# Life Science Industry Economic Footprint

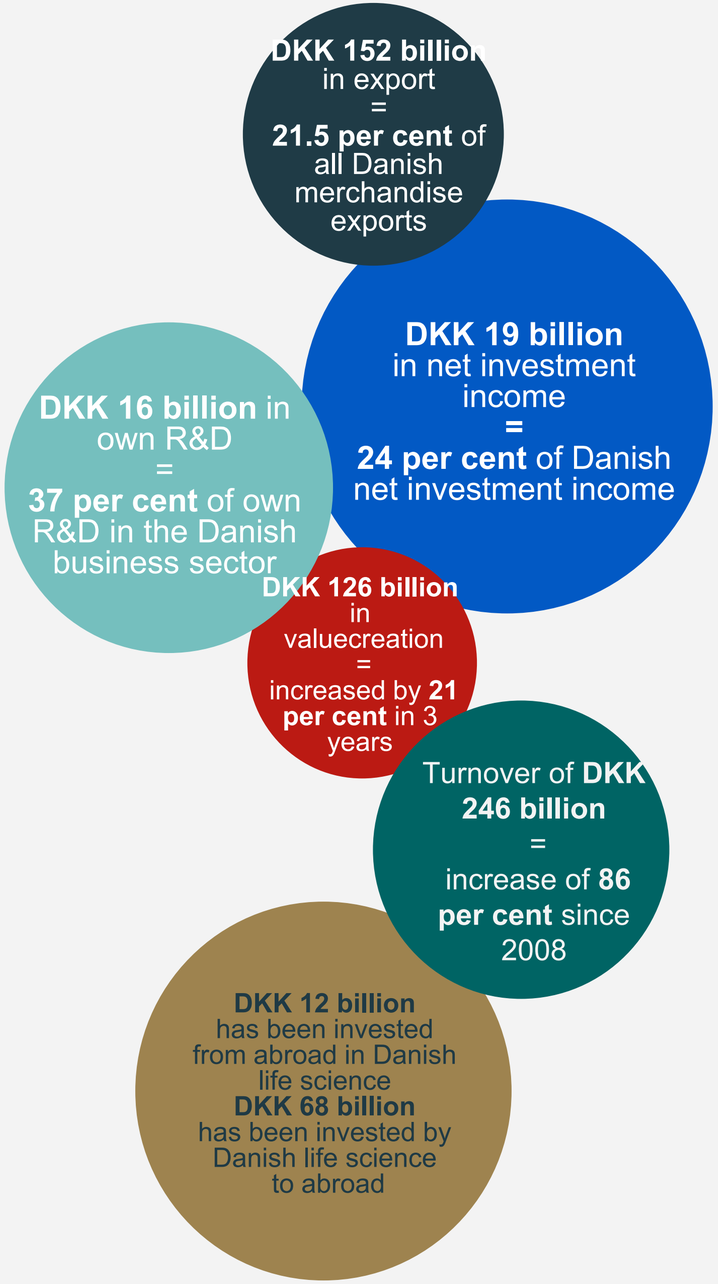
Ministry of Industry, Business and Financial Affairs, December 2021

# Contents

# Summary

# The life science industry, a Danish position of strength with a major economic footprint

The analysis is based on the latest available data from Statistics Denmark, Danmarks Nationalbank and Eurostat. Data on the companies' turnover, tax, employment and foreign comparisons are from 2018, while data for foreign investment and exports is from 2020.



# Main results of the analysis

Financial key figures:

- In 2020 the life science industry had exports of DKK 152 billion, corresponding to 21.5 per cent of goods exports in Denmark – almost tripling its exports in the past 12 years.
- The life science industry invested DKK 16 billion in own research and development (R&D), which accounted for more than a third of all R&D in the private business sector in Denmark in 2018.
- The life science industry had a turnover of just over DKK 246 billion in 2018, of which exports accounted for over half of the turnover that year.
- In 2018 the life science industry contributed more than DKK 24 billion to public finances, in the form of corporation taxes and personal taxes.
- Value creation in the life science industry increased to DKK 126 billion in 2018, corresponding to an increase of 21 per cent in 3 years.

Selected focus area in this year's analysis: Level of education and production jobs in the life science industry

- 32 per cent of people employed in the life science industry had completed lengthy higher education programmes or a PhD in 2018. This only applies to 11 per cent of those employed in the general Danish business sector.
- The number of skilled workers in the life science industry remained reasonably stable during this period, while decreasing in the general business sector.

Value added increased by 135 per cent from 2008 to 2018.

Employment has increased by 23 per cent from 2008 to 2018 and is now at 49,449 persons.

Net investment income from abroad contributes each year with slightly more than DKK 19 billion

Export has increased by 182 per cent from 2008 to 2020 and is now at DKK 152 billion.

Productivity is more than twice as high as in the private sector and has increased 55 per cent from 2008 to 2018.

The growth of the life science industry has increased since 1990, while greenhouse gas emissions have decreased.

# The companies and employees in the Danish life science industry

# Who are the Danish life science companies?

**The following pages show a number of key figures for companies in Danish life science**

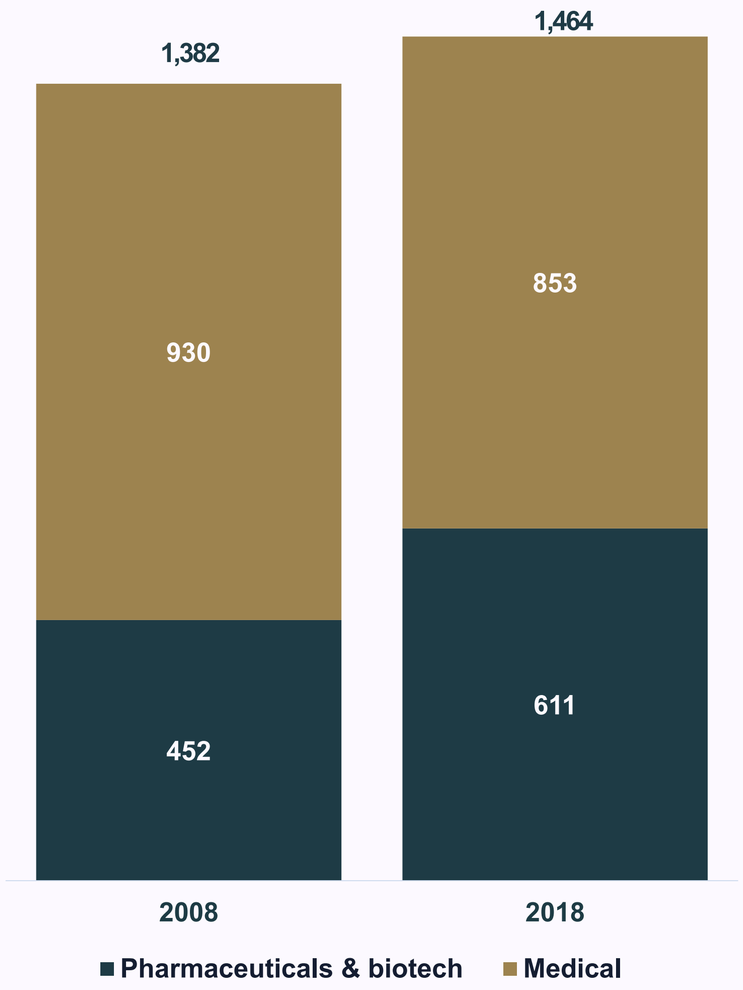
Life science companies are defined in this report as all companies that work in parts of the value chain within medical products as well as pharmaceuticals and biotechnological preparations. In other words, companies that work with research, development, advisory services, manufacturing and/or sales. Some companies manufacture/sell products that fall within industries defined as medical as well as pharmaceuticals and biotech. Novo Nordisk is an example of this. Novo Nordisk mainly manufactures pharmaceutical preparations, but they also manufacture equipment that is used in connection with healthcare treatment. Novo Nordisk is therefore included with a main emphasis on pharmaceuticals and biotech and with a lesser emphasis on medical.

In addition, some of the life science companies operate primarily in other industries that cannot be categorised as life science. These companies are only partially included in this report with a weight corresponding to their contribution to the life science industry.

# The companies

In 2018, there were a total of 1,556* companies in the life science industry in Denmark. This is an increase of 38 companies since the year before and an increase of over 100 companies since 2008.

## Number of companies in Danish life science, 2018



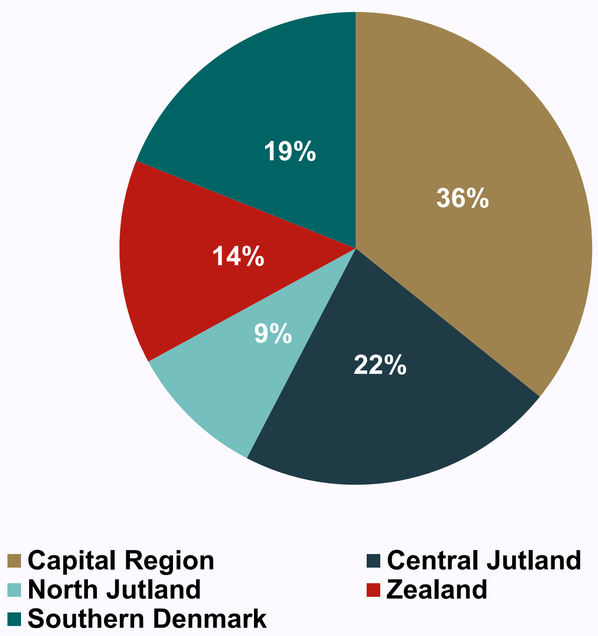

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
* Note: The numbers in the figure do not add up to 1,556, as only pure pharmaceutical and biotech and pure medical companies respectively are included in the figure. The total number of companies, i.e. 1,556,
covers all companies that produce life science products in Denmark.

# The companies

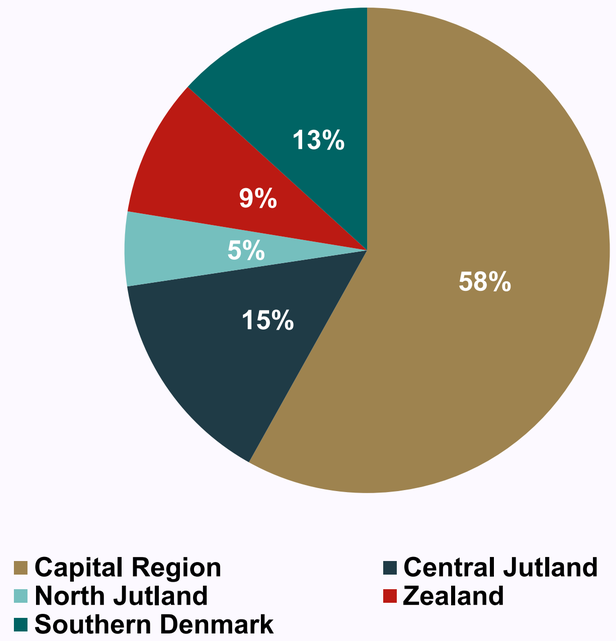
Around six out of ten life science companies are located in the Capital Region of Denmark. In particular, these are within the pharmaceutical and biotech industry, which has approximately 70 per cent of its companies located in the Capital Region.

The total life science industry thus has a greater connection to the Capital Region than the private sector generally, with just over 36 per cent of the latter companies being located in the metropolitan area.

**Regional distribution, 2018, companies in the private business sector, per cent.**




**Regional distribution, 2018, life science, per cent.**



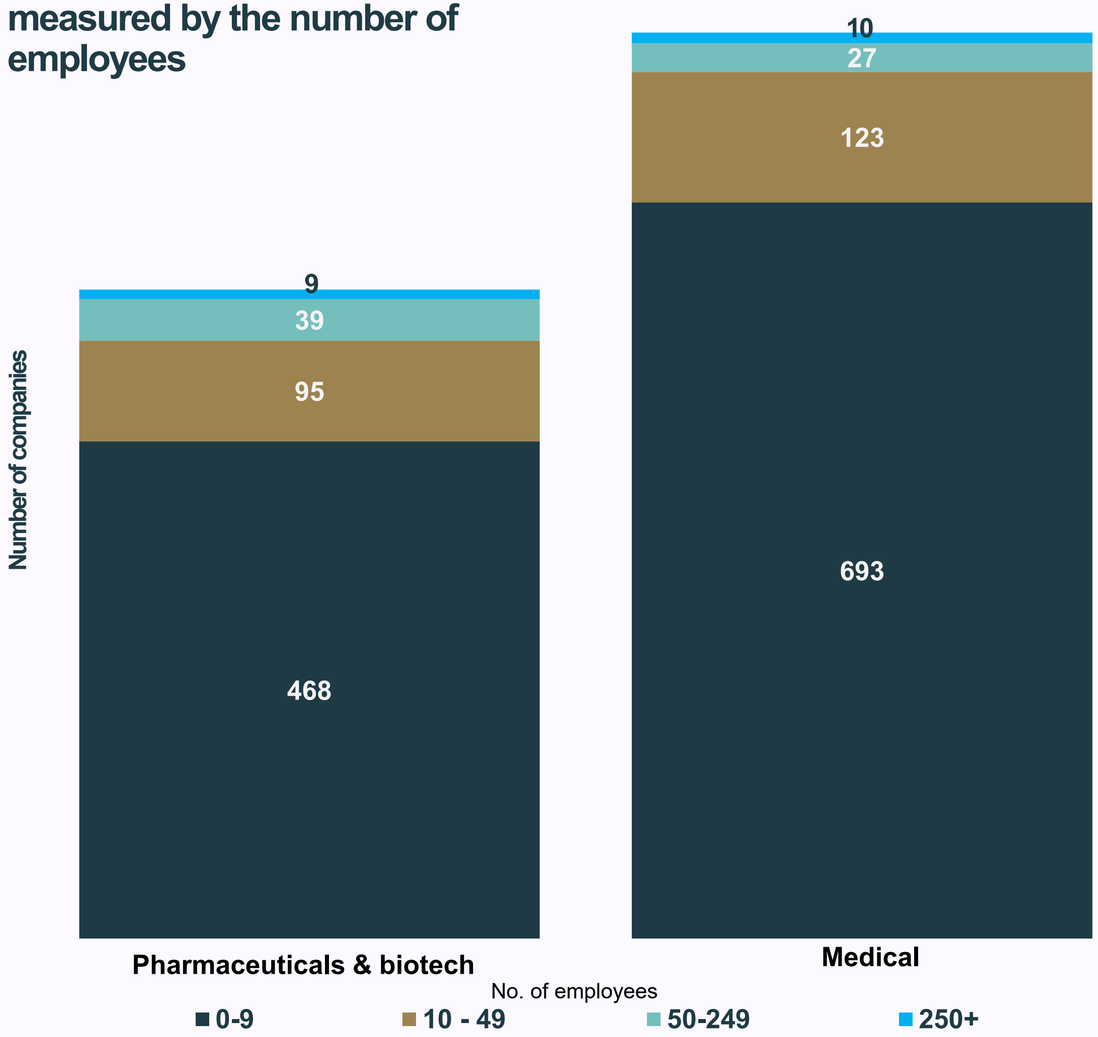

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: The private business sector is defined as the private business sector excluding agriculture, forestry and fishing, raw material extraction and financing and insurance.

# The companies

There are more companies in the medical industry than in the pharmaceutical and biotech industry. Common to the two industries is that the majority of the companies are micro-companies with 9 employees or fewer. Both industries had approximately 10 companies in Denmark with over 250 employees in 2018. This includes, among other things, large companies such as Novo Nordisk, Lundbeck and Coloplast.

Despite the fact that pharmaceuticals and biotech have the fewest number of companies, in 2018 the industry had **32,733** man-years, which constituted 66 per cent of total man-years in the overall life science industry.

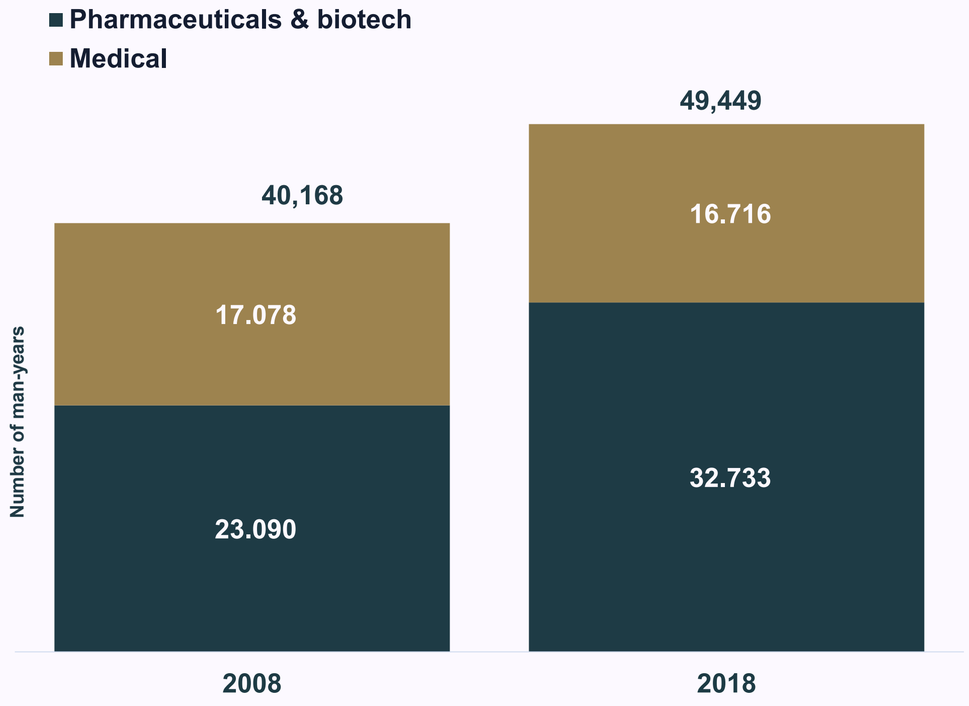
## Most small companies can be found in the medical industry measured by the number of employees



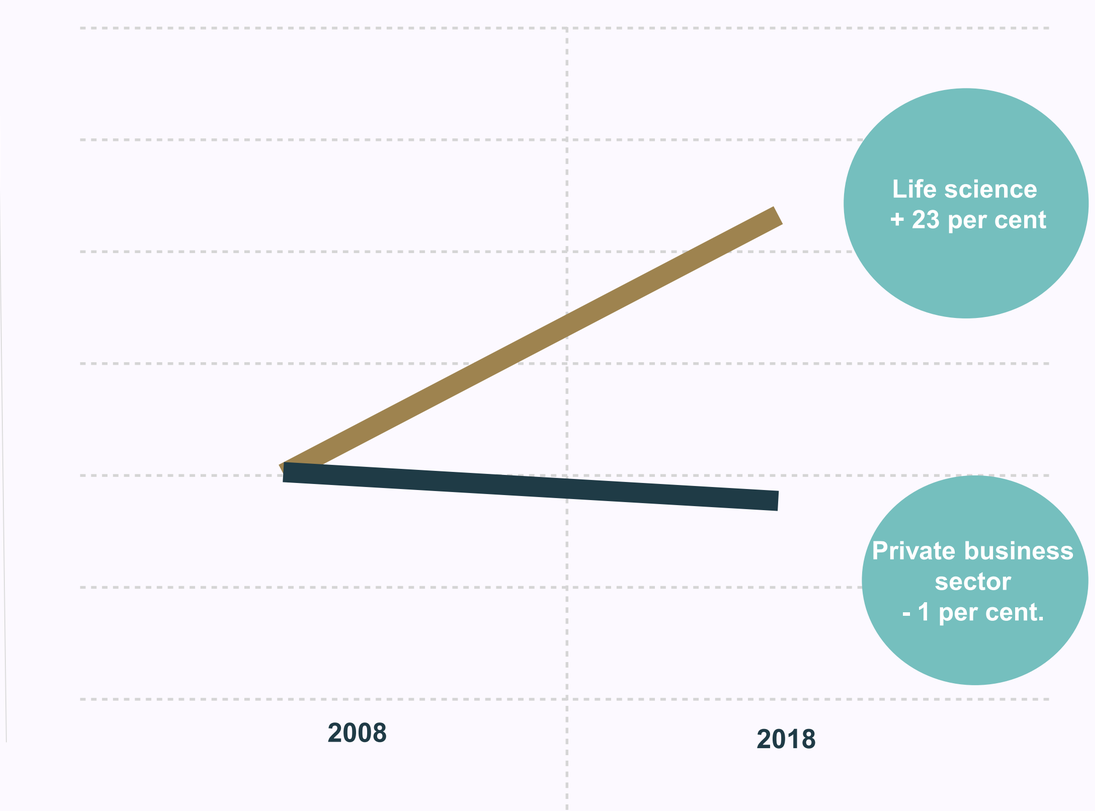

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: The numbers in the figure do not add up to 1,556, as only pure pharmaceutical and biotech and pure medical companies respectively are included in the figure. The total number of companies, i.e. 1,556, covers all companies that produce life science products in Denmark.

# Employment

**The life science industry employed 49,449 man-years in 2018. That is 2.2 per cent of the overall man-years for the entire Danish economy.**



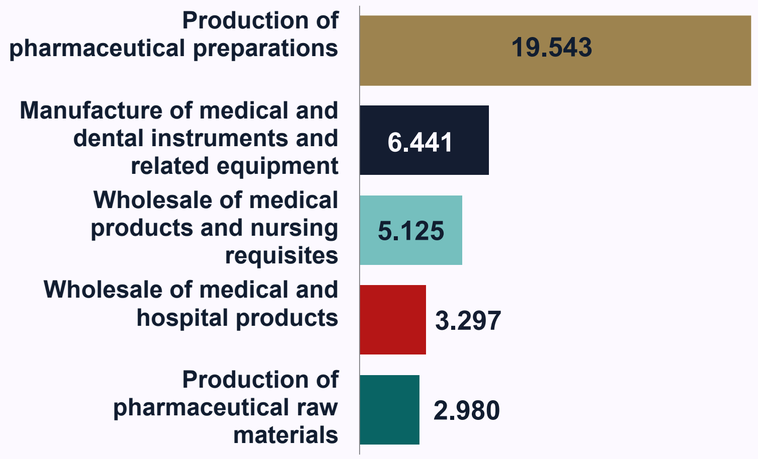

**Employment in the life science industry has grown by 23 per cent from 2008 to 2018. By comparison, employment in the Danish private business sector fell by 1 per cent during the period.**



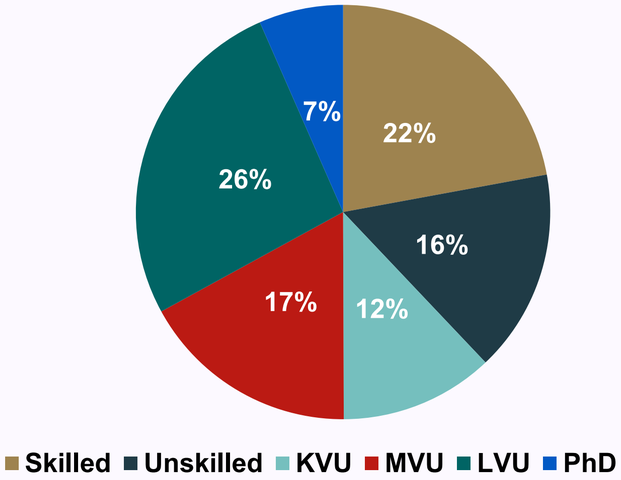

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: Employment is calculated based on the number of man-years, i.e. the number of full-time employees.
Note: The private business sector is defined as the private business sector excluding agriculture, forestry and fishing, raw material extraction and financing and insurance.

# The persons employed in the life science industry

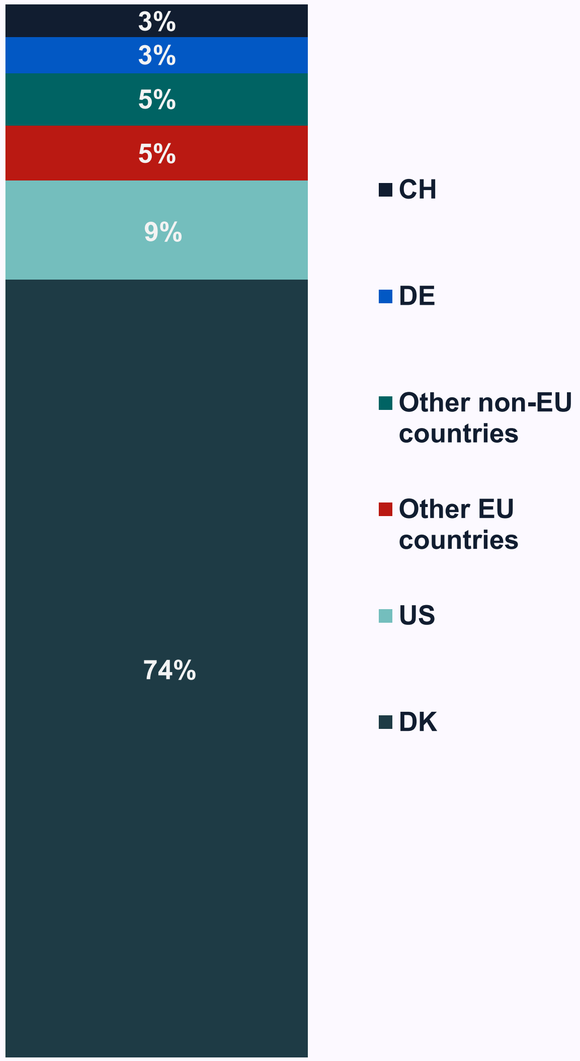
Number of full-time positions in the top five sub-sectors (2018)




Almost 4 in 10 or 22,815 are skilled or unskilled. More than 1 in 4 have completed lengthy higher education programmes



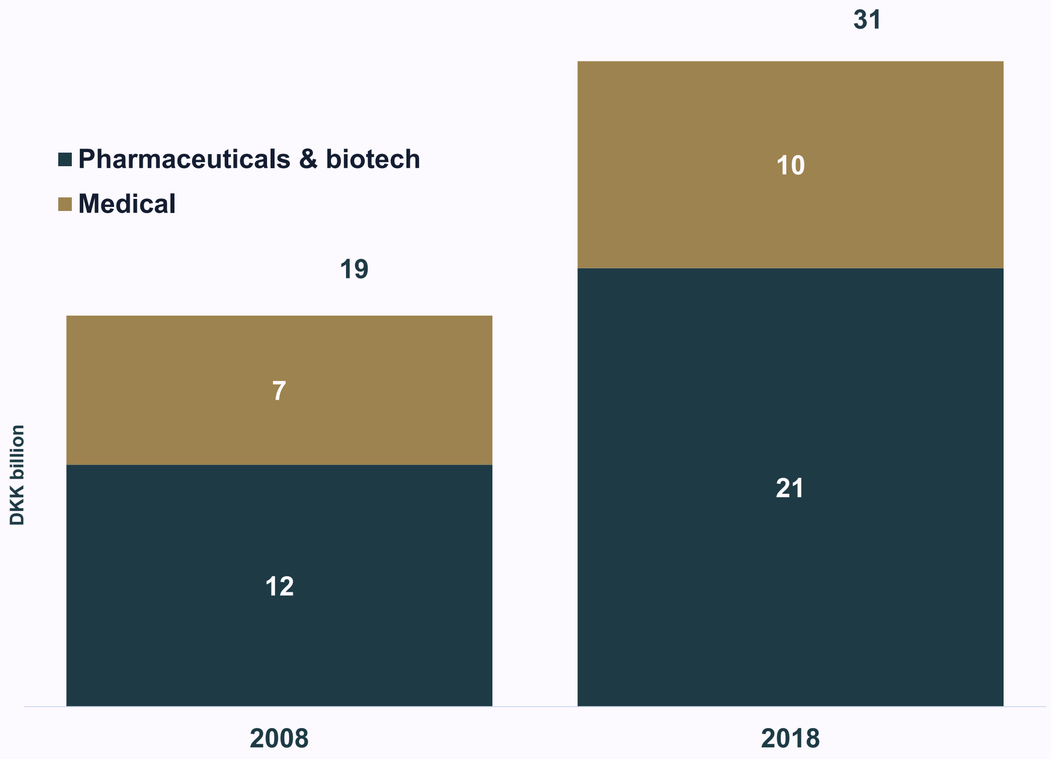

74 per cent are employed in Danish-owned companies



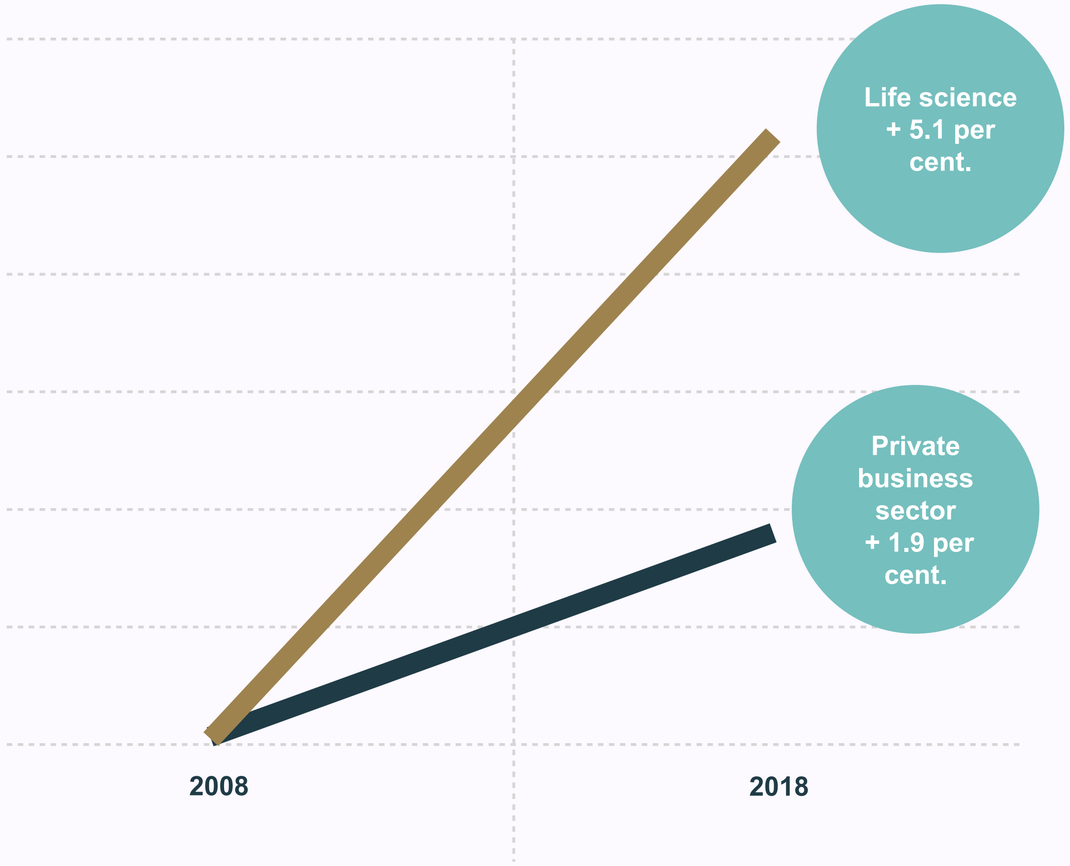

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: Employment is calculated based on the number of man-years, i.e. the number of full-time employees.
Explanation: KVU = a short higher education programme, MVU = a medium-length higher education programme, LVU = a lengthy higher education programme.

# Salaries

**In 2018, the life science industry paid salaries for DKK 31 billion.**




**The average annual wage growth in the life science industry was 5.1 per cent between 2008 and 2018. That is more than twice as high as the growth in private sector wages**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark.
Note: The private business sector is defined as the private business sector excluding agriculture, forestry and fishing, raw material extraction and financing and insurance.

# Turnover, productivity and tax payments

# Turnover

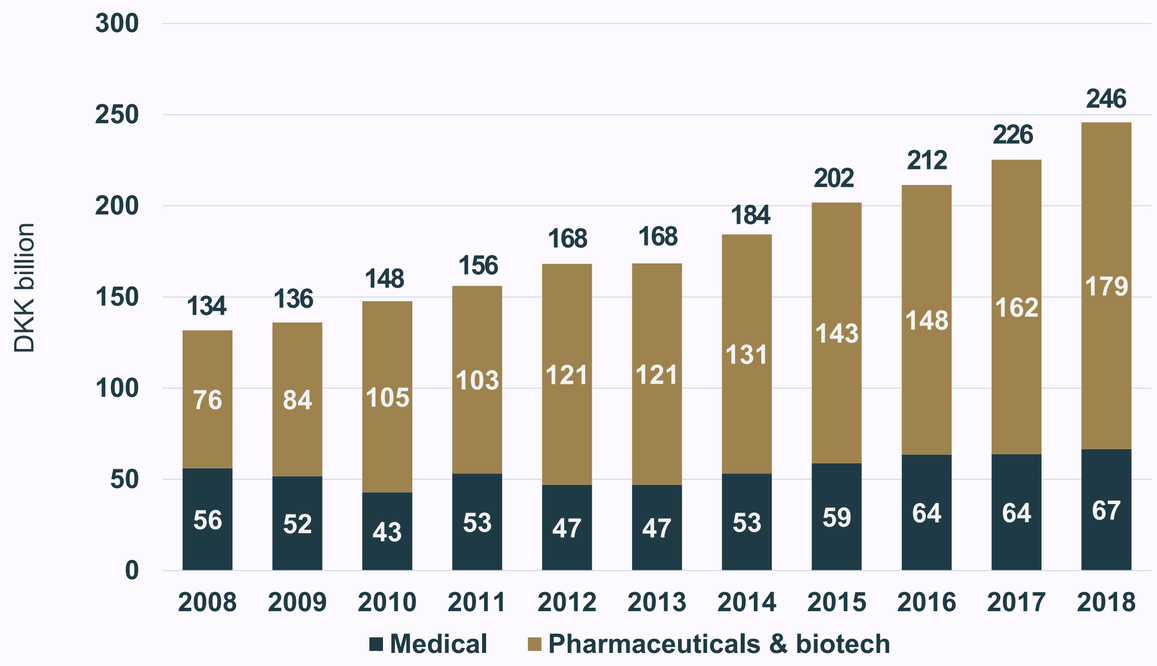
Turnover shows the life science industry's total income from sales of goods and services as well as return on investments.

In 2018, the life science industry had a turnover of DKK 246 billion, of which the pharmaceutical & biotech companies accounted for DKK 179 billion. As a result, the turnover in Danish life science amounts to just over 6 per cent of the total turnover of the Danish economy.

In 2008, the total turnover of the life science industry was DKK 132 billion. There has thus been an average annual growth in turnover of 6 per cent between 2008 and 2018. By comparison, the average annual growth in the private business sector as a whole during the same period was 2 per cent.

The high growth rates are particularly driven by the turnover within pharmaceuticals and biotech, which has more than doubled during the period.

## Turnover in the life science industry in Denmark, DKK billion




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: The private business sector is defined as the private business sector excluding agriculture, forestry and fishing, raw material extraction and financing and insurance.

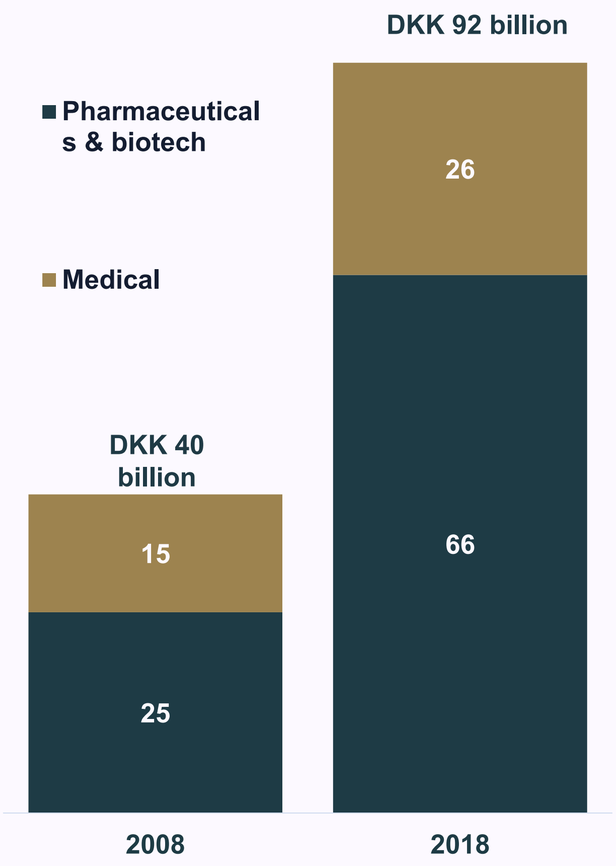
# Value added

Value added is the a company's turnover less its consumption.

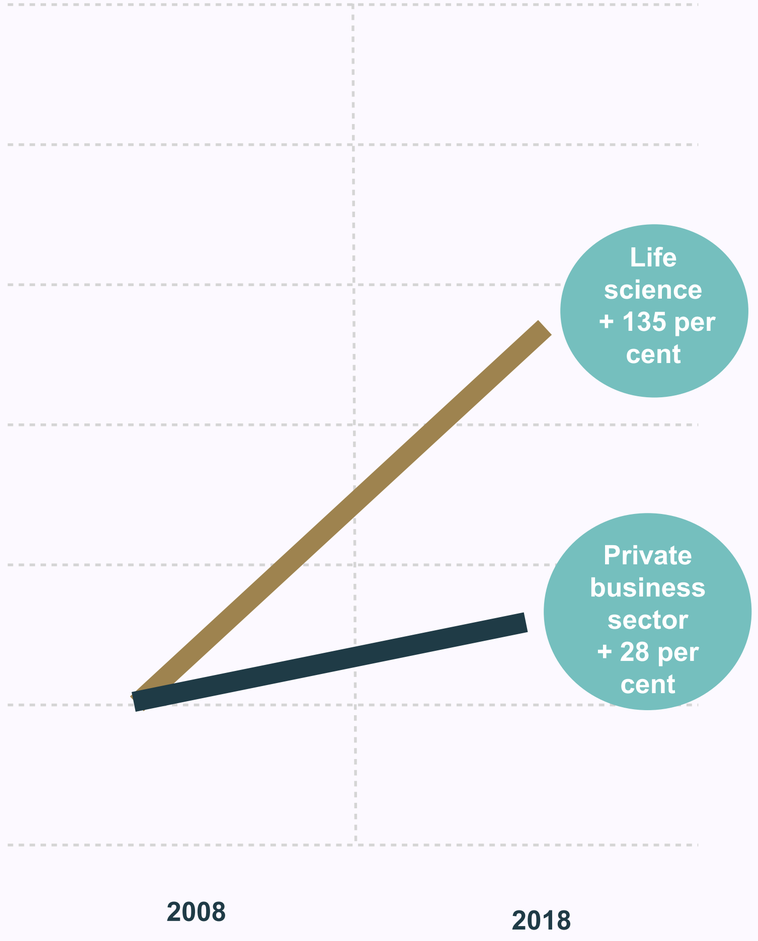
In 2008, the life science companies created value for approximately DKK 40 billion. In 2018, that figure had risen to almost DKK 92 billion, which means that they more than doubled value added during the period 2008–2018.

The life science industry has experienced an average annual growth rate in value added of 9 per cent, which is more than three times as high as the figure for the private business sector, which is 2.5 per cent. The growth can mainly be attributed to the large pharmaceutical companies.

## Value added in Danish life science, 2008–2018




## Almost 5 times the growth of the private business sector



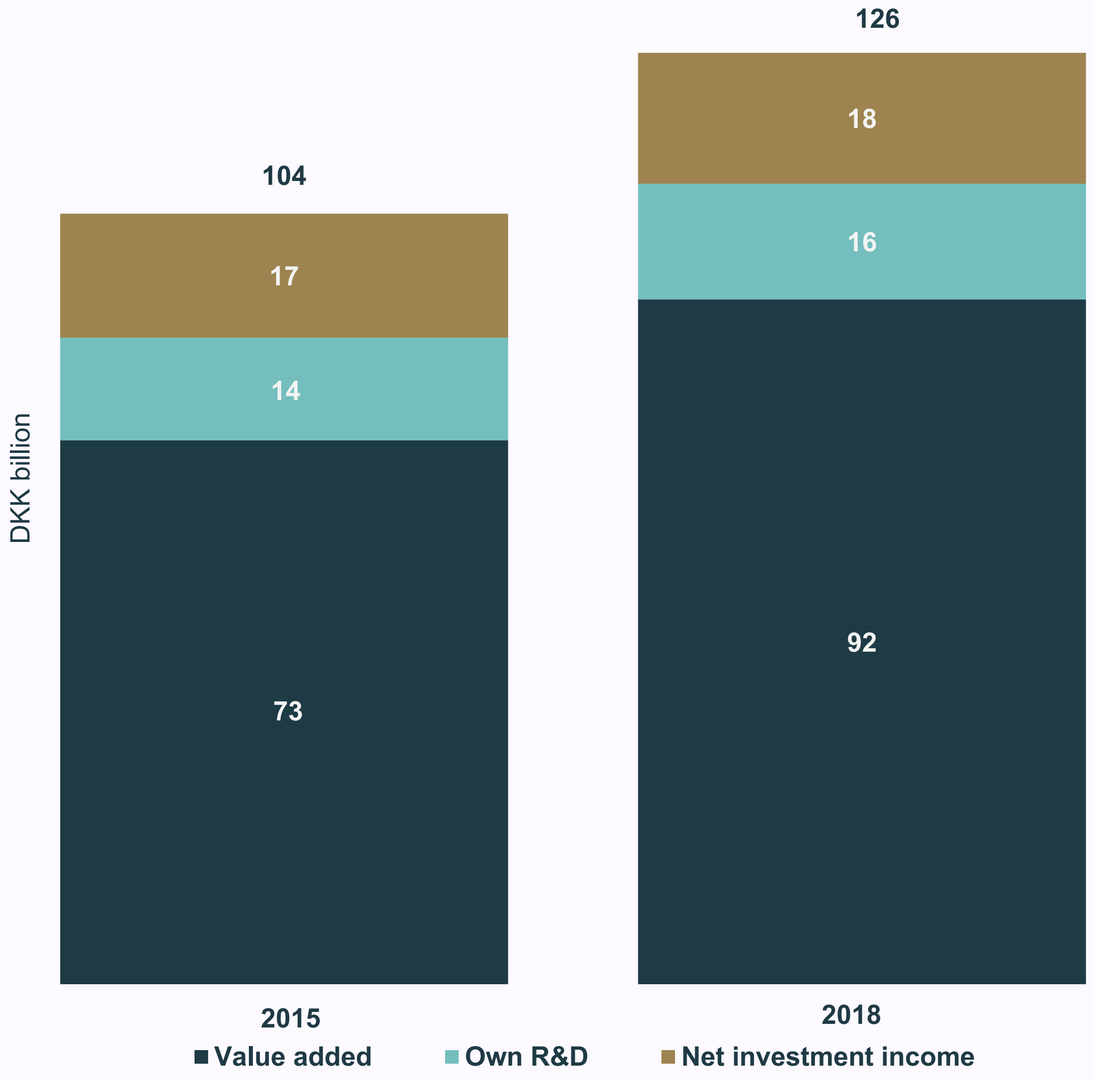

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: The private business sector is defined as the private business sector excluding agriculture, forestry and fishing, raw material extraction and financing and insurance

# Value creation

The calculation of the total value creation in the life science industry includes the companies' investments in own research and development as well as the profit created abroad constituting the net investment income.

The total value creation from the life science industry was DKK 126 billion in 2018. This was an increase of DKK 22 billion since 2015, when the total value creation was DKK 104 billion. This development is primarily driven by value added, which increased by DKK 19 billion during the period.

**The total value creation in Danish life science constituted DKK 126 billion in 2018.**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark and Danmarks Nationalbank
Note: The figures for research and development are only directly comparable from 2007–2016 and 2017–2019, cf. Statistics Denmark, which is why the increase from 2015 to 2018 should be interpreted with caution.

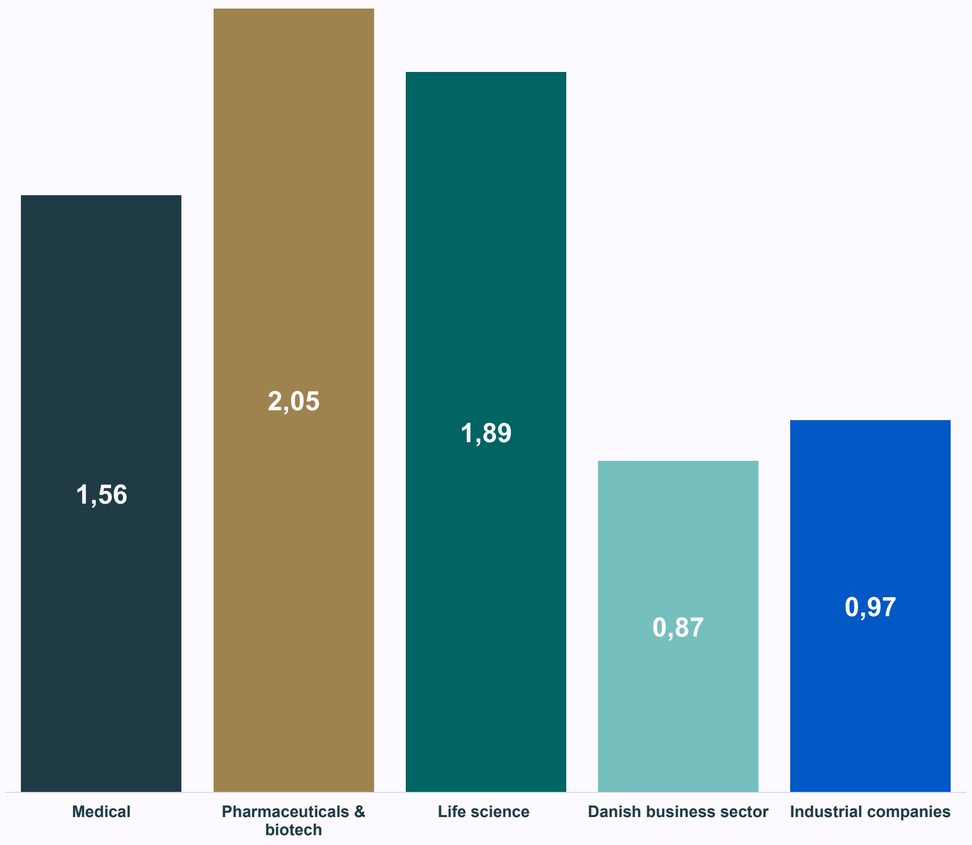
# Productivity

Productivity is a measure of the ability of companies or industry to create value in relation to the inputs involved in production.

Productivity can be calculated in different ways. In this analysis, we measure it as value added in relation to labour input measured as the number of man-years, i.e. value added per man-year. So, when the productivity of the life science industry is DKK 1.9 million, this means that each employee in the industry creates annual value for DKK 1.9 million.

The life science industry is thus a highly productive industry with higher productivity than in the rest of the Danish business sector and the combined industrial companies, which have a productivity of DKK 0.87 and 0.97 million respectively.

**Higher productivity in the life science industry than in the rest of the Danish business sector, DKK million, 2018**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: The private business sector is defined as the private business sector excluding agriculture, forestry and fishing, raw material extraction and financing and insurance.

# Productivity in life science has grown significantly

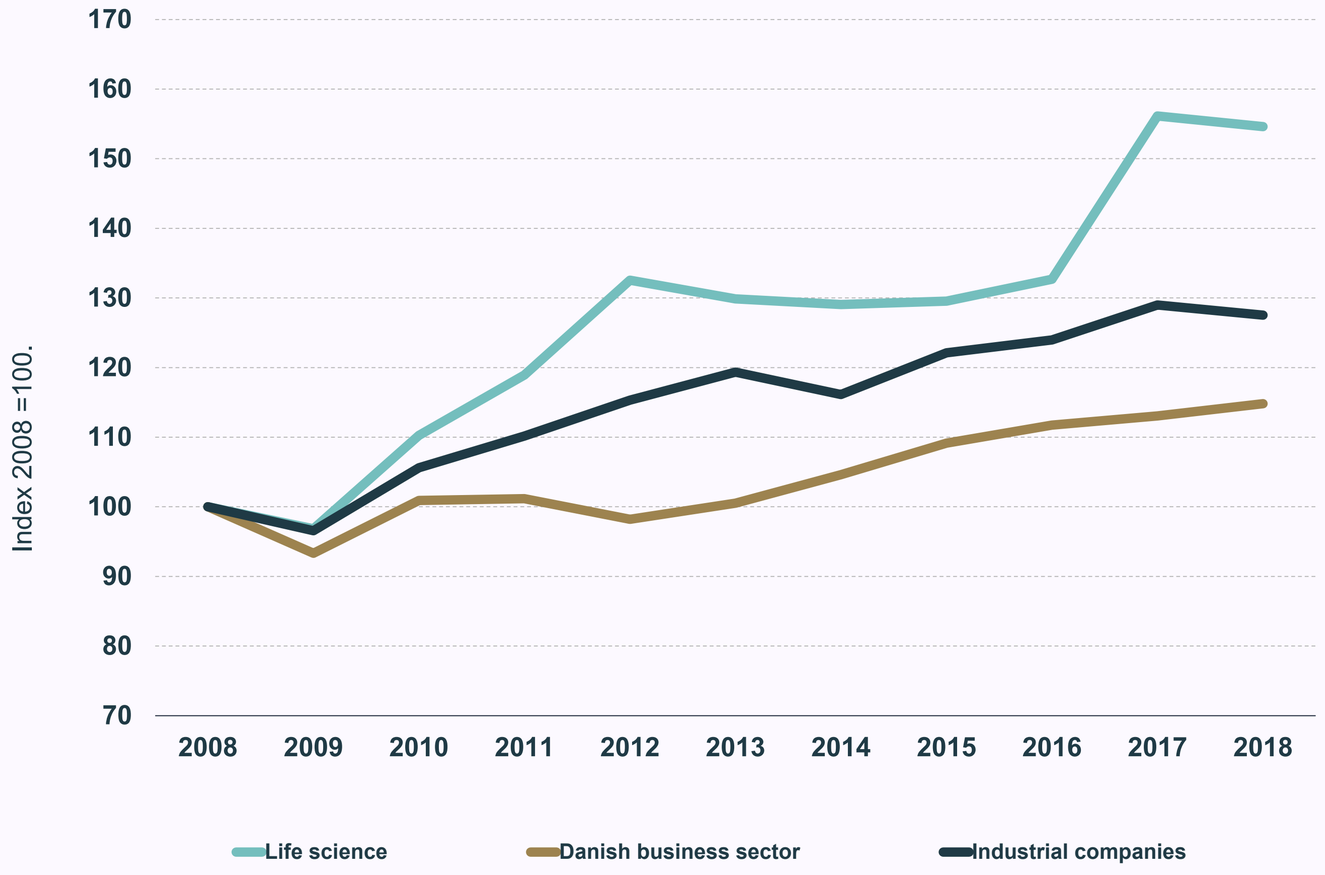
The figure shows the development in productivity at fixed prices for the life science industry, the industry companies and the Danish business sector.

The development in fixed prices shows the real development when the general price development within the sector is disregarded.

Productivity in the life science industry has grown significantly in the period 2008–2018 compared with industrial companies and the Danish business sector in general.

Excluding price developments, productivity in the life science industry has thus grown by 55 per cent in the period from 2008–2018. In the same period, productivity in the Danish business sector has grown by 15 per cent.

## Productivity growth 2008–2018, fixed prices



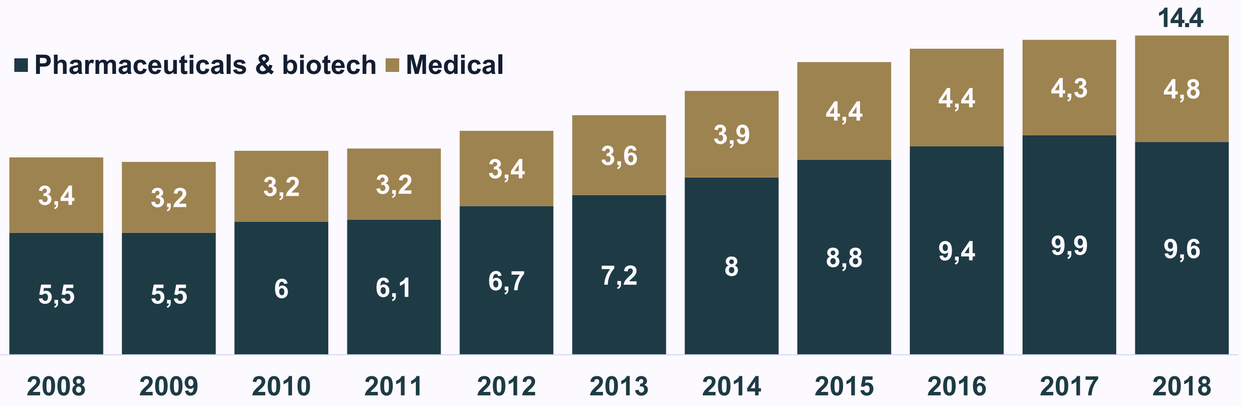

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: The private business sector is defined as the private business sector excluding agriculture, forestry and fishing, raw material extraction and financing and insurance. The fixed prices are calculated on the basis of the price index for value added in the pharmaceutical industry and the general Danish business sector. The price index is then weighted by the pharmaceutical industry's share of the total value added within life science, the business sector and industry, respectively.

# Tax payments

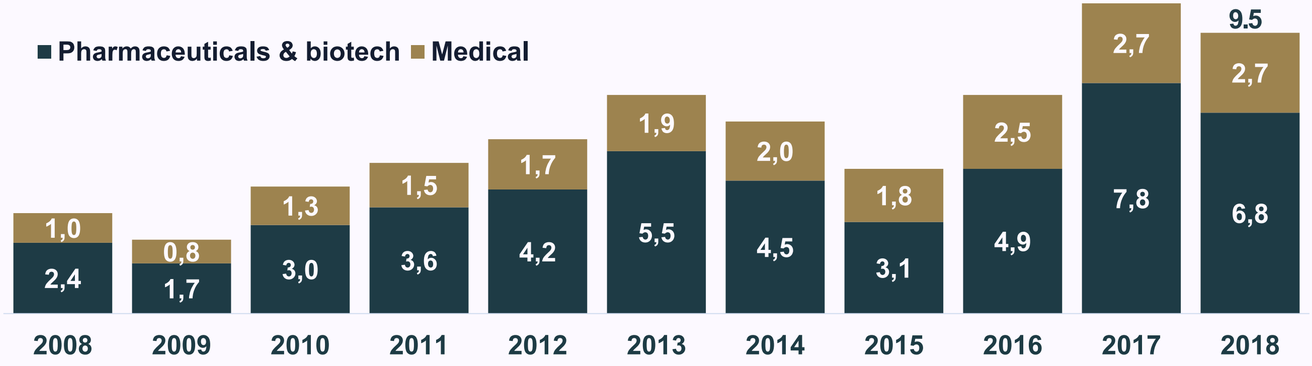
The life science industry contributed DKK 23.9 billion in 2018 to public finances, in the form of corporation taxes and personal taxes. Of the DKK 23.9 billion, DKK 14.4 billion stem from the personal taxes of employees in the life science companies, i.e. income tax and labour market contributions.
The remaining 9.5 billion come from the life science companies' corporation tax payments.

The tax revenue from companies and employees in the life science industry has almost doubled since 2008.

## Personal tax in the life science industry (DKK billion)




## Corporation tax in the life science industry (DKK billion)




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: Personal tax is defined as state tax (bottom-bracket tax and top-bracket tax), municipal tax, health contribution and labour market contribution, i.e. income tax plus labour market contribution.

# Life science industry exports

# Rising export figures

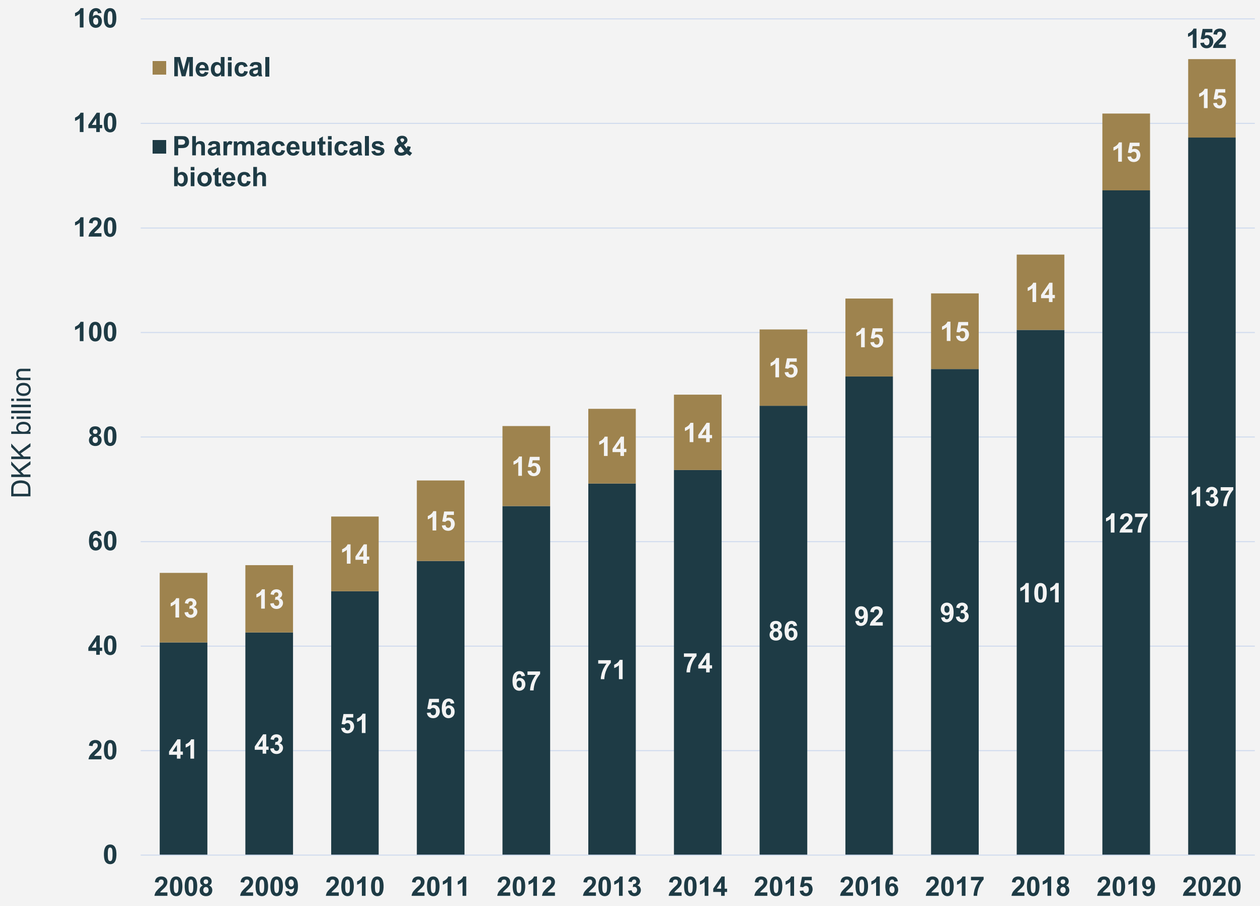
The life science industry exports abroad to a large extent, and there has been a positive development in Danish export of life science products in the period 2008–2020.

Exports have gone from DKK 54 billion in 2008 to DKK 152 billion in 2020 (current prices).

With an average annual growth rate of 9 per cent, the life science industry thus has managed to almost triple exports in the period 2008–2020.

The growth in exports has mainly taken place in the pharmaceuticals and biotech industry, where exports have increased by as much as 237 per cent during the period.

**In 2020, exports from the life science industry in Denmark were at DKK 152 billion.**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat
Note: The calculation is based on SITC product code 54 and CN product codes

# Clear footprint on overall Danish merchandise exports

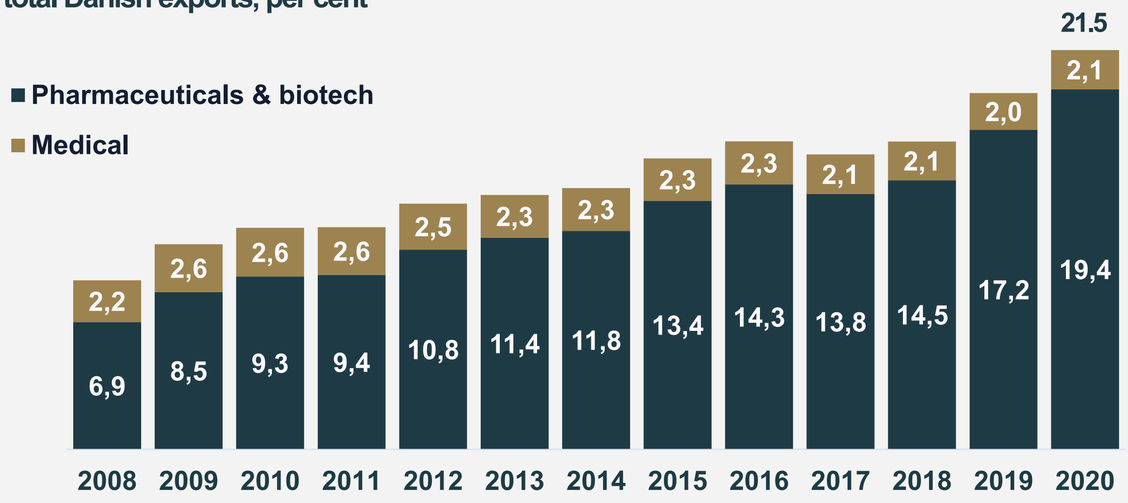
The Danish life science industry's exports accounted for 21.5 per cent of total Danish merchandise exports in 2020. This is a substantial increase of over 2 percentage points since 2019.

In 2008, life science exports accounted for just over 9 per cent of total Danish exports of goods, while in 2020 they accounted for 21.5 per cent, i.e. the figure has more than doubled.

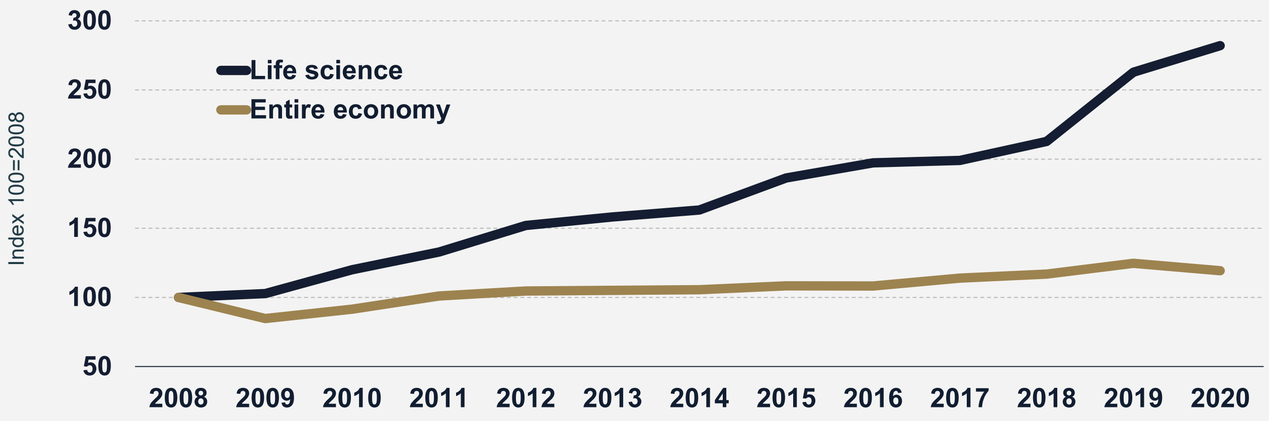
Throughout the period, growth in Danish life science exports has been significantly higher than growth in total Danish exports. Exports from life science alone have almost tripled, while exports for the entire economy including the life science industry have grown by just under 20 per cent.

In 2020 the COVID-19 crisis had a negative effect on total Danish merchandise exports, which fell by approximately 4 per cent compared with 2019, while exports for the life science industry continued to increase, and rose by a further 7 per cent in 2020.

**Life science industry exports as a share of total Danish exports, per cent**




**Growth in Danish exports, life science and the entire economy**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat
Note: The calculation is based on SITC product code 54 and CN product codes

# Top 10 buyers of Danish life science exports

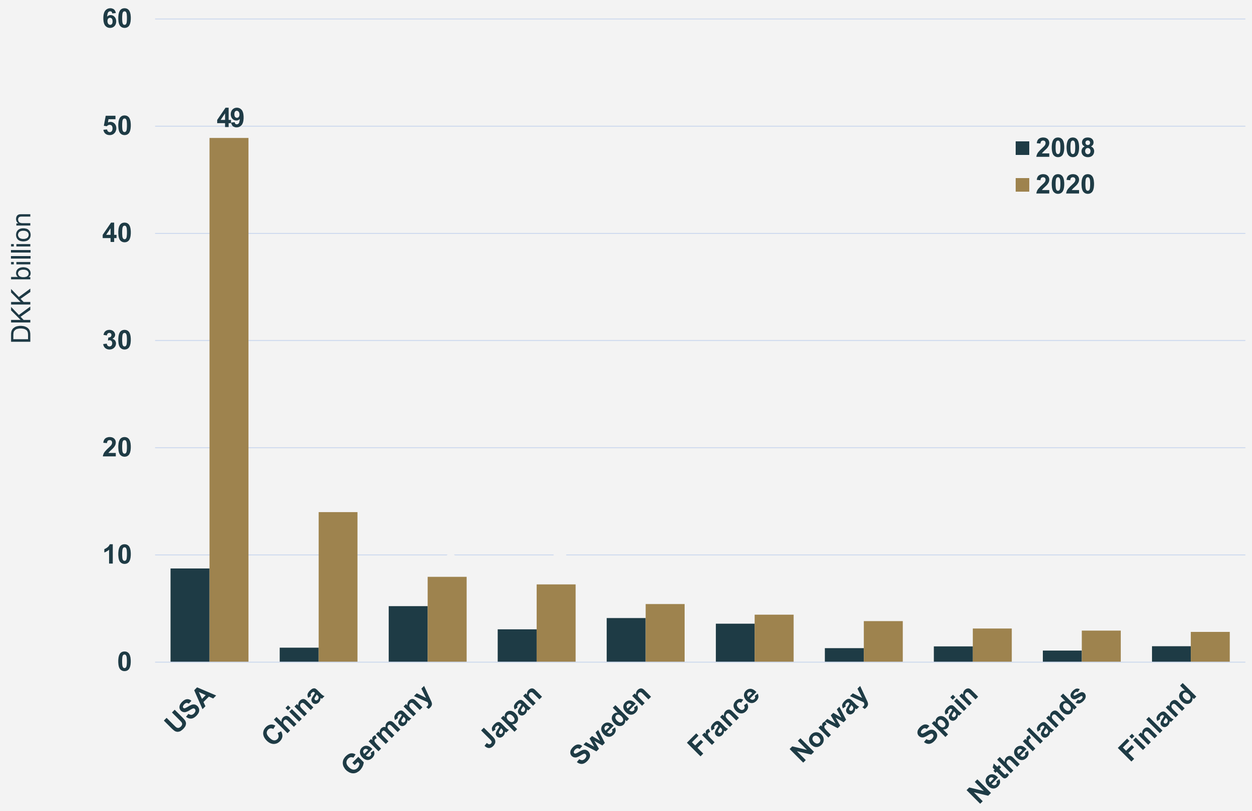
The figure shows the top 10 buyers of life science products in 2008 and 2020 (merchandise exports).

The USA is still by far the largest buyer of Danish life science products and purchased products for DKK 49 billion in 2020 alone. This corresponds to 32 per cent of the total Danish export of life science products in 2020 and more than half of all Danish exports to the USA. Exports to the USA amounted to DKK 9 billion in 2008, and are thus more than 5 times as high in 2020.

Exports to China have also grown significantly in the past 10 years. During the past decade, with growth of DKK 13 billion (from DKK 1 billion in 2008 to DKK 14 billion in 2020), China has grown from being a very insignificant market for Danish life science to the second largest Danish life science export market.

In 2020, the top 10 buyer countries imported life science products for a combined DKK 101 billion, corresponding to 66 per cent of the total Danish goods exports of life science products in 2020.

**In 2020, the USA purchased life science goods for DKK 49 billion.**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: The calculation is based on SITC product code 54 and CN product codes from Statistics Denmark

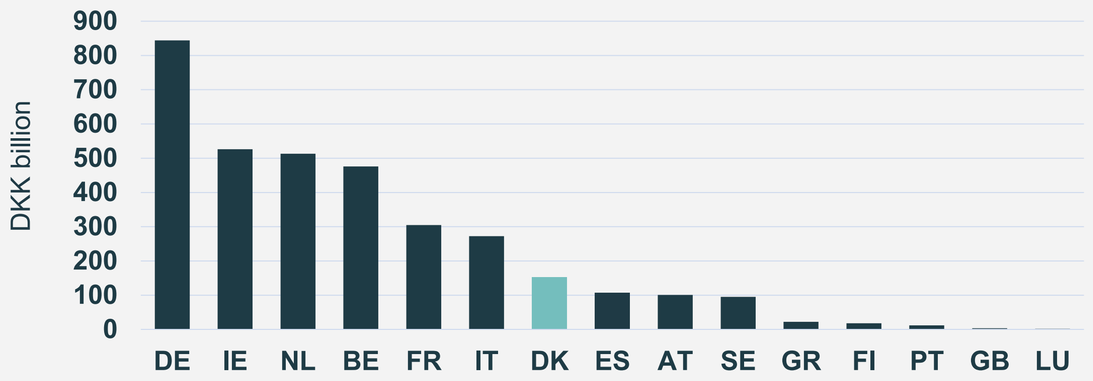
# Exports in EU-15 countries

Looking at the EU-15 countries, Germany is in the lead with exports of over DKK 800 billion in 2020. Denmark is the seventh largest life science nation among EU-15 countries, measured in terms of exports in absolute figures.

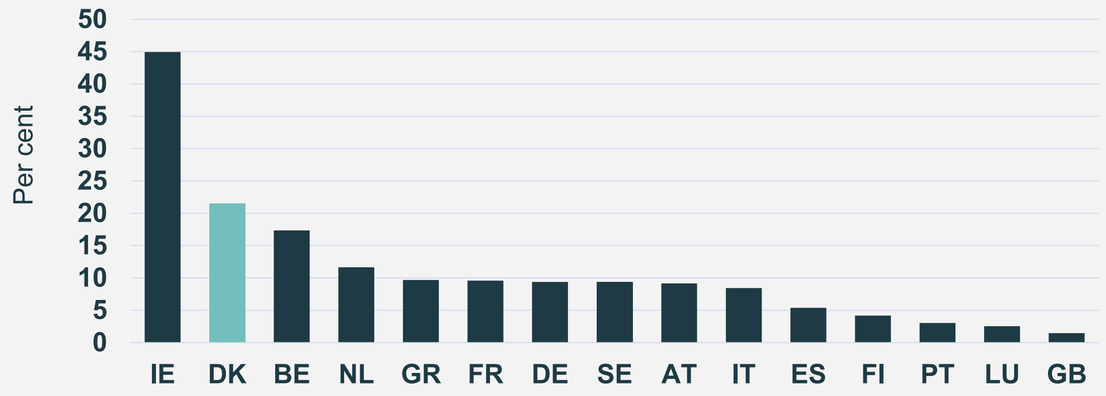
Looking at the share of total goods exports, life science exports make up a relatively large share of total merchandise exports in Denmark compared with the other EU-15 countries.

Only in Ireland does the export of life science products account for more of the total exports of goods than in Denmark.

**EU-15 countries' merchandise exports of life science products, 2020**




**The life science industry's share of total goods exports in EU-15 countries, 2020**






Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat.
Note: The calculation is based on SITC product code 54 and CN product codes. The EU-15 countries are the 15 countries that made up the EU until 2004, when the EU expanded to admit a further 10 countries.

# Innovation in the life science industry

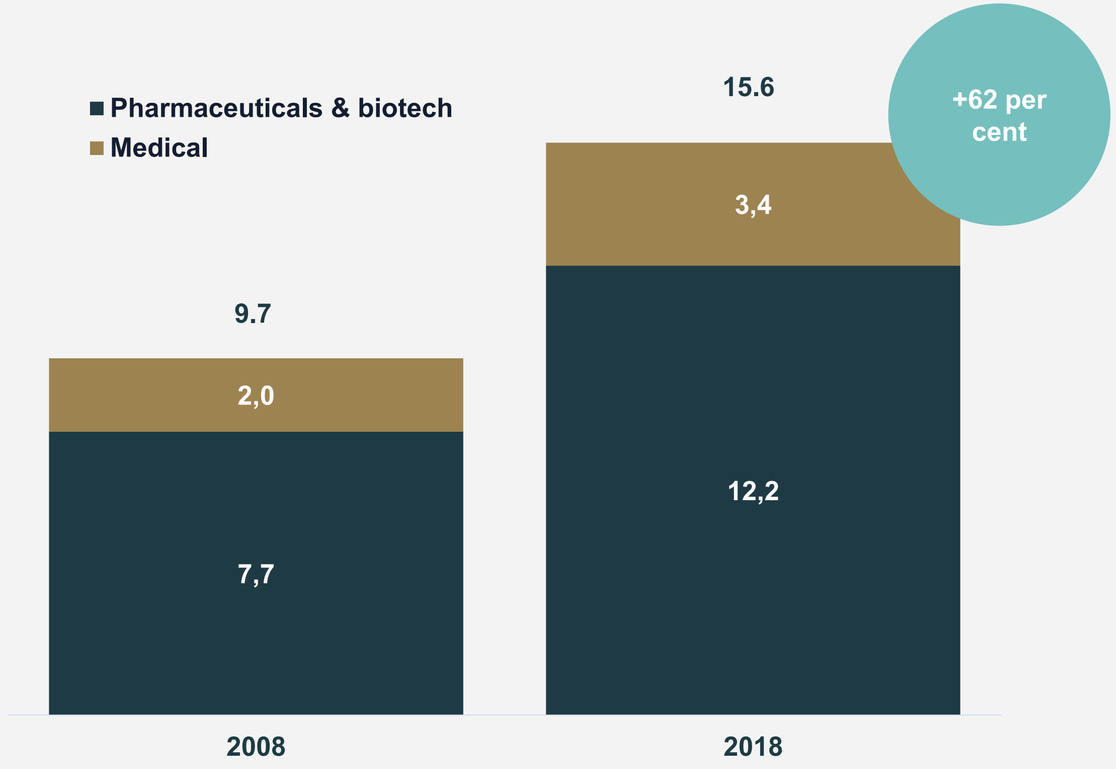
# Own research and development

Research and development contribute to promoting growth and thus also to strengthening the competitiveness of the companies. In 2018, the innovative companies* in the life science industry invested almost DKK 16 billion in their own research and development (R&D). As a result, investments in own R&D have increased by over 60 per cent since 2008.

In 2018, the innovative life science companies accounted for 37 per cent of the business sector's total investments in own R&D of around DKK 42 billion.

The life science industry is characterised by spending a large part of its turnover on research and development. In 2018, the life science industry spent just over 6 per cent of turnover on its own research and development. In the same year, companies in the Danish economy as a whole spent 1 per cent of turnover on research and development.

## Life science industry investments in own research and development, DKK billion




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: * Innovative companies include the companies that are included in Statistics Denmark's annual research and development survey. The definition of research and development work (R&D) covers work carried out on a systematic basis to increase existing knowledge and the utilisation of this knowledge to devise new areas of application.
Note: The figures for research and development are only directly comparable from 2007–2016 and 2017–2019, cf. Statistics Denmark, which is why the increase from 2008 to 2018 should be interpreted with caution.

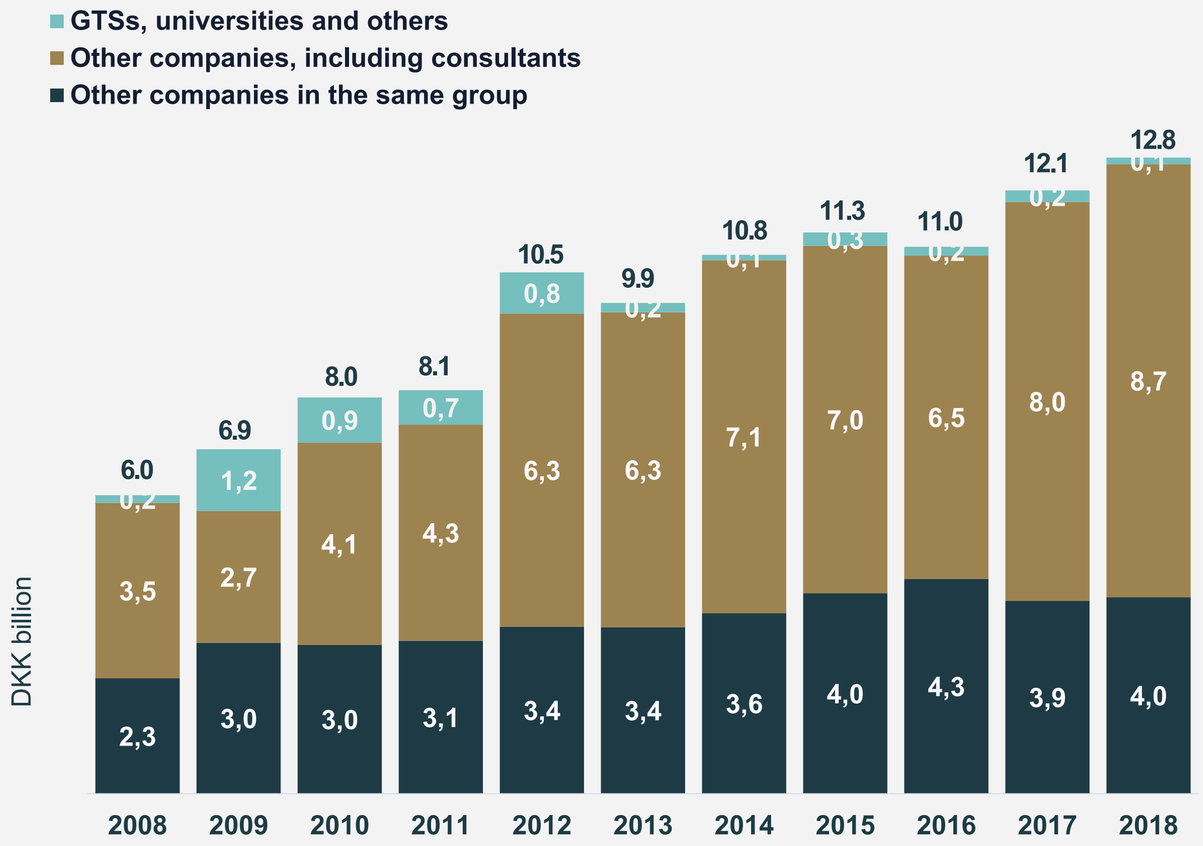
# Purchased own research and development

In addition to the research and development work carried out internally in the life science companies, another important source of new knowledge in the business world is the R&D services that the companies carry out externally. This is called 'purchased R&D'.

The life science industry's expenditure on purchased R&D has more than doubled in the period from 2008 to 2018. In 2018, the life science industry's expenditure on purchased R&D was DKK 13 billion approximately in total. This is more than half of the total expenditure on purchased R&D in the entire economy, which was just over DKK 20 billion in 2018.

It should be noted that the figure for own R&D cannot be added together with purchased R&D, as there is an overlap between the two figures. This is because R&D activities purchased from a subsidiary statistically count as both own R&D and purchased R&D.

## Purchased R&D in the life science industry in Denmark



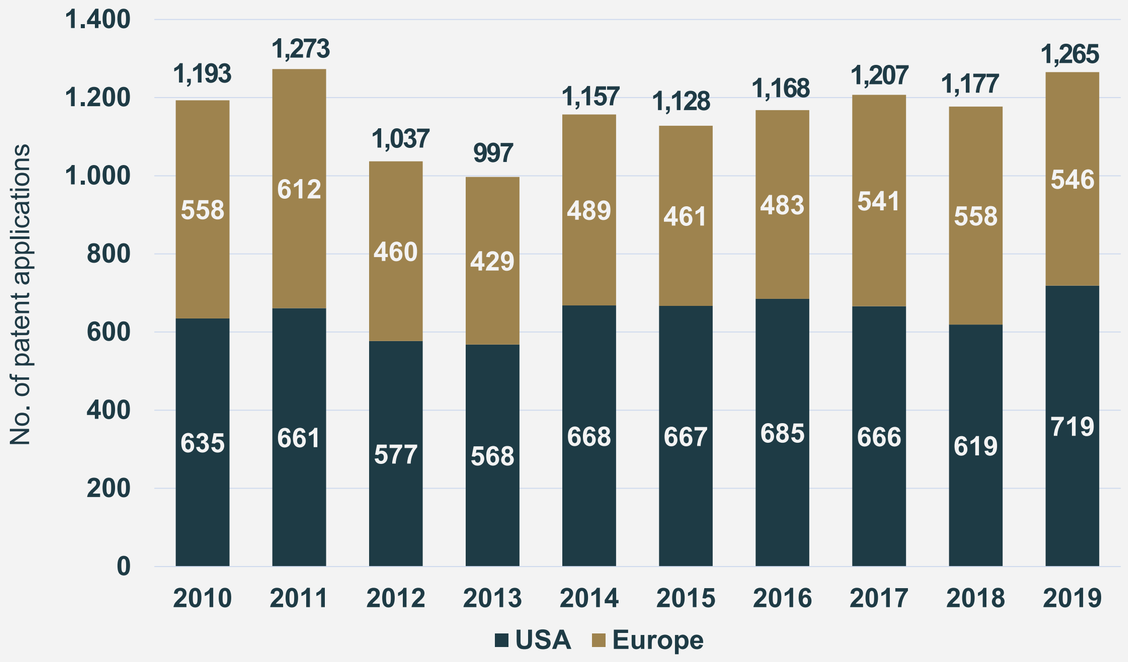

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: The figures for research and development are only directly comparable from 2007–2016 and 2017–2019, cf. Statistics Denmark, which is why the increase from 2008 to 2018 should be interpreted with caution.

# Patent applications

The figure shows the number of patent applications for the Danish life science industry for the United States Patent and Trademark Office (USPTO) and the European Patent Office (EPO) respectively.

Throughout the period 2010–2019, the life science industry has been at a stable level of around 1,200 patent applications per year. It should also be noted that, throughout the period, Danish companies submit more patent applications to USPTO than EPO, emphasising the fact that the USA is an important buyer of Danish life science products.

**Patent applications for the life science industry in Denmark in the USA (USPTO) and Europe (EPO) respectively**



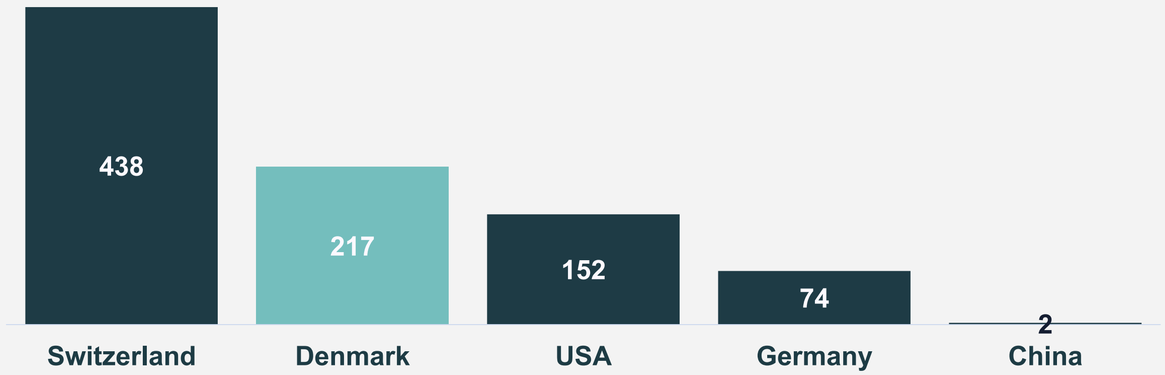

Source: Ministry of Industry, Business and Financial Affairs 2021 based on figures from the Danish Patent and Trademark Office.

# International patent applications and applications by type of technology

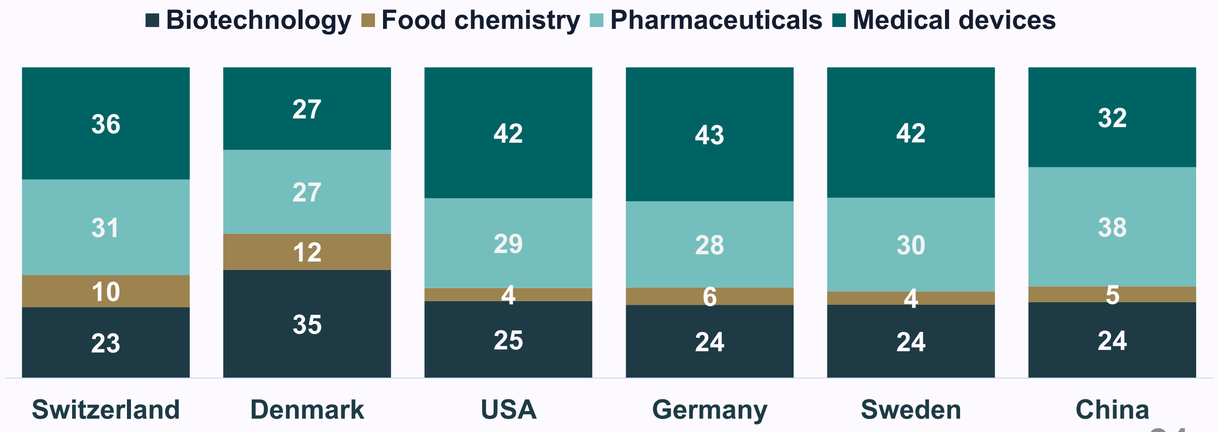
In 2019, the Danish life science industry submitted more patent applications to the US and European patent offices per million citizens than the USA, Germany and China.

The patent applications submitted to Europe and the USA by the Danish life science industry in 2019 were mainly in biotechnology, pharmaceuticals and medical equipment. Food chemistry has a relatively large overlap with biotechnology, and is therefore included in the figure.
In 2019, Denmark had a significantly higher proportion of patent applications in biotechnology than Switzerland, the USA, Germany, Sweden and China.

**Number of patent applications to the USA (USPTO) and Europe (EPO) per million citizens in selected countries, 2019**




**Proportion of patent applications submitted to the USA (USPTO) and Europe (EPO) in 2019 by technology class in selected countries (percentage)**






Source: Ministry of Industry, Business and Financial Affairs 2021 based on figures from the Danish Patent and Trademark Office.

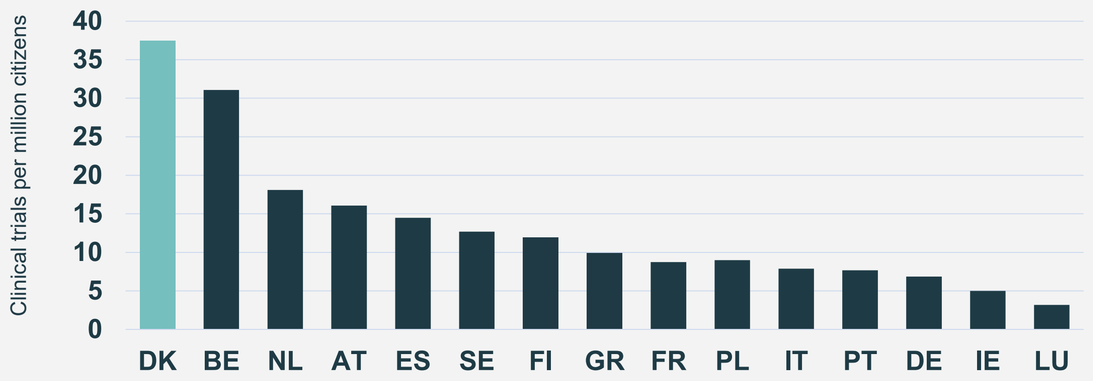
# Clinical trials

Denmark and Belgium lead the way in terms of clinical trials per million citizens in EU-15 countries, both in regard to clinical trials in general and industry-funded clinical trials. In 2020, **218** clinical trials were undertaken in Denmark, of which **131** of these were industry-funded.

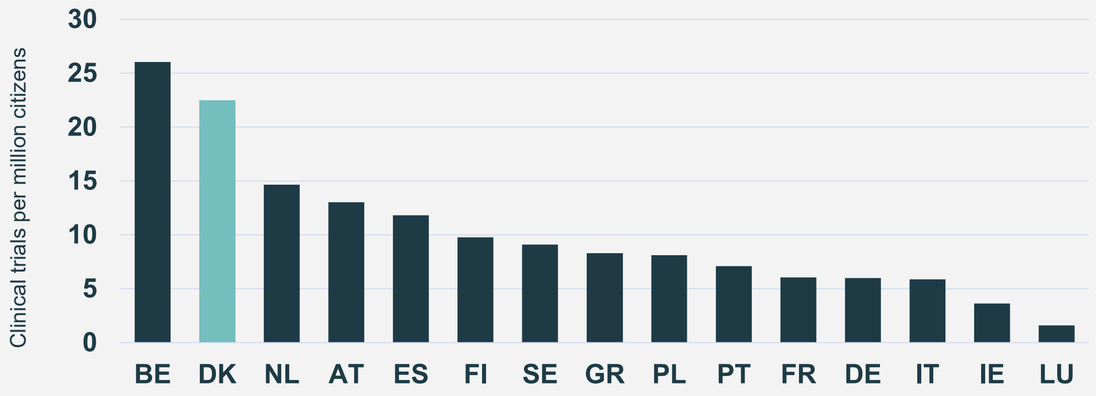
In regard to clinical trials in general, Denmark is the EU-15 country with the most clinical trials per million citizens in 2020, with **37** clinical trials per million citizens. Belgium is the only country approaching this level, with **31** clinical trials per million citizens.

In terms of industry-funded clinical trials in general, Belgium is the EU-15 country with the most industry-funded clinical trials per million citizens, with **26** clinical trials per million citizens in 2020. Denmark is in second place with **22** industry-funded clinical trials per million citizens.

**Clinical trials per million citizens in EU-15 countries, 2020**




**Industry-funded clinical trials per million citizens in EU-15 countries, 2020**






Source: The Danish Association of the Pharmaceutical Industry (Lif) 2021 based on Clinicaltrials.gov.
Note: The EU-15 countries are the 15 countries that made up the EU until 2004, when the EU expanded to admit a further 10 countries. The UK has been replaced with Poland in this figure, as data for the UK is not available.

# Theme: Education and production jobs in the life science industry

# Introduction

This year's theme focuses on the level of education and the development in production jobs in the life science industry in the period 2008 to 2018. The first part examines levels of education in the life science industry, with a particular focus on skilled workers. The second part highlights the development in skilled workers' salaries in the life science industry in comparison with the Danish business sector in general, while the third part focuses on professional and job mobility in the life science industry compared to other sectors of industry.

# Employees in the life science industry have been in education for longer and are paid more

Employees in the Danish life science industry tend to have been in education for longer than their counterparts in the Danish business sector. In addition, the proportion of unskilled workers in the life science industry fell significantly between 2008 and 2018. Skilled employees in the life science industry also have a significantly higher salary and remain in the industry longer compared with skilled workers in the Danish business sector. This is demonstrated, among other things, by:

- 32 per cent of people employed in the life science industry had completed lengthy higher education programmes or a PhD in 2018. This only applies to 11 per cent of those employed in the general Danish business sector.
- The number of skilled workers in the life science industry remained reasonably stable during this period, while decreasing in the general business sector.
- In the period from 2008 to 2018, the average salary per man-year was approximately DKK 175,000 higher for skilled workers in the life science industry than it was for skilled workers in the Danish business sector. In 2018, the salary was DKK 200,000 higher for skilled workers in the life science industry.

In 2018, **32 per cent** had completed a lengthy higher education programme or PhD

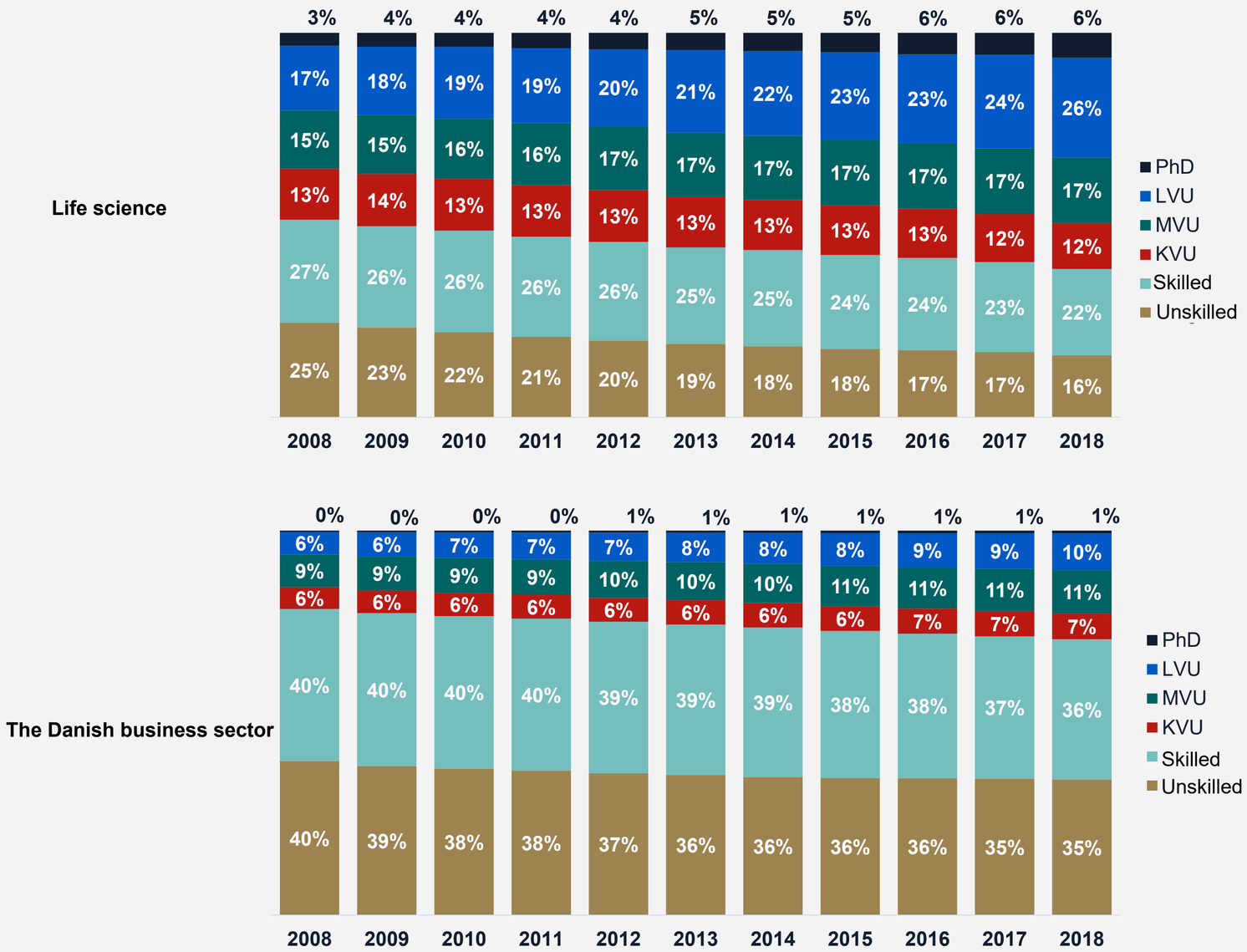
The number of skilled workers remained stable between 2008 and 2018, while declining in the business sector as a whole

In 2018, skilled workers received **DKK 200,000** more in wages compared with skilled workers in the rest of the Danish business sector

# More university graduates in the life science industry

Employees in the life science industry tend to have been in education for longer than those in the rest of the Danish business sector. In the life science industry, 32 per cent of employees had completed lengthy higher education programmes or a PhD in 2018, while this only applies to 11 per cent of employees in the rest of the Danish business sector.

Between 2008 and 2018, the proportion of skilled and unskilled workers fell in both the life science industry and the Danish business sector. The proportion of unskilled and skilled workers in life science fell by 14 percentage points, compared with 9 percentage points in the general Danish business sector.



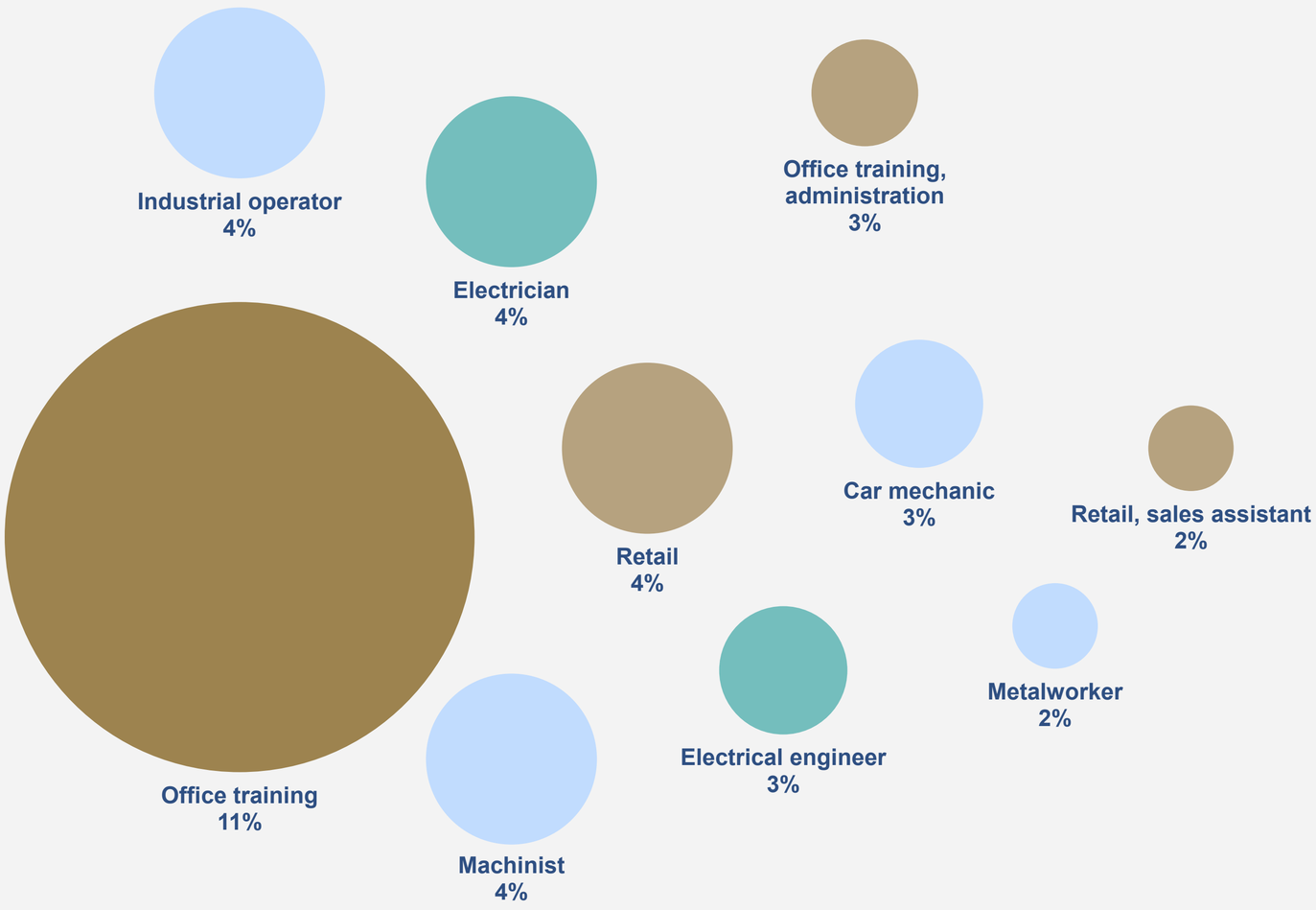

Source: DAMVAD Analytics 2021 based on Statistics Denmark
Note: KVU indicates a short higher education programme. MVU indicates a medium-length higher education programme. LVU indicates a lengthy higher education programme. The Danish business sector covers companies in the private business sector excluding agriculture, raw material extraction and the financial sector, i.e. all companies in the industries C–N excluding K.

# Skilled workers in the life science industry have both technical and administrative training

A large proportion of skilled workers in the life science industry have a background in office or retail training. A wide range of technical education programmes are also represented, such as electricians, machinists, industrial operators and others.

Skilled workers in the life science industry are thus a varied group with both technical and administrative backgrounds.

**Top 10 educational programmes among skilled workers in the life science industry, 2008–2018**



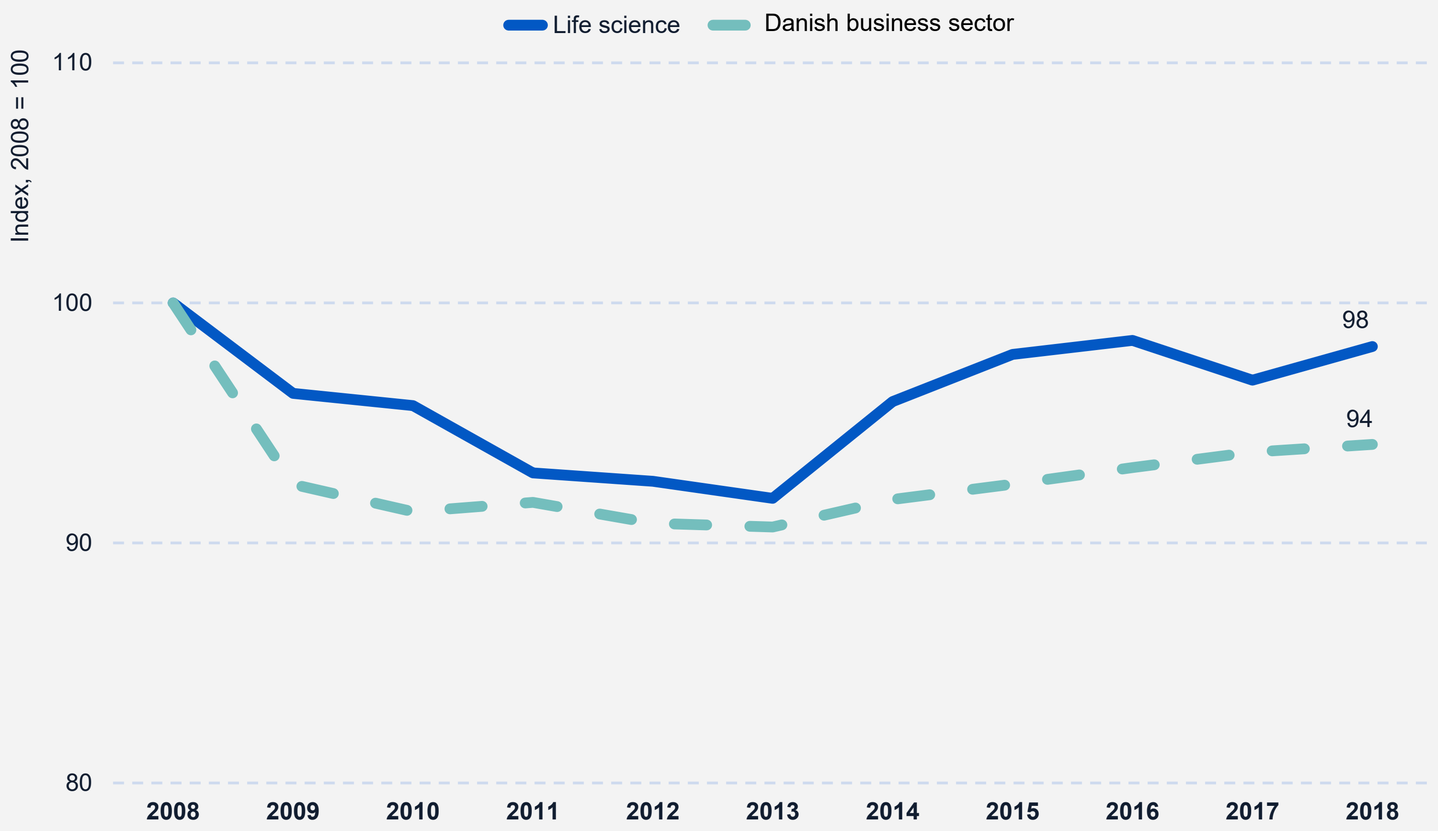

Source: DAMVAD Analytics 2021 based on Statistics Denmark
Note: The size of the circles represents the proportion, which is also stated as a percentage. A brown circle denotes an educational background in business economics, administration and law, a green circle denotes an educational background in engineering, technology and industrial production, while a blue circle denotes an educational background in mechanics, iron and metal.

# The number of skilled workers in the life science industry remains stable

Despite the fact that there are fewer skilled workers in the life science industry proportionally in 2018 compared with 2010, the number of skilled workers has remained stable. In 2018, around 13,000 skilled workers were employed in the life science industry, which is roughly the same as in 2008. This must be viewed in the context of the fact that the number of skilled workers in the business sector in general fell by 6 per cent during the same period, corresponding to about 40,000 skilled workers.

This result indicates that the life science industry continues to be a driving force for Danish production jobs.

**Development in the number of skilled workers from 2008 to 2018**



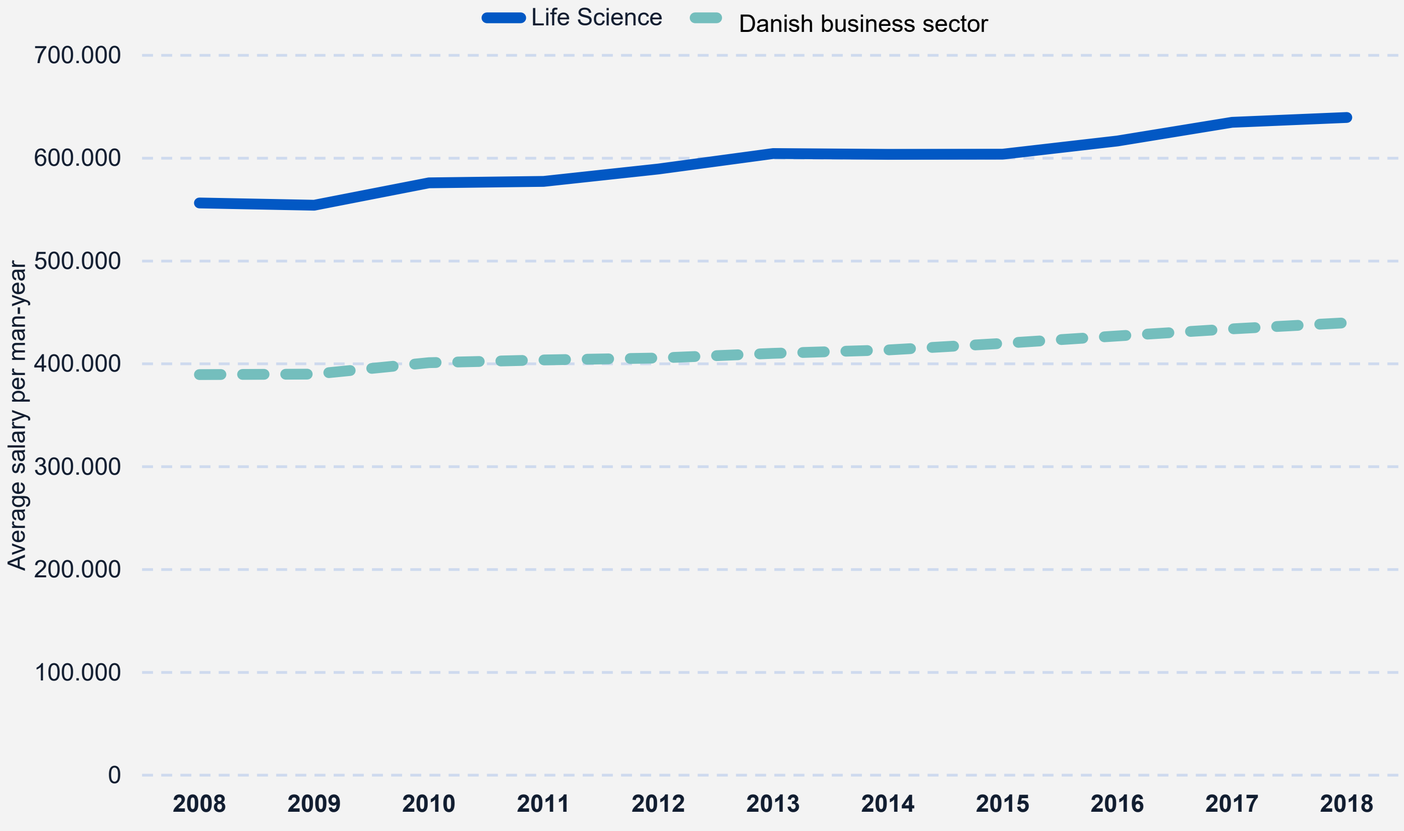

Source: DAMVAD Analytics 2021 based on Statistics Denmark
Note: The Danish business sector covers companies in the private business sector excluding agriculture, raw material extraction and the financial sector, i.e. the industries C–N excluding K.

# The pay gap between skilled workers in the life science industry and the business sector in general has increased

The salaries of skilled workers in the life science industry have generally been significantly higher than in the Danish business sector. In the period from 2008 to 2018, the average salary per man-year was approximately DKK 183,000 higher for skilled workers in the life science industry than it was for skilled workers in the Danish business sector generally.

Between 2008 and 2018, the pay gap between skilled workers in the life science industry and the business sector in general increased by almost 20 per cent. In 2008, the difference in salary per man-year was approximately DKK 167,000, while it was just under DKK 200,000 in 2018.

**Development in the average salary among skilled workers from 2008 to 2018**



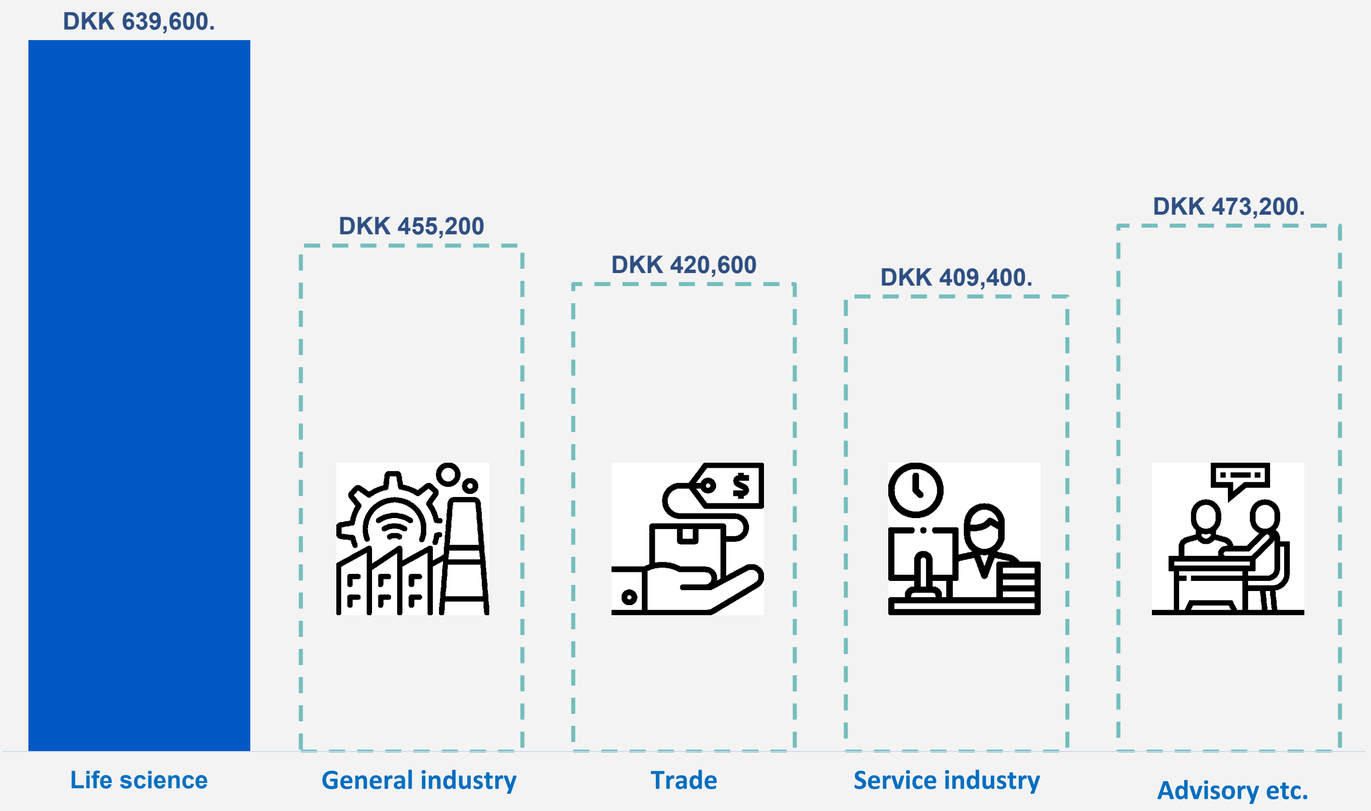

Source: DAMVAD Analytics 2021 based on Statistics Denmark
Note: The salary is calculated as a summation of all wage-related income including ATP contributions and employee benefits. The amount is adjusted for the number of paid hours in such a way that it indicates the average salary per man-year. The Danish business sector covers companies in the private business sector excluding agriculture, raw material extraction and the financial sector, i.e. all companies in the industries C–N excluding K.

# Skilled workers in the life science industry have higher salaries

The average salary per man-year for a skilled worker in the life science industry in 2018 was just under DKK 640,000. In comparison, the average salary per man-year in the industry in general was approximately DKK 455,000 in 2018, i.e. approximately DKK 185,000 lower. "The industry in general" covers all sectors of industry, i.e. everything from the food, beverage and tobacco sector to the furniture sector.

The average salary in the life science industry is also higher than in other sectors that employ many skilled workers, such as trade, service and advisory services.

**Average annual salary for skilled workers in selected sectors, 2018**



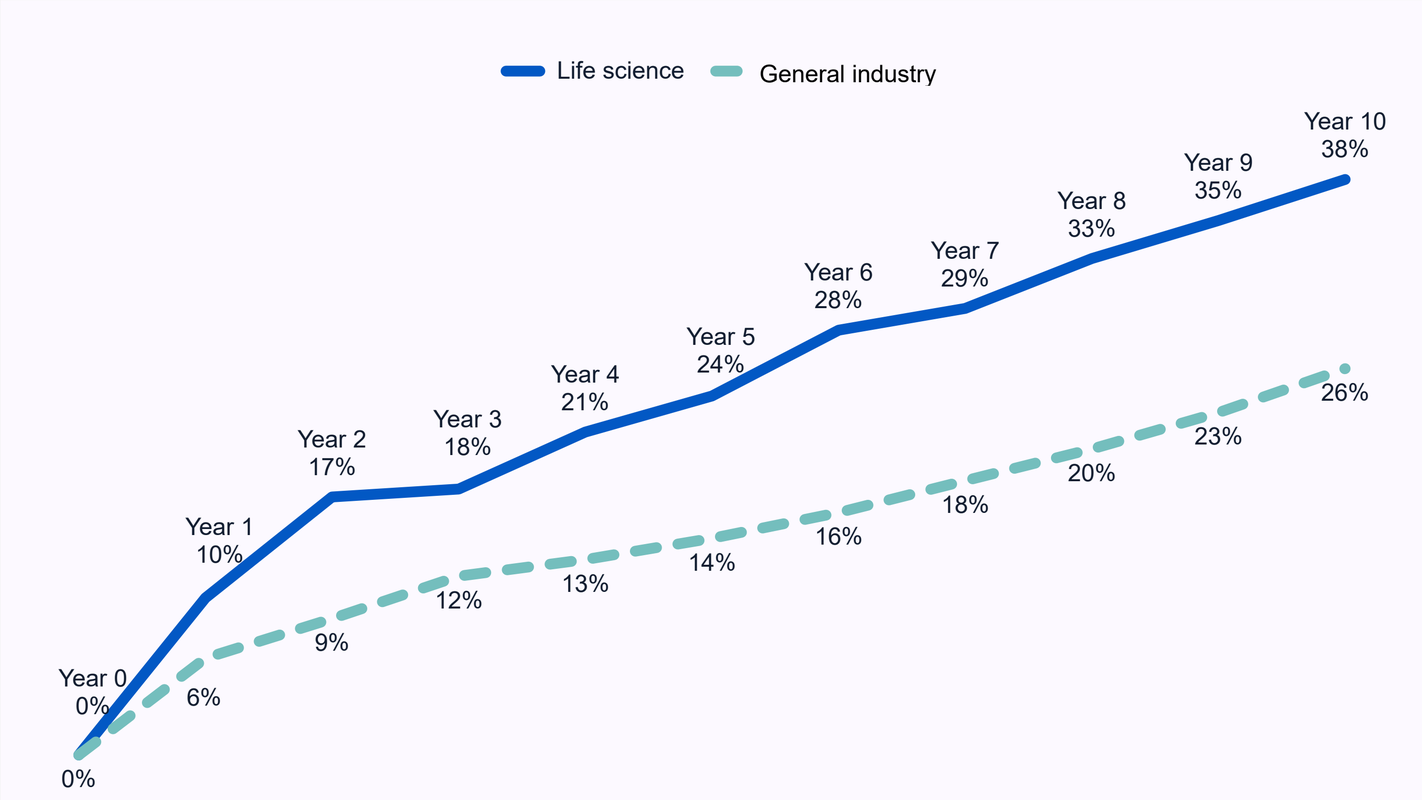

Source: DAMVAD Analytics 2021 based on Statistics Denmark
Note: The annual salary is calculated as a summation of all wage-related income including ATP contributions and employee benefits. The amount is adjusted for the number of paid hours in such a way that it indicates the average salary per man-year. "General industry" covers industry code C and thus also includes the life science industry. "Service" refers to the "Travel agencies, cleaning and other operational services" industry. Numbers are rounded up/down to the nearest 100.

# Skilled workers' salaries rise to a greater extent in the life science industry

Salaries for skilled workers in the life science industry increase faster after employment compared with the industry in general. After just one year of employment, the salaries of skilled workers have grown 4 percentage points more in the life science industry compared with industry generally, and after 5 years, the salaries of skilled workers have grown 10 percentage points more compared with industry generally. The pay gap between the life science industry and industry generally thus increases as a skilled worker becomes more senior.

The development in salary can be viewed as an expression of professional mobility, i.e. how mobile an employee is in terms of changing position and skill level. In that case, the results show that skilled workers in life science are more likely to increase their qualifications compared with those in industry generally.

## Development in salaries for skilled workers from 2008–2018




Source: DAMVAD Analytics 2021 based on Statistics Denmark
Note: The annual salary is calculated as a summation of all wage-related income including ATP contributions and employee benefits. The amount is adjusted for the number of paid hours in such a way that it indicates the average salary per man-year. "General industry" covers industry code C: Industry. The 10-digit grouping from Statistics Denmark has been used here. Year 0 indicates the first year as an employee in the life science industry in the period 2008 to 2018. Year 1 is thus one year after initial employment, year 2 is two years after, and so on.

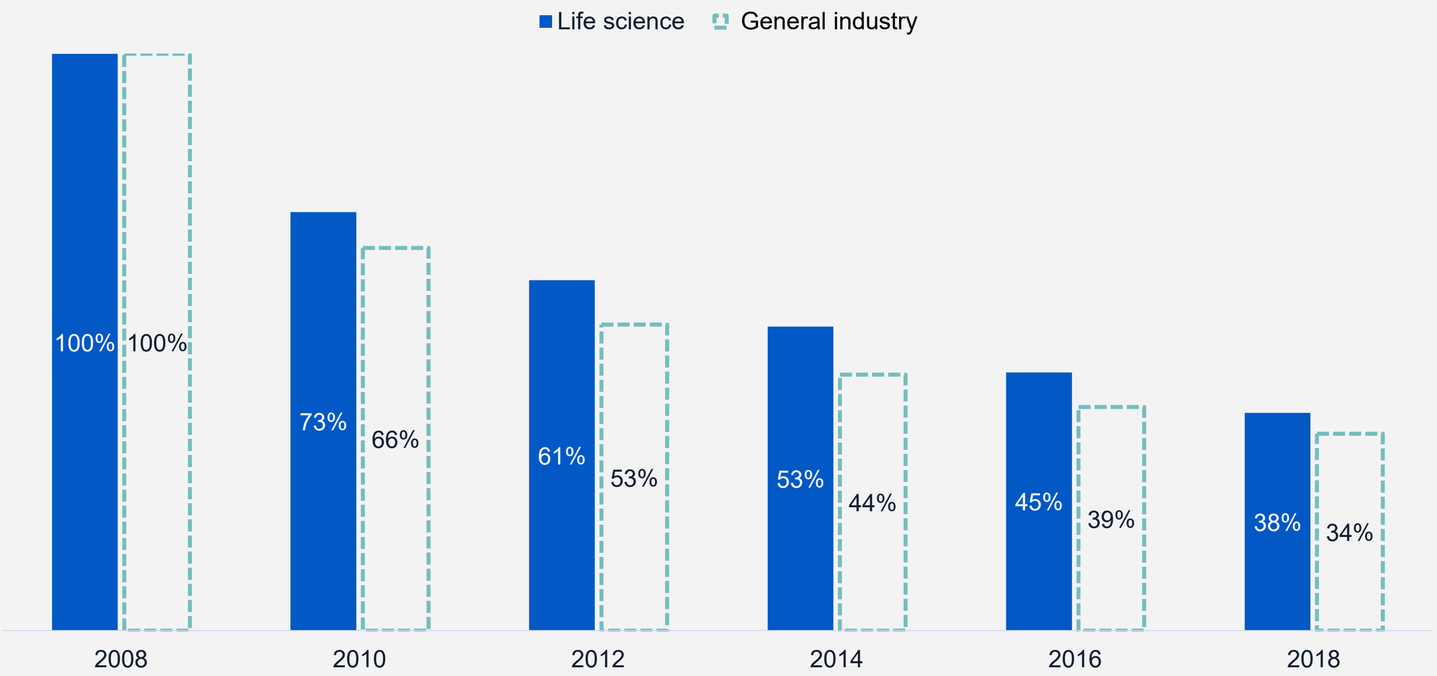
# Skilled workers in the life science industry remain in the industry longer

Of skilled workers who were employed in the life science industry in 2008, 73 per cent were still employed in the same industry two years later. The same applies to 66 per cent of skilled workers in industry generally.

10 years later – i.e. in 2018 – 38 per cent of skilled workers were still employed in the same sector in the life science industry, compared to about 34 per cent of skilled workers in industry generally.

Job mobility is an expression of how mobile a worker is in terms of changing sector. The results in the figure show that job mobility is generally lower in the life science industry compared with industry generally.

**Percentage of skilled workers employed in the same industry from 2008–2018**




Source: DAMVAD Analytics 2021 based on Statistics Denmark
Note: "General industry" covers industry code C: Industry. For both general industry and life science, changing sectors denotes a change in industry code DB07 level 3, i.e. the 36-grouping. A change could thus involve moving from the electronics industry to the chemicals industry.

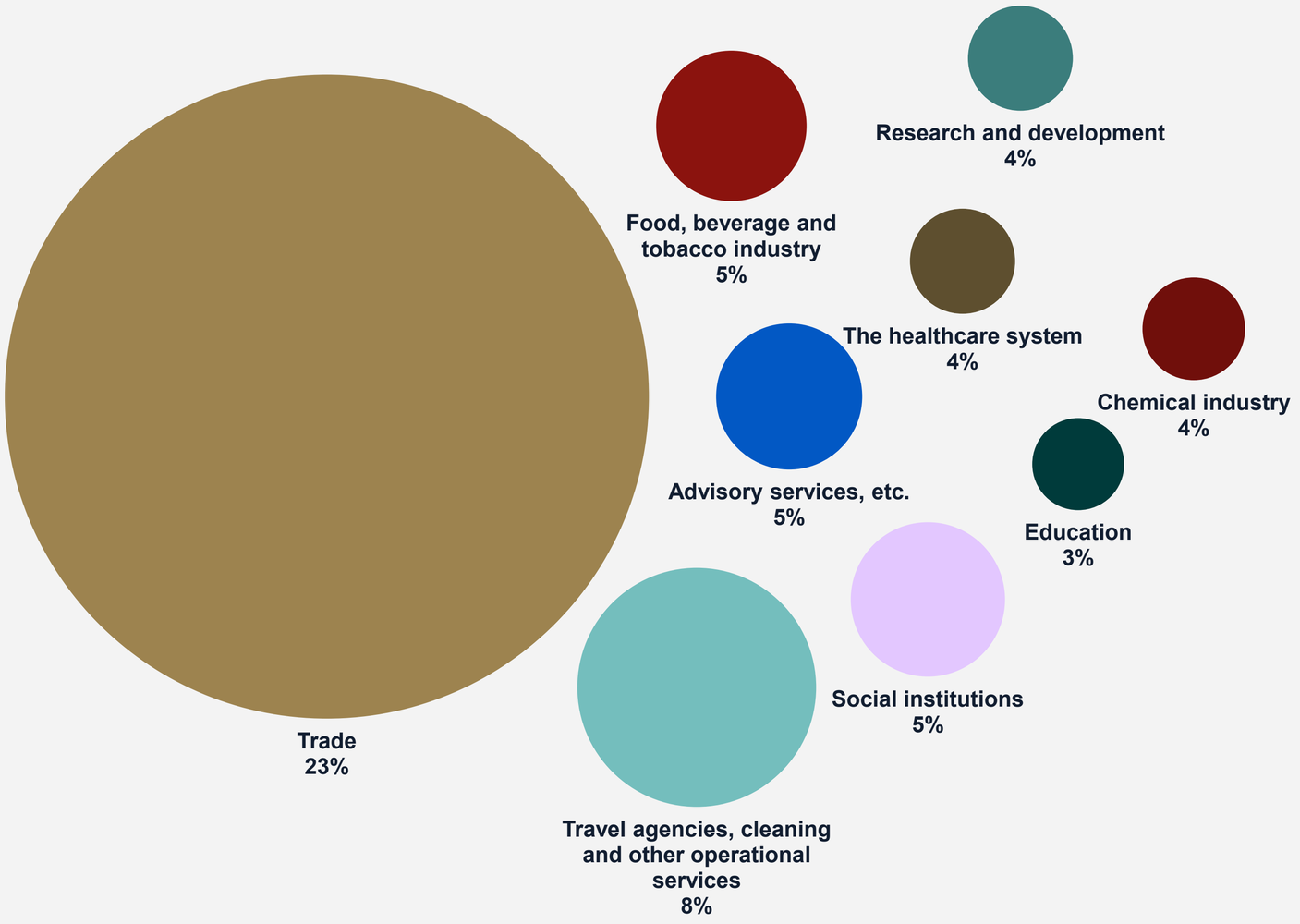
# Skilled workers most often leave life science for a job in the wholesale and retail trade

Skilled workers who leave the life science industry switch to sectors that reflect their educational background.

This means that 23 per cent move to trade, while others switch to other sectors such as the food industry and the chemicals industry.

Some also switch to the public sector, e.g to the health service, social institutions or education.

## Top 10 sectors among skilled workers leaving the life science industry, 2008–2018




Source: DAMVAD Analytics 2021 based on Statistics Denmark
Note: The Danish business sector covers companies in the private business sector excluding agriculture, raw material extraction and the financial sector, i.e. the industries C–N excluding K. Note that the percentages do not add up to 100%, as only the top 10 sectors are shown.

# The climate footprint of the life science industry

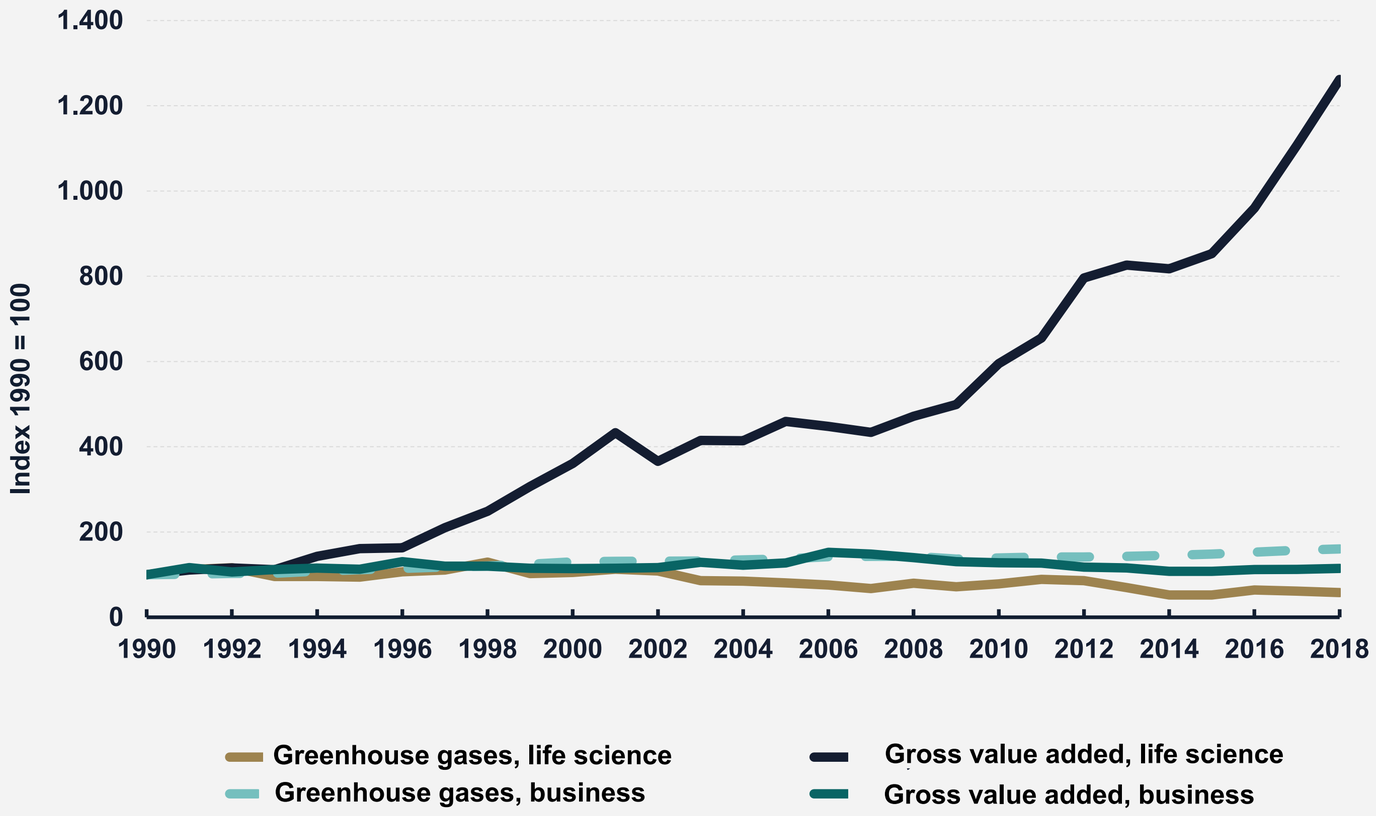
# More growth and fewer greenhouse gas emissions in the life science industry

In the period 1990–2018, the life science industry experienced strong economic growth measured by gross value added. During the same period, the life science industry succeeded in reducing absolute greenhouse gas emissions, while this figure remained unchanged for the Danish business sector.

Gross value added in the life science industry thus increased more than tenfold since 1990, while greenhouse gas emissions dropped by almost 50 per cent.*

For the private business sector, greenhouse gases have risen by 15 per cent, while gross value added has risen by just over 60 per cent since 1990.

**Development in gross value added (GVA) compared with greenhouse gas emissions, life science and the Danish business sector in relation to the 1990 level**



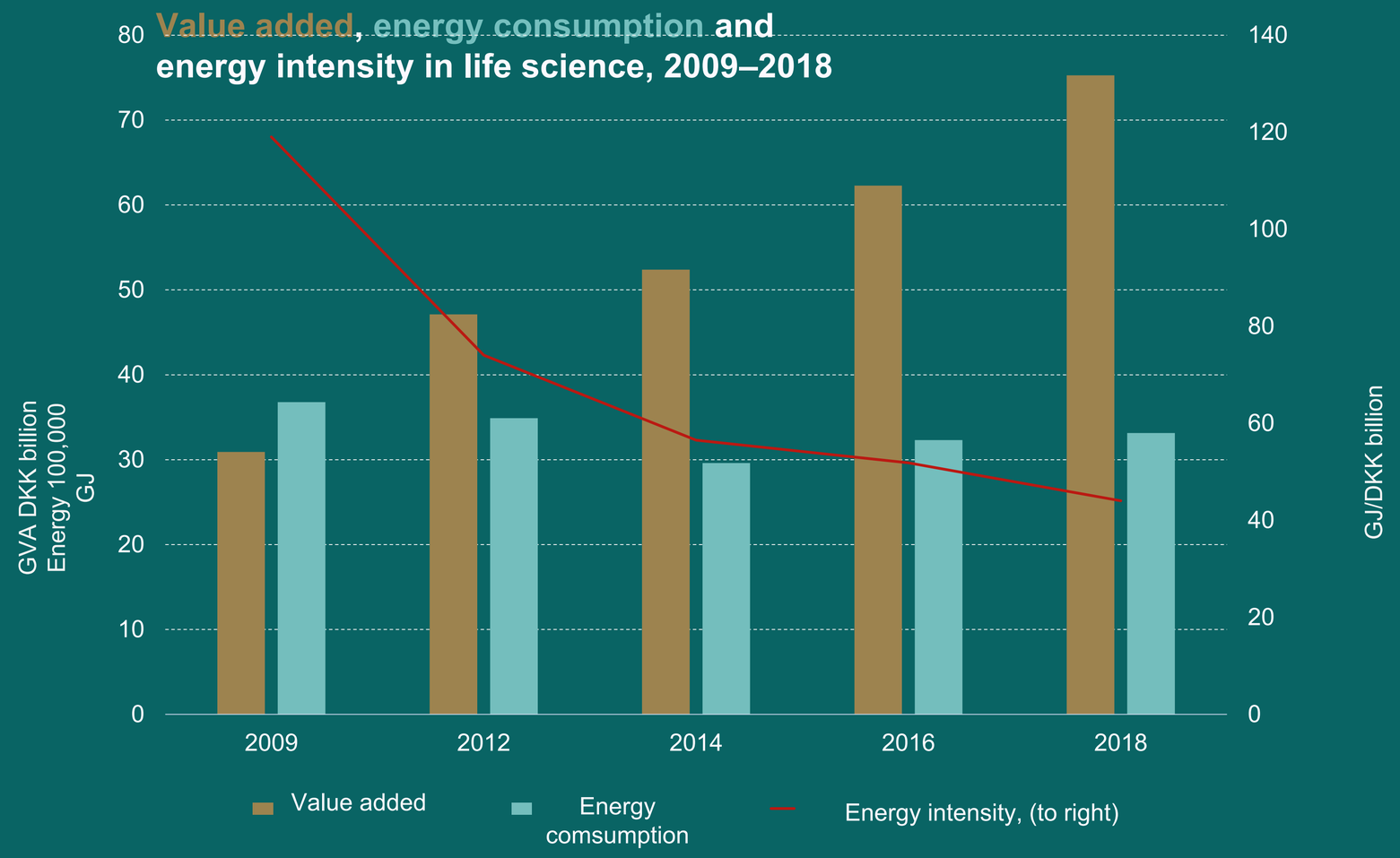

Source: DAMVAD Analytics based on the green national accounts and the national financial accounts from Statistics Denmark.
*Note: Only the following industries have been included here: *Pharmaceutical industry* (210000) and *Manufacture of medical instruments, etc.* (320010). This means that, in particular, many medical companies are not included. This is due to a rough industry division in the green national accounts. The figure is thus not comparable with figures for emissions published in connection with the climate partnerships.

# Declining energy consumption in the life science industry is due to more energy efficient production

A decrease in energy consumption in a particular sector can be driven either because production has decreased or because production has become more energy efficient.

To assess how energy efficient a given production is, the term "energy intensity" is often used. Energy intensity is defined as energy consumption in relation to value added at a given production. In this case, it is positive to have a low energy intensity.

In the period 2009–2018, the value added in the life science industry more than doubled. When the total energy consumption dropped in the same period, it was due to an effort to improve energy efficiency which led to a decrease in energy intensity in the life science industry of over 60 per cent from 2009–2018.




Source: DAMVAD Analytics based on Industry's Energy Consumption and Company Statistics from Statistics Denmark
Note: The data set covers a very detailed classification of energy consumption for companies with at least 20 employees in the industrial sector. The classification covers, inter alia, electricity, gas, coal and oil. In this context, it should be noted that the consumption of, for example, coal and oil only reflects the direct use in production in industry. The consumption of coal and oil in the production of electricity at the energy companies is thus not reflected in the consumption of coal and oil in the data set. In addition, the data set only contains information about companies in the industrial sector and of a certain size, which is why this sub-analysis only includes life science companies which are manufacturing companies and relatively large. Therefore, as was the case in section 2, this sub-analysis does not cover all life science companies. However, the sub-analysis can still provide a good indication of the climate footprint in the life science industry compared with other industries.
Note that value added is calculated in current prices. The overall decrease in intensity should thus be seen in the context of an annual inflation of around 1.5% from 2009–2018.

# Property income and foreign investment

# Property income and foreign investment

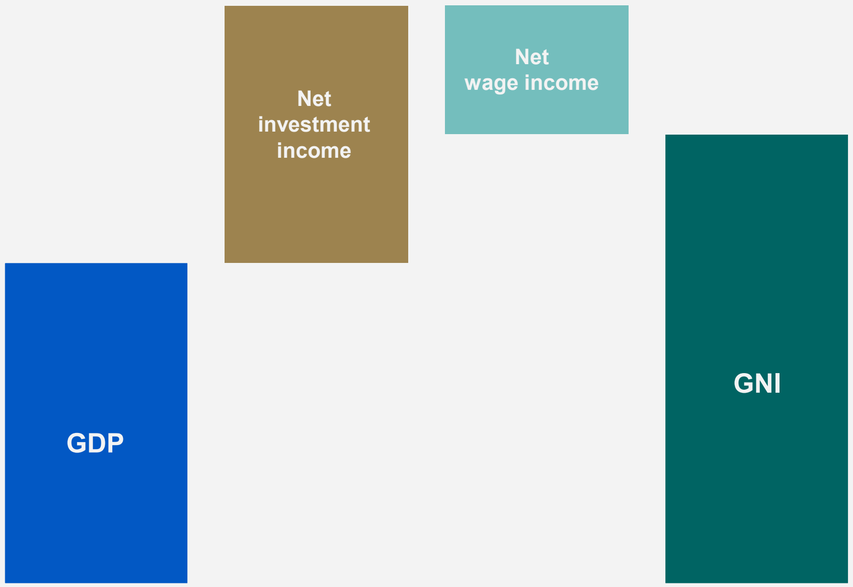
The Danish life science industry not only creates value through the production that takes place in Denmark. When Danish life science companies produce through subsidiaries abroad or receive return on investment outside the country's borders, they can subsequently move the money back to Denmark, benefitting Danish prosperity and investments in Denmark. Data on investment income and foreign investments come from a special extract from Danmarks Nationalbank.

**Net investment income** consists of the income that Danish companies bring home from investments abroad, less the income that foreign companies withdraw from Denmark.

**Foreign investment** consists of foreign investments in Danish life science and the life science industry's investments abroad, e.g. in the form of the establishment of subsidiaries, major investments, etc. Danish life science companies invest abroad with the expectation of generating a return. The investments abroad therefore create a basis for future investment income, which can contribute to Danish prosperity and future investments in Denmark.

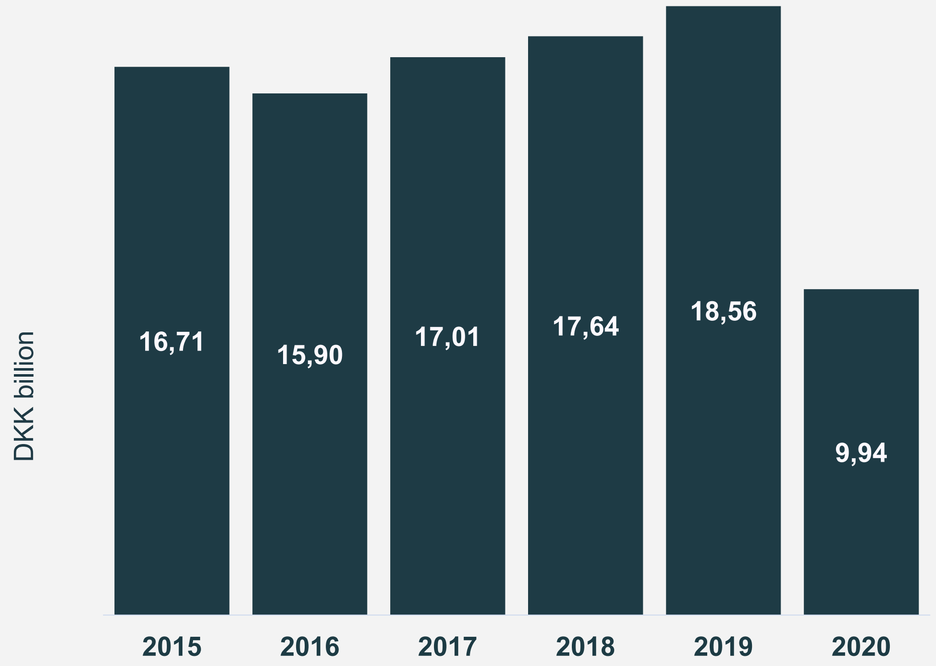
**Net wages** refers to the wages paid to Danish employees abroad, less wages for foreign employees in Denmark.

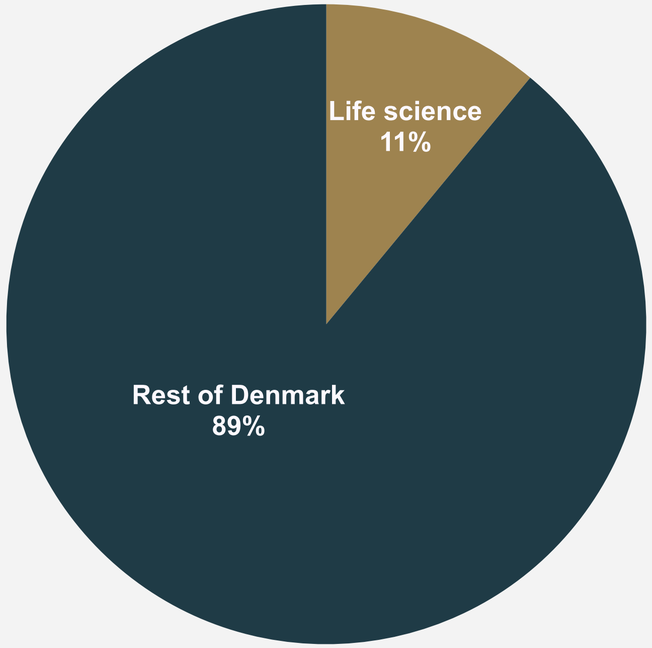
**Net investment income plus net wages make up the difference between GNI and GDP**



# Net investment income

**The life science industry's net investment income from abroad
in 2020 was DKK 9.94 billion. The large decline in 2020 is due to a large increase in foreign investment income from life science.**




**In 2019, the life science industry was responsible for 11 per cent of the Danish net investment income**

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Special extract from Danmarks Nationalbank
Note: The figure for net investment income deviates from previous announcements due to audits.
Note: Overall, Denmark's relatively high investment income can be attributed to the fact that Denmark's investment assets abroad contain more risk than our liabilities. Therefore, in most years, the assets provide a greater return than the liabilities. (Source: Danmarks Nationalbank, Quarterly overview, 4th quarter 2011)

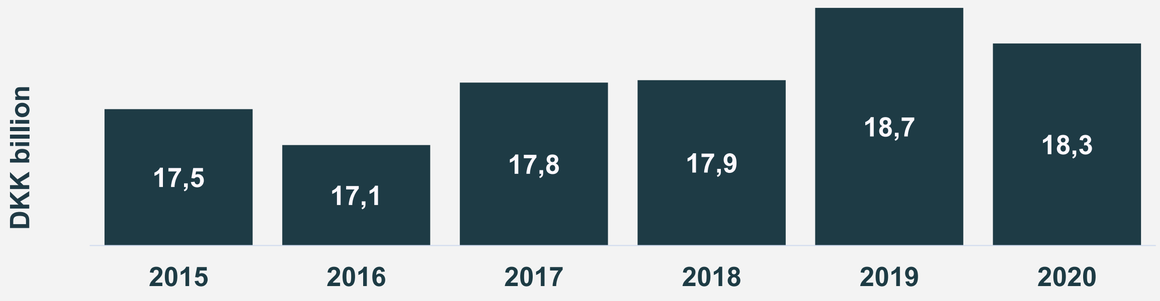
# Investment income

Over the past six years, the Danish life science industry has generated an investment income from abroad averaging DKK 17.9 billion per year.

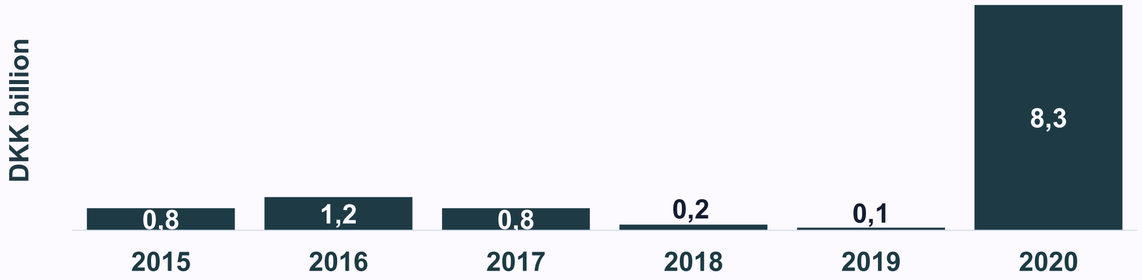
This exceeds the amount that foreign life science companies have withdrawn from Denmark. Therefore, net investment income has contributed positively to GNI.

Investment income from abroad was relatively consistent from 2015–2020. Foreign investment income from life science in Denmark rose substantially in 2020, which explains the decline in net investment income in 2020. The large increase in 2020 is due to the fact that a significant amount was distributed abroad in 2020 in connection with intra-group trading in patent rights.

## Investment income from abroad in Danish life science (DKK billion)




## Foreign investment income from life science in Denmark (DKK billion)



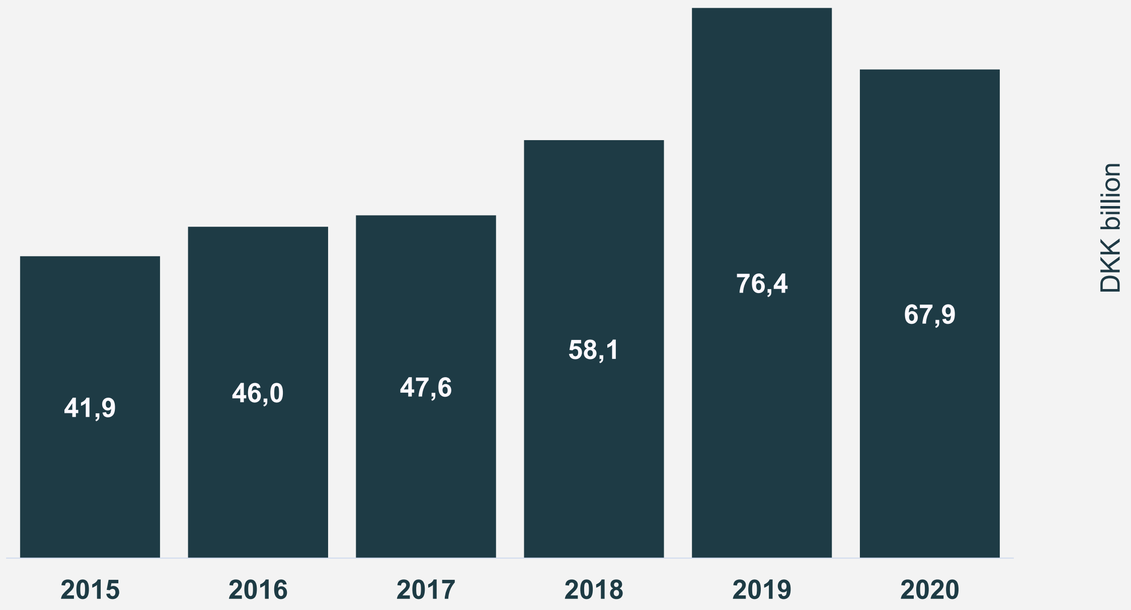

Source: Ministry of Industry, Business and Financial Affairs 2021 based on special extracts from Danmarks Nationalbank
Note: The figure for investment income deviates from previous announcements due to audits.

# Life science investments abroad

The Danish life science industry owns assets abroad worth DKK 68 billion consisting of direct investments, i.e. in subsidiaries, investments, etc.

Investments abroad increased by 82 per cent in the period 2015–2019, but fell by DKK 8.5 billion in 2020.

**Life science industry investments abroad (DKK billion)**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on special extracts from Danmarks Nationalbank and own calculations
Note: The figures are calculated as the portfolio of investments at the end of the year.
Note: The figure for investments deviates substantially from previous announcements due to audits.

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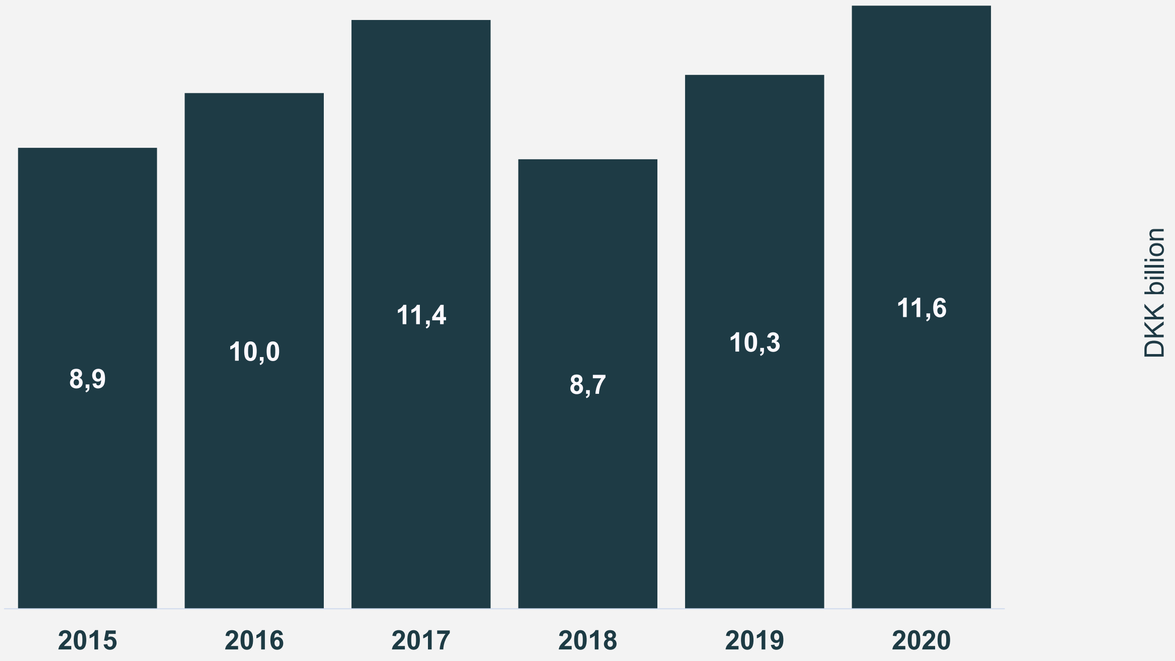
# Investment from abroad in Danish life science

In 2020, foreign investment in Danish life science was just over DKK 12 billion. Foreign investment in Danish life science has been relatively consistent over the past five years, but has increased by a little over DKK 3 billion since 2015.

**Investments from abroad in Danish life science (DKK billion)**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on special extracts from Danmarks Nationalbank and own calculations
Note: The figures are calculated as the portfolio of investments at the end of the year.
Note: The figure for investments deviates substantially from previous announcements due to audits.

# International comparisons

# International comparisons

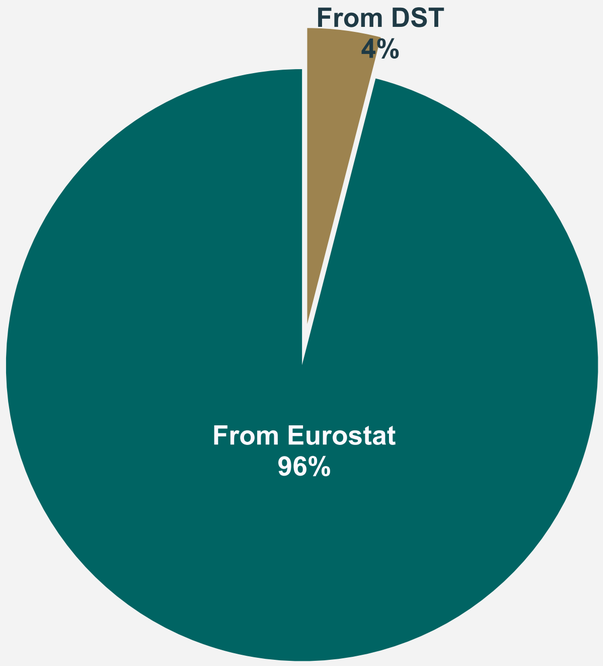
The following pages provide international comparisons of a number of economic indicators for the life sciences industry, including employment, turnover, value added and productivity.

For this comparison, macro data from Eurostat are used. This means that it is not possible to see the key figures at as detailed a level as is the case when using data from Statistics Denmark, which were presented in the first part of the analysis. More specifically, it is not possible to differentiate between medical and pharmaceuticals and biotech.

With figures from Eurostat, it is possible to compare 96 per cent of the Danish life science employment internationally – i.e. the Danish key figures are slightly underestimated in this comparison.

Eurostat does not have data for all key figures in all countries, so the same countries do not recur in all the comparison figures below. However, some of the missing information has been handled by simple interpolation.

The total for each country consists exclusively of the companies in the industries B–N excluding K, i.e. private business without agriculture and the financial sector. This is because Eurostat does not compile statistics for all industries. This applies to all the following figures in the international comparison.



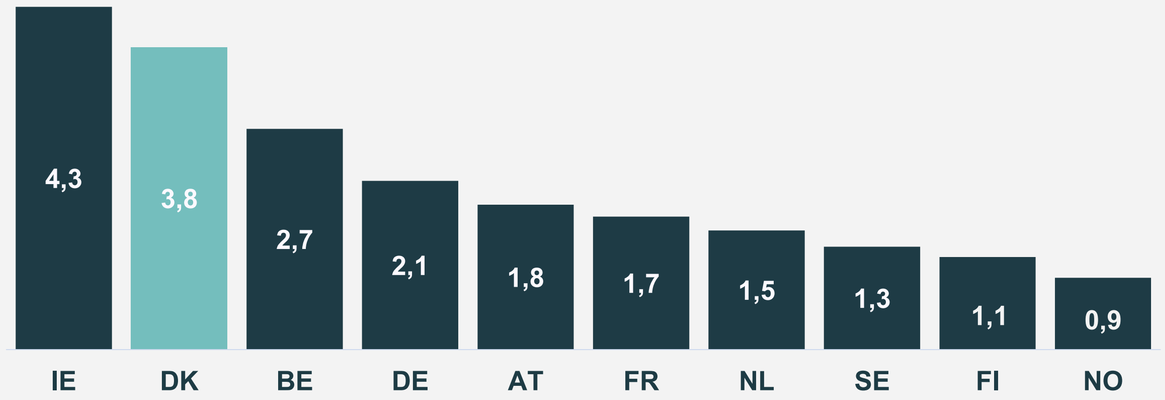
# Employment in the life science industry in Europe

In 2018, the number of employees in the life science industry was 3.8 per cent of the total employment in Denmark when calculated by Eurostat. Denmark employs a relatively large share in life sciences compared with neighbouring countries.

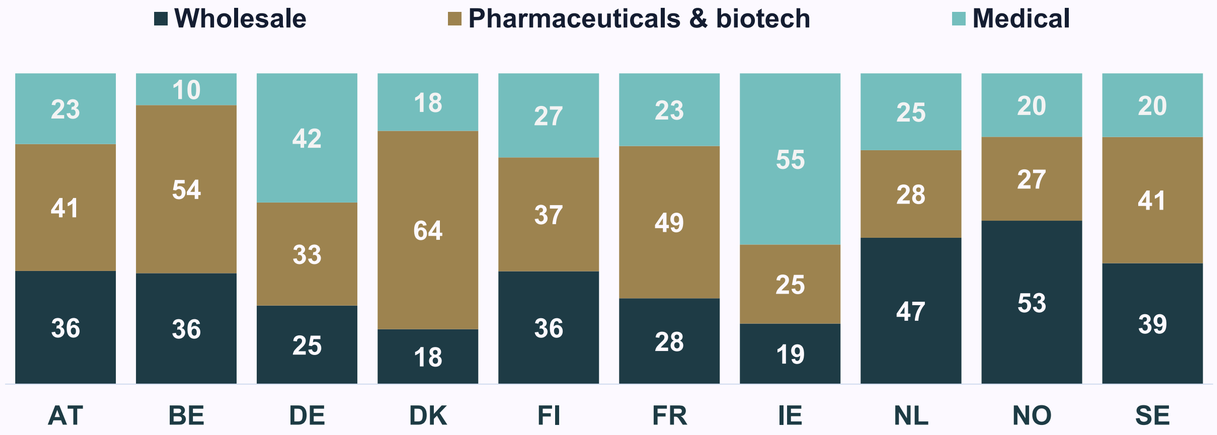
Only Ireland has a higher employment rate than Denmark. Ireland employs a particularly large proportion in the medical industry compared to the other countries, including many in the manufacture of medical and dental instruments associated equipment. Denmark is the country that employs the largest share in pharmaceuticals and biotech.

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat
Note: Employment is calculated in the number of man-years. Eurostat has not calculated the number of man-years for EU28, which is why it has not been included. There are few observations for the UK, which is why it is also not included. The pharmaceutical and biotech employment for Ireland is also higher than indicated in the figure above, as the employment figures for the research and experimental development in biotechnology industry are not indicated for Ireland by Eurostat.

**Employment in the life science industry in selected European countries, 2018 (per cent)**




**Distribution of employees across sectors, 2018 (per cent)**



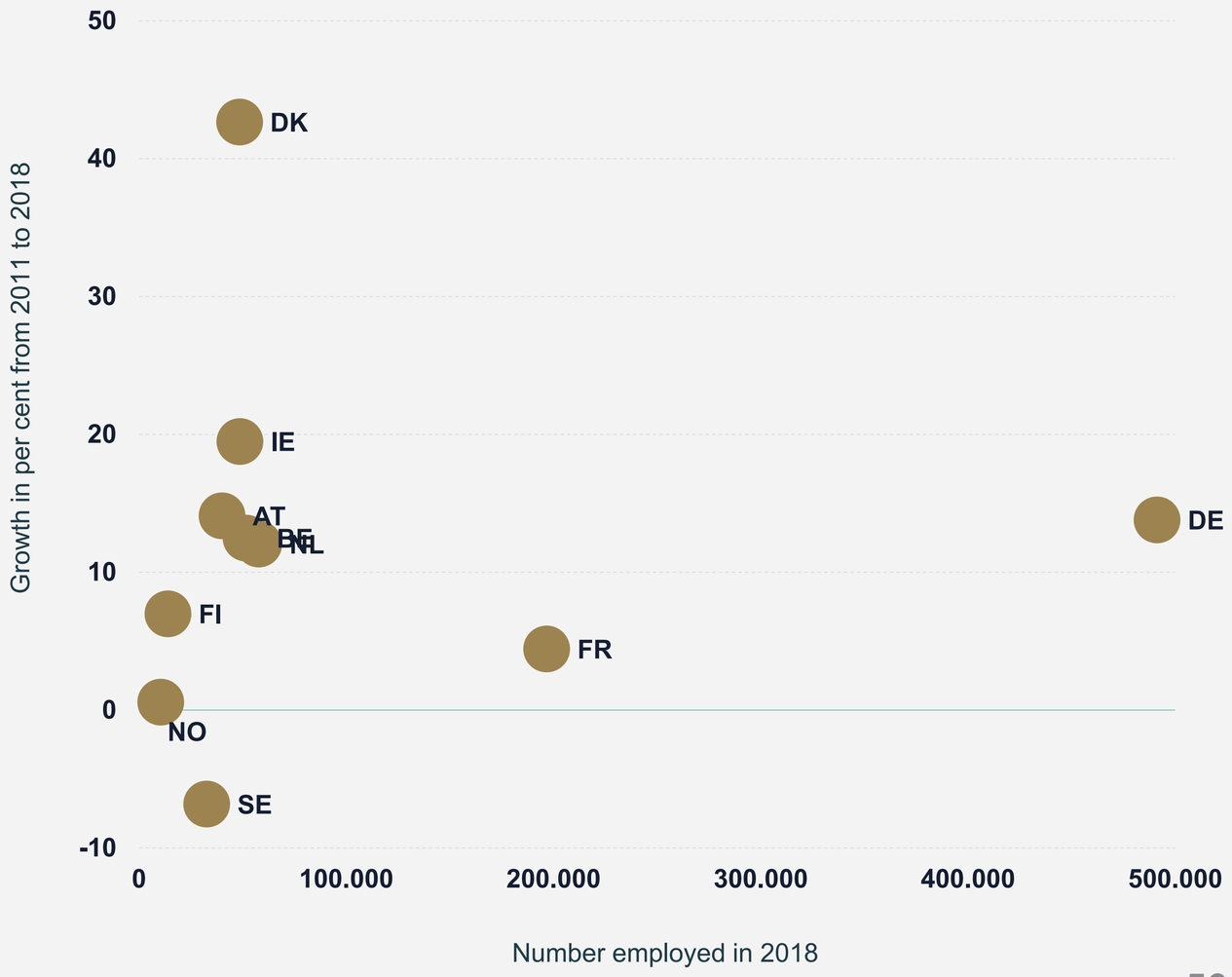
# Employment in the life science industry in Europe

The figure shows the number of people employed in selected EU countries in 2018 compared with the growth in employment from 2011 to 2018.

With a growth of 43 per cent since 2011, Denmark had by far the largest growth in employment during the period, while the number of employees is roughly in line with several European countries.

Germany and France stand out with significantly more people employed in the life science industry than the other European countries included in the survey. Sweden is the only country to have experienced a decline in employment during the period.

**Number of employees in the life science industry and growth here from 2011–2018**



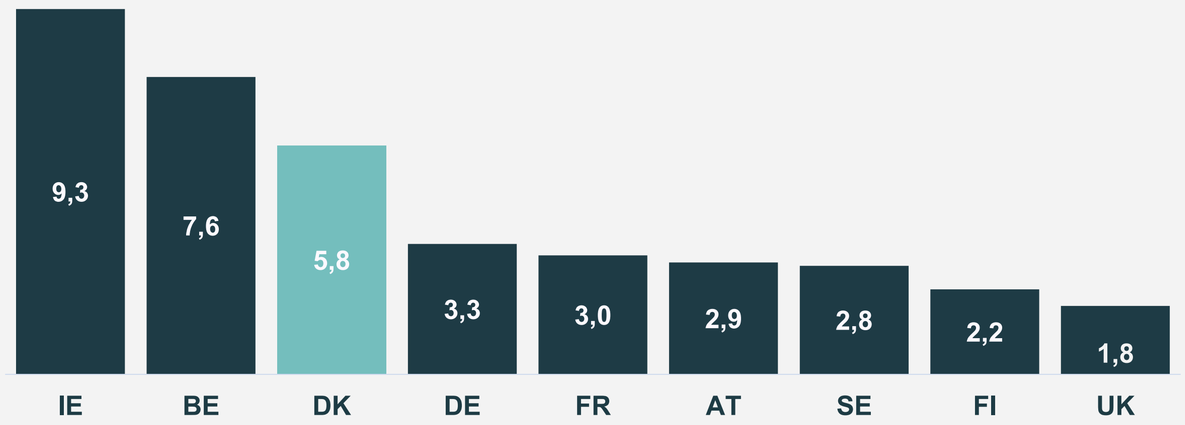

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat

# Turnover in the life science industry in Europe

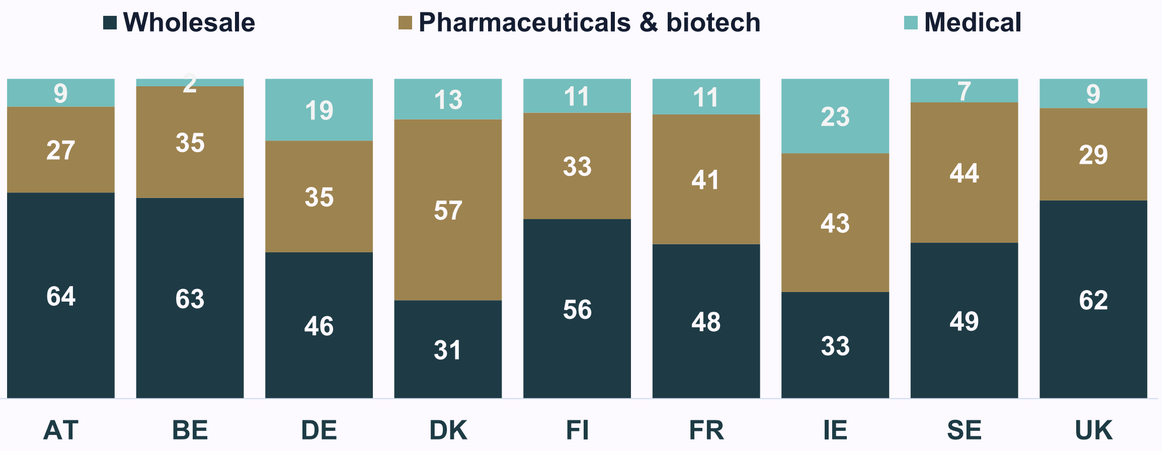
In 2018, the turnover in the life science industry was just over 5.8 per cent of the total turnover in Denmark. The share of turnover in Denmark is only surpassed by Belgium and Ireland. In Ireland, life science turnover was approximately 9.3 per cent of the total company turnover in 2018.

The Irish turnover stands out in particular by being driven by the turnover in the manufacture of both medical products as well as medicines and biotechnological preparations, whereas, for example, Belgium's turnover in life science is largely driven by wholesale trade with life science products. The Danish turnover stems mainly from pharmaceuticals and biotech.

**Share of the country's total turnover stemming from the life science industry in selected European countries, 2018 (per cent)**




**Distribution of turnover across sectors, 2018 (per cent)**



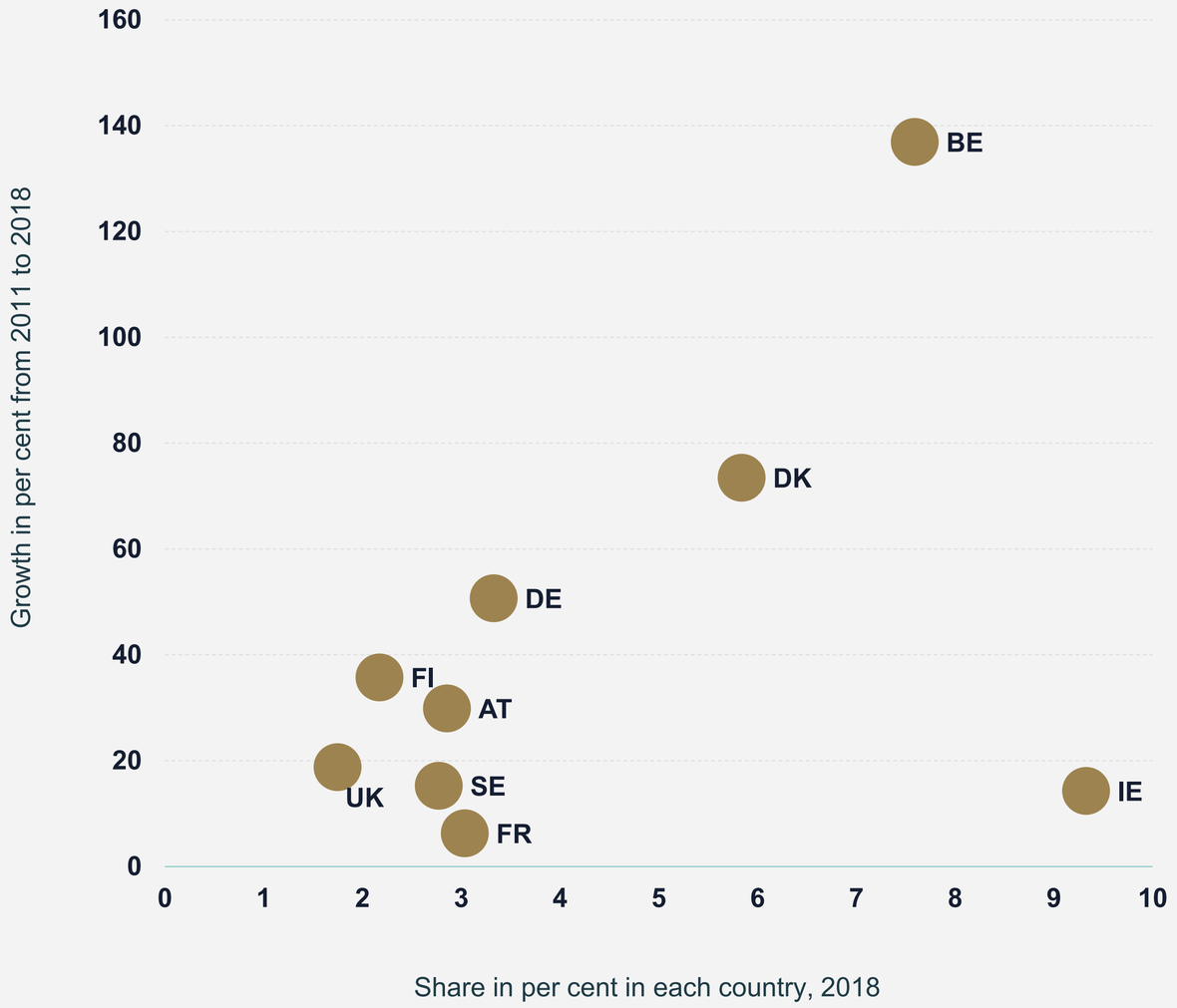

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat

# Turnover in the life science industry in Europe

The figure shows the turnover in the life science industry in selected EU countries in 2018 compared with the growth in turnover from 2011 to 2018.

Here it becomes clear that Denmark, with a growth of 73 per cent since 2011, and Belgium are among the countries that have experienced the largest growth in turnover during the period. Ireland's turnover accounts for the largest share of total turnover in 2018, but it is also the country with the second-lowest growth in turnover during the period.

**Share of turnover from the life science industry and growth from 2011–2018**



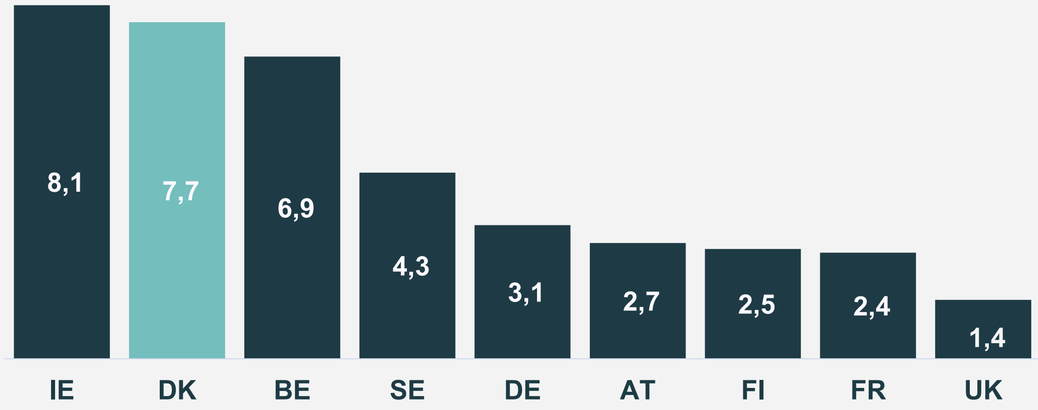

Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat

# The value added in the life science industry in Europe

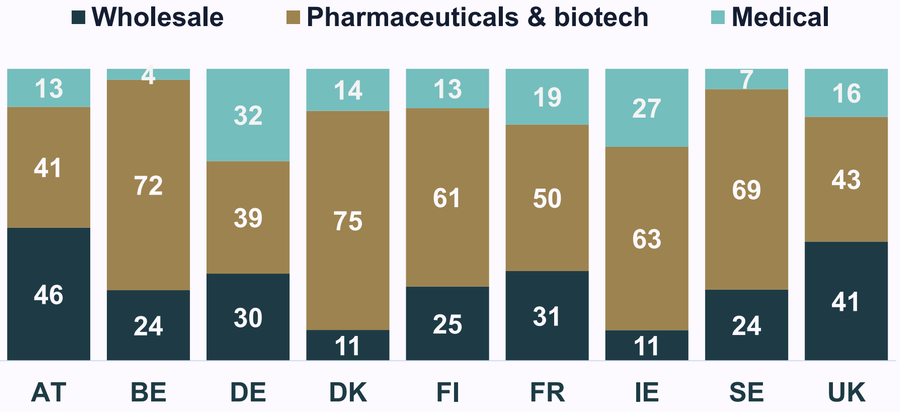
Denmark and Ireland are the two countries where value added from the life science industry is the most significant factor in the economy.

In Denmark, Ireland and Belgium, the value added from pharmaceuticals and biotech is particularly significant. In Germany and Ireland, the value added from the medical industry is also a significant factor.

**Share of the country's total value added stemming from the life science industry in selected European countries, 2018 (per cent)**




**Distribution of value added across sectors, 2018 (per cent)**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat

# Value added in the life science industry in Europe

The figure shows the value added in the life science industry in selected EU countries in 2018 compared with the development in value added from 2011 to 2018.

Here it becomes clear that the value added from the life science industry has a significant impact on Denmark, Ireland and Belgium, but that Denmark is the country that has experienced the largest growth by far.

Ireland had negative growth of 1% between 2011 and 2018.

**Share of value added from the life science industry and growth from 2011–2018**


Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat

# Productivity in selected countries

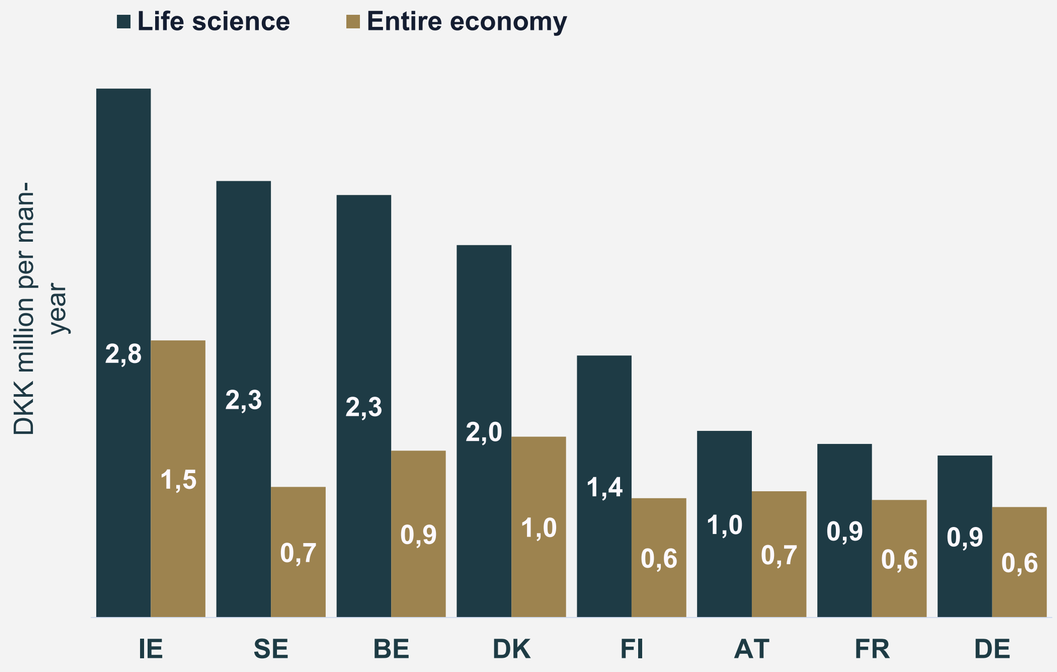
The figure shows the productivity of the life science industry compared to the productivity of the overall economy in 2018.

Across the various countries, the life science industry generally experiences a high level of productivity compared to the productivity of the rest of the economy.

The life science industry in Denmark is relatively productive compared to the other EU countries. However, Ireland's life science industry is the most productive at DKK 2.8 million per man-year. This is because Ireland has about the same number of people in life science as Denmark, but they create almost twice as much value added. As in Denmark, the pharmaceutical industry in Ireland is particularly productive.

The productivity figures, like the other figures in the international comparison, are not directly comparable with the productivity figures that appear at the beginning of the publication. This is because the European industry definition is not as precise as the one that can be applied to Danish data.

**Productivity in life science and the entire economy, 2018**




Source: Ministry of Industry, Business and Financial Affairs 2021 based on Statistics Denmark
Note: Productivity in life science is established by dividing the total value added in life science by the total number of man-years employed in life science. The total level of productivity is also calculated by dividing the total value added of the economy by its total number of man-years. There is a lot of missing information in NL, NO, UK and EU28 for productivity, which is why these countries are omitted. In addition, the level of productivity of Ireland needs to be interpreted with caution, as Ireland also has several missing pieces of information.

# Productivity in the life science industry in Europe

The figure shows the productivity in the life science industry in selected EU countries in 2018 compared with the development in productivity from 2011 to 2018.

It clearly establishes that Denmark is the country that has had the greatest growth in productivity during the period. Meanwhile Ireland, Sweden and Belgium are the countries with the highest productivity.

However, the high productivity in Ireland may be due to the fact that Ireland has attracted intellectual property rights from multinational companies to Irish subsidiaries for a period of time due to favourable tax conditions. This has increased Ireland's calculated trade and thereby the value added, which has created an "artificial" high productivity. The relatively large drop in productivity of over 30 per cent during the period may similarly be due to the transfer of assets in multinational companies.

**Productivity in the life science industry and growth of this industry from 2011–2018**


Source: Ministry of Industry, Business and Financial Affairs 2021 based on Eurostat
Note: Productivity in life science is established by dividing the total value added in life science by the total number of man-years employed in life science. There is a lot of missing information in NL, NO, UK and EU28 for productivity, which is why these countries are omitted. In addition, the level of productivity of Ireland needs to be interpreted with caution, as Ireland also has several missing pieces of information.

# Definition and method

# Data sources for delimitation of life science companies

There are three sources for delimiting companies that work within life science

### Product codes

The product codes are used to identify the life science companies that export life science products and that do not necessarily have the correct industrial classification code. However, many of these companies also export goods that are not life science and/or have a small total export. In order to avoid including companies that are not really life science companies, it is thus a condition that the life science export share must be greater than 50 per cent. In addition, it is stipulated that the total export in relation to turnover must be greater than 25 per cent, as the method is otherwise not robust. At the same time, all companies that are outside industries A–N are removed, i.e. all public companies. By collecting product codes, member lists and industrial classification codes, 1,518 life science companies were identified in 2017.

### Industrial classification codes

The calculation of key figures for the life science industry includes all companies that are part of the 8 different industries (see next slide).

### Member lists

A number of companies have been identified on the basis of membership lists from non-governmental organizations in life science and biotechnology

# Connection between company statistics and the national financial accounts

**All financial key figures in the section on the life science industry in Denmark are based on company statistics**.

The company statistics are a "first-hand report" directly from the companies and therefore provide faster access to the figures than the accounting statistics on which the national financial accounts are based. The company statistics can generally be approximated to the national financial accounts, but this requires a number of corrections.

For example, the total value added of the private business sector, which is
indicated in the company statistics, can be approximated to the gross value added (GVA) from the national financial accounts. However, a number of corrections are being made. Of these, the most important is the R&D correction, i.e. funds spent on own research and development, which are not counted as value added in the company statistics. The other corrections depend on the industry in question, but in the industry it includes, for example, software produced at own expense, production output for own consumption and fringe benefits.

In the calculation of the life science industry's value added, we must, as a minimum, add own research and development to the value added calculated in the company statistics. In addition, value is created abroad. The difference between GVA and gross domestic product (GDP) must be found in product taxes. If the product taxes are added to GVA, an indication of GDP is obtained.

# Weighting of life science companies

Figures for the life science industry can be compared internationally with 4-digit industrial classification codes. In order to be able to compare internationally, companies with an emphasis on one are included in the industry to which they belong. Novo Nordisk is an exception, however. They are mainly part of 212000, but also partly of 325000, which is their secondary industry.

Companies located in industries 464610 and 464620 are indistinguishable from each other internationally. They are therefore included with a total weighting of 1 and are distributed across Medical and Pharmaceutical and biotech based on their sales.

Companies outside the 8 industries are delimited based on members' lists and product codes and are assigned a medical and pharmaceutical weighting which assumes a value between 0 and 1.

$$\text{Medical weighting} = \frac{Export\ of\ medical\ products}{Export, total}$$

$$\text{Pharmaceuticals weighting} = \frac{Export\ of\ pharmaceuticals\ and\ biotech}{Export, total}$$

# Industrial classification codes in the life science industry

| | DB07 industrial classification code | Description of industry |
|---|---|---|
| Medical | 26.60.10 | Manufacture of hearing aids and related components |
| | 26.60.90 | Manufacture of irradiation equipment and electro-medical and electrotherapeutic equipment |
| | 32.50.00 | Manufacture of medical and dental instruments and related equipment |
| | 46.46.20 | Wholesale of medical and hospital products |
| Pharmaceuticals and biotech | 21.10.00 | Production of pharmaceutical raw materials |
| | 21.20.00 | Production of pharmaceutical preparations |
| | 46.46.10 | Wholesale of medical products and nursing requisites |
| | 72.11.00 | Research and experimental development in biotechnology |