. Typically, they are born and evolve the fastest in areas where there is world-class expertise and where new business and research happen the most. Finland is competing with other countries over where businesses and their product development organisations can find the best experts and innovation ecosystems. Global Finnish businesses that operate in Finland may not need Finland to succeed, but Finland needs leading world-class businesses and their research and product development to maintain the competitiveness of our own innovation ecosystems.

VTT is not only Finland's most important competence cluster for applied research but also a catalyst, i.e. an organisation dedicated to pooling Finnish innovation ecosystems and strengthening their competitiveness. VTT wants to give Finland new regional innovation ecosystems and make the current leading areas even stronger as global pioneers. If we succeed, we can inject businesses operating in Finland with more competitiveness and growth. Growing and evolving businesses are where the jobs and tax revenue lie, and on which Finland's wellbeing and future depend. VTT's objectives are exactly the same as Finland's. Finland's success and VTT's success are therefore inherently linked.

## Chair of the Board

Aaro Cantell

[Get to know the VTT Board](#) >



# VTT 2018 in figures

VTT's goal is to help our customers and society to grow and regenerate through applied research. We make impact through scientific and technological excellence.

The year 2018 was a successful one for us in many ways. We are especially pleased with the increase in our revenue from customer and EU projects and successes with the commercialisation of technology developed by us. We went from 21st to fourth in the European Research Ranking, which measures success in EU funding applications.

These figures reflect our performance in 2018. VTT does well when our customers do well, and we are therefore pleased to have launched as many as eight innovation ecosystems in 2018 to network our various partners. VTT creates impact by matching innovations and business.

## Net turnover and other operating income:

EUR 268 MILLION

## Personnel on 31 December 2018:

2,049

## Doctors and licentiates:

31.2 %

## International scientific articles:

486

## Patent families on 31 December 2018:

363

## Invention disclosures:

239

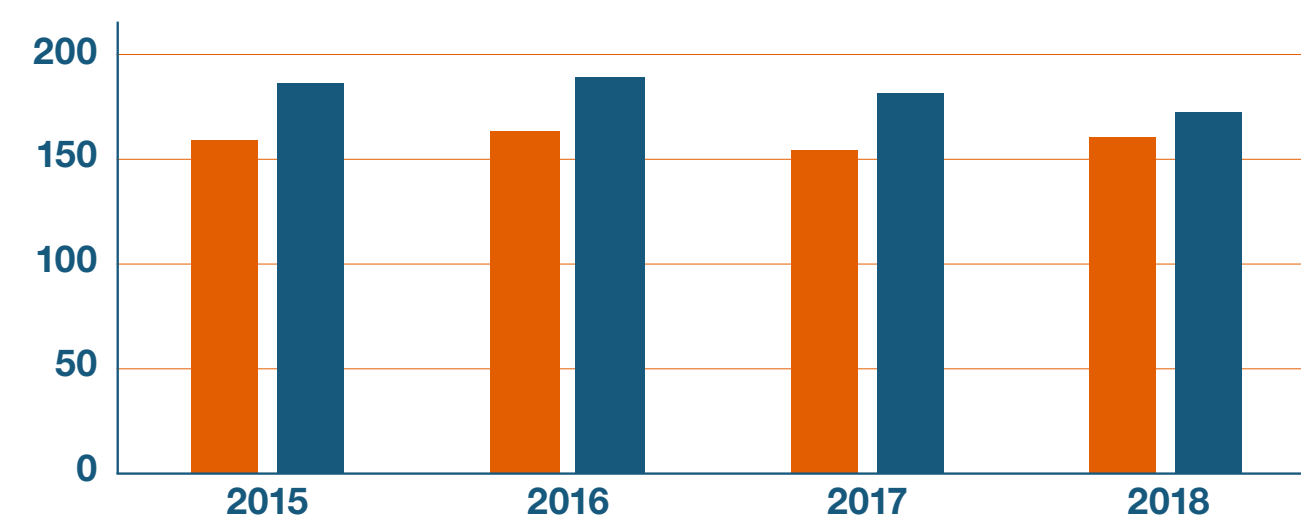
The figures are for the entire VTT Group. At the end of the financial year, VTT Group consisted of the parent company and three subsidiaries: [VTT Memsfab Ltd](#), [VTT Ventures Ltd](#) and [VTT International Ltd](#). VTT divested its commercial testing, inspection and certification service businesses VTT Expert Services Ltd and Labtium Ltd to Eurofins Scientific Group on 31 May 2018, as these kinds of commercial operations are not compatible with VTT's strategic mission to promote innovation through science and technology. VTT Expert Services Ltd and Labtium Ltd are included in the consolidated figures until the day of the sale.

[Find out more about VTT's organisation](#) >



# Financial statements

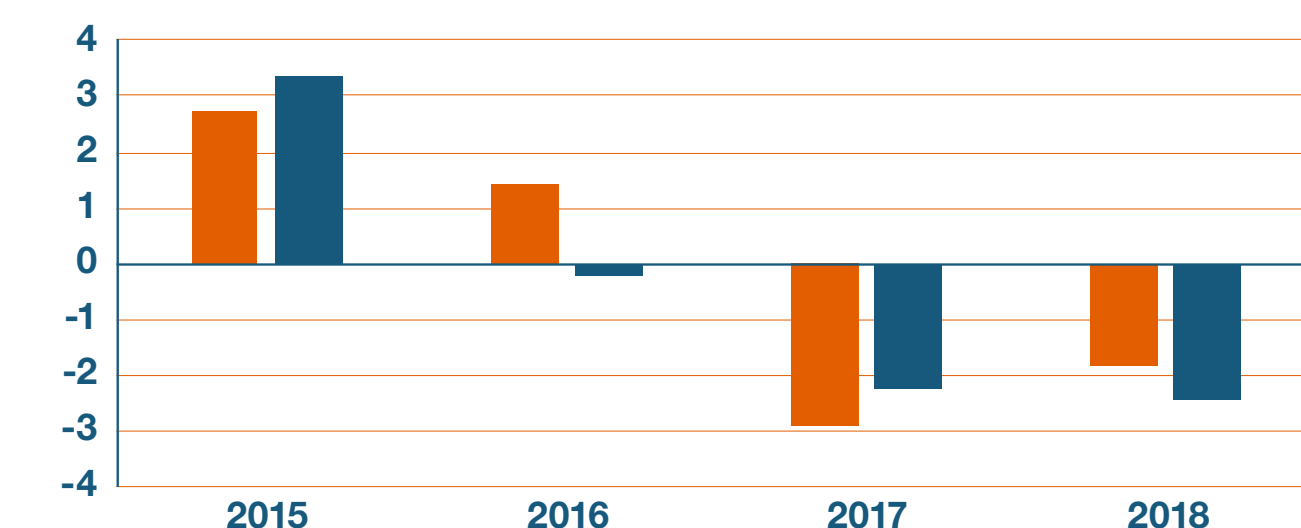
## NET TURNOVER M€



The parent company's **net turnover increased by 4.3%** during the financial year, but the Group's net turnover decreased due to the divestment of subsidiaries\*\*. The growth of the parent company's net turnover was mainly due to EU funding and the growth of commercial business.

■ Parent company ■ VTT Group

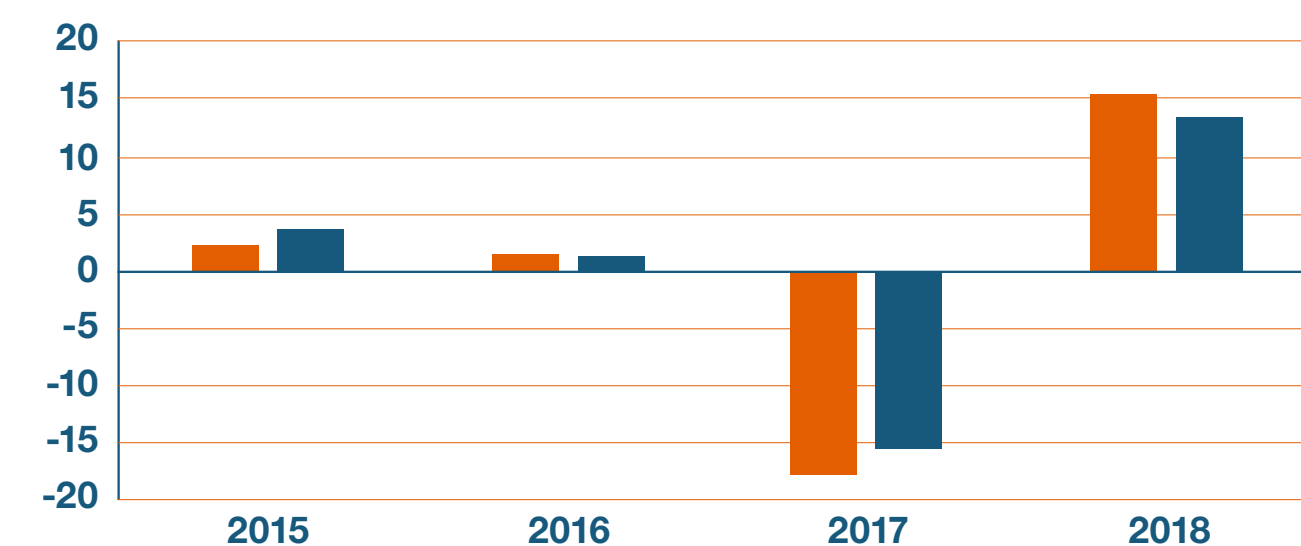
## COMPARABLE OPERATING RESULT M€



The parent company's **comparable operating result before special items\* has developed positively** but remains slightly negative.

■ Parent company ■ VTT Group

## RESULT OF THE FINANCIAL YEAR M€



The Group's **result of the financial year was positive** mainly due to the divestment of subsidiaries\*\* during the financial year.

■ Parent company ■ VTT Group

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 Employment and the Economy. According to the law VTT is an independent and impartial research organization. VTT operates as a research, development and innovation partner to help the society and companies to grow through technological innovations.

Finland's innovation funding has declined significantly for several years, which has also affected VTT's income financing and operating result. In the autumn of 2018, the Finnish government made decisions, which aim at stopping the decline of research and innovation funding. For example, the government increased the annual government grant received by VTT by seven million euros from 2019 onwards.

## KEY FINANCIAL FIGURES

	VTT Group			Parent company		
	2018	2017	2016	2018	2017	2016
Net turnover (1,000 euros)	171,163	180,219	188,378	159,785	153,183	162,572
Other operating income (1,000 euros)	96,738	77,345	80,875	81,286	82,372	86,430
Government grant	71,135	73,154	77,235	71,135	73,154	77,235
Other	25,603	4,191	3,640	10,151	9,218	9,195
Operating result before special items* (1,000 euros) (operative, unaudited)	-2,395*	-2,245*		-1,821*	-2,883*	
Operating result (1,000 euros)	9,876	-17,536	-244	-7,794	-18,175	1,442
Operating result (%)	5.8	-9.7	-0.1	-4.9	-11.9	0.9
Result of the financial year (1,000 euros)	13,503	-15,458	1,259	15,480	-17,677	1,538
Return on equity (%)	10.0	-11.7	-1.1	7.5	-14.1	1.0
Equity ratio (%)	66.3	59.6	67.3	64.6	58.3	66.9

VTT Technical Research Centre of Finland Ltd's net turnover consisted of 62% public sector revenue (Group 58%) and of 38% private sector revenue (Group 42%). The domestic revenue accounted for 55% (Group 56%) and foreign revenue for 45% (Group 44%) of the net turnover. Of the foreign revenue 68% came from Europe, 12% from North and South America, 20% from Asia and less than 1% from elsewhere.

\* Comparable operating result before special items does not include increase in provisions (2017: 15.3 M€ 2018: 5.4 M€) for the future costs of decommissioning of FIR1 research reactor and restoration of old hotcell premises. In addition, the Group's operating result before special items (\*) does not include the proceeds from the divestment of the subsidiaries. In the parent company the proceeds from the divestment are presented in the financial income, not in the operating result. The Finnish government decided on a 13.5 million euro budget authority in the 2019 state budget for the decommissioning of the FIR1 research reactor and restoration of old hotcell premises.

\*\* VTT divested VTT Expert Services Oy and Labtium Oy, which offer testing, inspection and certification services, to Eurofins Scientific Group on May 31, 2018, as such commercial service activities are not related to VTT's strategic task of supporting innovation through science and technology. VTT Expert Services Oy and Labtium Oy are included in the Group's figures until the date of sale.



## STRATEGY

# A bright future through scientific innovations

We make an impact through scientific and technological excellence. Demanding global challenges and customers help us to continuously improve our know-how and competence.





# Strategy

A challenge-driven approach and excellence in science and technology are at the core of our strategy. We help businesses to succeed in the face of current and future challenges and promote sustainable growth and wellbeing in society.

**We turn challenges into opportunities for business growth.**

A challenge-driven approach means focusing on global challenges, understanding our customers' needs and recognising their opportunities. We strive to turn challenges into opportunities for growth. This is how we make an impact.

Our impact is based on our excellence – the fact that our operations and competence are at the cutting edge. We learn and become better by working with demanding problems and customers.

In other words, VTT is driven by major challenges that offer potential for growth. We call these themes our Lighthouses.

You can learn more about VTT Lighthouses on our

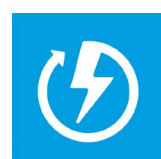
[website](#). [“VTT Lighthouses – growth opportunities for industry and society”](#), which we published in early 2018, is also worth a read. Growth Labs were held on three of the lighthouse themes in 2018. Read more about our [climate action event](#) (in Finnish).

VTT's iBEX programme brings together experts from different fields to tackle global challenges. There were [10 iBEX projects](#) in 2018, which are worth exploring. One of them was a project called PlastBug, which reached the top three in the Finnish Environment Institute's [Meriroskahaaste brainstorming competition](#). The PlastBug team is developing plastic-eating microbes to convert waste into new raw materials. The aim is to reduce the amount of waste that ends up in the Baltic Sea.

VTT's six strategic development programmes were completed in 2018. Their aim was to implement the new strategy and to come up with new operating models to improve VTT and the ways we operate. One of the new operating models is based on competence clusters called substance nodes that bring together experts from different parts of the organisation. We have also used Lean principles to introduce dozens of small improvements to our daily routines and practices. Our new operational plans are now being piloted in different Business Areas to continue their implementation in practice.

Read more information about [VTT's strategy for the years 2016–2020](#).

## FIVE VTT LIGHTHOUSES STEER ALL OUR RESEARCH SUSTAINABLY:



Climate action



Resource sufficiency



Good life



Industrial renewal



Safety and security

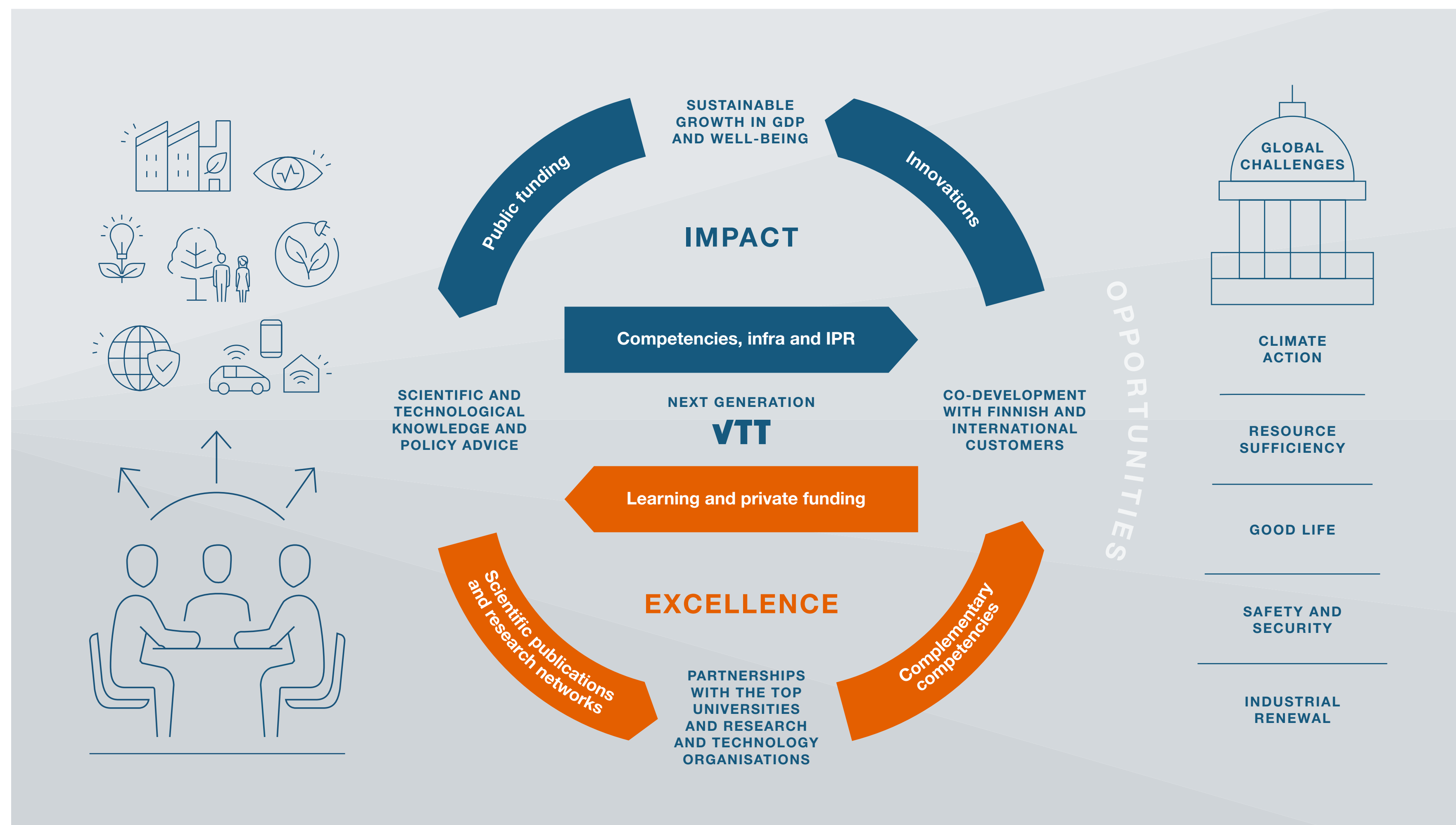


## IMPACT FROM VTT:

- 1** We work in a **challenge-driven** way to create solutions to the current and future needs of our customers and society.
- 2** We formulate our research agenda based on **future market growth opportunities** (lighthouses).
- 3** We co-develop with customers according to differentiated **service models** matching their needs.
- 4** We **proactively** bring different customers and partners **together** around ambitious innovation initiatives.

## EXCELLENCE FROM VTT:

- 5** We want to learn and improve. That's why we continuously **evaluate the impact** of our work.
- 6** We always improve our way to **lead people and substance** to ensure excellence and continuous competence development.
- 7** We work with leading **international customers and partners** to further develop our competencies and identify new growth opportunities.
- 8** We **invest in excellence** through funding from multiple public and private sources.





## IMPACT

# We make a long-term impact

We help our customers and society to grow and regenerate through applied research. By solving global challenges, we are also building wellbeing for future generations.



# Climate action – Clean energy for the future

**Urgent action is needed in all the sectors that produce greenhouse gas emissions.**

When it comes to climate, everything has an impact. The IPCC's 2018 climate report was a wake-up call: we need to slow down climate change. Thankfully, we can. We have the tools. They need to be adopted soon – and by everyone.

**C**lose to 200 countries have committed to the Paris climate agreement, which aims to keep global warming below 2 °C. Urgent action is therefore needed in all the sectors that produce greenhouse gas emissions. Finland has also set an ambitious target to increase the use of renewable energy to more than 50% of the country's final energy consumption by 2030.

Countless mechanical devices, buildings, vehicles and industrial processes need to be modified and modernised to improve energy efficiency and to lower emissions. The emergence of "prosumers" is transforming energy markets. Innovations for producing low-carbon energy from a wide range of sources are required more urgently than ever.

VTT fosters novel energy and fuel production technologies and digitalisation as opportunities to promote a systemic energy revolution.



## Carbon handprint – a measure of a product's positive climate impacts

Everyone knows what a carbon footprint is, but we – together with the Lappeenranta University of Technology and Finnish businesses – have come up with the concept of a carbon handprint. The carbon handprint is an environmental indicator for evaluating the positive climate impacts of products.

**Find out more** [➤](#)

## Smart Otaniemi puts together the building blocks of a smart energy future

VTT is coordinating an ecosystem known as Smart Otaniemi and its development in close cooperation with a network of universities and businesses. Smart Otaniemi is a platform for experimenting with a smart and flexible energy system that brings together specialists, businesses, technologies and pilot projects.

**Find out more** [➤](#)

**Smart Otaniemi home page** [➤](#)



# Resource sufficiency – Prosperity from resource wisdom

**We need sustainable solutions for ensuring prudent and efficient use of resources.**

If everyone consumed as much as the Finns, we would need the natural resources of three planets. We need to become prudent consumers and only produce enough for what we use and need, without stockpiling. Advancements in automation and logistics are a big help. Customised manufacturing and smaller yet still profitable production batches also help to reduce wastage. In terms of food production, finding sustainable sources of protein is vital.



**S**ocial changes, urbanisation and growing prosperity have led to increased exploitation of natural resources. This poses social challenges and a problem for the planet's carrying capacity.

VTT recognises the need for sustainable, resource-efficient solutions, such as renewable raw materials and a circular economy. The challenges can be overcome with the help of resource wisdom. Harnessing new technologies to make more efficient use of raw materials and waste creates new economic potential.

Several industrial sectors can benefit from renewable and unconventional raw materials, such as forest biomass and carbon dioxide. Product design can be used to ensure the high performance of consumables produced according to demand. Food produced by non-conventional means can help to feed the growing population while conserving water and the environment.

## Roadmap to sustainable economy

VTT's roadmap steers resource sufficiency towards a modern, sustainable economy in which materials and the associated information and value circulate together for as long as possible and as many times as possible. We need to become prudent consumers and only produce enough for what we use and need, without stockpiling.

**Find out more** [➤](#)

## New material developed by VTT provides an alternative for plastic

Plastic substitutes are in high demand, as the world's oceans alone contain approximately one hundred million tonnes of plastic waste. One new alternative is a 100% bio-based, thermoformable and biodegradable material developed by VTT. It can be used to replace traditional industrial plastics made with fossil raw materials.

**Find out more** [➤](#)



# Good life – Improved quality of life, work, health and wellbeing

**Society is facing a number of major challenges. We can overcome them.**

The population keeps growing, and people are living longer and longer lives. The labour market is changing: while some jobs disappear, others are created. Urbanisation continues. The built environment is evolving with services becoming integrated into buildings and stand-alone devices and systems becoming obsolete. We need to be able to take care of everyone – for their health, information security and otherwise. There are high expectations for artificial intelligence.

**M**ajor global challenges affect us every day. Growing health care costs together with population ageing call for a paradigm shift towards the efficient prevention of diseases and participatory and personalised health care. The labour market is in turmoil, as traditional jobs are disappearing due to the automation of knowledge work as well as robotisation. The close interaction between humans and technology is especially evident in the context of devices that we use both at work and at home. Instead of making our lives easier, they can actually increase our stress levels. Urbanisation and changes in infrastructure put pressure on the design of our living environment.

Finland has the ability to answer these challenges thanks to its well-educated population, high level of trust in society and large number of growth-oriented companies. VTT develops new technology, service concepts and business models that also genuinely benefit the individual.



## Fewer diseases, lower health care costs, better health and more wellbeing

VTT and the Finnish Institute of Occupational Health are building an ecosystem to increase the wellbeing of Finnish workers. The ecosystem promises to introduce a new approach to wellbeing at work and harness modern technology – such as artificial intelligence – to enable the adoption of new, globally competitive solutions in the health technology sector. The aim is to promote the population's fitness for work and wellbeing.

**Find out more (in Finnish)** [➤](#)

## Overcoming antimicrobial resistance

VTT has developed a vaccine that can be mixed with drinking water to treat diarrhoea in piglets during weaning. It helps to alleviate the worldwide problem of antimicrobial resistance, which, according to the WHO, has become a global threat to health.

**Find out more** [➤](#)



# Safety and security – Resilience in a turbulent world

**A safe society in the future will rely on the early identification of threats, contingency planning and fast recovery.**

The world is now safer than ever before. However, no one and nothing can live in a bubble. Exposure to unanticipated incidents is increasing, and their impacts can be huge. Access to vital resources such as water and energy needs to be ensured in all circumstances. This protects people, businesses and society's basic functions in a changing world while guaranteeing possibilities for growth.



In our turbulent world, unexpected and sudden changes can lead to catastrophic effects. We are becoming increasingly vulnerable to both natural and man-made threats. The survival of societies in all circumstances requires the ability to ensure the safety and security of people and the continuity of public and private functions in the event of faults. A safe society in the future will rely on the early identification of threats, contingency planning and fast recovery.

VTT helps different industries to ensure safety and security through new technologies, innovations and services. Even complex systems are designed with inherent safety, flexibility and adaptability in mind and are tested thoroughly. This allows the full potential of innovations to be exploited safely and securely in an increasingly digital society.

Solutions that protect us against threats are critical to a carefree lifestyle and uninterrupted business.

## **New tools for water utilities help to safeguard the security of supply during crises**

VTT has developed two different assessment tools for water supply companies. The tools enable water utilities to evaluate their cybersecurity and any gaps in their performance, which helps them to ensure Finland's security of supply in all circumstances. The KYBER-VESI project team also produced a number of guidelines relating to cybersecurity.

**Find out more** [➤](#)

## **New ways for consumers to avoid information security threats**

Encryption is becoming increasingly important with the spread of digital information networks where unencrypted transmissions can be vulnerable to prying eyes. It is impossible to name one unbeatable encryption solution or a sure-fire way to protect your privacy, but VTT has compiled a guide containing practical tips for consumers.

**Find out more** [➤](#)



# Industrial renewal – Innovations empowering industry

**Smart products and services stem from new industrial ecosystems.**

The next generation of factories are agile, adaptive production facilities where people and automation work flexibly together. Servicification and networking are penetrating deeper and deeper into the industrial sector: businesses no longer sell just equipment and machinery but a total package. Production processes are becoming increasingly automated, enabling the manufacture of customised products and small series. This reduces waste and helps to satisfy customers' wishes.

**R**adically transforming the design, manufacturing and service business with the help of digitalisation increases competitiveness and creates business opportunities for industries in high-cost economies. Economic growth and employment in Finland are highly dependent on the success of the export industry. It is essential for Finland's industrial sector to be one of the leading players in implementing future digital solutions and business models.

Tomorrow's smart products and services are created in new industrial ecosystems supported by a globally connected platform economy. Cooperation, the increasingly important role of services, and the use of data create completely new opportunities and change the way in which value is generated. The growing share of services and novel business models based on big data strengthen the competitive advantage of Finnish industries.

Robotisation, flexible automation and artificial intelligence offer opportunities for more cost-effective



production. The manufacturing industry benefits from specialisation and global networking. High dependence on resources (energy, materials, water) can be overcome by means of circular economy solutions.

Finland has a highly educated, skilled workforce and a lot of potential for innovation. We therefore have all the building blocks for becoming a pioneer in manufacturing and services.

## 3D-printed metallic components with intelligent identifiers and sensors embedded during manufacture

Digitalisation and artificial intelligence are revolutionising the industrial sector and manufacturing. VTT has successfully 3D-printed a smart metallic component. It proves that a range of intelligent identifiers or sensors can be embedded into 3D-printed metal parts during manufacture in order to track the performance and condition of machines and devices in real time.

**Find out more** [>](#)

## More reliability and longer lives for ships

VTT and Wärtsilä joined forces to coordinate a project in the course of which European maritime research institutions and businesses developed creative technological solutions for ships' azimuth thruster configurations. The new solutions lengthen the life of the configurations, reduce the need for maintenance and increase ships' reliability in extreme conditions.

**Find out more** [>](#)



# Customers and commercialisation

VTT was involved in an unusually high number of customer projects and new ambitious initiatives in 2018. We exceeded our sales target and managed to increase our revenue from customer projects by 12% from the previous year.

Everything we do, we do for our customers. We want to be known as a research and technology partner capable of finding new business opportunities and creating sustainable competitiveness for our customers. We want to provide a high standard of customer service and deliver a unique customer experience.

To promote these objectives, we combined our sales, marketing and communications activities into a new unit called Commercial operations on 1 March 2018. The new unit also includes a team dedicated to research service design. This helps us to ensure that our customers have access to all areas of VTT's expertise.

**Total number of customers\*:**

1,510

**Domestic private-sector customers\*:**

935

**International private-sector customers\*:**

355

**Domestic and international public-sector customers\*:**

220

**VTT's net promoter score (NPS)\*\*:**

47

**Percentage of customers who experienced a boost in knowledge and competence thanks to cooperation with VTT\*\*:**

94%

[More information about Commercial operations](#) >

\* Parent company

\*\* The figures are based on an independent customer impact survey commissioned by VTT.



# Commercialisation of technology and IPR

The year 2018 was a good year for the commercialisation of technology developed by VTT: IPR revenue amounted to EUR 3.8 million and set a new record for the fifth year in a row. The figure was a staggering 24% up from the previous year (2017: EUR 3.0 million).

As in the previous year, VTT's most important sources of licensing revenue were process simulation software, health technology, and optics and spectroscopy. VTT's IPR also played a key role in attracting new customers.

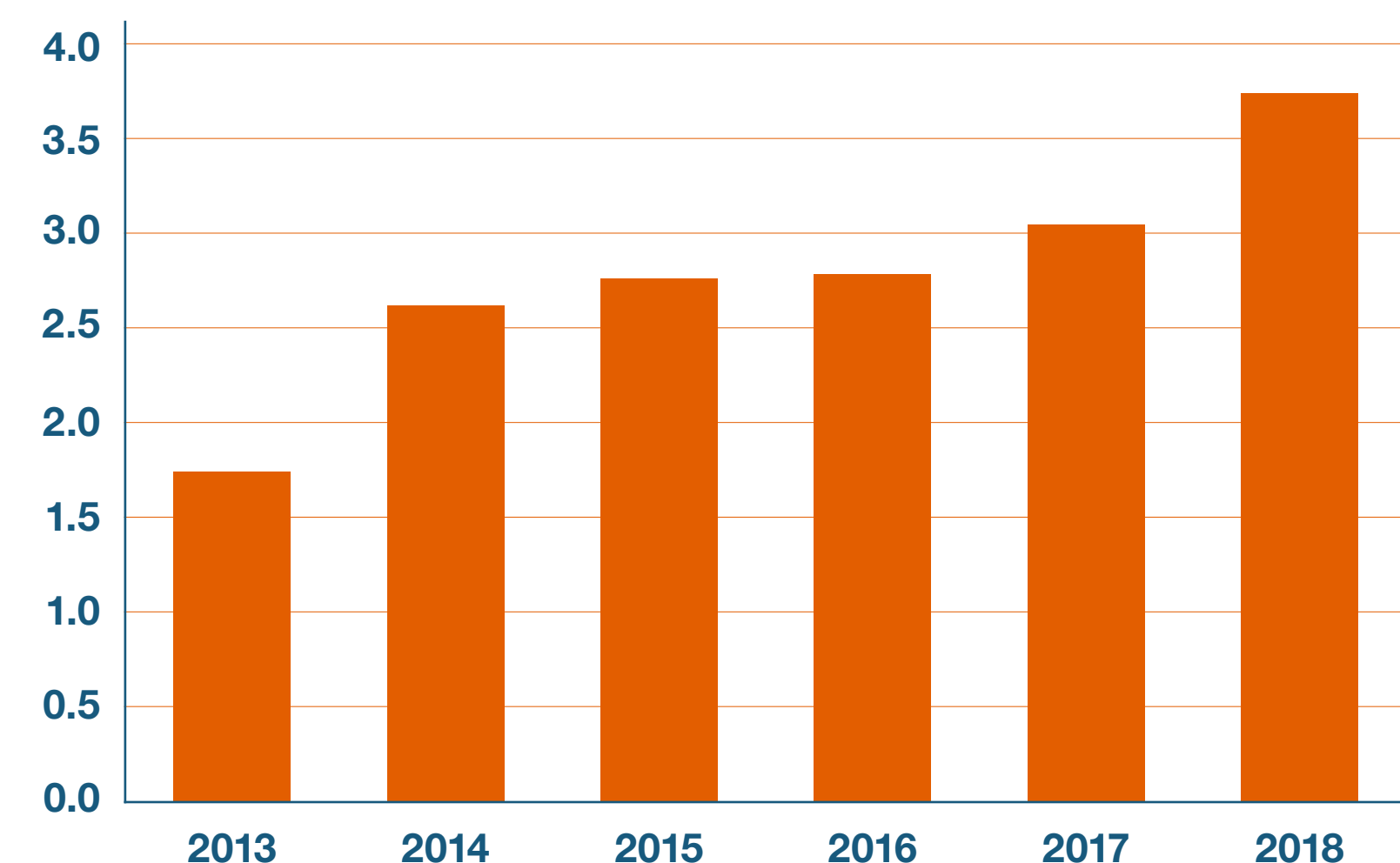
VTT received a total of 239 invention disclosures (2017: 237). VTT submitted 59 priority patent applications (2017: 45) and was the second most active filer of national patent applications with the Finnish Patent and Registration Office. At the end of 2018, VTT had 363 inventions that were protected by patents or patent applications, and the organisation had more than 1,300 active patents and patent applications in total. Investments in IPR, primarily in patent applications, amounted to a total of EUR 1.7 million (2017: EUR 1.7 million).

## Business from VTT researchers' ideas

Our subsidiary VTT Ventures turns the most promising ideas developed by VTT's researchers into commercialisation-ready prototypes. The key criteria for choosing spin-off companies to invest in are technological and commercial innovation, team competencies and international potential.

VTT Ventures sold its holdings in two spin-offs: a German company called m-u-t AG became the majority shareholder in Spectral Engines, which develops MEMS applications, and investment companies Maki and Beata Domus bought VTT Ventures' share in the cellulose-based textile manufacturing business Spinova Ltd. VTT Ventures' holdings in both companies were partially based on in-kind IPR investments.

VTT'S IPR REVENUE, MEUR



59

priority  
patent applications

363

patent families in the patent  
portfolio on 31 December 2018

239

invention  
disclosures received



## PROACTIVE PARTNERSHIP YIELDS RESULTS

**Global Program Manager Kalevi Tervo, PhD (Control Engineering) is the head of ABB Marine's research, product development and commercialisation functions. He is responsible for the development and commercialisation of ABB's intelligent maritime solutions, such as autonomous ships, on a global level.**

ABB and VTT have engaged in a range of partnership projects over the years. ABB is a global force in the energy, industry, transport and infrastructure sectors providing services such as electricity network solutions, electrification, industrial automation, robotics and discrete automation. ABB and VTT therefore have a lot in common when it comes to renewing the industrial sector.

We have partnered in numerous projects over the years. For example, VTT has developed tools that have allowed ABB to calculate the effect of our customers' energy efficiency. ABB is also a long-term customer of VTT's ship laboratory, which has helped us with our traditional ship building business.

In recent years, most of our cooperation has been in the form of EU projects in which VTT has usually been the coordinator and a major research partner. VTT's solid research know-how, experience of the EU application process and expertise in consortium coordination combined with ABB's core skills in research and product development, strong global market position and contacts with a range of maritime operators provide an excellent foundation for successful innovation activities.

ABB has certain R&D needs that VTT can meet. VTT's know-how and research are world-class, and

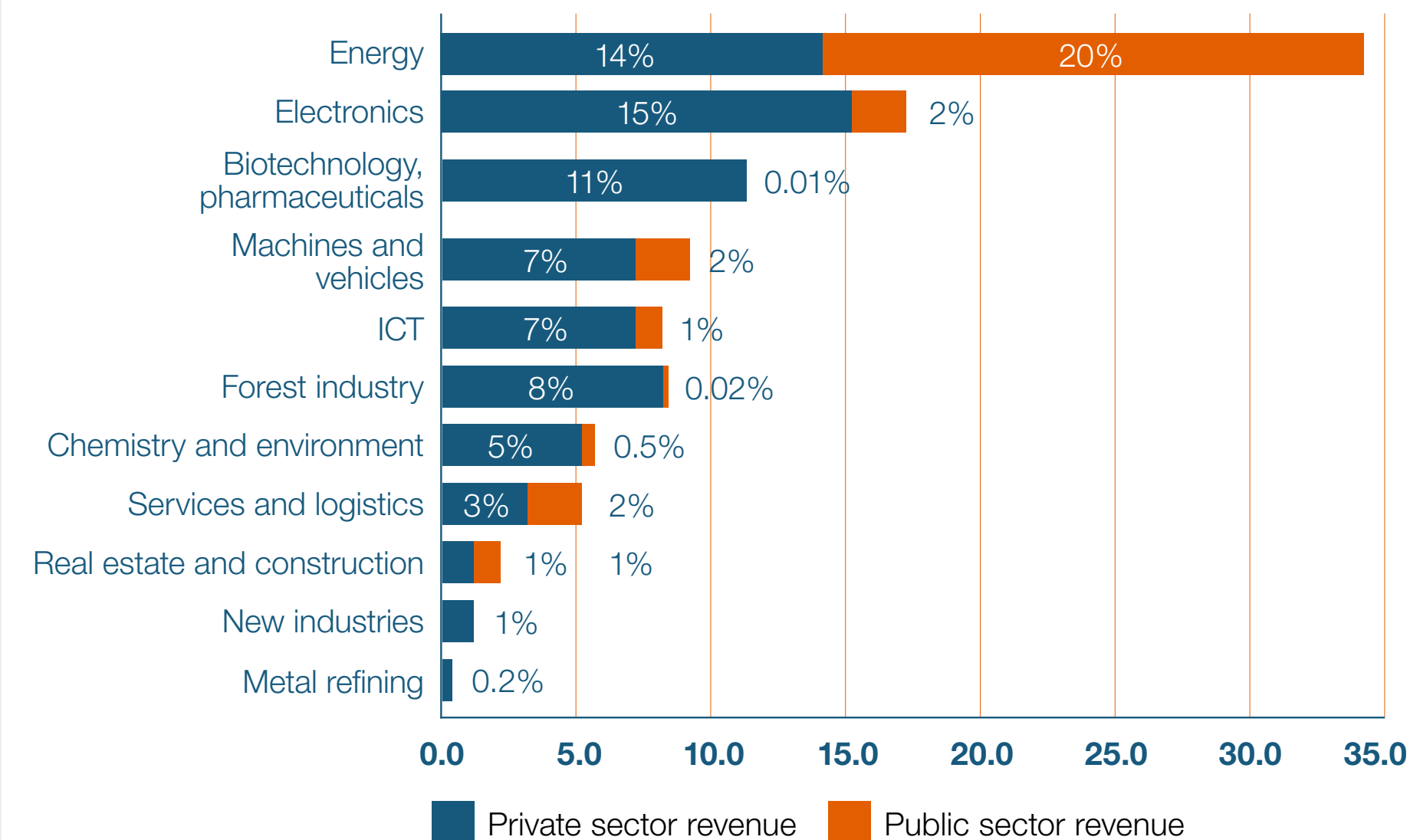
our joint ventures in the field of fuel cells in particular have yielded amazing results. One good example is a project called [Maranda](#).

In the future, I would like to see VTT producing prototypes on a tight schedule, as ABB's customers often want to see demonstrations of new solutions before deciding on a purchase. There is demand for proofs of concept.



Whenever we have wanted to submit a project proposal, VTT has been actively involved and helped us to draw up our proposal quickly. A proactive approach to cooperation is great, and a partnership like this that yields results and solutions is especially productive.

## CUSTOMER SOLUTIONS SALES REVENUE (%)\*



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



# More impact through collaboration

**Our extensive networks give our partners access to international know-how and competence.**

In terms of domestic and international cooperation, VTT aims to take part in solving common problems and helping to build a bright future.

## NETWORKS

Numerous partnerships and extensive networks put VTT in a strong position to pave the way through research and innovation activities.

We actively cooperate with businesses, universities and other research institutions, funding agencies, non-governmental organisations and government departments in Finland. Our aim is to promote regular interaction and the formation of a common position on issues that are important to Finland and where Finland wants to make an impact internationally.

We work in close cooperation with businesses in research and innovation projects that focus on sustainable competitiveness and renewal of Finnish and European industrial value chains. VTT invests decisively in the development of competence centres and innovation ecosystems. In addition to our project collaboration with businesses and universities, VTT is a partner in the Academy of Finland's Centres of Excellence as well as the Flagship Programme. VTT's research infrastructure and technology platforms also constitute an important part of Finland's national innovation infrastructure.

Our mandate from the Ministry of Economic Affairs and Employment also creates a solid foundation for having an impact on an international level. Our extensive networks give our partners access to international know-how and competence. Although the majority of VTT's international public-sector research cooperation is based on EU programmes, we also regularly interact with research institutions and universities outside of the EU and participate in EU-funded networks and projects in third countries. VTT also has international private-sector customers.

VTT's role as a European player is evidenced by the fact that we successfully secured a total of EUR 134 million in funding from the world's largest research funding programme, the EU's Horizon 2020, between 2014 and 2018. Our figure accounts for approximately 17% of all EU Horizon 2020 funding granted to Finland. The information is based on statistics published by Business Finland. VTT was fourth in the latest European Research Ranking, having ranked 21st the previous time. [Find out more.](#)

You can read more about VTT's [domestic and international collaboration](#) on our website.

## INNOVATION ECOSYSTEMS – A MEETING PLACE FOR RESEARCH AND THE BUSINESS SECTOR

Innovation ecosystems provide an efficient infrastructure for tackling increasingly complex future challenges that require more and more multifaceted and interdisciplinary expertise.

The year 2018 saw VTT begin to build eight international innovation ecosystems focusing on our strategic priorities.

Our innovation ecosystems provide solutions to challenges relating to smart energy, bioeconomy, synthetic biology, future food production, preventive health care, autonomous systems, industrial renewal and the electronics industry.

The ecosystems are designed to enable efficient cooperation between international research institutions and businesses and to make Finland the home of leading innovation clusters in these fields.

Significant business-led partnership networks have already emerged around the innovation ecosystems, which are striving to turn research findings and innovations into international business in close cooperation with researchers.

VTT's innovation ecosystems:

- [Smart Energy](#), see [Smart Otaniemi](#)
- [Circular bioeconomy](#), see, e.g., [FinnCERES](#)
- [Food Economy 4.0](#), see [crEATe](#)
- [Smart Health](#), see, e.g., [FCAI](#)
- [Research Alliance for Autonomous Systems](#)
- [Renewal Industry](#), see [Reboot IoT Factory](#), [SMACC](#)
- [Finnish Electronic Industry](#), see, e.g., [PrintoCent](#)
- [Synbio Powerhouse](#)



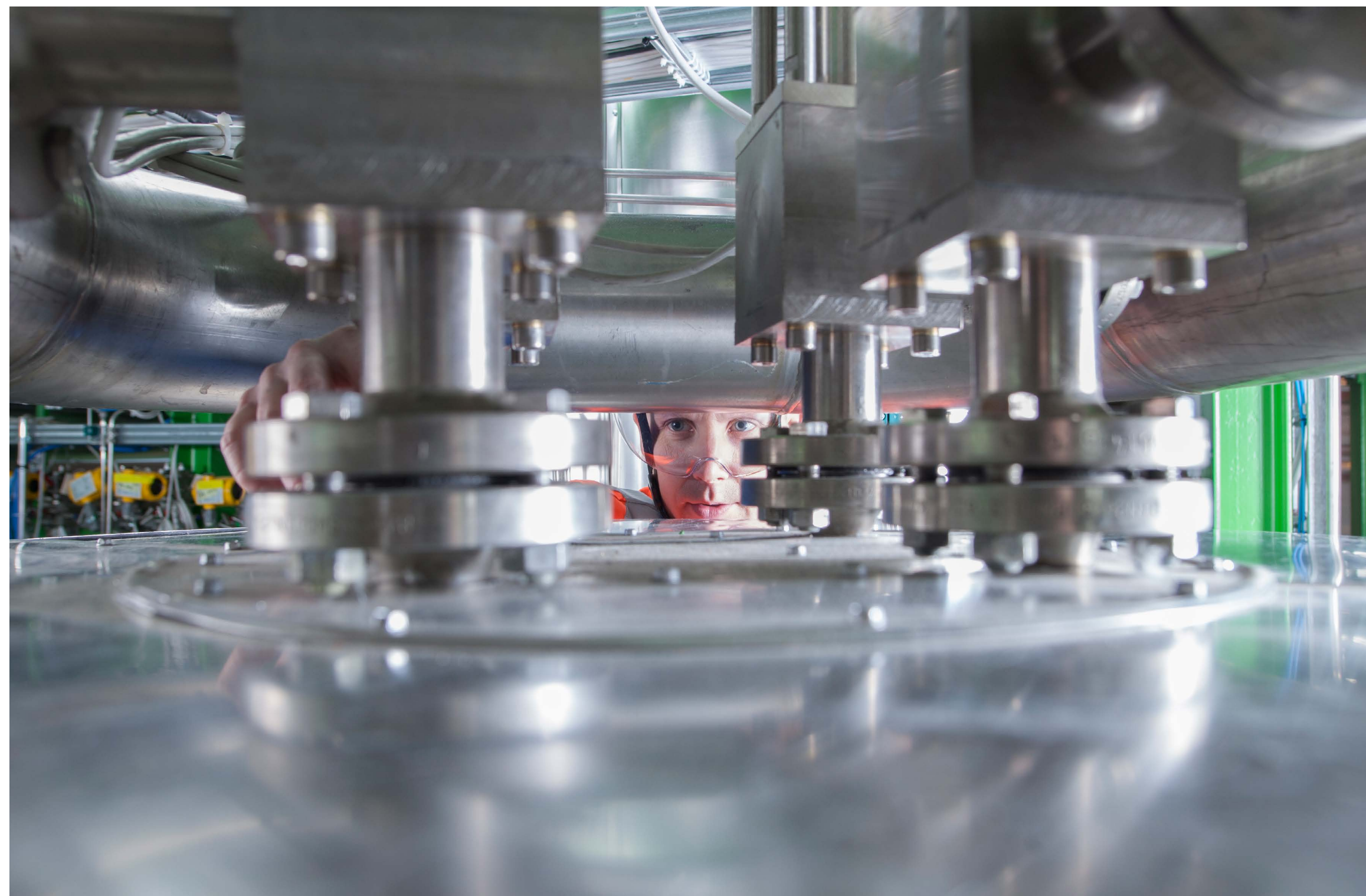
## RESEARCH ENVIRONMENTS AT YOUR SERVICE

Much of Finland's national innovation infrastructure is based on VTT's unique research infrastructure and development environments, the majority of which are also part of EU-wide networks: Bioruukki, industrial biotechnology, VTT's fibre-based product development environment, 5G Test Network Finland, Micronova, MIKES, PrintoCent, ROViR, SMACC and VTT Centre for Nuclear Safety. Our research environments enable product development from basic research to piloting and even small-scale production.

VTT continued to invest in its most important piloting and research environments in 2018. An extension to Bioruukki was completed in Kivenlahti, Espoo in the spring of 2018; Bioruukki now houses a biomass centre and a fibre spinning pilot facility, too. The third phase of the Bioruukki project, which involves the construction of a green chemistry centre, began in the autumn and is expected to be completed in the summer of 2020. Bioruukki provides the infrastructure for VTT's Digital Fibre business ecosystem, which is designed to create an innovation platform for digital bioeconomy.

The year 2018 saw us increasing our international cooperation in respect of the shared use of research infrastructure through, for example, a partnership with the Research Institutes of Sweden in the sphere of bioeconomy. The Academy of Finland ranked our [bioeconomy infrastructure](#) that we share with Aalto University the second best infrastructure in Finland.

We continued to invest in hot chambers in our Centre for Nuclear Safety. Significant strategic changes were



introduced to our laboratory operations in connection with our office move in Tampere: we decommissioned some of our bigger machinery and invested instead in AR-assisted and VR-assisted research facilities.

The Renewal of Finnish Electronics initiative involves modernising and improving VTT's research and manu-

facturing infrastructure in the cleanrooms of [Micronova](#). Our [printed electronics research infrastructure](#) in Oulu has also been developed and improved by adding a new component mounting line.

**More information about our research environments** [>](#)

**VTT's research environments are world-class. They enable product development from basic research to piloting and even small-scale production.**



# VTTers consider their work meaningful

**Continuously improving our competence and our staff's wellbeing is vital for VTT.**



## Corporate culture

We invested heavily in VTT's corporate culture in 2018. VTT Experience brought newcomers and experienced members of staff together for a day to discuss VTT. A total of eight events were held, and they were attended by 190 individuals. VTT conducted a personnel survey called VTT Compass in December of 2017, and debriefings on the survey were held in the spring of 2018. The debriefings were based on a special work community game that each team played under the supervision of internal facilitators. A total of 82 work community games were played.

Leadership training teams were involved in developing VTT's leadership principles, which were disseminated to approximately 250 managers and leading experts during VTT's Leadership Day. Teams have begun to adopt the

principles, and they will play a central role in development discussions in 2019.

## Leadership and managerial development

Excellent leadership and management are important for motivating VTT's staff and therefore for the organisation's success. The leadership and managerial development initiative that we launched in 2017 continued in 2018 in the form of, for example, a programme called VTT Transformers for top management, LEAP training for middle management and Manager Toolbox events for newly appointed managers. We also incorporated people management into our project management training programmes. Approximately 200 individuals attended these programmes during the year.

## Wellbeing

VTT's wellbeing priorities and principles were revised and a team dedicated to wellbeing was set up in HR. Our wellbeing principles, which steer our pursuit of better wellbeing, are leadership, health and safety. Our focus in 2018 was on the ability of individuals to improve their own wellbeing through various kinds of applications and online services. Psychological wellbeing and stress management were promoted by means of lifestyle coaching and lectures. A wellbeing tour was organised to disseminate wellbeing services and raise awareness across the organisation.

Staff on the Espoo campus were provided with campus bicycles and challenged to a walking competition. All

members of staff were offered an influenza vaccine towards the end of the year.

## Competence development

Continuously improving our competence and excellence is vital for VTT. Our competence clusters help us to continuously improve our core competencies. We also invest in mentoring, and a total of 124 members of staff participated in both internal and external mentoring programmes during the year. Approximately 100 individuals took our new project management training course. A total of 12 individuals obtained IPMA certification, and VTT's success rate was 100%. We also focused on improving our staff's communication and presentation skills.

## Employer image

We took part in Universum's annual employer branding surveys. Technology students voted us the 12th best employer and natural sciences students the seventh best in a student survey in the spring. The results of the survey focusing on graduates were published in the autumn, and our ranking among technology professionals had improved to second since the previous year. Natural sciences professionals ranked us seventh. We used the results as the basis of our new employer promise, which is at the core of all our recruitment communications in 2019.

## Reward scheme

VTT rewards its human resources by means of investments in staff wellbeing, training, financial remuneration, various kinds of benefits and flexible working hours. The most important element of financial remuneration is our



bonus scheme that rewards excellent performance. Almost 500 members of staff were rewarded for promoting excellent performance and helping VTT to reach its goals in 2018. We also piloted a reward called Customer Excellence, which is given out to research teams in recognition of exceptional and exemplary customer service or efforts to promote customer service.

### Publications

VTT also had an impact through a range of publications.

Scientific publications are an important vehicle for VTT to disseminate our researchers' latest findings, demonstrate our excellence and therefore influence the development of science and society.

VTT employees publish their findings in Finnish and international scientific journals, professional periodicals and publication series as well as in books, conference presentations and patents.

The year 2018 marked the launch of our new research database VTT Pure, which contains our staff's publications and other information about research activities. The database shows the authors of publications, global partners and descriptions of the research topics. Two thirds of VTT's publications each year are co-authored with research partners and other external operators. You can read more about our publications in [VTT Pure](#).

**1,049**  
PUBLICATIONS

■ **1,049 publications,**  
■ **of which 803 were peer-reviewed,**  
■ **including 486 peer-reviewed articles**  
**in scientific journals**

## MAARIA NUUTINEN, EXPERT IN HUMAN ACTIVITY AND ORGANISATIONS, IS INSPIRED BY THE POSSIBILITY OF HAVING AN IMPACT ON THE FUTURE

**Approximately one in four VTT employees have doctorates, but few are like Maaria Nuutinen, who has a PhD in psychology.**

"Positive, energetic and bold", are the words used by one of the members of Maaria's team to describe their leader, who has been with VTT ever since she graduated in 1997. Maaria has held a number of research and leadership positions. At the moment, she is in charge of an interdisciplinary research area called Business, Innovation and Foresight, and leads a team consisting of education and social sciences professionals and engineers.

"I want my work to promote a customer-centric approach across the whole of VTT", Maaria says. She has been actively involved with customers in both the public sector and the private sector. "My previous customers include, among others, Fortum, KONE, Vaisala and the Hospital District of Helsinki and Uusimaa", she explains. Maaria is especially fascinated by organisational cultures, on-the-job learning and modernising operational cultures. Her expertise in these fields also benefits her colleagues across VTT, as she heads a group focusing on employee experience, corporate culture and practices in the context of VTT's new facilities.

Maaria wrote her doctoral dissertation in 2006 on the importance and development of expert identity and professional confidence. In other words, she approaches

technology from the human perspective. Much of her research has focused on user experience, i.e. how people feel about using a certain product, service or system.

Working at VTT has also given unforgettable user experiences for Maaria herself: "One particularly memorable moment for me was studying the decision-making process on the bridge of a ship as a young researcher and having to climb a rickety rope ladder to get from the pilot boat to the ship in the middle of the sea", Maaria explains. However, every experience is a lesson learnt, and there is no limit to the kinds of skills and know-how that could prove useful. "The best thing about working at VTT is being able to really have an impact on the future."

Although it is easy to get immersed in fascinating work, there needs to be a balance. Maaria's escapes are her horse and exercise – she cycles to work even in the middle of a blizzard.

- Maaria's doctoral dissertation, "Expert Identity in Development of Core-Task-Oriented Working Practices for Mastering Demanding Situations", is available at <http://www.vtt.fi/inf/pdf/publications/2006/P604.pdf>
- Follow Maaria on Twitter: [@MaariaNuutinen](#)



**"I want my work to promote a customer-centric approach across the whole of VTT."**



# How do we measure the impact of our work?

VTT is a pioneer in studying the impact of research. This is an important topic, as traditional innovation metrics do not reveal the true scale of the impact that research institutes and their innovations have.

**T**raditional metrics measure the benefits of R&D&I primarily from the perspective of technology and economy. They do not factor in changes in society or growth, or the intangible value of innovations. Furthermore, they often focus on the ratio between inputs and outputs and ignore impact.

VTT's impact evaluation model studies VTT's impact from four perspectives:

- benefit for the society
- benefit for our customers
- excellence in everything we do
- sufficiency of financial resources

You can read more about our impact evaluation model in Senior Specialist Kirsi Hyytinen's blog [Making the invisible visible – new research impact metrics](#).

The impact evaluation model also forms the basis of VTT's key performance indicators (KPIs). Our priority in 2018 was to determine which KPIs to apply to each level of our operations. VTT's staff can follow the progress of our generic KPIs in real time on the intranet.



One of the indicators of our success is how we generate growth and bring about new business opportunities. This is depicted in our impact stories. We produced three impact stories in 2018. They provide a long-term picture of VTT's contribution to the growth and development of specific industries. The stories contain both quantitative and qualitative information.

**One of the indicators of our success is how we generate growth and bring about new business opportunities.**

You can learn more about our impact stories on the next few pages. The full stories are available on our website along with videos and other information.



**VTT'S INNOVATIONS  
ENABLE FINLAND  
TO CONTINUE LIVING  
OFF THE COUNTRY'S  
FORESTS**

Forests account for 78% of Finland's area, but the materials for packaging, clothes and electronics are still extracted from the ground in the form of oil. VTT wanted to challenge the idea that the print media is the only commercially viable, high added value product that can be sourced from the forest. We have now developed both methods for converting packaging waste into energy and new materials through gasification, and various food and product packaging applications that are recyclable and partially produced from biowaste. We have also developed ways to turn cellulose into textile fibres.

**Find out more** [>](#)

## GOAL FOR THE YEAR 2038:

**GDP UP BY**

30%

**FOREST INDUSTRY  
EXPORTS UP BY**

33%



**FINLAND BEGINS TO  
INDUSTRIALISE PRINTED  
INTELLIGENCE UNDER  
VTT'S LEADERSHIP**

It all begins with the courage to have a vision. As expertise and technological potential grow, businesses have also begun to realise the possibilities presented by printed intelligence. When, for example, paper industry products are enhanced with electronic or biological features, they can open up new markets in the health care or security sector. Printed intelligence is revolutionising Finnish industry.

Find out more [➤](#)

**IN 2017\*****TOTAL VOLUME OF THE  
PRINTED ELECTRONICS  
MARKET:****25****EUR BILLION****IN 2027\*****TOTAL ESTIMATED  
VOLUME OF THE PRINTED  
ELECTRONICS MARKET:****63****EUR BILLION**

\* Source: IDTechEx report "Printed, Organic & Flexible Electronics Forecasts, Players & Opportunities 2017-2027"



### VTT CREATES A SIXTH SENSE FOR HUMANITY – HYPERSPECTRAL IMAGING

It changes the way we see the world. In the future, we will be able to identify skin cancer, narcotics, pollution and crop ripeness with a hand-held hyperspectral camera and spectral sensors. Our technology can be scaled for mass production, and many of our customers have already done so.

Find out more [>](#)

# A SIXTH SENSE

# HYPERSPECTRAL IMAGING



## CORPORATE RESPONSIBILITY

# Everything we do, we do responsibly

VTT's raison d'être is to find answers to the big questions of our time. Being a good corporate citizen is therefore at the core of everything we do and how we do it.





# VTT operates responsibly and develops sustainable solutions

VTT's core mission is to develop sustainable solutions for our customers and society. We observe the principles of sustainable development in all our research and development activities and in our internal operations.

We apply the GRI guidelines to our corporate social responsibility reporting. Our researchers follow the Finnish National Board on Research Integrity's guidelines on good scientific practice, and all our employees have completed our online Code of Conduct training course.

## Social responsibility

VTT's research priorities – climate action, resource sufficiency, good life, safety and security and industrial renewal – seek sustainable solutions to major social challenges. We base our research agenda on an outside-in, challenge-driven approach. This continuous process is steered by outside signals instead of our existing competencies.

The challenges and future growth opportunities of our customers have a pronounced impact on our research agenda and competence development. According to studies, the utilisation rate of our research results is extremely high, which means that VTT has a highly important impact in promoting sustainable development. Our research results and experts are also widely called upon as a basis for public decision-making on the journey to a society founded on sustainable development.



VTT is a member of the FIBS corporate responsibility network.

## Responsibility for our own personnel

Our staff is what makes VTT, and we therefore look

after our employees in many ways. Staff wellbeing is discussed in more detail on page 22. We pay particular attention to safety, and our occupational health and safety policy is that we only accept a good level of safety in all our operations.

**The utilisation rate of our researchers' findings is extremely high, which means that VTT has a huge impact in promoting sustainable development.**



**Only 0.56 accidents  
per one million  
working hours  
across VTT Group.**

**Zero serious  
occupational  
accidents.**

Our objective is that our staff comes to work healthy and leaves work healthy:

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

VTT is a member of the Zero Accident forum. Our Zero Accident policy is not just about injuries but also, for example, the following:

- Zero occupational illnesses
- Zero tolerance for bullying
- Zero sick days resulting from work
- Zero unaddressed incidents of violence and harassment
- Zero burnouts
- Zero managers and staff who do not know about occupational health and safety

According to our policy, our customers also need to have valid occupational health and safety certification to work in our laboratories. We have long required occupational health and safety certification from all our suppliers and some service providers, but the requirement has now been extended to our customers as well.

Based on the Finnish Workers' Compensation Centre's calculations, the frequency of occupational accidents across VTT Group was 1.33 per one million working hours, while the figure for the parent company was 0.56. VTT Expert Services Ltd was only included in the consolidated figures for the first five months of the year (1 January – 31 May 2018), which explains the apparent increase in the frequency of accidents.

The most common causes of injuries were physical impacts, slips and falls, and chemicals. Our KPI for the seriousness of injuries was 5.80 sick days per injury across VTT Group (8.00 within the parent company). We are especially pleased with the fact that there were no serious occupational accidents within the parent company in 2018 or in 2017.

VTT's occupational health and safety committee decided to experiment with raising awareness of safety issues by choosing one observation to show-case each month. OSH delegates and OSH manager choose the monthly observation together. The monthly observation can either be a single serious incident or a series of similar incidents reported within the month. The individual who reported the featured observation wins a small prize. The experiment was well received by both staff and managers, and it continues in 2019. The 2018 observations included the procedure in the event of a fire alarm, the operation of safety switches on machinery, extension leads and their use, and fork-lift operation.

## Responsibility for the environment

VTT has ISO 9001:2015 and ISO 14001:2015 certified management systems that are regularly audited by Inspecta Sertifiointi Oy. Our environmental principles are as follows:

- 1) Improving the eco-efficiency of our operations
- 2) Communicating openly about our environmental policy
- 3) Developing new and significant environmental innovations
- 4) Producing specialist information to support decision-making by businesses and society

Our new fibre-based product development environment in Jyväskylä was audited pursuant to the Finnish Energy Efficiency Act in 2018. Electricity consumption had dropped by 6% on the previous year and office paper purchases by 30%. The volume of air travel had increased by 6% on the year 2017.

VTT is a member of the Climate Leadership Coalition. VTT bought and cancelled a quantity of emission allowances from its EU emissions trading quota equivalent to the CO<sub>2</sub> emissions of VTT's rental cars in 2017, i.e. 57 tonnes. VTT does not operate in areas where there are groundwater reserves, but our Espoo campus is located close to the Laajalahti Natura 2000 Nature Reserve.

VTT scientists took part in eleven parliamentary committee hearings on the subjects of energy and the environment, either as invited experts or by submitting a written statement.



# GRI index

No.	Point	Included in report	Link or explanation
102	Organisational profile		AR = Annual Report 2018, CoC = <a href="#">Code of Conduct</a> , MA = <a href="#">Management approach annex</a>
102-1	Name of the organisation	yes	<a href="#">Key facts of VTT</a>
102-2	Activities, brands, products and services	yes	Research results, AR 11-16, 19, 25-27 <a href="#">Key facts of VTT</a>
102-3	Location of headquarters	yes	<a href="#">Key facts of VTT</a>
102-4	Location of operations	yes	<a href="#">Key facts of VTT</a>
102-5	Ownership and legal form	yes	CoC 6
102-6	Markets served	yes	AR 19
102-7	Scale of the organisation	yes	AR 6-7, 17-19
102-8	Information of employees and other workers	yes	<a href="#">Total number of employees by contract type and gender</a>
102-9	Supply chain	yes, partly	<a href="#">MA</a> VTT uses Hansel's services in procurement. <a href="#">Responsibility report</a> .
102-10	Significant changes to the organization and its supply chain	yes	The ownership of VTT Expert Services Ltd and Labtium Ltd passed to Eurofins Scientific Group from 1 June 2018 on.
102-11	Precautionary Principle or approach	yes	The State owned bodies are following the precautionary approach although it is not any more explicitly mentioned.
102-12	External initiatives	yes	CoC 6
102-13	Membership of associations	yes	Because of corporatization VTT has joined to Palta ry.
102-14	Statement from senior decision-maker	yes	AR 4
102-16	Values, principles, standards, and norms of behavior	yes	CoC 3-6
102-18	Governance structure	yes	<a href="#">Tax footprint, management and control annex</a> <a href="#">VTT's Corporate Governance</a> The <a href="#">administration code</a> of Finnish listed companies VTT's Board has audit and remuneration committees.
102-40	List of stakeholder groups	yes	<a href="#">Stakeholders</a>
102-41	Collective bargaining agreements	yes	Essentially 100%, only top management is outside collective bargaining agreements.
102-42	Identifying and selecting stakeholders	non-conformity	<a href="#">Stakeholders</a>
102-43	Approach to stakeholder engagement	non-conformity	<a href="#">Stakeholders</a>
102-44	Key topics and concerns raised	non-conformity	<a href="#">Stakeholders</a>
102-45	Entities included in the consolidated financial statements	yes	<a href="#">Annual Report 2018</a> (in Finnish)



No.	Point	Included in report	Link or explanation
102-46	Defining report content and topic Boundaries	yes	<a href="#">MA</a> Government ownership steering requires government-owned companies to submit reports in a specific format. <a href="#">Ownership policy</a>
102-47	List of material topics	yes	201-1, 201-4, 203-1, 301-1, 302-1, 303-1, 305-2, 305-3, 305-5, 306-1, 306-2, 306-3, 306-4, 307-1, 401-1, 403-1, 403-2, 404-1, 405-1, 406-1, 409-1, 415-1, 416-1
102-48	Restatements of information	yes	No major changes.
102-49	Changes in reporting	no	
102-50	Reporting period	yes	Calendar year 2018
102-51	Date of most recent report	yes	12th April 2018
102-52	Reporting cycle	yes	Annually, typically on March/April
102-53	Contact point for questions regarding the report	yes	<a href="mailto:info@vtt.fi">info@vtt.fi</a>
102-54	Claims of reporting in accordance with the GRI Standards	non-conformity	This material references partly to Global Reporting Initiative GRI Standard 2016. The scope is 'Core'-option, however not all criteria are met. Those have been marked in this table as 'non-conformity'.
102-55	GRI content index	yes	This table
102-56	External assurance	no	There are identified non-conformities, no external assurance is used. Situation will be re-considered each year.
200	Management approach		MA 1, 2
201-1	Direct economic value generated and distributed	yes	AR 6-7
201-4	Financial assistance received from government	yes	AR 7
203-1	Infrastructure investments and services supported	yes	<a href="#">Annual Report 2018</a> (in Finnish)
300	Management approach		MA 1, 2-3
301-1	Materials used by weight or volume	yes, partly	<a href="#">Amount of printings</a> <a href="#">Consumption of paper reams</a> <a href="#">Destruction of white paper</a>
302-1	Energy consumption within the organization	yes, partly	<a href="#">Consumption of electricity</a> <a href="#">Consumption of heat</a>
303-1	Water withdrawal by source	yes	<a href="#">Consumption of water</a>
305-2	Energy indirect (Scope 2) GHG emissions	yes, partly	<a href="#">Amount of CO2</a>
305-3	Other indirect (Scope 3) GHG emissions	yes, partly	<a href="#">Amount of CO2</a>



No.	Point	Included in report	Link or explanation
305-5	Reduction of GHG emissions	yes	VTT purchased CO2-emission allowances from the European emission trading scheme corresponding the amount of VTT's car fleet CO2-emission - 57 tonnes (2017), calculated based on car fleet's specific emission and kilometres driven. This amount has been eliminated from the quota.
306-1	Water discharge by quality and destination	yes	No direct discharges into water. All waste water is conveyed through the sewer system to the municipal waste water treatment plants. An obligation to monitor the quality of water, pursuant to a permit for conveying waste water to the sewer system, is in force for Kaitoväylä 1, Oulu (21 May 2012)
306-2	Waste by type and disposal method	yes, partly	<a href="#">Amount of waste</a>
306-3	Significant spills	yes	No significant spills. Earlier (2011) spill follow-up control proceeding into the phase where sample frequency is reduced to two times per year and suggested to be reduced to one time per year.
306-4	Transport of hazardous waste	yes	<a href="#">Amount of waste</a> Hazardous waste to Ekokem by road (ADR) No hazardous waste exported nor imported. No hazardous waste treated. No hazardous waste shipped internationally.
307-1	Non-compliance with environmental laws and regulations	yes	No compliance breaches have been identified.
400	Management approach		MA 1, 3-4
401-1	New employee hires and employee turnover	yes, partly	New employee hires by age group and gender (no screening by region)
403-1	Workers representation in formal joint management-worker health and safety committees	yes	100 % represented formal joint management-worker health and safety committee
403-2	Types of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities	yes, partly	<a href="#">Management of HR risks</a> <a href="#">Frequency and gravity of accidents</a> (no screening by gender)
404-1	Average hours of training per year per employee	yes, partly	<a href="#">Training expenses and days</a> (Education and training costs)
405-1	Diversity of governance bodies and employees	yes, partly	<a href="#">Age structure and gender distribution</a> <a href="#">Share of men and women</a> In VTT's Board there are three women and four men.
406-1	Incidents of discrimination and corrective actions taken	yes	No discrimination cases identified.
408-1	Operations and suppliers at significant risk for incidents of child labor	yes, partly	MA 4
415-1	Political contributions	yes	No contributions have been rendered
416-1	Assessment of the health and safety impacts of product and service categories	yes, partly	Research concerning health technology and foodstuff, AR 13-14, 20



# beyond the obvious



VTT Technical Research Centre of Finland Ltd

[www.vttresearch.com](http://www.vttresearch.com)