



**Lower Silesia**  
a region of innovations

Chemistry and pharmacy, high-quality food, natural and recycled raw materials

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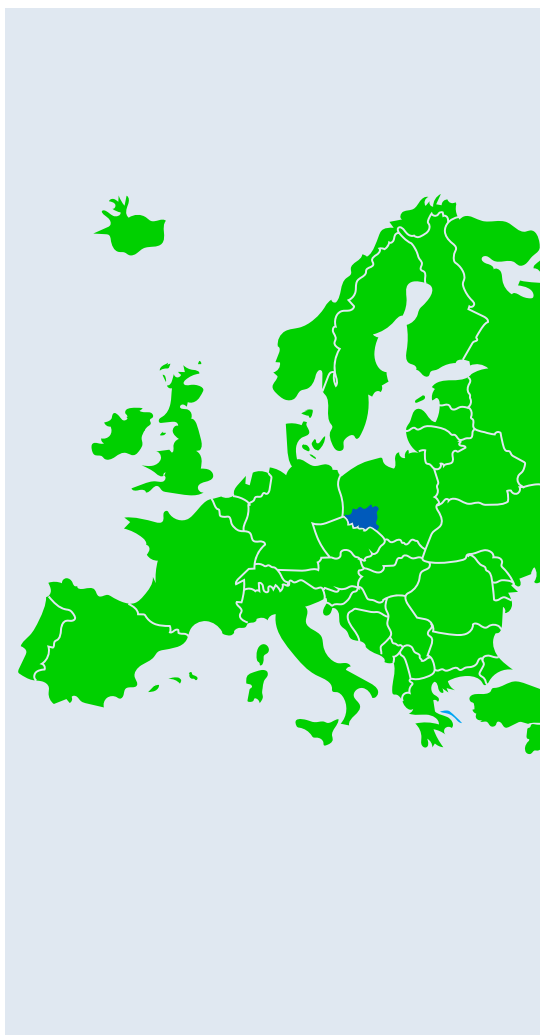
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## Profile of the Province



### Region's capital city:

Wroclaw

### Surface:

19 947 km<sup>2</sup>

### Population:

2.898 million (data for 30 June 2020)

### Economically active population:

1.265 million (data for 30 June 2020)

### Population of students:

117.6 thousand, of which 7% foreigners (data for December 2019)

### Unemployment rate:

5.6% (data for September 2020)

### Gross domestic product per capita:

PLN 175.690 million / PLN 60,562 per capita (data for 2018)

### Region's part in the gross domestic product of Poland:

8.3% (fourth place in Poland in 2018)

### Average gross remuneration in the business enterprise sector:

PLN 5,514.14 (data for September 2020, increase of 6.2% compared to September 2019)

### International airport:

Wroclaw Airport

### Special economic zones:

Economic zone	Website
Kamienna Góra Special Economic Zone for Small Entrepreneurs	<a href="http://www.ssemp.pl">www.ssemp.pl</a>
Legnica Special Economic Zone	<a href="http://www.lsse.eu">www.lsse.eu</a>
Wałbrzych Special Economic Zone	<a href="http://www.invest-park.com.pl">www.invest-park.com.pl</a>

## Industry and technology parks:

Technology Park	Website
Technology Park ChemiPark in Brzeg Dolny	<a href="http://www.chemipark.pl">www.chemipark.pl</a>
Data Techno Park (Wroclaw Medical, Scientific and Technology Park)	<a href="http://www.dtpark.pl">www.dtpark.pl</a>
Lower Silesia Innovation and Science Park	<a href="http://www.dpin.pl">www.dpin.pl</a>
Lower Silesia Technology Park 'T-Park' in Szczawno Zdrój	<a href="http://www.darr.pl/pl/park-technologiczny-t-park">www.darr.pl/pl/park-technologiczny-t-park</a>
KGHM LETIA – Legnica Technology Park in Legnica	<a href="http://www.letia.pl">www.letia.pl</a>
Nowa Ruda Industry Park and Nowa Ruda Technology Incubator at the Agency for the Regional Development 'AGROREG' in Nowa Ruda	<a href="http://www.agroreg.com.pl">www.agroreg.com.pl</a>
Bukowice Industry Park in Brzeg Dolny-Bukowice	<a href="http://www.bukowiceip.com">www.bukowiceip.com</a>
Wroclaw Industry Park	<a href="http://www.wpp.wroc.pl">www.wpp.wroc.pl</a>
Wroclaw Technology Park	<a href="http://www.technologypark.pl">www.technologypark.pl</a>

## Selected foreign investors:



### Household appliances industry:

BSH, Electrolux, Ilpea, Italmetal, LG Electronics, Posco, Whirlpool



### Chemical and pharmaceutical industry:

3M, BASF, Hasco-Lek, Fresenius, Herbapol, USP Zdrowie



### IT & ICT:

Atos, Dolby, Capgemini, GlobalLogic, IBM, Nokia, Opera Software, Tieto, Unit4, Volvo IT



### Automotive industry:

Autoliv, Daimler, Industrias Alegre, Pittsburgh Glass Works, Toyota, Volvo, ZF



### Modern business services:

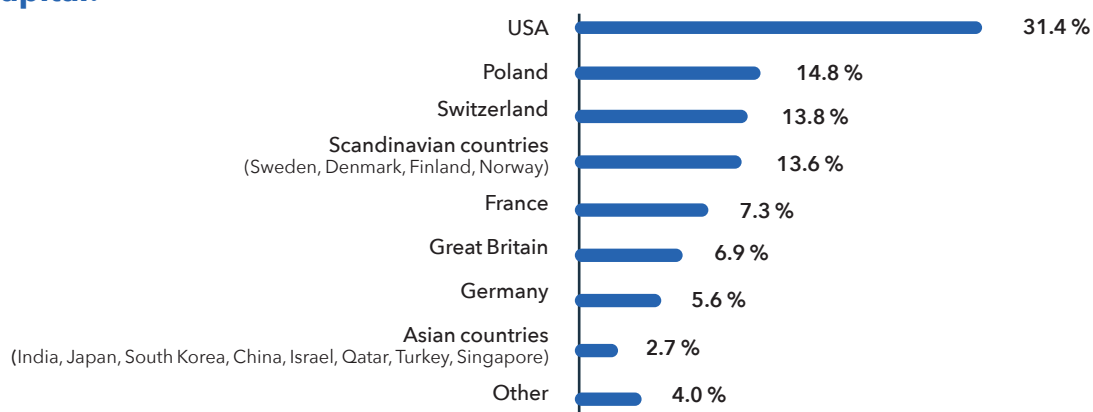
BNY Mellon, Credit Suisse, Google, HPE, McKinsey, Merck, Olympus, Qiagen, Schaeffler, Smith+Nephew, UBS



### Machine industry:

ABB, Balluff, Bombardier, Collins Aerospace, Danfoss Solutions, Fanuc, GE, XEOS

## Employment structure in the modern business services sector by origin of capital:



Sources: *The Modern Business Service Sector in 2020 in Poland. Report by ABSL*

# Assets and strengths

## Location advantages



Favourable location in terms of geography and communication - close to the border with Germany and the Czech Republic

Well-developed transport infrastructure, making the access to the commercial outlets of the European Union and Eastern Europe available

## Investors' support



The economic policy of the authorities of the Province of Lower Silesia aims at developing the region's potential by strengthening the pro-innovative skills and attitudes of the region's residents and entrepreneurs

The activity of the local and regional business environment institutions, supported by the activity of the Polish Investment and Trade Agency

High investment attractiveness of the areas located in the region and intended to serve for economical purposes, supported by the active economic policy of the local and regional authorities

## Potential of the regional economy



Growing economic importance of the Lower Silesia, resulting in increasing value of the gross domestic product, both total and per capita

Transformation of the economy towards knowledge-intensive and high-innovation sectors

Importance of Wrocław as one of the largest business service centres in Poland - in the city there are 188 SSC/BPO centres (data for the first quarter of 2020) which employ 51,900 employees (new investments: Align Technology, ArchiDoc, Gates Corporation, Infosys, JetBridge, Nexio Management, Olympus Business Services, UPM)

## Potential of the knowledge-based industries



Potential of research and development centres of national importance - fields of specialisation: IT, engineering, chemistry and pharmacy, bio- and nanotechnologies

Wrocław as a leading centre of R&D and computer game sector in Poland

Attractive environment for startups, supporting innovators which successfully operate on international markets: Olga Malinkiewicz (Saule Technologies), Miron Tokarski (Genomtec), Patrycja Wizińska-Socha (Nestmedic), Krystian Piećko (DataWalk), Jan Kędzierski (Flash Robotics /EMYS), Jerzy Łątka (Archi-tektura.eu)

The region of Lower Silesia is a place with the largest number of entrepreneurs of technology sector - The region of Lower Silesia is a place with the largest number of entrepreneurs of technology sector - statistically, there is 1 start-up per 4,500 inhabitants of the region

High part (in relation to the average national value) in the exports of technologically advanced products

## Labour market



Increasing percentage of foreigners in the labour market structure

High percentage of people employed in technologically advanced industry and services - high employment level of ICT specialists in enterprises in relation to the average national value (36,000 specialists employed in the ICT sector)

Very good quality of life, resulting in one of the highest percentage of households in Poland with relative highest income

## The Province of Lower Silesia is one of the leading regions in Poland in terms of the economic development

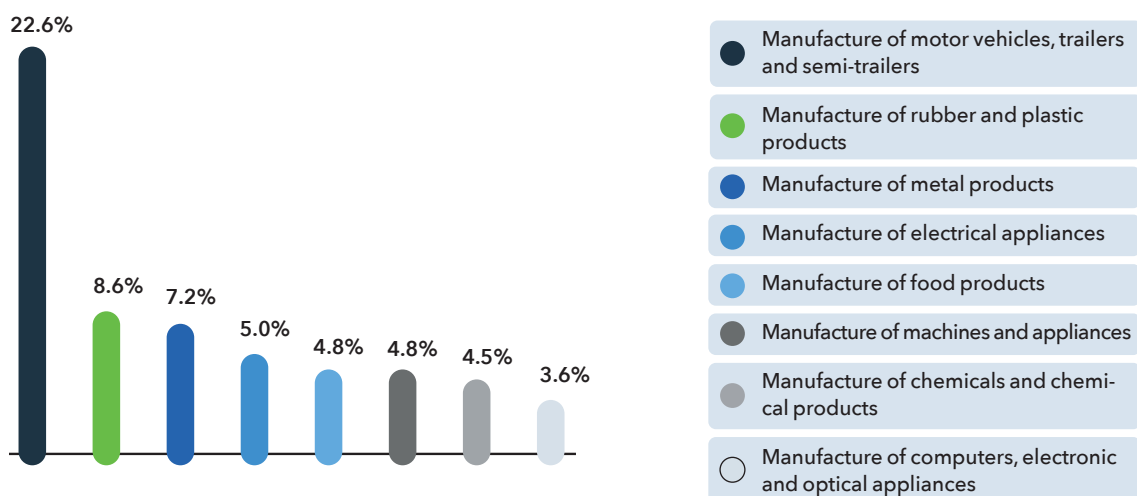


In many aspects, the Province of Lower Silesia is placed among the top-ranked regions in Poland with regard to the economic growth. As it can be clearly seen from the analysis of the localisation indicator, used for demonstrating regions relatively over- and under-represented by enterprises of a given type, **the prevailing types of industry in the region are raw material industry and industrial processing industry. Apart from that, the ICT sector is also of importance, and this is mainly due to the function of Wrocław as a significant national development centre for this sector.**

In 2018, the **sold production of industry** (including the whole activity of business entities, i.e. both industrial and non-industrial type) in the enterprises located in Lower Silesia and employing at least 9 employees reached the high value of 121,176.6 million PLN, placing the region in the fourth place in the country in terms of the sold production of industry.

**The industrial processing** contributed the most to create the sold production of industry (81.7%).

### Structure of creating added value in industrial processing:



Sources: Central Statistical Office, Domestic Database (Regional accounts)

**With its gross domestic product** of 175.7 billion PLN (2018), the Province of Lower Silesia is placed in the fourth place among all the regions in Poland. In 2018 (as in the previous years), the gross domestic product per capita in the region was approximately 10% higher than the average national value.

**The gross value added** for 2018 of the Province of Lower Silesia was 153.5 billion PLN, which was the fourth best value of this indicator in the country.

Pursuant to The Regional Innovation Scoreboard [(4)], **one of the most important virtue of Lower Silesia, crucial in terms of region innovativeness rankings**, is relatively high employment rate in the sectors of middle and high technology and knowledge-based business services in comparison to average values. In addition, noteworthy is the activity in the field of scientific papers, legal protection of inventions and utility designs.



In 2019, Lower Silesia was one of five provinces with **positive net migration rate** (third place in the country). Importantly, in the case of Province of Lower Silesia, the positive value of the rate was mainly due to international migration, what is indicative of a strong international economic position of the region.

According to the development plans for the region laid down in The Development Strategy of the Province of Lower Silesia 2030, the region's potential should be strengthened by investing in the economy's innovativeness, which should in turn be carried out for example by developing smart specialisations or supporting modern reindustrialisation.



# Innovative potential of the Lower Silesian economy

The province of Lower Silesia belongs to the group of the leading Polish regions in terms of the level of innovative development. Almost one fourth of enterprises running their activity in the region have introduced in a given period at least one product or process innovation: a new or significantly improved product (service) or process. Particular attention shall be paid to the relatively wider innovative activity of companies providing services.

***In the years 2016-2018, the level of expenditure on innovative activities in enterprises providing services increased by 24.2% compared to the period 2015-2017. However, the industrial enterprises channel more funds for such type of activity.***

As it can be seen from the diagnoses of smart specialisations of the Province of Lower Silesia, these are manufacturers of machinery and appliances and companies from the chemical and pharmaceutical sectors that are particularly active in this area. More than two-thirds of enterprises from the ICT sector and more than half of manufacturers of machinery and appliances and of chemicals and pharmaceuticals declared that they had introduced some innovation over the last 10 years.

One of the most important factors proving the high extent of scientific research support, technological development and innovation in the region is the level of expenditure on R&D activity. Its value places Lower

***In the years 2009-2018, the level of expenditure of Lower Silesian enterprises on R&D activity increased nine times.***

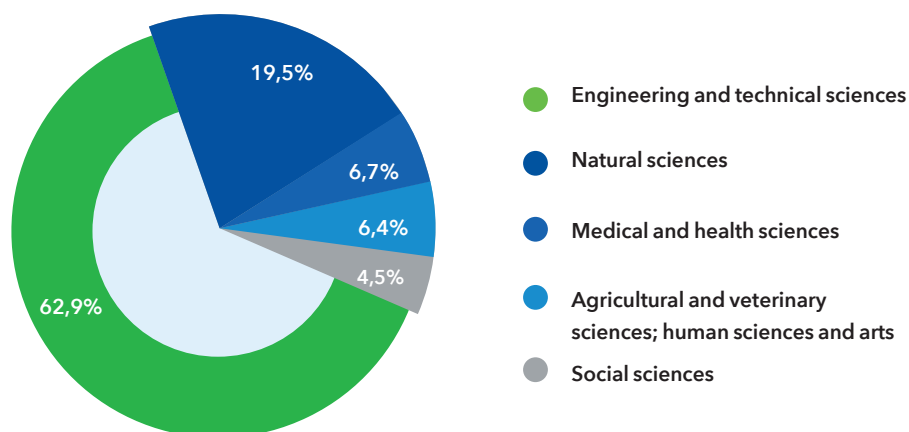
Silesia among the best Polish provinces in this respect. The expenditure incurred by the companies on R&D activity constitute more than half of the total expenditure for these purposes in the region.

The innovative potential of the Province of Lower Silesia can be put down, among others, to a large number of employees involved in R&D activity. Their number is systematically increasing, and now they constitute about 1.5% of all employed persons (second place in Poland). About 50% of employees involved in R&D are employed with enterprises.

**The number of people employed in R&D in the business enterprise sector is growing faster than in the higher education sector. This is an optimistic sign for the future which will allow companies to reach higher level of independence in their development processes.**

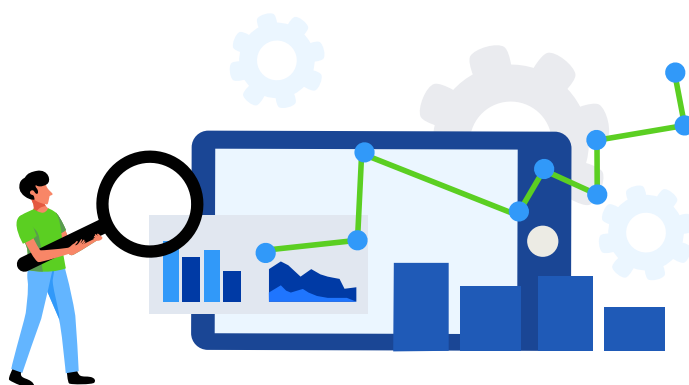
Over the years 2015-2018, the number of entities carrying out R&D activity increased by 43%, reaching in 2018 the value of 437. Importantly, this increase is due primarily to increased number of R&D entities related to industry and services; they constitute over 90% of all such entities.

### Structure of expenditure on R&D activities in 2018 in Lower Silesia by fields of science:



Sources: Central Statistical Office, Domestic Database (Research and Development Activities)

By linking the internal expenditure on R&D activity with the fields of science and technology it can be shown that engineering and technical sciences, on which almost two thirds (62.8%) of all expenditure are spent, are prominently predominant in the Province of Lower Silesia. This could logically be attributed to the aforementioned higher share of the business enterprise sector in the expenditure on R&D activity. In 2018, the highest expenditure was incurred by companies dealing in information and communication (28.7% of enterprises' expenditure on R&D activities), production of motor vehicles, trailers and semi-trailers (23.6%), chemicals (9.5%) and manufacture of machines and appliances (7.0%).



# Chemistry and pharmacy

The Polish chemical industry has a long tradition, since it is just in Poland where the petroleum was being used on a large scale. Nowadays, the sector is characterised by extensive R&D activity. The prevailing branches in the chemical industry are petrochemistry and processing of plastics and mineral fertilisers. The importance of pharmacy and cosmetics industry is relatively low in comparison to the abovementioned branches.

However, there are great opportunities for the chemical industry to develop in Poland. The contribution of the industry to the industrial production is lower than it is in other countries. The percentage of Europe in the global production is 24%, whereas that of Poland – 2%. It should be noted, however, that until mid-1990s the chemical industry in Poland had been constantly developing. There is no doubt that following the Poland's accession to the European Union, the value of the Polish exports increased significantly.

**Lower Silesia** is a region where entities heavily involved in R&D activity are of relevant economic importance. The sector is particularly predestined for R&D investments, both within own R&D departments and as part of the collaboration with scientific entities in this field. Special attention should be paid to the production of pharmaceuticals and to the local, domestic leader PPF Hasco-Lek. Enterprises with foreign capital operating in the region, such as LG Chem, PCC Rokita, Colgate-Palmolive, IMKA, and innovative startups deal in manufacture of chemical products (industrial gases, organic chemicals, cosmetics and toilet products). ([1]: 22)].

## **Subareas of specialisation:**

- 1. Designing and developing of innovative extraction and production technologies for:**
  - **active substances,**
  - **mixtures with active substances and excipients,**
  - **excipients for the sectors of chemistry and pharmacy.**
- 2. Designing and developing of innovative synthetic methodologies and of chemical technologies and processes.**
- 3. Designing, developing and implementing of innovative medications, medical devices, cosmetics, household and professional chemicals.**
- 4. Designing of innovative materials, biomaterials and specialty chemicals.**
- 5. Designing, developing and implementing of biological medicines and methods of their production and characterising.**
- 6. Studies on the impact mechanism of active substances on humans.**
- 7. Developing of innovative processes and technologies for the production of medications, cosmetics, medical devices and other materials of use in medicine**

PCC Rokita is one of the leading companies on the Central European market as far as polyols, alkalis or compounds of derivatives of phosphorus are concerned. The company in question is considered as a corporate giant among the chemical enterprises in Poland and the products it manufactures and distributes are used in the plastics, cosmetics, construction and textile industry and for household and industrial chemicals. Another example could be the company PPG Deco Polska, which is a manufacturer of paints and varnishes and the owner of the Dekoral brand. Another strong sector is the construction chemistry with such global companies as Selena or Roben.

Among the global, foreign investors, 3M is worth mentioning, which following the takeover of the Viscoplast factory in 2001 systematically invests in the expansion of production centres in Wrocław. The company has four factories located here which, after multiple expansions, make up 3M Superhub Wrocław, the largest 3M production centre in Europe. It employs 3,000 employees who produce, among others, plasters and dressings, industrial tapes, adhesives and health and safety products and protective films. 3M also runs an R&D centre, which employs 200 engineers working on product innovativeness. The factories opened in 2011 manufacture in turn products for the aviation industry (the recipients are Airbus, Bell and Boeing) and elements used in the construction of ceramic catalysts and diesel filters for passenger cars, trucks and buses.

The startups and activity of the Wrocław Technology Park supporting them play an important role. Attention should be paid to several entities of this type, such as Apeiron Synthesis or Silesian Catalyst, the innovative potential of which could successfully compete on a global scale. The spin-off companies also deserve attention in the context of the pharmaceutical industry. These include Lipid Systems, a company operating in the field of pharmaceutical nanotechnologies (targeted drug delivery), which has evolved into a R&D centre. The company boasts about introducing pharmaceutical and cosmetic preparations which contain liposome carriers. Another interesting

***and veterinary medicine, of household and professional chemicals products and biocidal products.***

***8. Innovative methods of providing active substances.***

***9. Designing, developing and implementing of innovative infrastructure, including specialised equipment, appliances and production lines for the chemical and medical sectors and for pharmacy.***

***10. Designing and manufacture of nanotechnological products.***

***11. Designing and developing of new analytical and diagnostic techniques.***

***12. Designing and implementing of new methods of application testing.***

***13. Developing and implementing of advanced medical technologies, including stem cell therapies, for the purpose of personalised medicine development.***

example of a company introducing technologically advanced solutions to the market is the startup Biotts. It is a company dealing in the biotechnology sector that develops proprietary technologies of transport of medicinal substances and medicine formulas for oncology, dermatology and autoimmune diseases.



Apart from the abovementioned Wrocław Technology Park, worthy of note is 'The Łukasiewicz Research Network – PORT Polish Centre for Technology Development, which is one of the first RTO – (Research and Technology Organisation) entities in Poland. One of the elements of its strategy was the development of technologies for the medical and cosmetic industry: developing new medicines and their formulas, searching for new diagnostic strategies for the prevention and treatment of diseases, biomarkers and stem cell therapies.

In addition, an important source of specialisation is the presence of enterprises focused on production of pharmaceuticals and cosmetics based on natural raw materials, including herbal ones. An example could be Wrocławskie Zakłady Zielarskie Herbapol, which is one of the largest companies in Poland specialising in the manufacture of products of plant origin to be used in the treatment and prevention of diseases. Another company, Torf Corporation, is in turn a global leader in the production of peat-based dermocosmetics and extracts with proven properties. Due to the globally increasing demand for products based on natural ingredients, human- and environment friendly, free of allergens, parabens or genetically modified ingredients, there is a great development opportunity arising for the companies producing such type of cosmetics.

The potential of the region in the field of development of modern tools for analytical chemistry and biotechnology is also worth emphasising. Lower Silesia is a region where companies with R&D potential are located. Examples of such companies could be:

- Ertec (producer of microwave mineralisers for preparation of analytical samples and of new microwave emission sources for spectroscopy),
- WIAN (the only company in Poland to produce chemical reference standards compliant with the requirements of ISO Guide34 standard). What is more, there is a large number of analytical laboratories dealing in practical chemical analysis for various branches of the industry.

## Chosen enterprises of the sectors of chemistry and pharmacy located in Lower Silesia:

Enterprise	Manufacture	Location	Country of origin
3M	Tapes, industrial adhesives, protective films, elements of catalysts, water filters	Wroclaw	USA
BASF	Catalysts, brake fluids, engine coolants, varnish coatings, materials for batteries for electric cars	Środa Śląska	Germany
Colgate-Palmolive Manufacturing	Products for oral hygiene and body care, cleaning agents	Świdnica	USA
Colorobbia Polska	Frits, pigments, glazes, paints for screen printing	Żarów	Italy
Gambit Lubawka	Sealings and thermal insulation	Lubawka	Poland
Gerresheimer Bolesławiec	Packages for pharmaceuticals	Bolesławiec	Germany
Hasco-Lek	Medicines	Wroclaw	Poland
Hirsch Porozell	Packages, insulations, floor heating systems	Wroclaw	Germany
Jelfa	Medicines	Jelenia Góra	Poland
LG Chem Poland	Manufacture of structural binders / lithium-ion batteries for electric cars	Biskupice Podgórne	South Korea
Minova-Ksante	Xanthates, resin substances	Polkowice	Poland
Oleofarm	Dietary supplements, raw materials for pharmacy	Wroclaw	Poland
PCC Rokita	Polyols, chloralkalis, chlorobenzenes, derivatives of phosphorus, derivatives of naphthalene	Brzeg Dolny	Poland
PPG Deco Polska	Paintings, enamels, sizings, primers, plasterworks	Wroclaw	USA
Selena	Construction chemistry	Wroclaw	Poland
USP Zdrowie	Medicines	Wroclaw	USA
ZA Silesia Huta Oława [The Oława Smelter Plant]	Production and processing of zinc	Wroclaw	Poland

Sources: Own study of the Wrocław Agglomeration Development Agency (ARAW)

## Development trends for the chemical and pharmaceutical sectors

Many companies use multi-stage, complex processes that have a side effect in the form of generating a wide variety of waste products. The growing social pressure and the costs of waste disposal (storage) make them one of the serious factors limiting the activities of enterprises in the sector.

**Enterprises from the chemical and pharmaceutical sectors** are facing the technological challenge to reduce the quantity of waste, and the target value of the implemented changes will be completely waste-free ('zero waste') technologies.

**Many of the 'chemical' processes can be replaced with 'biotechnological' ones**, which, due to the mild conditions and the aquatic environment, are generally less energy-consuming and generate less toxic waste (biocatalysts are usually sensitive to toxic byproducts). Although the efficiency of these processes and the costs of biocatalysts are still high, it should be expected that in the coming years the economic calculation will more and more indicate biotechnology as an attractive alternative to 'traditional' processes.

**New technological ventures that use waste materials generated in other processes** (including the materials deposited as post-production waste in dumps and landfills, referred to as 'urban mining') operate in line with the above assumptions.

The need to optimise the technological processes and increase their efficiency or quality is associated with the need to have full control over the process and ability to react and influence it in real time. More and more accurate measurement of processes is enabled by growing computing capabilities of computers and development of the market of sensors and detectors.

**Enterprises from the sector, as well as other sectors, will be forced to implement IT solutions and industrial automation on an increasing scale. The implementation of industry 4.0 becomes a necessity.**

Demographic changes (increase in the world's population, ageing population – especially in Poland and in many developed countries) change the demand for industry products in areas such as hygiene, quality of life and health. Particularly increasing will be the demand for medicines used for treatment of chronic and age-related diseases.

**Chemical and pharmaceutical companies will constantly be under pressure from the public opinion and health care systems to supply hygiene products and medicines in sufficient quantities. Particular emphasis will be put on developing anti-cancer medicines and those for metabolic and mental diseases.**

Both in Poland and in Europe, there is a strong pressure on the 'ecological' nature of products. It is due to the aforementioned tendency to be waste-free, but also with the trend to use natural materials in production and – among the most aware consumers – the search for products made of natural and 'local' materials.

Lower Silesia, with its enormous wealth of minerals and outstanding agriculture, is able to meet the demand of the chemical and pharmaceutical industries for local and natural raw materials (including in such demanding industries as pharmacy).

Integrating the development of the chemical-pharmaceutical specialisation with other specialisations of Lower Silesia for a better utilisation of its potential, including:



#### **Natural and recycled raw materials.**

According to the indicated market niches, the byproducts generated by the extractive industry may constitute a basis for the development of new product specialisations in the chemical sector. The basis can be both the potential of KGHM's dumps and landfills, as well as waste products generated on an ongoing basis by smaller producers.



#### **The potential of the ICT sector.**

The technology can be used for telemedicine or telerehabilitation (e.g. applications facilitating carrying out medical tests, testing new preparations or conducting planned treatments), but also for managing the production processes in production plants or analytical processes in R&D institutions, e.g. big data analysis, more efficiently.

The development potential, especially that of the pharmaceutical sector, also results from **the increasing popularity of health prophylaxis** (spa, wellness). Lower Silesia, with its spa potential (especially the Kłodzko Valley), has particularly suitable conditions to develop them. It is a very broad issue, since although the tourism potential is the basis, it is complemented by a wide range of pro-health services. This gives an opportunity for the companies from the pharmaceutical sector to operate on a large scale, for example in the area of research and development of a range of medicines for the elderly. Obviously, not only the older part of the population is a potential addressee of such activities. The market optics can be significantly broadened if we allow for another trend that may have implications for the pharmaceutical sector, i.e. counteracting the effects of civilization diseases (e.g. cardiovascular diseases or obesity). When the abovementioned trends are taken into account, a wide variety of application can be developed for pharmacological agents produced by the pharmaceutical industry, enabling a more comprehensive use of the region's potential; what is more, it allows the pharmaceutical sector to be linked with other ones.

Another trend occurring both in Poland and in Europe and affecting almost all areas of life is broadly understood **ecology combined with increasing interest in natural products**. This type of trend may influence both the chemical and pharmaceutical industry by offering the market not only cosmetics, cleaning agents or dietary supplements based on natural ingredients, but also construction and finishing materials. A special variation of the ecological trend is **eco-construction** (passive houses or zero-emission housing estates) and, as a result, prospective groups of products, such as biodegradable construction materials and cleaning agents, modern insulation materials, nanosteel and nanoaluminium, characterised by increased strength, and proactive surfaces (e.g. self-cleaning glass).



# High-quality food



Lower Silesia is among the top five regions in Poland with the highest number of food producers. Compared to other provinces, Lower Silesia can be considered as a region with significant, yet not the largest one in Poland, economic potential as far as the food production is concerned. The dynamics of growth in the number of companies producing food in the Province of Lower Silesia was one of the highest among all the regions. In the years 2009-2019, the number of entities increased by approximately 14%. It was the third highest increase among all the provinces.

The Province of Lower Silesia specialised in food production in the middle of 20th century. The agricultural and food industry in Lower Silesia was one of the best developed in the country and characterised by a relatively high geographical concentration due to favourable climatic and environmental conditions.

The food sector in Lower Silesia is made up not only by small producers, but also by manufacturers of semi-finished products and materials. Several food concerns, such as Nestle Purina or Lorenz Bahlsen, are also based in the region. Such a location of the companies of the industry in question was chosen because of the logistic conditions and the need to provide a sufficient number of employees necessary to conduct production activities.

## **Subareas of specialisation:**

- 1. Foodstuffs used in initial or complementary preventative and therapeutic treatment.**
- 2. Dietary supplements and foodstuffs for particular nutritional uses.**
- 3. High-quality feedstuffs and alternative products used in pharmacotherapy of farm animals and livestock.**
- 4. Specialty food and dietary supplements for domestic animals.**
- 5. Organic, traditional, regional and local food.**
- 6. Functional food and nutraceuticals.**
- 7. Food with increased nutritional properties.**
- 8. Technologies of packaging and storing of means from sub-areas of smart specialisation.**
- 9. Quality evaluation methods of means from sub-areas of smart specialisation.**
- 10. Technologies in the production of means from the sub-areas of smart specialisation.**

## Chosen enterprises of food sector, located in Lower Silesia:

Enterprise	Production	Location	Country of origin
Aktiw	Ready-made foodstuffs and ingredients for production (eggs)	Stare Bogaczowice (Wałbrzych)	Poland
AVO-Werke	Ready-made foodstuffs and ingredients for production (spice and functional mixtures, including for meat, fish processing, dairy, bakery and HoReCa industry)	Wierzbice	Germany
Bama Companies	Semi-finished food products (frozen cakes, muffins, biscuits and rolls)	Stanowice (Oława)	USA
Borghetti Chemicals Poland	Ingredients for production (including raw materials for food industry)	Prusice	Italy
Cargill Poland	Ready-made foodstuffs, ingredients for production (including feedstuff pre-mixtures, starch syrups, gluten and soybean meal)	Bielany Wrocławskie	USA
DIJO Baking Horeca Service	Ready-made foodstuffs (including salty and sweet snacks, sauces for ice cream and desserts, tortillas)	Wrocław	Poland
Eisberg	Processing of vegetables (mixed lettuces)	Legnica	Switzerland
Mondelēz International	Chocolate, cookies, chewing gums, candies, coffee and beverages	Bielany Wrocławskie	USA
McCain	Ready-made foodstuffs (chips, other potato products)	Strzelin	Canada
Nestle Purina	Ready-made foodstuffs (chips, other potato products)	Nowa Wieś Wrocławska (Kąty Wrocławskie)	Switzerland
Sonko	Ready-made foodstuffs (mainly animal feed)	Bielany Wrocławskie	Poland
Sofrapol	Ingredients for production (including additives, spice and functional mixtures)	Wrocław	France
The Lorenz Bahlsen Snack-World	Ready-made foodstuffs (mainly salty snacks)	Stanowice (Oława)	Germany
Uldo Polska	Ready-made foodstuffs and ingredients for production (mainly breadstuff, bakery and confectionery improvers and mixes)	Wrocław	Germany

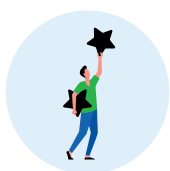
Sources: Own study of the Wrocław Agglomeration Development Agency (ARAW)

## Development trends in the food production sector

'Production of dietary supplements and foodstuffs for particular nutritional uses', 'Production of foodstuffs used in initial or complementary preventative and therapeutic treatment', 'Production of food with increased nutritional properties' and 'Production of functional food and nutraceuticals' - all these production fields show an upward trend, visible in the region and on national and international levels. Their development will be positively influenced by demographic trends (ageing society, increased life expectancy), changing lifestyle (active lifestyle, popularity of pro-health behaviours, popularisation of preventive healthcare) and escalating consumer requirements for food products.



The upward trend may be of use for the producers who base their production on natural resources, in particular on herbal substances. The high development level of the agriculture in Lower Silesia may become an opportunity for the development of these areas.



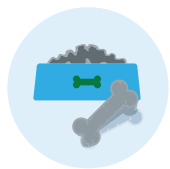
The great potential of the chemical and pharmaceutical sectors can be used to manufacture products enriched with biologically active substances or requiring special quality and technological conditions, such as probiotic products or dedicated dietary supplements for diseases in case of which the therapy can be complemented with a special diet, such as adjuvants for articulations.



The potential of the chemical and pharmaceutical sector along with the existing capabilities of food technology and biotechnology can be used for production of food with a short list of ingredients, such as gluten- and lactose-free food, low-calorie food, etc.



It is predicted that the development of food with increased nutritional properties will continue over the long term both in Poland and in Europe, which is due not only to the demographic conditions, but results also from changing habits and from pro-health attitude of consumers (special food for pregnant women, baby food or functional food for seniors).



The market of food products and dietary supplements for domestic animals offers almost unlimited possibilities for the producers to prove their imaginativeness in the field of technology and marketing. It should be expected that in the coming years the market (which is undergoing a phase of intensive development) will remain open to virtually any product innovation.



The production of feedstuff and products for farm animals requires rather efficient marketing activities or a change in business model than outlays for technological innovations to be able to compete on the same market with larger and settled domestic and foreign producers. Although the market is still growing, practically all the growth is attributable to a narrow circle of producers.

# Natural and recycled raw materials

Poland with its vast deposits is an important global producer of mineral resources, such as copper (sixth place), silver (second place), zinc, lead, rare earth elements, e.g. rhenium, as well as coal and numerous chemical and petrean raw materials. Lower Silesia plays an important role in this respect, since there are in the region, due to its geological structure, a variety of natural mineral resources enabling the development of enterprises in the extractive and mineral raw materials production and processing sector. Enterprises dealing only with extraction are usually small gravel pits and sand pits, since larger plants of this type carry out ordinarily at least initial processing (sorting of the mineral). The most advanced processing of mineral raw materials is undertaken by plants which exploit raw materials for construction ceramics and deliver to the market the final products offered subsequently to customers, such as bricks, roof tiles, etc. Similar situation occurs in the case of natural gas produced in Lower Silesia and in the case of brown coal, where both the mine, as well as the power plant located in Turoszów, both owned by PGE GiEK, are suppliers of the final product which is the electrical energy.

There are certain factors which together boost the competitiveness of Lower Silesia's smart specialisation 'Natural and recycled raw materials' within EU and globally, namely:



**Presence of various groups of raw materials within a radius of several dozen kilometres**, which constitutes a factor favourable for establishing new production plants of various consumer goods, from furniture to the aviation and aeronautical industries. This makes it possible to reduce the raw material supply costs significantly especially for SMEs, which due to small volume of raw material, usually decide to use relatively expensive road transport. **Virtually no other region in the world has a similarly wide range of natural resources.**

## **Subareas of specialisation:**

### **1. Extraction, advanced processing and using natural raw materials**

- **technologies of extraction, processing and using useful minerals,**
- **technologies of obtaining new products from the main mineral,**
- **integrated systems for monitoring threats in the vicinity of mining plants,**
- **technologies of producing, treating and using ordinary, thermal and mineral waters,**
- **technologies of obtaining, processing and using wood and plant raw materials in innovative products,**
- **new medical treatment and spa services in case of which natural raw resources are used.**

### **2. Recovery technologies for useful materials; recycling and waste disposal technologies.**

### **3. Advanced materials**

- **new forms of raw materials (powders, microstructures, nanostructures, amorphous forms, etc.),**
- **composite materials,**
- **smart materials,**
- **materials for industrial applications,**
- **design and development of production technologies for materials with functional properties.**



**Natural monopoly within the EU on rhenium, copper and silver.** The location of the resources of these metals in the centre of Europe along with easy access to the market create an opportunity to develop the production of wide range of goods, from aircraft engines, air conditioning and solar heating systems to furniture and jewellery with copper and silver finish and decorated with Lower Silesian stones.



**The metropolitan nature of the city of Wrocław,** which makes it an attractive place for highly qualified employees, also foreigners, to settle down in. Thanks to its well-developed social infrastructure, Wrocław is a city in which not only social, recreational and cultural, but also educational needs in foreign languages can be met.

The industry dealing in using natural and recycled raw materials has been given an opportunity for development, involving the possibility of a more comprehensive use of post-mining waste, which can make up a source of valuable raw materials, which are so far unused, yet can be possible valuable source of resources in the future:



The post-flotation waste and copper slag, produced by KGHM within its activity and piled up in a mass with a multimillion weight, may be used to develop an extremely profitable processing activity.



Dumps of coal slates and waste from coal processing in the vicinity of Wałbrzych and Nowa Ruda may become a valuable raw material for the building materials industry. The finest fractions can be used for the production of mineral wool; besides, they can be used in products made by pouring melted basaltic rocks into mouldings of desired form, e.g. acid-resistant pipes and sinks, even ordinary paving bricks.



Due to their chemical composition, fine basalt and melaphyre fractions can be used as a slowly decomposing ecological fertiliser.



Fine fractions, generated in the production of crushed granite aggregate and cutting granite blocks, can be also disposed in a profitable manner, e.g. in the field of ceramics production or as product extenders in construction chemistry.

The natural resources of Lower Silesia, i.e. gold, silver, gemstones and decorative stones, favour the development of a niche, however highly profitable sector – jewellery, and its related sectors (e.g. glassmaking).

Use of the natural resources of Lower Silesia, availability of gemstones and decorative stones and location of production plants of silver and gold create an opportunity to develop the sector of jewellery. The development may be hindered, as in the case of traditional and regional food, by the lacking education and qualified craftsmen.

Nowadays, jewellery and glassmaking rely not only on traditional technologies, but require new technologies and knowledge in many areas, e.g. in joining materials or process control.

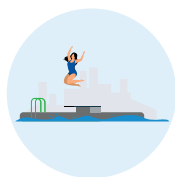
The mining sector, being a significant element of the smart specialisation 'Natural and recycled raw materials', has very limited facilities for the production of dedicated machines and appliances. Considering the number of operating and processing plants, it may be quite surprising that in the entire voivodeship there is not enough number of enterprises that provide necessary machines for entrepreneurs from the mining and raw material processing sectors.

The facilities of the natural and recycled raw materials industry in Lower Silesia are very limited at a regional level as far as the production of dedicated machines and appliances is concerned. Given the fact that in Lower Silesia operate enterprises in the extractive and raw material production and processing sectors, they would have direct access to future users, which would enable joint testing of new solutions.

Lower Silesia has more resources of valuable mineral and medicinal waters than any other region of the country. Unfortunately, this potential remains to a large part untapped. Apart from a few mineral water bottling plants, these resources are used principally on the local scale for the needs of health resort medicine.



In general, the health resort medicine is a rather conservative sector, but it is clear that the network of health resorts in Lower Silesia could constitute a basis for developing mass family tourism. However, this will require changes rather in the health resorts functioning model than in technology.



There is an interesting niche in balneology, namely the technologies of heat recovery from thermal waters, especially in such places as Cieplice, where the temperature of water from deep boreholes exceeds 80°C, or in Łądek Zdrój, where the water is about 45°C hot. The potential of the thermal springs is at the present moment not utilised to the full extent because of the lack of an appropriate technology that would enable increasing the heat recovery from thermal waters.

The production of advanced materials, such as composites, nanomaterials, etc., is a relatively young sector that is constantly developing. It may bring about new applications of these materials in the chemical, construction and pharmaceutical industries.

Thanks to new applications of composites, nanomaterials etc. in the furniture and wood processing sectors and by use of advanced materials in the wood sector, the resistance of wood to pollution and external conditions (for example rain, wind, low temperatures) will be increased, which may contribute to the extended lifespan of the material and enhance its functionality.

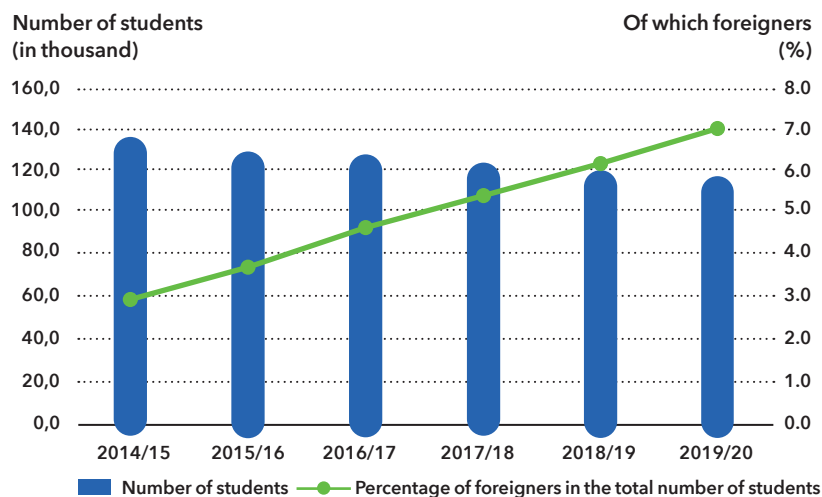
## Education, including higher education

In the academic year 2019/20, there were 33 universities in the Province of Lower Silesia, of which 13 were public schools. As at 31 December 2019, 117.6 thousand students were educated at universities in Lower Silesia, which makes the region one of the largest academic centres in Poland. In 2019, 31.2 thousand students, i.e. by 2.8% more than in 2018, graduated from universities. The number of foreign students was still increasing.

In the case of Province of Lower Silesia, higher education institutions represented 9.5% of all Polish higher education institutions, and the number of students – 9.8% of the total number of students in Poland, what places Lower Silesia in the fourth place in the country.

The main academic centre in the province is Wrocław, where the largest universities in the region in terms of the number of students are located: Wrocław University of Science and Technology (24.7 thousand students) and the University of Wrocław (23.5 thousand students). In the academic year 2019/20, the number of students in Wrocław was 108.5 thousand, which constituted 92.4% of the total number of students in the province.

### Number of students at the universities of Lower Silesia:



Sources: Statistical Office in Wrocław, Higher education in the Lower Silesia Province in 2019

The most numerous group of foreigners at universities in Lower Silesia were students coming from European countries, mainly from Ukraine – 4.1 thousand (50.4% of foreign students) and then from Belarus and Germany – 8.9% and 5.5% of foreign students, respectively.

In the academic year 2018/19, 31.2 thousand students graduated in the Province of Lower Silesia, which represented 9.9% of the total number of graduates in the whole country. Similarly, the number of graduates from abroad has dynamically increased in recent years. In the academic year 2018/19, the number of foreign graduates was 1.5 times higher than in the previous year. University diplomas were awarded primarily to students from Ukraine – 54.0% of all graduates from abroad, and then from the Czech Republic and Belarus – representing 9.1% and 5.7%, respectively.

***In the years 2014-2019, the number of foreigners studying at universities in Lower Silesia increased (by 120.2%), as well as their share in the total number of Lower Silesian students (by 150% in turn).***



In the academic year 2019/20, the fields of study most often chosen by people in the Province of Lower Silesia were still business, administration and law – 26.5% of the total number of students, and technology, industry, construction – 18.9% of the total number of students, then human sciences and arts – 8.8%, social sciences – 8.1%, natural sciences – 6.3% and ICT – 5.8%.

There are numerous R&D centres operating in the Province of Lower Silesia, which conduct works related principally to chemistry and pharmaceuticals. They include **the Piastów Śląskich Medical University of Wrocław**, the main technological specialisation of which is pharmaceuticals, biotechnology, organic chemistry and medical technologies. The entity's services are dedicated, among others, to the chemical and machinery industry. It should be stressed that the entity runs **the Centre for Innovation and Technology Transfer**, which provides services for R&D entities and enterprises and offers, among others, the access to the patent database, experts, research apparatus, innovative project base, feasibility studies, research and implementation teams, science and business meetings.



Another example of entity conducting research in this area could be **the Wrocław University of Science and Technology** with its leading technological specialisation in organic chemistry. The entity responsible for the technology transfer is **the Wrocław Centre for Technology Transfer**. The main objective of its activity is to commercialise the results of scientific research obtained at the Wrocław University of Science and Technology, animate the cooperation of research and technology and support the enterprises' activity in the field of innovativeness.



**The University of Wrocław** specialises also in research in research in the field of organic chemistry, biotechnology and pharmaceuticals. The entity responsible for the technology transfer at the university is the company operating since 2014 under the name **Centre for Innovation and Knowledge Transfer**, whose principal activity is broadly understood supervision of the commercialisation processes of scientific research results.

Another university the research activity of which should be noted is **the Wrocław University of Environmental and Life Sciences**, supported by the Department of Innovation, Implementation and Commercialisation. The task of this organisational unit is to manage and protect the intellectual property of the Wrocław University of Environmental and Life Sciences. The university specialises primarily in the field of organic chemistry, biotechnology, food chemistry, further also in pharmaceuticals. However, the unit does not run a technology transfer centre and thus it cooperates with the Wrocław Centre for Technology Transfer at the Wrocław University of Science and Technology.



Noteworthy is the activity of **the Ludwik Hirsfeld Institute of Immunology and Experimental Therapy of the Polish Academy of Sciences in Wrocław** with its leading technological specialisation in biotechnology and pharmaceuticals. The Institute offers its services mainly to two industries: chemistry and production of medical, precision and optical instruments. Activities in this area are also run by **the Włodzimierz Trzebiatowski Institute of Low Temperatures and Structural Research of the Polish Academy of Sciences in Wrocław**, specialising, among others, in chemical engineering. The chemical and machine industries are counted to the potential recipients of the Institute's services.

With regard to the activity profile of all the universities in the region, the educational and R&D offer in the field of high-quality food concentrates in five universities in Wrocław:

#### University of Environmental and Life Sciences

Faculty of Biotechnology and Food Sciences, e.g. Department of Food Biotechnology and Microbiology, Department of Agricultural Technology and Storage, Department of Human Nutrition.

Faculty of Animal Biology and Breeding: Department of Animal Nutrition and Feedstuff Science.

#### Wrocław University of Science and Technology

Research and education in the field of food-related issues, conducted within the Faculty of Chemistry: Department of Biochemistry.

#### The Piastów Śląskich Medical University of Wrocław

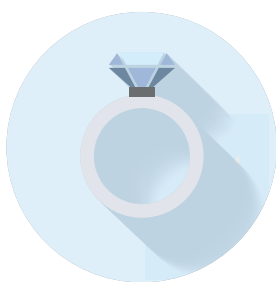
One out of the five faculties at the Medical University focuses on food-related issues. It is the Faculty of Pharmacy with the Division of Medical Analytics: Department of Bromatology and Dietetics.

#### University of Economics

At this University, the unit specialised in the field in question is the Faculty of Engineering and Economics, e.g. Department of Agricultural Engineering and Quality Analysis, Department of Biotechnology and Food Analysis, Department of Food Technology of Animal Origin.

#### University of Wrocław

At the University of Wrocław, issues related to food are dealt with by the Faculty of Biotechnology: Department of Biochemistry and Department of Genetic Biochemistry.



**As far as the sector of natural and recycled raw materials is concerned, the University of Handicrafts and Management in Wrocław is noteworthy, as it is the only university in Poland to educate future craftsmen in the jewellery industry and experts in precious stones and art conservation.** As one of the few universities in Europe, it holds programmes in gemmology, i.e. the science dealing with precious stones. The specialists are educated at the bachelor's level in full-time and extramural studies. The university is oriented on educating highly qualified professionals and preparing them to run own business.

Potential of chosen R&D units that are able to support enterprises operating within the following smart specialisations: 'Chemistry and pharmaceuticals', 'Natural and recycled raw materials' and 'High-quality food':

Chemistry and pharmaceuticals	
The Novasome Research and Development Centre	Preparation of new pharmaceutical formulas for the market.
Faculty of Chemistry, Department of Organic and Pharmaceutical Technology of the Wrocław University of Science and Technology	Technology of specialty chemicals, including natural medications.
Institute of Immunology and Experimental Therapy of the Polish Academy of Sciences	Life science – biotechnology, clinical medicine, immunology, virology, stem cells.
Faculty of Biotechnology of the University of Wrocław	Medical biotechnology, biochemistry and molecular biology.
Wrocław University of Science and Technology, Department of Medical Chemistry and Microbiology	Creating and synthesis of new biologically active chemical compounds. Development of innovative semiconductor materials for molecular electronics and sensor devices.
Laboratory Complex for Chemistry and Bioengineering of the Wrocław Technology Park	<ul style="list-style-type: none"> <li>• Laboratory Complex for Chemistry and Bioengineering</li> <li>• Laboratory Complex for Physical Properties</li> <li>• Laboratory Complex for Electronics and Energy Technology</li> </ul>
Department of Bioorganic Chemistry of the Wrocław University of Science and Technology	<ul style="list-style-type: none"> <li>• Creating, synthesis and research of the activity of inhibitors of selected enzymes</li> <li>• Synthesis of structurally diverse bisphosphonic acids as potential medicines for osteoporosis</li> <li>• Application of metabolomics as a technique to support medical and environmental diagnostics</li> <li>• Application of biocatalysts in organic synthesis and in biorefining</li> <li>• Enzyme immobilisation for laboratory and industrial purposes</li> <li>• Application of carene, a component of Polish turpentine, as a substrate in synthesis of medications and fragrances</li> </ul>
Faculty of Biotechnology and Food Sciences, Chair of Chemistry of the University of Environmental and Life Sciences	<ul style="list-style-type: none"> <li>• Organic synthesis</li> <li>• Food chemistry</li> <li>• Bioorganic chemistry</li> <li>• Biotransformations</li> </ul>
Selena Labs	Specialised in chemistry of sealants, construction and industrial adhesives, polyurethane foams and hydro-insulation.

## Natural and recycled raw materials

KGHM CUPRUM Research and Development Centre	Research, e.g. in the field of mining and geo-engineering, geology and hydrogeology, geodesy, automation, mechanics and electrification of mines, ore enrichment, flotation waste storage.
The Poltegor Institute for Opencast Mining	Development and implementation of industrial innovative technologies, processes, methods and technical solutions as a response to the needs of opencast mining.
Scientific research in the field of underground and opencast exploration of deposits, exploratory and mining geology, geoinformatics and geoengineering	Scientific research in the field of underground and opencast exploration of deposits, exploratory and mining geology, geoinformatics and geoengineering.
University of Wrocław, Institute of Geological Sciences of the University of Wrocław	Research in the field of petrology and geology of crystalline rocks, isotope geology and geochemistry, stratigraphy, palynology, sedimentology and economic geology, hydrogeology and protection of groundwater.
Włodzimierz Trzebiatowski Institute of Low Temperatures and Structural Research of the Polish Academy of Sciences	Physicochemical research of structure of solids and its influence on physical, chemical and spectroscopic properties with special focus on testing at low temperatures.

## High-quality food

Faculty of Biotechnology and Food Sciences, Faculty of Veterinary Medicine and Faculty of Animal Biology and Breeding of the University of Environmental and Life Sciences	<p>Chosen areas of research:</p> <ul style="list-style-type: none"> <li>• Monitoring of food production chain monitoring,</li> <li>• Impact of diet on the health of consumers,</li> <li>• Enriching the nutritional value of wheat and rye bread,</li> <li>• Innovative preparations with therapeutic effect.</li> </ul>
Faculty of Engineering and Economics, Institute of Chemistry and Food Technology of the Wrocław University of Economics	<p>Chosen areas of research:</p> <ul style="list-style-type: none"> <li>• Research on the convection-microwave process of foodstuff drying,</li> <li>• Ways of diagnosing the quality deviations in poultry meat.</li> </ul>
Department of Genetic Biochemistry of the University of Wrocław	The Department specialises in growing genetically modified plants that can potentially be used in food production.

Sources: Assessment and development trends of the Lower Silesia smart specialisation: Chemical and pharmaceutical industry

# Labour market in Lower Silesia

According to the Central Statistical Office (GUS), the registered unemployment rate in the Province of Lower Silesia was 5.5% in October and fell by 0.1 percentage point compared to the previous month. Since June 2020, the unemployment rate for the whole country is 6.1%. It is a sign of the good condition of the Lower Silesian economy, which manages to counter the negative phenomena occurring in the economy as a result of the state of epidemiological threat announced in March 2020 due to the spread of the COVID-19 infectious disease.

***The Province of Lower Silesia is one of the leading regions in Poland in terms of the percentage of people employed in the business enterprise sector.***

Lower Silesia is ranked second in terms of the amount of remunerations, right after the Mazovia Province. In the first half of 2020, the average salary in the economy of the region was PLN 5,582, and increased by 3.6% compared to 2019.

## Challenges for the labour market in Lower Silesia

Lower Silesia with its main economic centre Wrocław belongs to the group of the fastest growing labour markets. The business-like approach of local organisations and local government, favourable infrastructure, availability of qualified employees and high academic potential make it an attractive place for Polish companies and foreign investors. The most developed sectors are those related to industry and production, modern service centres and IT. Over the past few years, dynamic growth of the R&D sector has also been observed.

The most demanding challenge for the local labour market is to attract employees with competences and financial expectations corresponding to the needs of employers. Enterprises are already striving to create positive experiences for job candidates and employees and pay attention to salaries, benefits, career paths and professional recruitment process.

The academic environment in Lower Silesia is highly developed and is a source of qualified specialists for both international corporations and local enterprises. The amount of remuneration depends largely on the competences, experience and skills of employees. From the point of view of employers' needs, not only education in relevant field of science, but also soft skills, such as ability to think abstractly or to work in teams, are of importance. It is due to the progressing trends of modern industrialisation and Industry 4.0, where companies increasingly rely on automation and optimisation of production, and thus emphasise the importance of those features that machines or artificial intelligence cannot learn.

## Salary range for chosen job positions in production and engineering:

Job position	Gross salary in PLN for a given (full-time) job position per month		
	MIN	OPT*	MAX
Operations Director	23 000	30 000	33 000
R&D Manager	13 000	17 500	22 000
Production Manager	10 000	15 500	23 000
Project Manager	10 000	13 500	20 000
Maintenance Manager	10 000	13 000	18 000
EHS Manager	9 000	12 000	18 000
EHS Specialist	6 500	8 500	10 000
Tooling Engineer	7 000	9 000	14 000
R&D Engineer	6 000	9 000	12 000
Project Engineer	6 000	9 000	12 000
Lean Manufacturing Engineer	6 000	8 000	11 000
Production/Proces Engineer	6 000	8 500	10 000
Maintenance Engineer	6 000	8 000	10 000
Electrical Engineer	6 000	8 000	10 000
Automation Engineer	6 000	9 000	12 000
Packaging Engineer	6 500	8 000	10 000
Quality Control Specialist	5 000	7 500	8 500
Electrical Technician	4 000	5 500	6 500
Utilities Specialist	7 500	8 500	10 000
Production Planner	4 000	6 000	9 000

\* OPT - amount that reflects in the best way the current market level.

Sources: Payroll report 2020. Labour market trends. HAYS

## Salary range for chosen job positions in pharmacy and clinical researches:

Job position	Gross salary in PLN for a given (full-time) job position per month		
	MIN	OPT*	MAX
R&D Director	24 000	30 000	35 000
Marketing Manager	18 000	21 000	25 000
Product Manager (innovations)	14 000	18 000	23 000
Product Manager (generics)	11 000	13 500	17 000
Medical Advisor	14 000	17 000	20 000
Pharmacovigilance Manager	13 000	14 000	16 000
Regulatory Affairs Manager	13 000	14 000	16 000
Medical Science Liason (MSL)	11 000	13 000	16 000
KAM (hospitals/chemist networks)	8 500	10 500	13 500
Pharmacovigilance Specialist	8 000	8 000	9 000
Regulatory Affairs Specialist	6 500	7 000	8 000
Medical Representative	5 500	6 500	8 500
Pharmaceutical Representative	5 000	6 000	7 500

\* OPT - amount that reflects in the best way the current market level.

Sources: Payroll report 2020. Labour market trends. HAYS



## Business environment institutions

There are several dozen business environment institutions and companies in the Province of Lower Silesia which provide support to entrepreneurs in setting up, running and developing business, in training, consulting and implementation of projects based on modern technologies, in R&D services, etc. The business environment institutions include technology parks, science parks, science and technology parks, technology transfer centres, technology incubators, business incubators, chambers of commerce, entrepreneur councils, training and advisory centres, loan and guaranty funds, to name a few.

***The business environment institutions are located principally in about a dozen centres of at least sub-regional importance, such as Wrocław, Legnica, Jelenia Góra, Wałbrzych, Świdnica, Głogów, Lubin or Polkowice. Dzierżoniów, Kłodzko and Złotoryja are examples of smaller towns with business environment institutions to support entrepreneurs.***

The activity of the majority of the Lower Silesian business environment institutions (BEIs) is focused on supporting business initiatives and attitudes, technology transfer and local development. The most developed activity in this regard is without doubt the training, consulting and information activity in the field of running business. The pro-innovative institutions have a wide range of professional specialisations. In certain cases, BEIs could have many specialisations, depending on the customers' preferences and structure.

Currently, potential investors might find in Lower Silesia over 100 offers of investment real estate, most of all investment areas, located in different parts of the region. The fact that almost all those areas are located within the Special Economic Zone gives additional opportunities to entrepreneurs who want to start a business there. Thanks to the Polish Investment Zone, an instrument created in 2018 to support new investments in Poland, it is possible for the entrepreneurs who plan a new investment to be granted public aid from several sources:



**Financial support within EU programmes**



**Real property tax exemption**



**Governmental grants**



**Income tax exemption  
(in any location chosen by the entrepreneur)**



Lower Silesia is the region where 3 out of 14 state institutions issuing investment decisions are located in. They process applications and issue decisions on supporting new investments in the form of tax relief:

Economic zones	Website
Kamienna Góra Special Economic Zone for Small Entrepreneurs	<a href="http://www.ssemp.pl">www.ssemp.pl</a>
Legnica Special Economic Zone	<a href="http://www.lsse.eu">www.lsse.eu</a>
Wałbrzych Special Economic Zone 'INVEST-PARK'	<a href="http://www.invest-park.com.pl">www.invest-park.com.pl</a>

In regard to supporting enterprises, the knowledge and technology transfer from universities and R&D units to business plays an important role. There are a number of entities of such type in Lower Silesia, which offer enterprises and potential investors the access to up-to-date knowledge and research results. Besides, they support innovation implementation processes:

Technology transfer centres	Website
Wroclaw Centre for Technology Transfer at the Wroclaw University of Science and Technology	<a href="http://www.wctt.pwr.edu.pl">www.wctt.pwr.edu.pl</a>
Centre for Innovation and Technology Transfer of the Medical University of Wroclaw	<a href="http://www.citt.umed.wroc.pl">www.citt.umed.wroc.pl</a>
Wroclaw Technology Park	<a href="http://www.technologpark.pl">www.technologpark.pl</a>
University of Wroclaw	<a href="http://www.uni.wroc.pl">www.uni.wroc.pl</a>

**Level 4.0**, a consortium set up in Wroclaw associating companies, specialists and scientists, is another institution providing services for enterprises interested in implementing innovations. Level 4.0. is composed of 5 expert organisations, specialising in various technologies within Industry 4.0. The members of the Level 4.0 consortium will share their expert know-how with enterprises. The aim is to support the regional economy in digital transformation by raising awareness in the field of new technologies in industry and business, and by assisting enterprises and organisations in implementation of the latest solutions. Companies interested in it can use Level 4.0 services free of charge.

The Polish Investment and Trade Agency (PAIH) is an institution largely contributing to the investor support. Its activity is supported by the nationwide network of regional Investor Service Centres (COIs), partners of partners of PAIH. COIs were established in close cooperation with the voivodeship marshals, statutorily responsible for the promotion of their provinces, and provide investors with comprehensive services at the level of province. In the case of Lower Silesia, COI is run by The Lower Silesian Agency for Economic Cooperation. The main objective of the activity of the Centres is to provide investors with comprehensive services at the level of province. The Centres cooperate with PAIH in handling investment projects and independently offer their services to investors who contact them directly. The Centres also have databases of contacts with local self-governments and business-related institutions, the activity of which is aimed at developing the voivodeship.

Furthermore, there are the Regional Investor Service Offices, operating under the patronage of PAIH in Lower Silesia. The purpose of their activity is to enhance the cooperation in the field of promotion of the economy and to attract foreign investments to municipalities. One of the Offices is run by the Wroclaw Agglomeration Development Agency (ARAW).

ARAW is a company aiming at attracting foreign investors in order to create thereby new workplaces and support the economic growth of the region. Established in 2005 as the first institution of this type in the country, it is owned by the Municipality of Wroclaw and 29 municipal self-governments of the agglomeration. In addition, the company conducts vast informative and promotion activities directed at residents, and implements projects supporting development and cooperation in the agglomeration.

***ARAW has supported over 200 direct foreign investments, creating thus over 100,000 workplaces.***

The company's activity focuses on numerous areas of operation of Wroclaw and its surrounding municipalities, and contributes to the intensified cooperation and to creating a strong economic position and image of the Wroclaw agglomeration:

- Creating new workplaces by attracting foreign investors from the production and service sectors; cooperation with the agglomeration's businesses as part of aftercare; providing conditions for the development of startups;
- Supporting the cooperation between self-governments by implementing various types of projects: educational, promotional or infrastructural ones, using external financial support;
- Carrying out informative activities directed at residents and all those who work, study, live or spend their free time in Wroclaw and the surrounding area;
- Branding and development of many recognisable brands, such as **Invest in Wroclaw, Study in Wroclaw**.

# Sources

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