Annual Review 2020

DANISH
TECHNOLOGICAL
INSTITUTE

Key figures

EURm 147
Turnover

350
R&D-projects

1,000
Employees

70
Laboratories

12,000
Customers

30,000
Course attendees

Danish Technological Institute (DTI) is a self-owned and not-for-profit institution. We are approved as an RTO by the Danish Ministry of Higher Education and Science.

We have promoted the use of technological progress to the benefit of industry and society through development, consultancy and education since 1906. We fulfil this objective by developing new knowledge through research and development activities, which are then converted into technological services and provided on market terms.

Her Majesty the Queen is patron of Danish Technological Institute.
Find more details at dti.dk

Introduction

DTI supplies high technology solutions derived from current market requirements to the benefit of individual enterprises. One example is the development of a conductive ink based on nano-copper. This solution makes it possible for Danish enterprises to integrate electronics into common products such as clothes, furniture and packaging, by printing electric circuits onto textiles, plastic film and paper. That means they can rapidly develop prototypes on which sensors, processing and electronics provide new functionality to their products. Design and production costs are reduced, and development lead times shortened, enhancing the competitive edge Danish enterprises have over their foreign competitors. Overall, this innovative solution will change logistics and business models.

DTI is in charge of a European collaboration centred on printed electronics to ensure that individual enterprises can gain access to the best skills throughout Europe. A platform that supports a future manufacturing industry in Denmark.

We also run Northern Europe's biggest robotics environment in Odense, and work closely with the industry on the development and use of robot technology.

We house what is perhaps Denmark's biggest and oldest skills centre within building and construction, and an internationally-recognised centre for energy-efficient installations. We specialise within agroindustry, meat production, environmental technology, advanced materials and agile production. These are a few examples out of many, because our skills, equipment and domain expertise are very wide-ranging.

We deliver more than 40,000 advanced technological solutions a year in response to specific needs and problems for our more than 12,000 customers. We employ around 1,000 specialists, working in close consultation with 800 research and development partners to help enterprises of all sizes remain competitive and innovative.

A resilient Danish Technological Institute has ensured high-technology progress since 1906. Our purpose is to support individual enterprises, and the continued development, growth and wealth of society as a whole. We ensure tangible and measured progress towards a better world.

Juan Farré
President

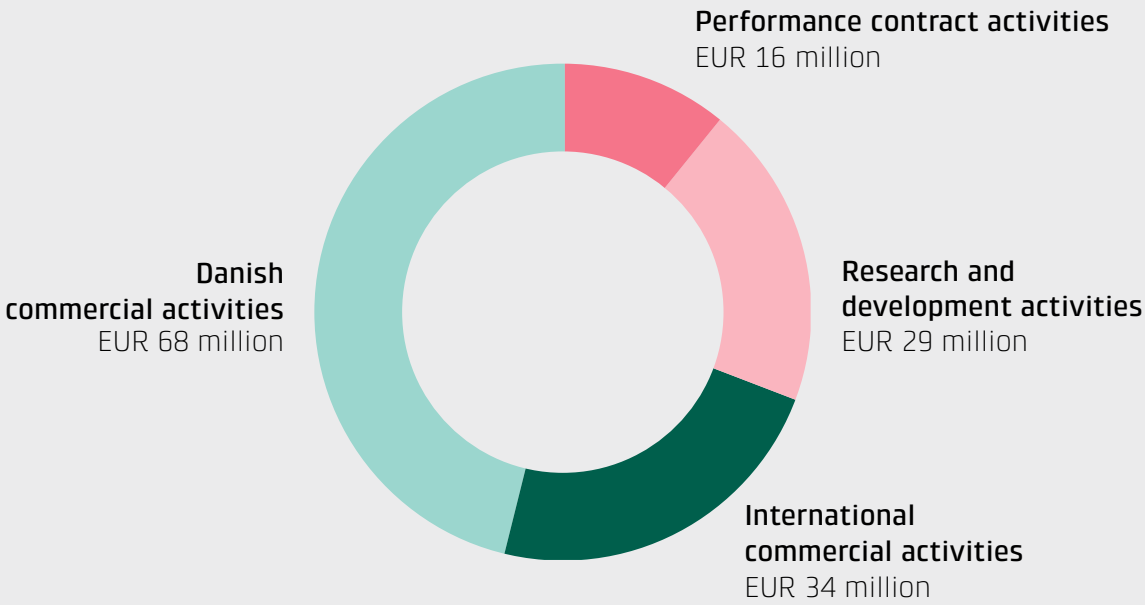
Jens Maaløe
Chairman of the Board

Technology for a robust society

The main purpose of the Institute is to find and show the way to technological progress that will benefit industry and society.

Key to our efforts is constant development of new knowledge through research and development activities, which are then converted into technological services and provided on market terms.
We conduct technological research and development valued at over EUR 45 million p.a., and commercial activities worth over EUR 120 million p.a.

EURm 147 TURNOVER*



*Breakdown of group turnover in 2020

Transformation and Development

By providing technological services we contribute to the transformation and development of Danish enterprises.

We believe that Danish enterprises face growing pressure in relation to two major transformations to be made: the green transition and digitisation. They will also face sustained pressure to improve their competitiveness in terms of product and service development, and within continuous productivity improvement.

Transformation

Green transition

Digitisation

Development

Product/service development

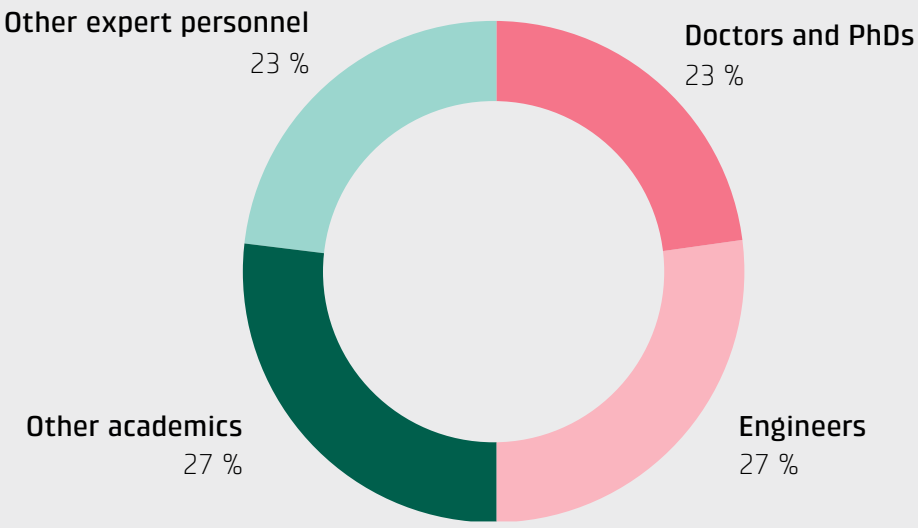
Productivity development

Effects for industry and society

Environment and Climate
CO_2-reduction
Environmental impact

Competitiveness
Turnover
Jobs

WORLD-CLASS SPECIALISTS*



*Employee composition for the Institute in 2020

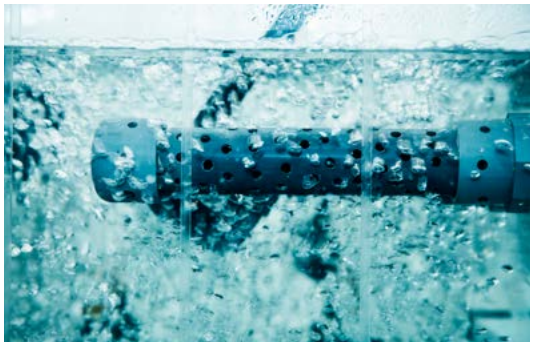
Positions of strength

Building and construction

We ensure a sustainable, efficient digital building industry, with high quality buildings and constructions with a long service life.

Food

We develop healthy, high quality and safe food products that can be produced efficiently and sustainably.



Environmental technology and resources

We create the solutions of the future within environmental and health technology.

Agriculture and bioresources

We are shaping the resource-efficient agroindustry of the future, to the benefit of the climate and environment.

Energy

We develop the green and competitive solutions able to ensure the sustainable production and consumption of energy.

Agile production

We boost production through the use of data, advanced manufacturing technologies and robots.

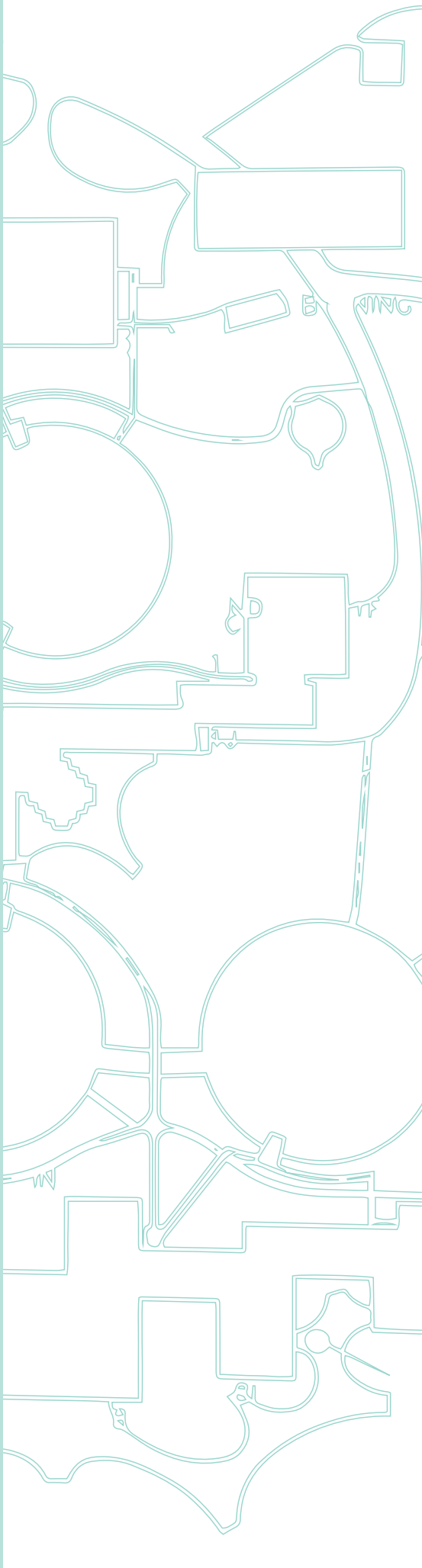
Big Science

We boost exports to the Big Science market and access for Danish enterprises to Big Science facilities.

Products and materials

We create better products through insight into the properties and longevity of materials.

Contents



Management's review

Primary activity

Danish Technological Institute (DTI) is an independent and general research and development institute. We have been promoting the use of technological progress to the benefit of the industry and the society through development, consultancy and education since 1906. We fulfil this objective by developing new knowledge through research and development activities, which are then converted into technological services and provided on market terms.

The Institute represents a completely unique platform when it comes to helping enterprises to develop new technologies, and convert knowledge into value: We provide a solid technological infrastructure, based on specialised expert and domain knowledge and world-class equipment. We establish solutions-oriented, interdisciplinary partnerships with Danish knowledge institutions. We act internationally by taking part as the Danish element of the European research and development programmes – and are one of the top 10 out of 350 international research and technology organisations. On that basis, we have a close, well-developed partnership with enterprises, the Danish authorities and the EU on the development, implementation and validation of technological solutions.

DTI is a key partner for Danish commerce and industry, with our objective of enhancing competitiveness and the ability to innovate amongst Danish businesses, whilst generating growth and wealth for the country. This is more important now than ever before.

We take responsibility, but do not close down

In the spring of 2020, Denmark was hit by the global COVID-19 pandemic, followed by lockdown that caused huge and varied problems for Danish enterprises. And for the Institute as well, due to our close collaboration with those enterprises.

Notwithstanding fluctuations according to different sectors, the Institute's approach and message was to act responsibly concerning limiting the spread of infection, but not to close down. We also acted responsibly with regard to helping our customers to keep their own activities going.

The Institute therefore focused on continuing its core activities at full strength, a continued high level of quality during lockdown and during the gradual reopening of society.

We have provided key services from our laboratories, test facilities or pilot plants – making our over 1,000 specialists available to help enterprises to adjust to the 'new normal'. To support the ongoing process of skills development for the workforce, we consistently adapted the range of courses to the restrictions, including expanding our range of distance learning programmes by over 200 new online courses, for example.

That enabled us to remain a strong, stable partner for our customers, and we managed to start using digital platforms in record time, as well as adapting the way we work and our methods to a new reality, one heavily influenced by the need for close consultation with the enterprises we work with, yet kept at a safe distance. Audits and inspections are good examples, as they had to be conducted remotely by using digital solutions. The Institute also shoulders a strong societal responsibility when it comes to long-term rebuilding. That is why we continue to prioritise activities that involve a high degree of development, in the belief that the way out of a crisis is through investment in green transition and digitisation, along with continued research, innovation and development.

DTI's objective has always been, and remains, to develop and deliver technological services able to contribute to the necessary development and transformation of Danish enterprises. Conducting research and development activities (R&D) is essential for the Institute to be able to offer our customers relevant and usable technological products and services. This is true in particular for interdisciplinary and highly topical societal drivers such as digital transformation and green transition, and that applies to the domains within which the DTI is highly specialised.

The role that DTI has played since 1906 remains very relevant: We take technological leadership, are forward-thinking and place ourselves where we know that Danish enterprises need our help for development and transformation.

Our customers

Danish Technological Institute takes technological leadership when it comes to finding and showing the way for the use of technologies, able to raise the ability of our customers to transform and develop to a level of greater competitiveness, and towards a greener and more sustainable future.

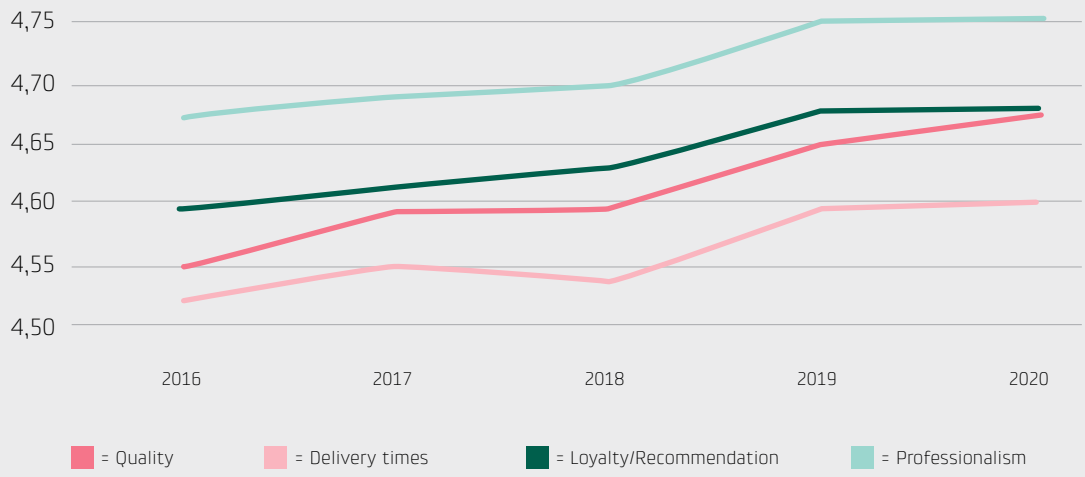
DTI has a strong collaborative interface with its customers. Commercial sales for the group totalled EUR 102 million in 2020. The biggest single customer group was the Danish business and industry, which accounted for 36 % of the group's turnover, with sales of EUR 52 million. The next group is international customers, who accounted for 23 % of the group's turnover, with sales of EUR 34 million.

DTI meets its Danish customers across a very wide front. The number of customers by region complies closely to the regional distribution of Danish enterprises. Our high levels of customer satisfaction bear strong witness to the fact that we deliver relevant services with considerable professionalism and very high quality.

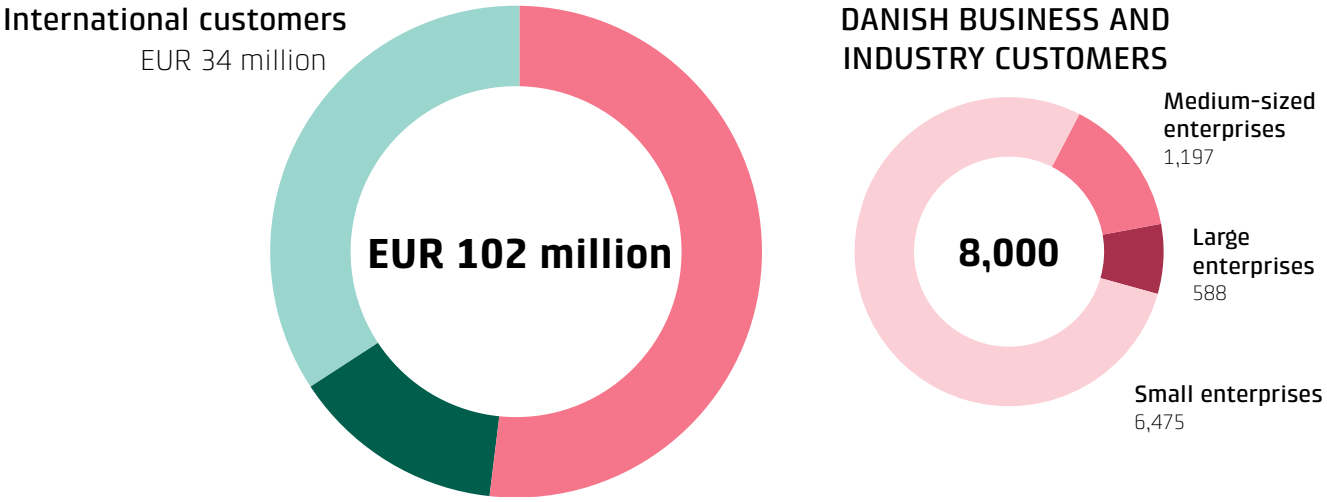
CONTINUED HIGH CUSTOMER SATISFACTION

Customer satisfaction, measured on the parameters of quality, delivery times, professionalism and loyalty/recommendation, continues to improve, despite the high starting point.

Overall customer satisfaction for 2020 reached 4.7 out of a possible 5.

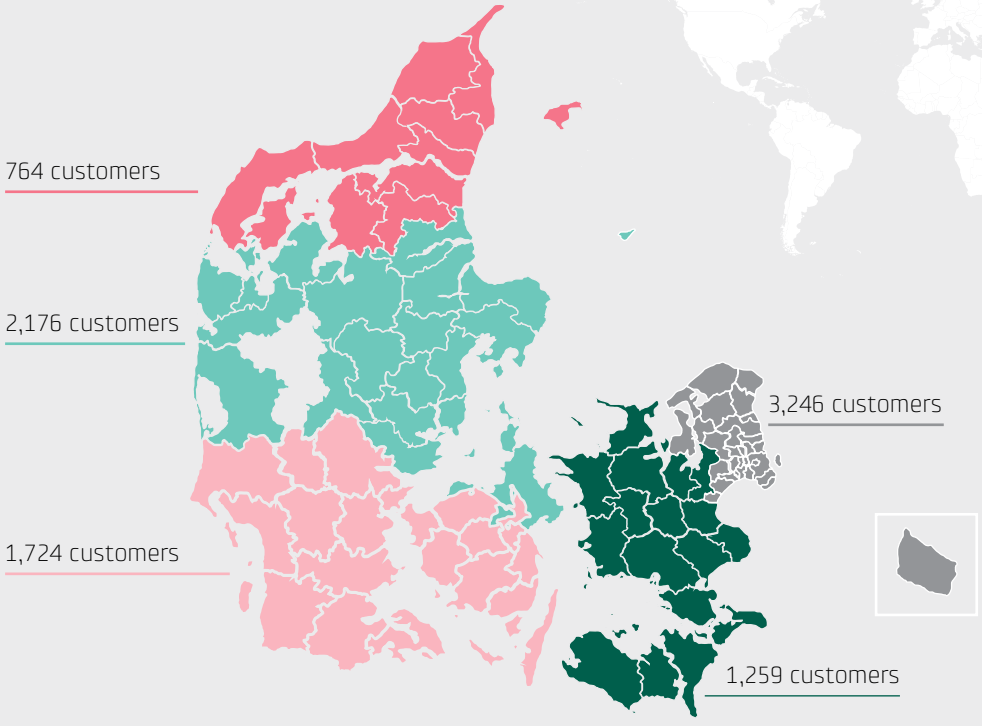


BREAKDOWN IN TURNOVER BY CUSTOMER TYPES*



*Group commercial turnover by customer type in 2020

9,000 DANISH CUSTOMERS EVENLY SPREAD THROUGHOUT DENMARK*



2,000 INTERNATIONAL CUSTOMERS IN 62 COUNTRIES

*The group's customers by region in 2020

Research and development

The accumulation of new knowledge and the development of technological services in demand are key to the work of the Institute. DTI's own investment in the development of new technological services comprised EUR 12.2 million in 2020.

Along with our R&D-projects, this considerable investment helps ensure that the Institute remains an attractive partner. Our objective with the deep technological know-how achieved through our R&D-activities is to offer our customers new, usable technological products and services.

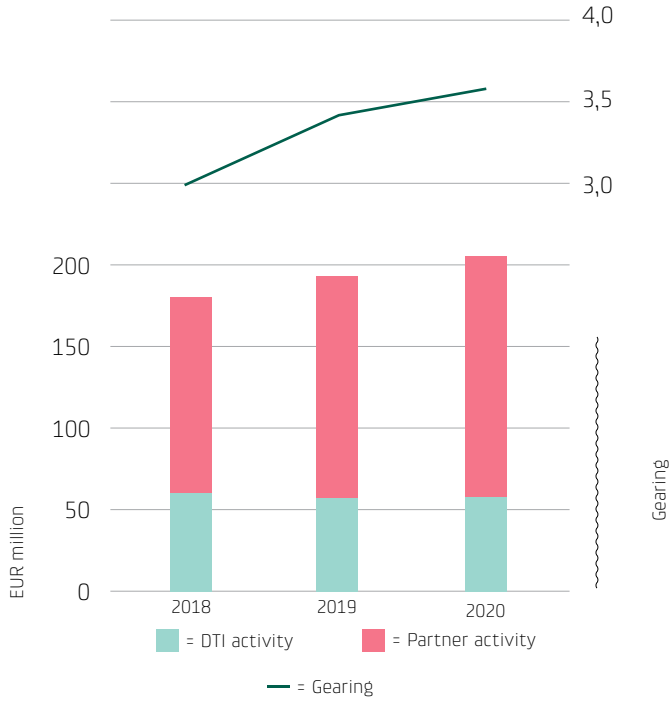
Development in partner activities and gearing

The value of our R&D-activities in 2020 reached EUR 57.6 million, with investment from project partners comprising EUR 148.4 million. For each EUR invested by grant makers and the Institute in R&D, project partners thus invested EUR 0.35, equivalent to a gearing of 3.58.

The Institute has increased its own activities along with its partners in a period when competition for grant funds has been high, and in which enterprises have been under pressure from the COVID-19 pandemic.

This is partly due to the Institute successfully taking part in large international consortiums in the EU's framework programme.

Danish partner activities also rose between 2019 and 2020.



KEY FIGURES: R&D AND KNOWLEDGE IN PRACTICE

800 unique R&D-partners

EUR 58 million in R&D-activities

350 R&D-projects

1,000,000 online visitors

2,000 Courses

100,000 newsletter subscribers

In 2020, DTI maintained particular focus on its research and development projects that play a role in multidisciplinary and highly relevant societal drivers, such as the digital and green transitions.

Green transition

Danish enterprises play a major role in how we as a society can achieve our goals for green transition. Denmark's leading position within green transition should result in more exports of green solutions. This is where DTI is a key player. Working in close consultation with the industry, we develop green solutions and provide test, demonstration and development facilities. All of which are essential to get those green solutions onto the market quickly.

We have built up new knowledge and developed our services in 2020, through taking part in the following R&D-projects:

ALIGHT

The air travel industry has an objective of eliminating CO_2-emissions from aircraft and airports by 2050. There are numerous technological solutions and options, but also a number of barriers to overcome before the green transition of the industry can become a reality.

The ALIGHT project is designed to ensure the development of solutions to two key challenges. The first concerns the means and logistics to handle biofuels for aircraft – including procurement, mixing, fuelling, quality control and safety processes. The second concerns smart energy solutions for other airport operations, including boosting the production of sustainable energy, energy storage and electrification. The project will also develop a design manual for the aprons of the future, able to support sustainable fuels for aircraft, such as electricity and hydrogen.

With a grant of just under EUR 12.2 million, the project will develop and demonstrate specific solutions and examples of how an airport can operate without any CO_2-emissions at all, and provide infrastructure for CO_2-neutral aircraft. The solutions found will be implemented in the first instance at Copenhagen Airport, to inspire the whole of Europe.

RECYCALYSE

Catalytic materials are the crux of the RECYCALYSE project, which will use surplus energy from the sun and wind to create a sustainable, hydrogen-based energy store, and thus contribute to the Power-to-X agenda. The project is based on the PEM electrolysis energy storage method (polymer-electrolyte-membrane), which briefly involves using electricity to separate the components of water, to develop hydrogen and oxygen while energy demand is low or energy production high. What we will achieve is chemical storage of surplus energy that is not only more flexible, but also has higher energy density than batteries, for example. Subsequently, the hydrogen can be used for such purposes as generating electricity again when demand rises, or can be converted to chemicals and fuels.

RECYCALYSE will also help reduce, or even avoid, dependence on material imports in the EU. The aim is to reuse the elements in new catalytic materials, to contribute to a circular economy, and reduce the amount of critical raw materials in such catalytic materials that have to be imported from outside the EU.

The RECYCALYSE project is funded by EUR 5.5 million from Horizon 2020. It brings together world-leading European research and technology organisations (RTO's), universities and industry working within hydrogen, material technologies and recycling.

CALLISTE

Via CALLISTE, we are developing the future generations of green cements from Aalborg Portland. The first generation, FUTURECEM™, was launched in early 2021, and reduces CO_2-emissions from the manufacture of cement by 30 %, and has been developed into premixed concrete. The ambition for the 2nd and 3rd generations is to cover all areas of use for concrete, and not just premixed. The 3rd generation is also intended to reduce CO_2-emissions by up to 50 %.

The project will position the Danish cement and concrete industry as a frontrunner within green transition, by finding solutions to reduce CO_2-emissions in the construction industry.

A global implementation will mean immediate CO_2-savings of around 900 million tonnes a year.

Circular Mono Plastic Packaging

The Circular Mono Plastic Packaging project will develop two new technologies designed to make it possible to produce flexible food packaging made of a single plastic type. The result will be easier recycling of food packaging, which will mean less plastic sent for incineration. The project will develop two key technologies that the plastics industry can implement on its existing production lines, using its existing equipment.

Even at the early stages of the project, the new forms of packaging will be used in practice for dairy products. The project will then simulate packaging being collected and reused as new packaging film, which can then be recycled again to use for packaging. The objective is to study any possible loss of quality.

A particular problem with using recycled materials is hygiene and food safety, which have been the focus of the project right from the start. The packaging developed will give this country a competitive advantage on the European market, where food producers will soon be met by a requirement for recyclable packaging.

InnoFlot

The food industry is one of the sectors that uses the most water on a global level. The InnoFlot project applies our know-how within water technology to develop innovative solutions able to significantly reduce the consumption of water and energy, and to exploit resource-rich residuals in food production better.

The project is a 'Beacon Project', in which the technology will be implemented in full scale with funding from the Danish Environmental Protection Agency's MUDP programme. The objective of the project is to initially halve the consumption of water used by one of the biggest manufacturers of fishmeal and fish oil in the Nordics. We also expect a reduction in the emission of harmful greenhouse gases.

We are updating the 'flotation' technology in the projects, a well-known technique used for water purification. We have done so by developing a sensor-based control system that makes it possible to continuously adjust and optimise the purification process in real-time.

Another objective is to purify the water by adding traditional flocculants. Flocculants are a chemically-produced agent that cause microscopic suspended particles to aggregate (in this instance, fish residuals) in a foam fraction on the water surface. Because traditional flocculants cannot be used for feed and food production, the project is intended to identify a suitable flocculant that can. The new flocculant has to be an efficient and financially feasible alternative, suitable for feed and food production, so that residuals in the water can be used for feed.

The digital transformation

The digital transformation is already taking place in Danish enterprises. But there is still considerable unrealised potential in the use of existing and new digitisation technologies. By combining several technologies, we can create totally new solutions and business models, while contributing to considerable improvements in efficiency.

We have built up new knowledge and developed our services in 2020, through taking part in the following R&D-projects:

Growth in the agroindustry

This project will strengthen the entire agroindustry's competitiveness and position, while stimulating growth based on data. Greater competition and growing demands for precision and documentation make it necessary to develop and renew the industry's products, services and business models by exploiting the opportunities the technology creates to gather, exchange, process and value data.

The principle is that the basic technology already exists or can be developed according to need, but the agroindustry needs specific knowledge, partnerships and ecosystems, plus help to develop services and business models to be able to exploit the potential inherent in digitisation.

The project will provide help to identify and define potential available from data, use of digitisation and business models. The industry will become better at understanding customer requirements and market conditions, from which it can develop realistic service concepts and business models, technical concepts or prototypes for new or existing products.

MADE FAST

Danish manufacturers are under growing pressure to react quickly to changing customer requirements, fluctuating supplies of raw materials, components and disruptive digital technologies. They need to boost productivity, and to rapidly introduce customer-centric smart products via resource-effective production.

The project will develop flexible production systems producing adapted products on agile platforms, able to rapidly scale volumes up or down. It will also focus on the use of sustainable manufacturing principles able to minimise environmental impact, and improve competitiveness.

AI Denmark

AI Denmark is a new national initiative that will make Danish industry better at working with artificial intelligence. It will lead to new products, innovative services and generally boost the competitiveness of Danish enterprises.

A total of 120 SMEs will be offered a 6-month, customised development journey, designed to help them use data to gain a competitive advantage. The focal point is AI pilot projects aimed at industry, combined with workshops focusing on exploiting specific AI technologies and organisational change processes.

The Institute is leading the project, and will help make the technology more relevant and value-creating for a wide range of enterprises. Examples include real-time monitoring of business processes, intelligent marketing, predictive analyses or automation, via robots and drones.

Abattoir robot

The Danish abattoir industry has invested massively for decades in automation, and Denmark has the highest automated pig abattoir in the world. New technological advances have now made it possible to automate using robot cells and multifunction robots. High production speed and strict hygiene standards have been a problem, but advanced 3D sensor systems, ultra-precise cutting tools and artificial intelligence have created the basis for a totally new way of automating.

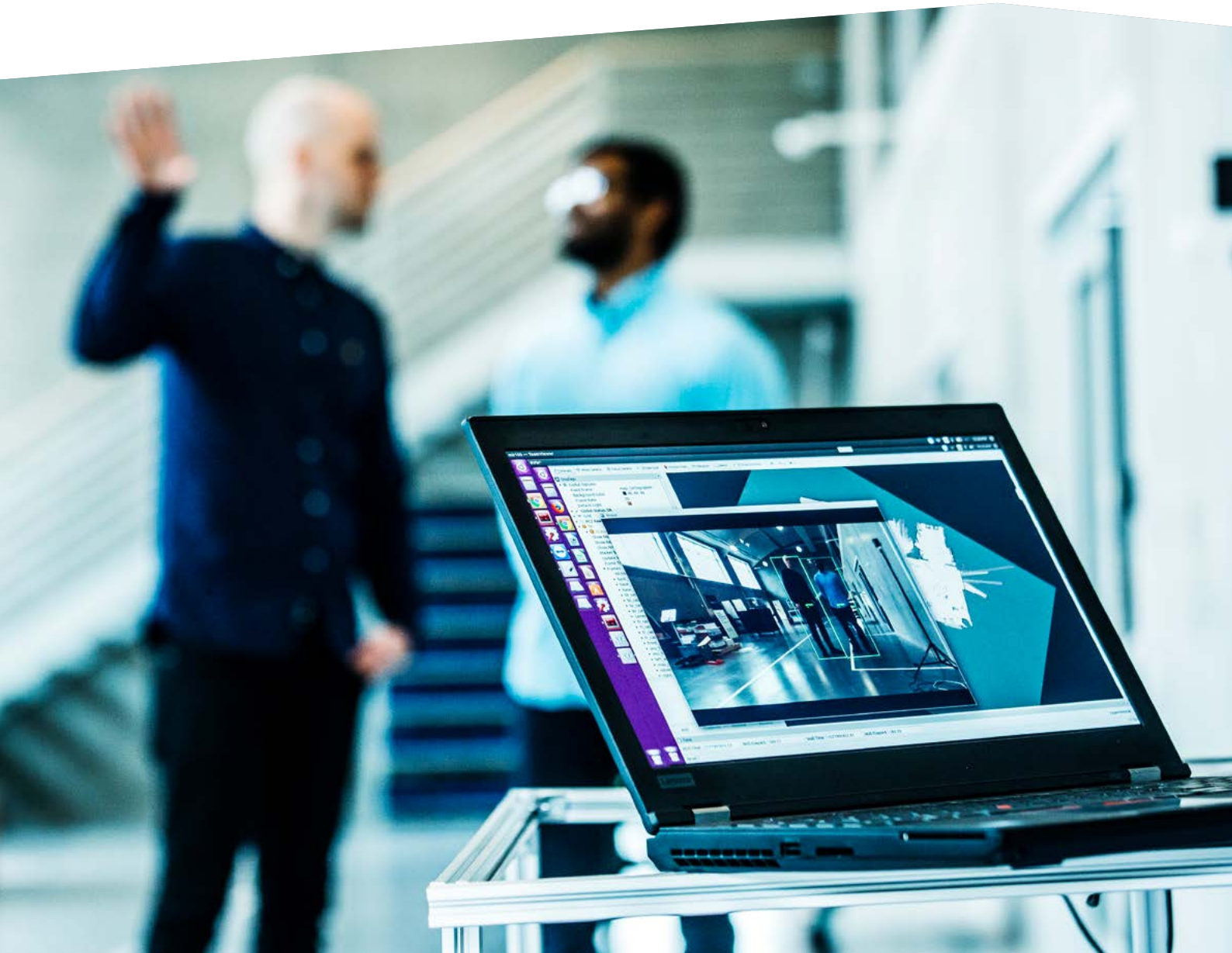
The first functional model is already installed at Danish Crown's abattoir in Ringsted. Two collaborative industrial robots can cut off toes and ears, extract tenderloins and cut openings in a sealed, ultra-hygienic robot cell at very high speed. The technology is being developed further to include more processes, but the biggest step has already been taken: the technologies have been developed, and the Institute has shown that it is possible. Supported by the Svineafgiftsfonden (a pig industry foundation) and Danmarks Innovationsfond (Innovation Fund Denmark), a new, revolutionary technology has been created that can be the driving force behind the Danish abattoir industry's competitiveness in the future.

Digital Twin

Heat pumps and cooling systems are key components of future energy systems – especially with regard to integration and sector coupling. Digitisation of heat pumps and cooling systems, plus integrating them in the Internet of Things (IoT) make it possible to improve their long-term performance and use them for sector coupling by flexible operation in accordance with controlling the demand.

But integration in the IoT requires better understanding of the system in operation, which can be difficult and expensive to determine using conventional methods. 'Digital twins' make it possible to analyse existing readings, and to gain an insight into the system when in operation through numeric modelling. Digital twins are a virtual representation of a physical system in the form of numerical models that constantly adapt to actual operating conditions.

This project aims to reduce the amount of modelling related to digital twins by developing repeatable, modular and self-learning models, plus advanced methods to analyse the system specially-developed for the intended services. This will not only make an efficient implementation process possible, with reduced investment costs for digital twins, but also enhanced exploitation of system potential.



A resilient Institute

DTI has been finding and showing the way to technological progress that will benefit industry and society since 1906. That requires a resilient Institute in a state of constant development.

Our ability to win and conduct R&D-projects, and to deliver high-quality, market-relevant technological services depends on the following four capabilities:

Collaborative relations:
We are reaching out and bringing together
We are a key player in the innovation system

Skills, leadership and organising:
Our employees are the foundation on which the Institute can create innovative results

Equipment and facilities:
Our equipment and facilities must be advanced and market-relevant

Methods, processes and systems:
We will solve assignments more efficiently
We will run the digital transformation of our customers

STRONG PARTNERSHIPS

The institute is a member of EUROTECH, along with nine of the biggest Research and Technology Organisations in Europe*

**EUROTECH is a special interest group originating from EARTO (the European Association of Research and Technology Organisations), which brings together 350 international RTOs.*

World-class equipment

In 2020, DTI invested in tangible fixed assets to a value of over EUR 8.4 million, including the acquisition of a large farm in Trige, north of Aarhus, to ensure DTI's long-term presence in the area. A considerable sum was also invested in maintenance of the Institute's buildings.

Major investments in equipment include:

Smart HVAC-laboratory

We develop and test ventilation systems and components in our new Smart HVAC laboratory, focusing on Heating, Ventilation, and Air Conditioning.

This indoor laboratory has flexible room modelling and dimensioning, complete with indoor climate modules for ventilation, heating and cooling. We can control the elements and simulate the effects of indoor climate, such as surface temperatures, daylight penetration and heat loss.

The laboratory also has electrical and data installations, along with a control and measurement platform with data collection and analysis tools. There is also laboratory equipment, person simulators and visualisation screens for technology development and teaching.

The rapid establishment of complex conditions gives the Institute the chance to conduct development work that would otherwise be left out due to the cost or availability of resources. Focus areas are office buildings, schools and institutions, buildings with special room sizes and relationships.

New test facilities for large heat pumps

We have built new facilities in our cooling and heat pump laboratory, including a new test rig for heat pumps used for district heating at MW level, a new, large-scale CO_2-cooling plant, and an XXL climate chamber.

The new facilities will help to ensure that the Institute retains its role as the absolute leading international laboratory for testing and development of components and systems with CO_2 and NH_3 as coolant.

The size of the XXL climate chamber means that the laboratory can run tests of heat pumps, cooling plant, evaporators/air coolers, gas coolers, condensers with capacity exceeding 100 kW, something which very few laboratories in Europe can.

There is heavy demand from customers for test facilities of this size, often driven by new EU legislation that sets standards for a wide range of products.

GC-MS-equipment

The Institute has invested in new GC-MS equipment, including thermal desorption system (TDS), dispensers and microchambers. These will be used in connection with research and development work, such as determining the longevity profiles of food products based on the content of aroma components.

By implementing microchambers in our analysis methods, aroma components can be collected direct from the sample to the equipment. That provides a more authentic impression of what is often a complicated aroma composition.

The procurement of new GC-MS equipment ensures that the Institute can conduct tests in connection with conducting accredited VOC analyses (Volatile Organic Compounds).

The investment also means that we can automate analysis functions and data processing when conducting tests, and thus replace the time-consuming procedures previously used.

This investment updates DTI with the latest technology and know-how, which, in addition to its application within aroma components from food products, can be used for analyses of volatile, hazardous substances and smells from building materials, furniture and other materials that can affect the indoor climate.

Q-TOF-equipment

Within chemical characterisation, we have invested in Q-TOF equipment (Quadrupole Time-of-Flight). The equipment is used for such purposes as chemical characterisation of medical equipment to analyse for non-volatile organic compounds (NVOC). It is also used to analyse chemical content substances in biocide and pesticide products. The investment was made in response to the current major changes in prioritisation of biological and chemical testing of medical equipment. Regulation (EU) 2017/745, (the Medical Device Regulation) used to contain a requirement that biological studies be conducted before chemical tests, but the practice is now changed so that chemical tests have to be conducted first.

This change has given the Institute a unique opportunity to establish itself as a serious provider of chemical analyses for medical equipment, and thus become a competitive supplier of all analysis packages to Danish and international customers. Such a position on the market required investment in the Q-TOF 10 equipment.

In summary, the investment in Q-TOF equipment helped ensure the future competitiveness of the Institute's chemical and microbiological laboratory within chemical characterisation of leaking substances and extractable substances.

3D-printer

The Institute has invested in a new 3D-printer to support our work with expanding industrial 3D-print in Danish industry. We invested in a polymer printer, that combines productivity, flexibility and quality, covering the most important requirements of industry.

Our activities primarily involve the development of new materials, and increasing awareness of them for specific sectors. A good example is the development of a new 3D-print material in plastic that can be detected by a metal detector, for Danish enterprises within food production. This material has massive potential, and has now been rolled out to our key customers, while we continue work on upscaling in consultation with major foreign groups.

Furthermore, we have a number of activities within post-production treatment of the materials produced by the new printer. The most promising is a process we were partly responsible for developing, called 3S, which makes surfaces smoother and easy to clean. Once again there is massive potential for food-producing enterprises, and within 3D-print for the health sector for example, which has expressed considerable interest.

A digital, efficient Institute

The Institute continuously develops methods, tools and systems with regard to streamlining our work, and to enhance the quality of solutions we deliver. We place particular focus on digital transformation as a means of streamlining, improving quality, protecting and developing our dealings with customers.

Digitisation of laboratories

All the Institute's platforms and customer-oriented solutions are continuously optimised and developed, but the streamlining of working processes, data processing and quality standards for our approximately 70 laboratories was in particular focus in 2020. The work was based on a new, common data platform, which works as a flexible, easy-to-use development tool that can be adapted to diverse processes and equipment in our laboratories. The platform can also optimise data use in R&D-activities without high volume, when development has to be done together with partners. Late in the year, the platform was expanded with an IoT solution able to gather data from customers and partners, making closer integration in the customer's value chain possible.

Digitisation teams

In line with the expansion of our data processing architecture, we have created five digitisation teams drawn from the entire Institute. The teams each concentrate on AI, IoT, simulation and modelling, data analysis and visualisation, plus data gathering. They all work with digital maturity, business support and expert development. To support collaboration and insight into our digitisation skills, we have collected and classified our digitisation skills for 133 key employees. The objective is for them to actively develop new digital products, business models and specific customer solutions.

The digital workplace

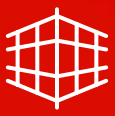
COVID-19 has also made its mark on the digital workplace. The crisis has accelerated use of a number of digital tools, such as Microsoft Teams, and created fertile conditions for thinking out of the box on how we work with customers and partners. This has resulted in a change of strategy, in which the Institute is revising its procedures and working methods into a Teams First strategy – naturally with full respect for what the customer wants and the compliance rules we are subject to.

133 DIGITISATION SPECIALISTS – TOP 6 DIGITISATION DISCIPLINES

AI

Robot technology

IoT



Simulation and modelling

Sensor and vision technology

Data collection and analysis

Organisation, management and competencies

Our employees competencies are at the core of all activities and form the very basis for the Institute's ability to create innovative results. The purpose of the Institute's HR efforts is to support our overarching goals for R&D and commercial activities and to support international activities, the Institute's digitisation and the development of strategic positions of strength.

At the end of 2020, DTI had more than 1,000 employees. 22 % of the academic staff held PhD's at the end of 2020, a 1 % increase compared to 2019.

Competency development

Throughout 2020, activities related to competency development, working conditions, business development, etc. were affected by the COVID-19 pandemic. Digital development has accelerated in a number of fields, such as in relation to the support of virtual working and the conversion of physical courses, internal communications and events to digital offerings. Digital platforms for meeting activities and webinars have become an integrated part of everyday work.

Communication and video formats have also been implemented to ensure ongoing progress reports and frequent information from management.

Many employees have taken advantage of course activities, which has supported virtual competency development, including online sales, virtual meetings, planning, etc. Virtual network events have also taken place for both business and team managers.

Employee satisfaction and wellbeing

2020 also required management to focus on maintaining stable business operations, ensuring productivity and safe-guarding employee wellbeing, resulting in significant attention on how to handle the impact of COVID-19, the safety of coming to work, motivation and support measures for remote working.

In 2020, the Institute conducted its 10th employee survey with the highest ever response rate of 94 %, and with a generally high level of satisfaction recorded on all parameters. The evaluation of vice presidents, directors and managers shows the same high degree of satisfaction as in 2018, and the number of 'ambassadors' at the Institute has increased from 18.6 % to 21.3 %. The employee survey included questions about the Institute's handling of the COVID-19 issue, and the responses indicate acceptance of the way in which the crisis has been handled and a general sense of safety about coming to work. Absence due to sickness in 2020 was 2.89 %, which includes employees with long-term sickness and those who have been sick with COVID-19.

Operational Excellence

As in previous years, DTI focused strongly on process optimisation in a number of areas. Central elements of the Institute HR system have been implemented, enabling a higher degree of self-service, and the handling of employment relationships has also been further streamlined. As part of this, several digital decision and management tools have been introduced which combine data across internal common functions in order to support future decision processes. A system has also been implemented for more targeted and visible individual competency development.

A course platform has been implemented as part of the new HR platform, the purpose of which is to create visibility and enable targeting of development offers for the various functions at the Institute. Extended platform use will continue in 2021.

Recruitment and onboarding

DTI posted 90 job advertisement on its recruitment system in 2020, only 16 fewer than in 2019. The reduction was to be expected considering COVID-19. The advertisements generated 3,300 applications, matching past levels. Furthermore, an active search effort via LinkedIn showed that approx. 60 % of all individuals contacted were positive about working at DTI.

In 2020, 103 employees went through a comprehensive on-boarding program which, even during a COVID-19

pandemic has ensured that all new employees are well-informed and prepared for working at DTI.

Employer Value Proposition

In order for the Institute to continue to be able to attract the best candidates, the Institute worked strategically with an employer value proposition/an employer promise during 2020 as the basis for the Institute's recruitment and employer branding activities. Internal focus groups, questions in the employee survey and external surveys have provided a foundation for the continued work on spreading the message of the Institute as an attractive place to work.

Gender equality

DTI continues to focus on ensuring a gender-balanced management. The overarching approach is that DTI treats everyone equally, regardless of gender, age, race, religion, political conviction, etc., in all employment matters. This applies both to recruitment, appointment to management positions and career development. This is supported by the Institute's staff policy which states: 'We work to promote a balanced employee composition in order that the Institute always has access to the best qualified employees within the Institute's core competencies'. In 2020, the female to male ratio at DTI was 37 % to 63 %, while the ratio at executive level at the Institute (team leaders, directors and vice presidents) was 38 % to 62 % at the end of 2020.

EMPLOYER VALUE PROPOSITION

WE CHALLENGE YOU PROFESSIONALLY

(WE ARE THE EXPERTS' EXPERT, AND WE DEVELOP NEW TECHNOLOGY)

WE MAKE A DIFFERENCE

(WE CREATE INNOVATIVE AND/ OR SUSTAINABLE SOLUTIONS FOR BUSINESS AND INDUSTRY)

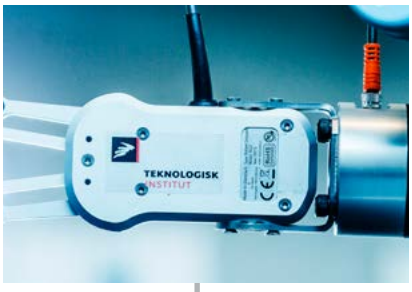
WE CREATE OPPORTUNITIES FOR GROWTH

(WE STRIVE TO SUCCEED TOGETHER AND ENJOY FREEDOM WITH RESPONSIBILITY)

Group chart

DANISH TECHNOLOGICAL INSTITUTE

REG NO.: 56 97 61 16



SUBSIDIARIES

FOREIGN

DTI SPAIN S.L.

67 % REG. NO.: B-65573784

DANISH

DANCERT A/S

100 % REG. NO.: 29 51 20 94

DANFYSIK A/S

100 % REG. NO.: 31 93 48 26

NOTES

TEKNOLOGISK INSTITUT AB, Sweden

100 % REG. NO.: 556456-9894

Sold as of 01.01.2021

TEKNOLOGISK INNOVATION A/S

100 % REG-NO.: 20 66 65 45

Company with limited activities

Company details

Danish Technological Institute
Gregersensvej 1
DK-2630 Taastrup

Tel: +45 72 20 20 00
Fax: +45 72 20 20 19

Website: www.dti.dk
Email: info@teknologisk.dk

Reg no.: 56 97 61 16
Founded: 1906
Registered office: Taastrup
Financial year: 1 January – 31 December 2020

Board of Trustees

Jens Maaløe, Chairman
Mikael Bay Hansen, Deputy Chairman
Anders Bjarklev
Claus von Elling
Connie Hedegaard
Niels Techen
Per Laursen
Frederik R. Steenstrup
Lotte Bjerrum Friis-Holm

Executive Board

Juan Farré, President

Auditors

PricewaterhouseCoopers
Statsautoriseret Revisionspartnerselskab
Strandvejen 44
DK-2900 Hellerup

Board of Trustees

Jens Maaløe
Chairman

Mikael Bay Hansen
Deputy Chairman

Lotte Bjerrum Friis-Holm
Board member

Claus von Elling
Board member

Connie Hedegaard
Board member

Anders Bjarklev
Board member

Per Laursen
Board member

Niels Techen
Board member

Frederik R. Steenstrup
Board member

Board of Representatives

The Board of Representatives consists of members appointed by the main stakeholder organisations in Denmark. The Board of Representatives currently has the following composition:

Chairman
Jens Maaløe
Professional board member
Appointed by the Confederation of Danish Industry

Deputy Chairman
Mikael Bay Hansen
Head of Department
Appointed by the Economic Council of Labour Movement & the Danish Confederation of Trade Unions

Name	Job title	Organisation
Appointed by the Economic Council of Labour Movement & Danish Confederation Trade Unions		
Fie Vestergaard	Head of Department	The Danish Association of Professional Technicians
Ejner K. Holst	Deputy Chairman	Danish Confederation Trade Unions
Michael Rask Pedersen	Management Consultant	3F – United Federation of Danish Workers
Peter Jacques Jensen	Chairman	Union of Commercial and Clerical Employees in Denmark, IT, Media & Industry Metropolitan Branch
Claus von Elling	Chairman	3F – United Federation of Danish Workers
Appointed by Danish Academy of Technical Sciences		
Anders Bjarklev	President	Technical University of Denmark
Lisbet Thyge Frandsen	Civil Engineer	
Appointed by Confederation of Danish Employers		
Michael H. Nielsen	Director	Confederation of Danish Industry
Lisbeth Dalgaard	Merchant	Confederation of Danish Employers
Elly Kjems Hove	Industry Director	Confederation of Danish Industry
Troels Blicher Danielsen	Managing Director	TEKNIQ
Carsten Toft Boesen	CEO	Niras A/S
Appointed by the Danish Chamber of Commerce		
Louise Riisgaard	Chief Consultant	Danish Chamber of Commerce

Name	Job title	Organisation
Appointed by Confederation of Danish Industry		
Michael Lumholt	CEO	Ticra A/S
Clas Nylandsted Andersen	Director	
Appointed by the Danish Federation of Small and Medium-sized Enterprises		
Niels Techen	CEO	Helmer Christiansen A/S
Thomas Krebs	Managing Director	Danish Federation of Small and Medium-sized Enterprises
Preben Jakobsen	CEO	Nordtec Optomatic A/S
Appointed by the Danish Society of Engineers, IDA		
Per Diget	Chairman for IDA's Commercial and Growth Committee	Niras A/S
Appointed by KL - Local Government Denmark		
Agnete Thomsen	General Manager	Allerød Municipality
Appointed by Danish Agriculture & Food Council		
Morten Andersen Linnet	Chief Consultant Research and Education	Danish Agriculture & Food Council
Appointed by the Danish Association of Managers		
Bjarne Henning Jensen	Management adviser	Danish Association of Managers
Appointed by Danish Regions		
Poul Fremmelev	Regional Council Member	Region of Southern Denmark
Elected by the Board of Representatives		
Connie Hedegaard	Former EU Commissioner	Board of Representatives
Per Laursen	Vice President	Danish Crown A/S
Appointed by the Institute's Collaboration Committee		
The Institute's co-operative committee has appointed the following employee on the Board of Representatives to attend without voting rights:		
Søsser Schmidt	Service and Event Coordinator	Robot Technology, Danish Technological Institute

Management overview

PRESIDENT

CFO

VICE EXECUTIVE PRESIDENT
PRODUCTION AND
INNOVATION

VICE EXECUTIVE PRESIDENT
BUILDING AND
CONSTRUCTION

VICE EXECUTIVE PRESIDENT
ENERGY AND CLIMATE

VICE EXECUTIVE PRESIDENT
DMRI

VICE EXECUTIVE PRESIDENT
MATERIALS

VICE EXECUTIVE PRESIDENT
ENVIRONMENTAL
TECHNOLOGY

VICE EXECUTIVE PRESIDENT
AGROTECH

Excerpt: Consolidated financial statement

FINANCIAL HIGHLIGHTS FOR THE GROUP

EURm	2020	2019	2018	2017	2016
Financial ratios					
Net turnover	146.6	152.4	150.5	151.1	150.0
Operating profit or loss	3.0	6.4	5.7	5.2	3.4
Financial items	-0.3	-0.2	-0.2	0.0	-0.3
Tax on profit or loss from ordinary activities	0.0	0.0	0.1	0.5	0.4
Net profit or loss for the year	**2.7**	**6.2**	**5.6**	**5.7**	**3.5**
Balance sheet total	155.1	159.1	150.0	143.3	134.6
Equity attributed to parent company	**105.1**	**101.2**	**95.4**	**90.3**	**84.3**
Cash flow	**-4.2**	**-1.3**	**1.2**	**8.9**	**-11.7**
Of which investment in property, plant and equipment	8.4	5.0	7.8	5.3	4.0

Financial ratios					
Profit margin	1.9	4.0	3.7	3.5	2.2
Solvency ratio	67.8	63.6	63.6	63.0	62.6
Liquidity ratio	118.4	109.6	121.8	119.0	112.0
Development financied by operators	8.3	7.7	7.7	8.0	8.9
Average number of full-time employees	**980**	**1,000**	**1,009**	**1,041**	**1,074**

Excerpt: Consolidated financial statement

BALANCE

	Group		The Institute	
EURm	2020	2019	2020	2019
ASSETS				
Fixed assets				
Intangible fixed assets				
Goodwill	0.0	0.1	0.0	0.0
Completed development projects	0.0	0.5	0.0	0.0
Patents	0.0	0.0	0.0	0.0
Intangible fixed assets in total	**0.0**	**0.6**	**0.0**	**0.0**
Property, plant and equipment				
Land and buildings	54.2	49.9	54.2	49.9
Production plant and machinery	0.4	0.4	0.0	0.0
Other plant, operating equipment, fixtures and fittings	11.9	12.8	11.9	12.7
Fitting out leased premises	0.0	0.1	0.0	0.1
Property, plant and equipment in total	**66.5**	**63.2**	**66.1**	**62.7**
Financial fixed assets				
Investments in subsidiaries	0.0	0.0	5.3	3.0
Other securities, loans and investments	31.8	32.4	31.8	32.4
Financial fixed assets in total	**31.8**	**32.4**	**37.1**	**35.4**
Total fixed assets	**98.3**	**96.2**	**103.2**	**98.1**
Currents assets				
Inventories				
Inventories	5.6	5.5	0.4	0.3
Inventories in total	**5.6**	**5.5**	**0.4**	**0.3**
Receivables				
Receivables from sale of goods and services	21.6	23.3	18.1	20.8
Contract work in progress	14.1	14.5	13.4	12.6
Receivables from subsidiaries	0.0	0.0	2.6	4.5
Deferred tax assets	0.6	0.9	0.0	0.0
Other receivables	1.1	0.6	0.2	0.2
Accruals	0.6	0.7	0.6	0.6
Receivables in total	**38.0**	**40.0**	**34.9**	**38.7**
Cash	**13.2**	**17.4**	**10.5**	**15.4**
Total current assets	**56.8**	**62.9**	**45.8**	**54.4**
Total assets	**155.1**	**159.1**	**149.0**	**152.5**

BALANCE

	Group		The Institute	
EURm	2020	2019	2020	2019
LIABILITIES				
Equity				
Retained earnings	105.1	101.2	105.1	101.2
Equity attributed to parent company	**105.1**	**101.2**	**105.1**	**101.2**
Minority interests	**0.1**	**0.1**	**0.0**	**0.0**
Total equity	**105.2**	**101.3**	**105.1**	**101.2**
Deferred liabilities				
Guarantees	0.3	0.2	0.0	0.0
Other provisions	1.6	0.4	1.5	0.3
Total provisions	**1.9**	**0.6**	**1.5**	**0.3**
Payables				
Short-term payables				
Contract work in progress	13.7	18.5	11.8	15.9
Suppliers of goods and services	5.8	5.5	4.3	4.4
Debts to credit institute	4.0	14.0	4.0	14.0
Corporation tax due	0.1	0.0	0.0	0.0
Other debt	24.0	18.9	22.1	16.7
Accruals	0.4	0.3	0.2	0.0
Short-term payables in total	**48.0**	**57.2**	**42.4**	**51.0**
Total payables	48.0	**57.2**	42.4	**51.0**
Total liabilities	**155.1**	**159.1**	**149.0**	**152.5**

Locations

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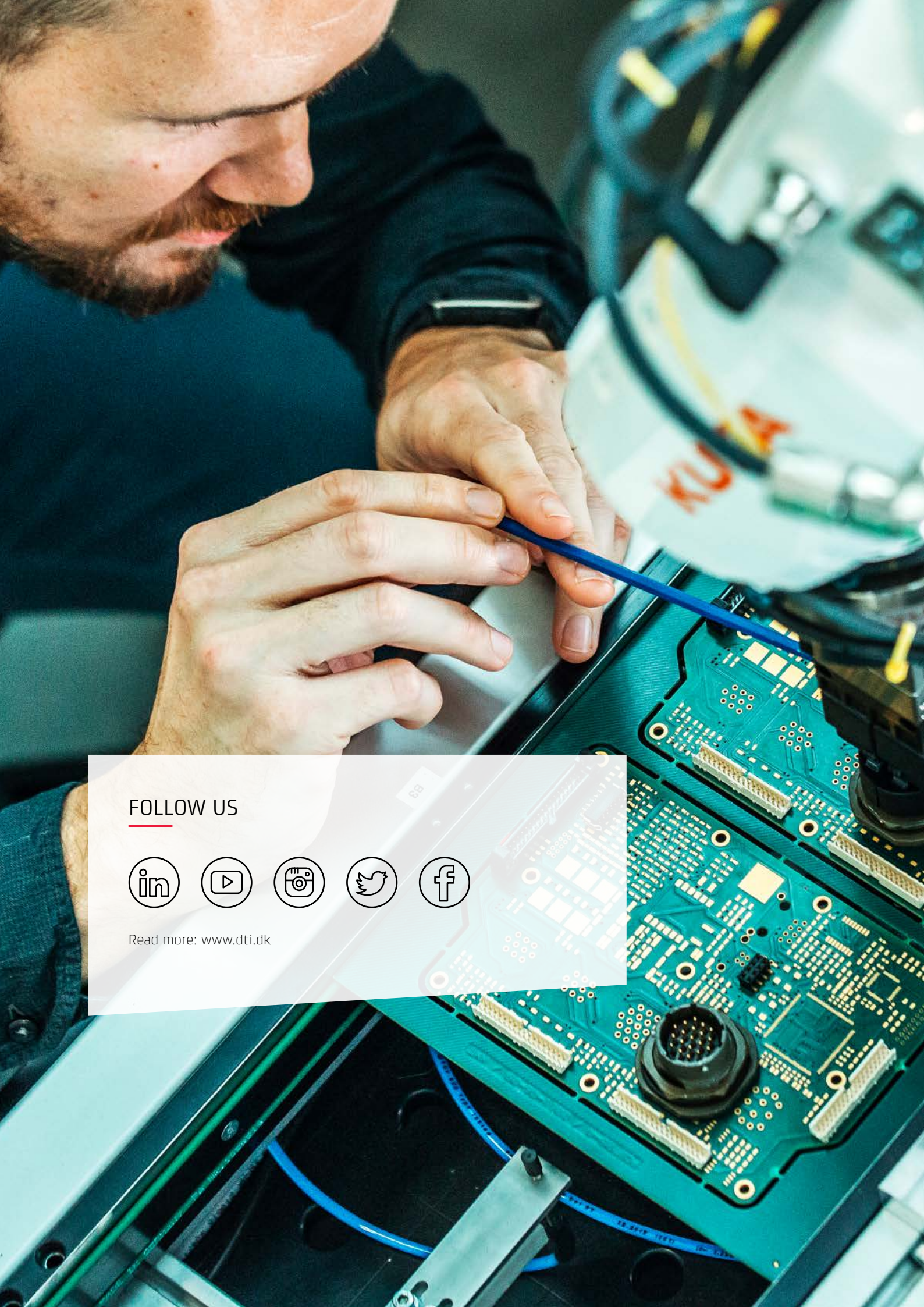

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Read more: www.dti.dk

The transition to a bioeconomy is key to attain climate goals. There are also major economic benefits to be gained from developing new bio-based products and the building blocks for the future's feed, food, energy and materials.

Danish Technological Institute has built up a range of strong specialist skills and facilities over the last 10 years for analysis, tests and pilot scale production of bioresources. We separate the building blocks in biomass that cannot be optimally exploited, so that the individual components in their purer forms can achieve a higher value. A component could be protein which can be included as ingredient in food, feed, cosmetics etc., depending on their type and quality. Fibre can also be used within areas such as materials, feed and bioenergy.

The photo on the front cover shows the extraction of lupin protein, which can be an ingredient of protein-based glue.

We demonstrate the possibilities offered by bio-refining on laboratory scale, and upscale production in our pilot plant, which is also approved for food products. Working closely with enterprises, we can determine whether full scale production is possible, and whether it makes commercial sense.

DANISH
TECHNOLOGICAL
INSTITUTE