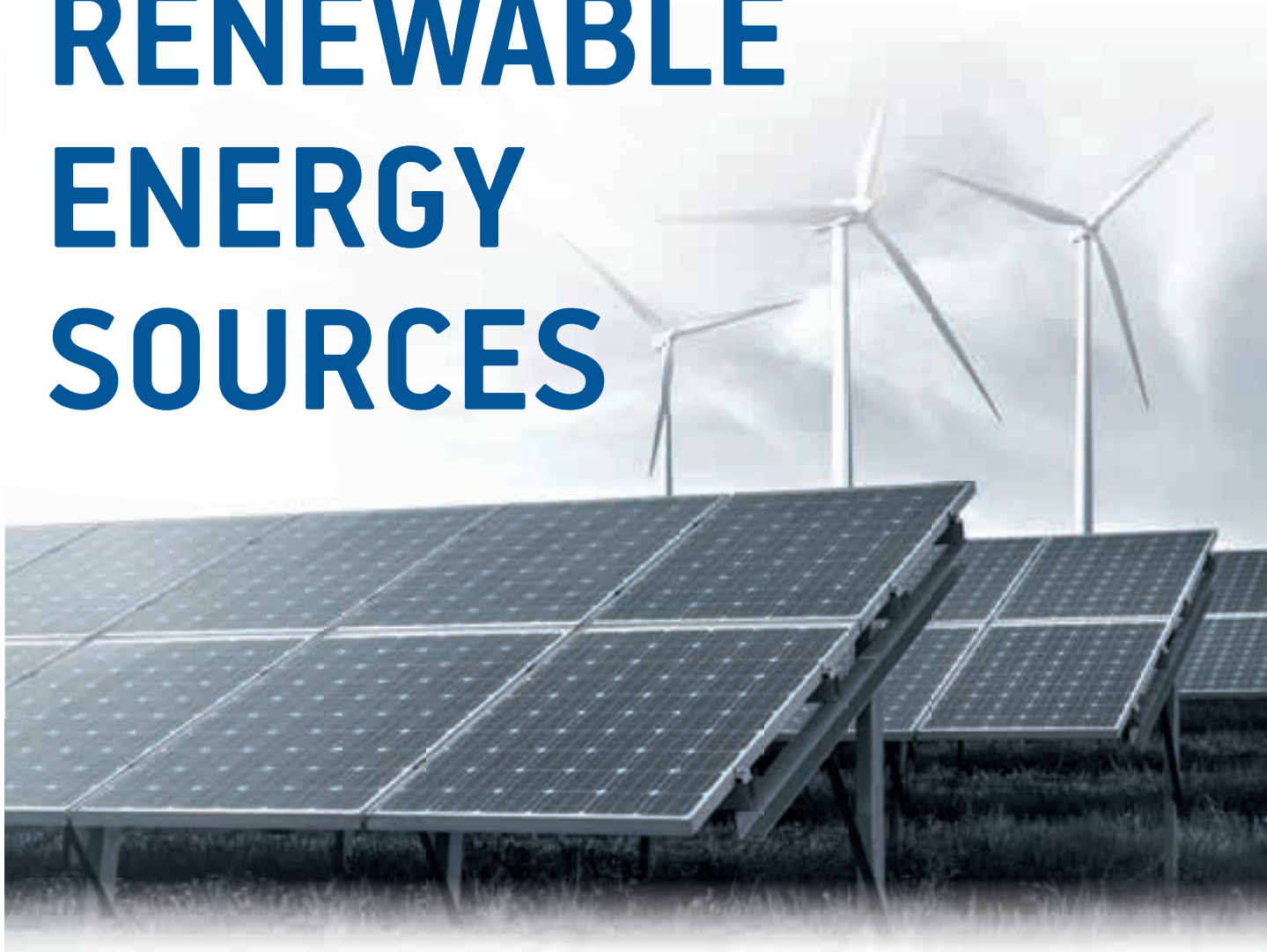
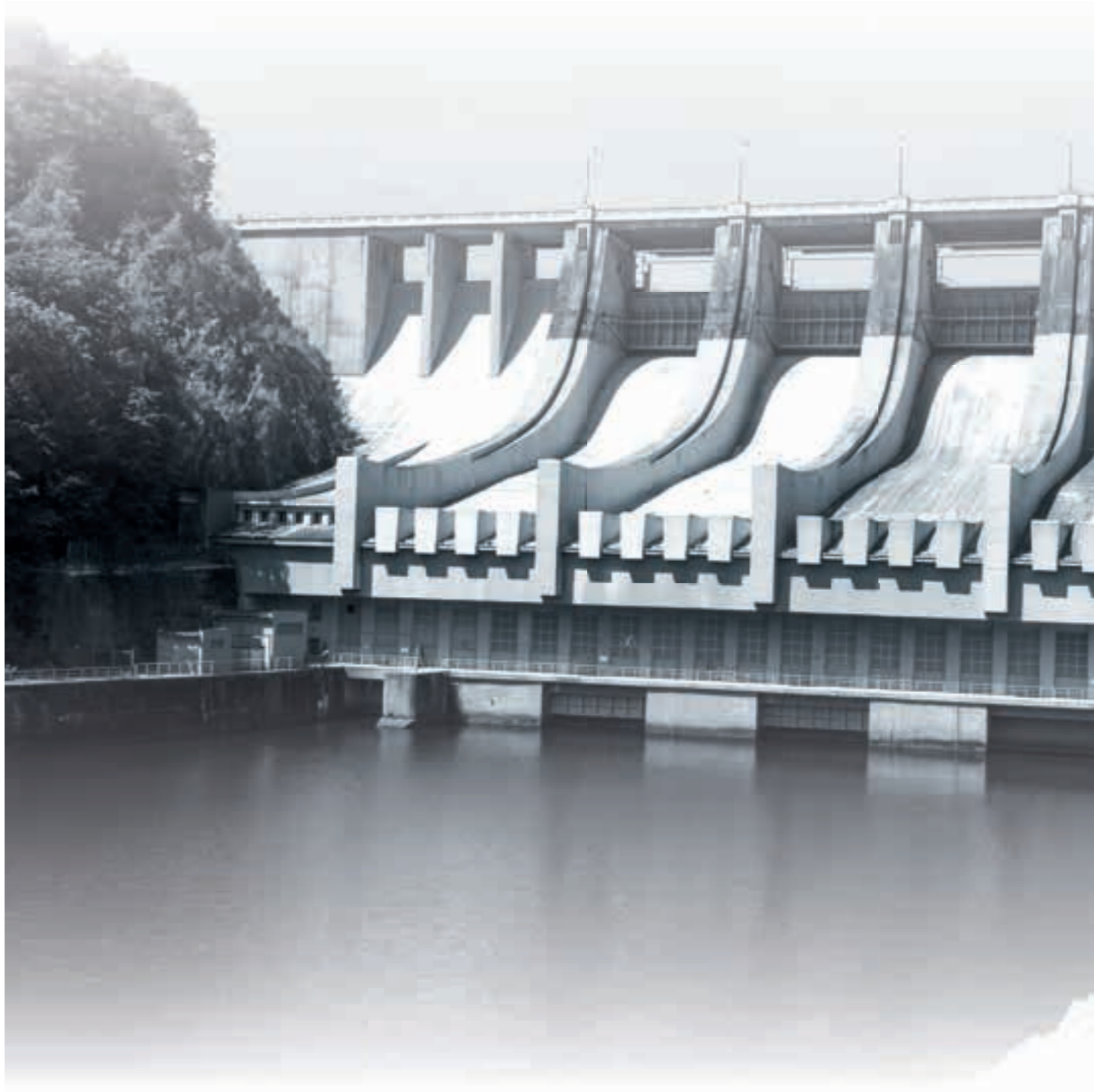


RENEWABLE ENERGY SOURCES





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The Czech Trade Promotion Agency is proud to present the actual state of Czech renewable energy sources in the new sector guide.

If you are looking for a supplier in the Czech Republic, CzechTrade will be delighted to assist you in finding new manufacturing/service partners, professional organisations and interest groups.



CzechTrade operates in almost 60 countries worldwide.

CzechTrade is a government trade promotion agency of the Czech Republic focusing on developing international trade and cooperation between Czech and foreign businesses. CzechTrade works with Czech companies to facilitate their success on international markets.

The goal of this brochure is to inform interested foreign entities about the renewable energy sources industry field in the Czech Republic. Take the companies listed in this brochure as a sample listing, which will help you to formulate a better picture of the specific field.

If you are interested in more information, please contact: supplier@czechtrade.cz

CzechTrade

YOUR BUSINESS PARTNER IN THE CZECH REPUBLIC

Foreign companies contact CzechTrade when looking for new reliable partners in the Czech Republic. The CzechTrade foreign office network together with its sourcing team will identify potential suppliers based on your requirements:

- ⊙ initial consultation by phone/email/in person
- ⊙ provision of a basic overview of a specific sector
- ⊙ compilation of a contact list of companies interested in cooperation
- ⊙ eventual facilitation of meetings with Czech companies, so-called Sourcing Days

Other services:

- ⊙ access to verified Czech suppliers
- ⊙ assistance with language support
- ⊙ presentation of Czech companies at foreign trade shows
- ⊙ preparation of business missions to the Czech Republic
- ⊙ providing the online database Czech Exporters Directory <http://exporters.czechtrade.cz>



Information and contacts for individual foreign offices can be found at www.czechtradeoffices.com

Head Office:

Czech Trade Promotion Agency / CzechTrade
Dittrichova 21
128 01 Prague 2
Czech Republic
Phone: +420 224 907 820
E-mail: Info@czechtrade.cz

DID YOU KNOW?

CzechTrade has an extensive network of foreign offices in almost 60 countries on 5 continents. Within their scope of activities, the foreign offices network covers Europe from Scandinavia to the Balkans, Eastern Europe and the CIS, Africa from Sub-Saharan Africa to South Africa, major Asian regions, the American continents from Canada to Latin America, and Australia.

THE CZECH RENEWABLE ENERGY CHAMBER

The Czech Renewable Energy Chamber is a Czech association that incorporates all professional associations focused on different types of renewable energy, including manufacturers of technology and scientists. The Chamber supports the sustainable increase of renewable energy consumption, unifying and standing up for its member's interests, and is dedicated to raising awareness about renewable energy.

Štěpán Chalupa – Chairman of the Czech Renewable Energy Chamber said: *“Throughout the world, wind power plants are growing at a 20% rate and photovoltaic plants are even twice as fast for the third decade running. Unfortunately, clean sources in the Czech Republic have been stagnating in recent years. As far as the new industry is concerned, I have no doubt that clean energy can soon compete with the automotive sector in the Czech Republic, as in similarly industrial Germany.”*

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E-mail: martin.mikeska@komoraoze.cz
www.komoraoze.cz



RENEWABLE ENERGY IN THE CZECH REPUBLIC

At the climate conference held in Paris in 2015, the Paris Agreement was adopted where the contracting parties – States – undertook to reduce greenhouse gas emissions. The Agreement was approved by all 195 contracting parties and adopted on 12th December 2015. As of June 2019 the Agreement had been signed by the 195 parties of the United Nations Framework Convention on Climate Change; it has now been ratified by 186 of them. The long-term goal is to keep the increase in global average temperature to well below 2 °C compared to pre-industrial levels and to aim towards limiting the increase to 1.5 °C. The Czech Republic in collaboration with the EU and its Member States undertook to reduce greenhouse gas emissions by 40 % below 1990 levels by 2030.

Following the undertaking to reduce greenhouse gas emissions, investments have arisen in the amount of 1.7 billion dollars per year. According to the International Renewable Energy Agency (IRENA), investments in the modern power industry themselves should save 6 billion dollars per year. The transformation of the power industry will support the global economy and

it will also create export opportunities. With regard to sustainability, more emphasis is being placed on the reduction of the carbon footprint and more frequent use of renewable energy sources also in the transport sector. According to the international calculation methodology EUROSTAT – SHARES, the share of the gross final energy consumption from RES in the Czech Republic was 15.2 % in 2018. RES contributed to power consumption by 14 %, to transport by 7 % and to final consumption for heating by 21 %.

The binding target of RES' share in the gross final consumption of EU for 2030 is 32.0 %. The Czech Republic has reached the target value of the share of energy from renewable sources in the gross final consumption set for 2020, which was 13 %. The Czech Republic is planning to achieve a 22% share of renewable energy sources in gross final consumption by 2030, which is an increase of 9 percentage points compared to the domestic target of 13.0 % for 2020.

In the transport sector, the RES share has been set to 14 % in the Czech Republic by 2030. The transport sector's



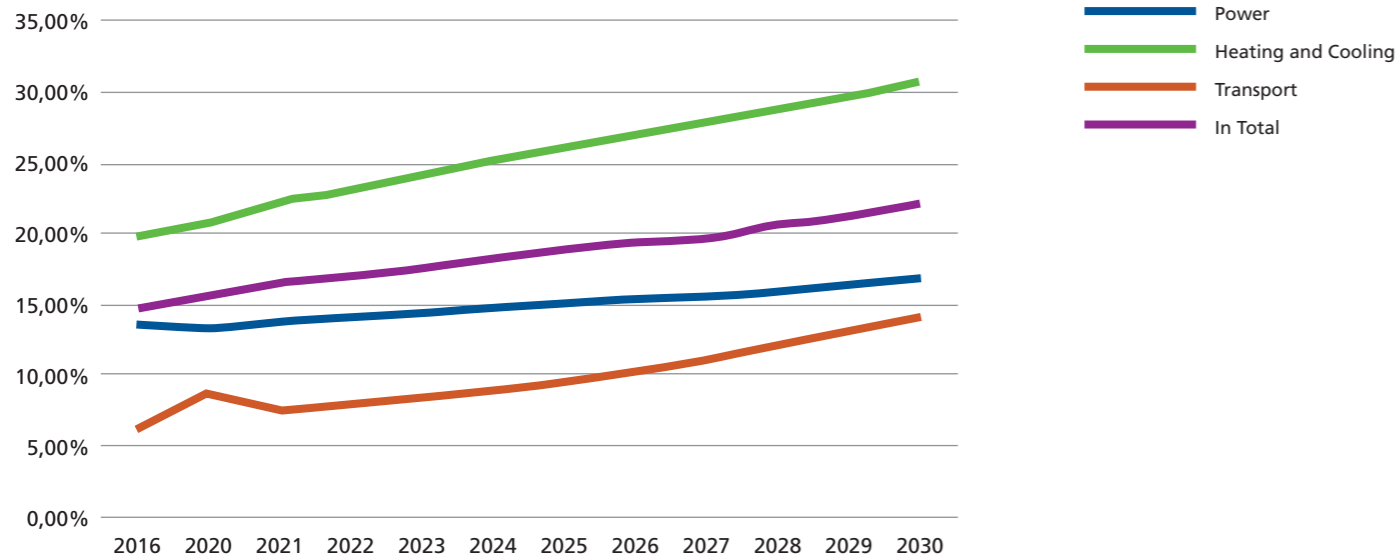
share ranges between 6–7 % in the long term and currently it is at 6.5 %. The target for advanced biofuels is 3.5 % (0.2 % by 2022 and 1 % by 2025). The sector indicative target for heating and cooling for 2030 is based on the increase in the share of energy from RES in heating and cooling by 1.1 percentage points or 1.3 percentage points (p.p.) per year (with or without waste heat).

The Czech Republic's activities in the sector of energy innovations rank among the best in the world. In the recent and distant past, Czech

companies have participated in many energy infrastructure projects in various countries. These concern, for example, technologies for greening power plants, highly efficient turbines, information and control systems, security, and increasing the efficiency of energy sources. Czech manufacturers rank among the best in the world in the development and production of biomass heating plants, hydroelectric power stations, heat pumps, solar thermal collectors, control systems and regulators of solar power plants and home biomass boilers. Czech companies are also suppliers of key components

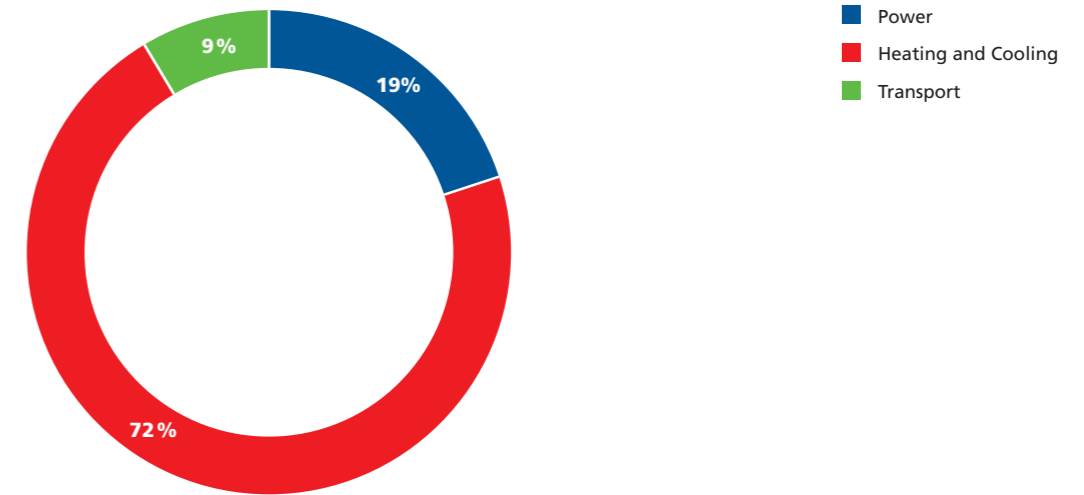
for wind power plants such as towers, flanges, bearers, gearboxes and control electronics. Renewable energy sources bring many other opportunities and in the Czech Republic there are companies with their own development which are successful. They include so-called "smart" meters, intelligent control of building energy systems with their own renewable sources, as well as systems for accurate weather forecasting which are crucial for operators of wind and solar power plants and networks.

THE EXPECTED DEVELOPMENT OF THE SHARE OF RES IN GROSS FINAL CONSUMPTION IN THE CZECH REPUBLIC ACCORDING TO SECTORS



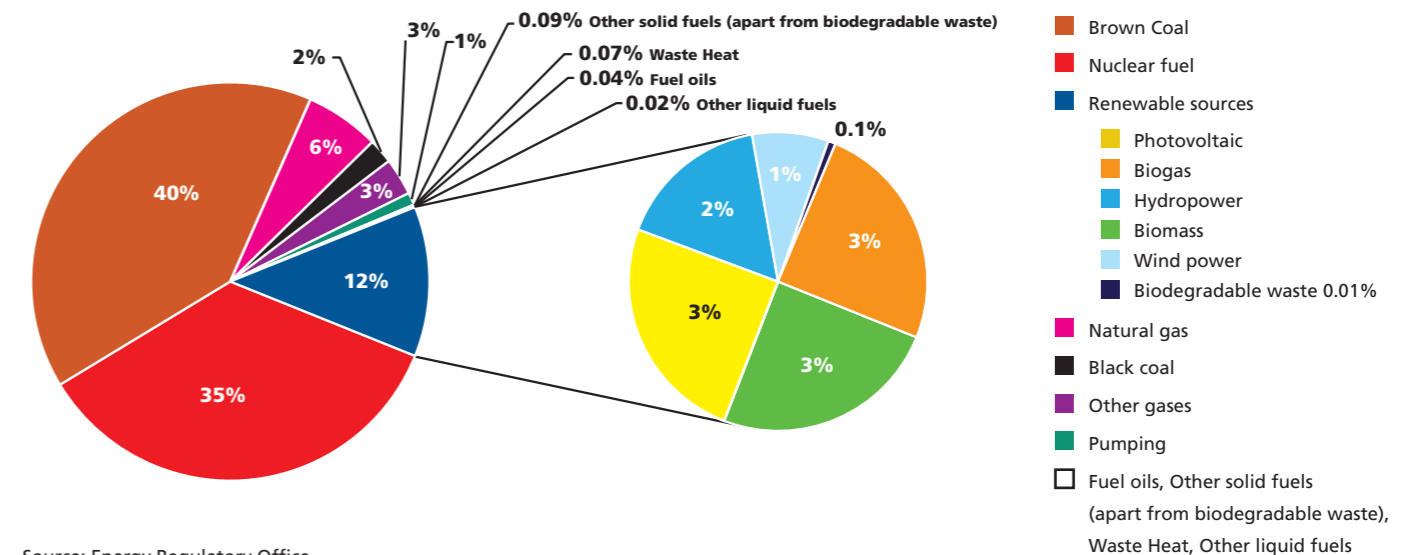
Source: Ministry of Industry and Trade

GROSS FINAL CONSUMPTION OF ENERGY FROM RENEWABLE SOURCES IN % IN 2019 ACCORDING TO SECTORS BASED ON THE EUROSTAT – SHARES METHODOLOGY



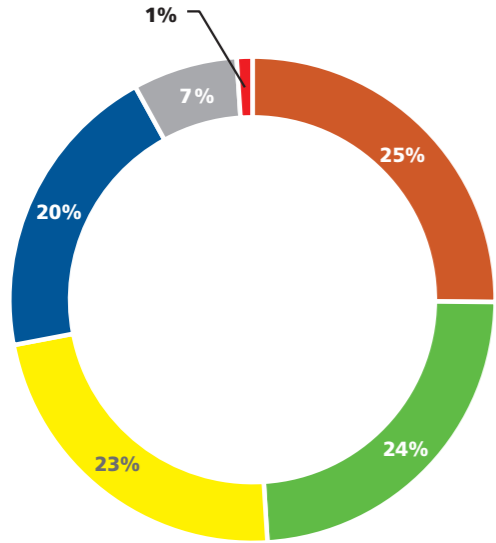
Source: Ministry of Industry and Trade

SHARE OF FUELS AND TECHNOLOGIES IN GROSS POWER PRODUCTION IN 2019



Source: Energy Regulatory Office

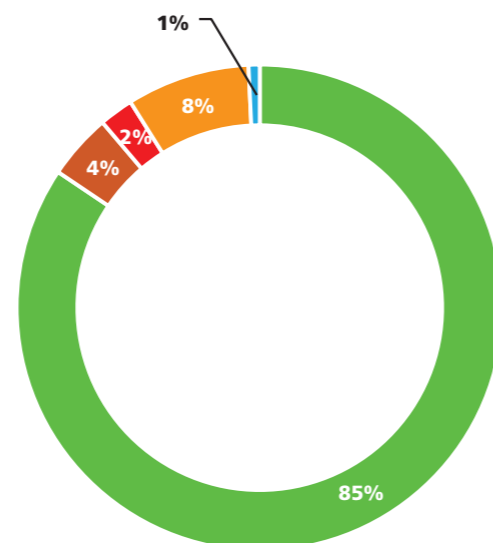
POWER PRODUCTION FROM RENEWABLE RESOURCES IN 2019



- Biogas
- Biomass
- Photovoltaics
- Hydropower
- Wind power
- Biodegradable waste

Source: Ministry of Industry and Trade

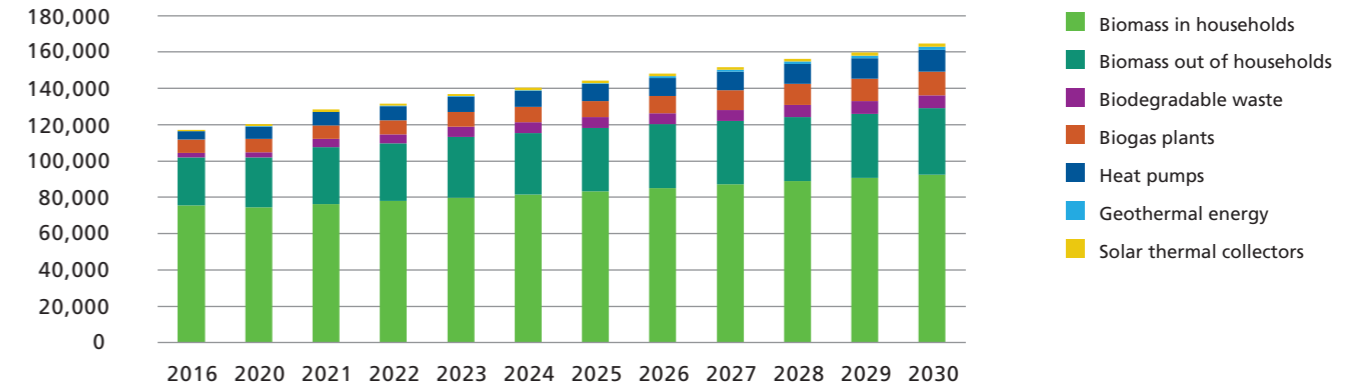
HEAT PRODUCTION FROM RENEWABLE SOURCES IN 2019



- Biomass
- Biogas
- Biodegradable waste
- Heat pumps
- Solar thermal collectors

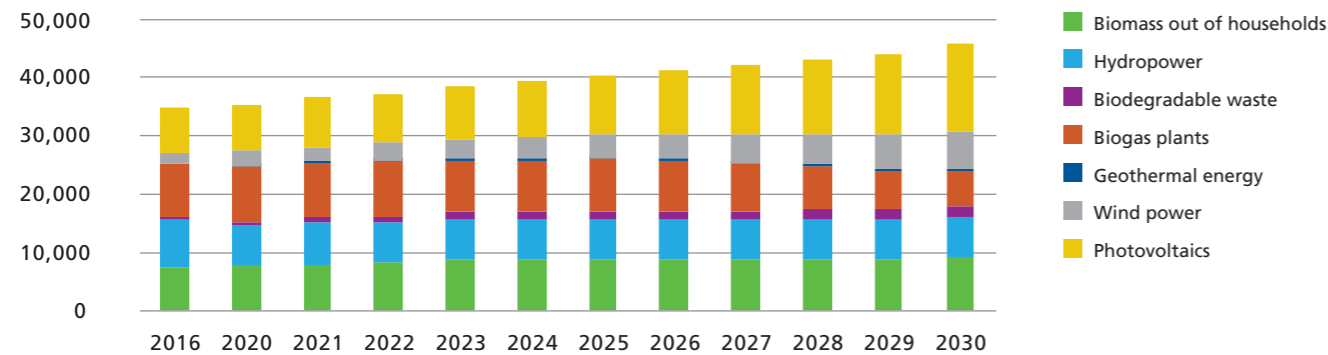
Source: Ministry of Industry and Trade

THE EXPECTED DEVELOPMENT OF RENEWABLE ENERGY SOURCES IN HEATING AND COOLING [TJ]



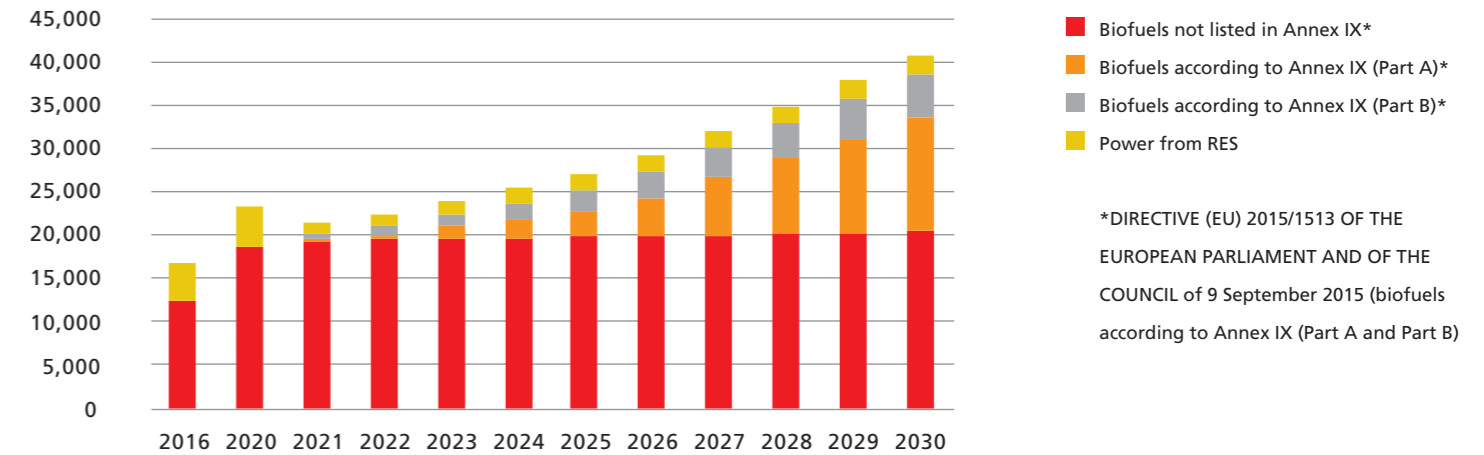
Source: Ministry of Industry and Trade

THE EXPECTED DEVELOPMENT OF RENEWABLE ENERGY SOURCES IN POWER PRODUCTION [TJ]



Source: Ministry of Industry and Trade

THE EXPECTED DEVELOPMENT OF RES IN TRANSPORT [TJ]



Source: Ministry of Industry and Trade

*DIRECTIVE (EU) 2015/1513 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 September 2015 (biofuels according to Annex IX (Part A and Part B))

1 BIOENERGY

BIOMASS

Czech companies contribute to the development of power and heat production from biomass. For this purpose, new combustion technologies and production of recycled solid fuels are being developed; in this way energy can be efficiently gained from waste biomass in the form of power, heat and fuels of the third generation.

Attention is being paid especially to the development, manufacturing, assembly and service of home and industrial boilers, and boiler rooms for ecological biomass combustion.

Companies offer completely automated solutions for the heating of buildings used for living, Civil Service or agricultural



and industrial production. Apart from long-life and efficient boilers for combustion of different types of biomass (wood chips, pellets, sawdust, briquettes, wood, chipboard), companies also provide related services, such as calculation of operating costs, return studies, device monitoring, maintenance and supply of fuels.

ATMOS

Atmos is a Czech family company and currently one of the largest European manufacturers of solid fuel boilers. The company exports more than 80% of its production abroad, mainly to Germany, Romania, Italy, France, Sweden, Austria, Poland, Russia, Bulgaria, Denmark, Slovakia, Lithuania, Latvia, Ukraine, Belarus, Spain, Great Britain, etc. The range includes solid fuel boilers, wood gasification boilers from 15 to 150 kW, lignite (and wood)

gasification boilers from 16 to 48 kW, lignite briquette and black coal gasification boilers with an output of 25 kW, automatic pellet boilers from 4.5 to 80 kW and combined wood gasification boilers in combination with a pellet burner with outputs from 20 to 35 kW. Atmos products have attracted great interest among wood-burning users and plumbers for their good functionality, quality and, last but not least, very reasonable price.

Jaroslav Cankař a syn ATMOS
www.atmos.eu



SMART HEATING TECHNOLOGY

This company offers a complete energy solution in the range of 60 to 2 000 kW with economic and ecological automated operation. Smart biomass boilers and mobile container boiler rooms are perfect for the heating of municipal facilities, agricultural, residential and industrial buildings, in fact any business requiring heating and/or hot water or emergency energy. The company also offers its clients a complete range of services starting with the calculation of new operating costs for biomass

combustion, elaboration of technical solutions, payback studies, complete supply and installation of equipment, subsequent installation monitoring, periodic service and maintenance. Last but not least, the company offers fuel supplies for its devices.

The whole system is made in the highest quality class. The guarantee is the ISO 9001 certification. The boiler parameters such as efficiency, amount of emissions, etc. are fully comparable with the top technologies for biomass combustion due to the European quality standard.

Smart Heating Technology s.r.o.,
www.smartheating.cz



TTS

The company is engaged mainly in the supply of investment units and technologies focusing on biomass combustion (industrial boilers with thermal outputs of 1 to 10 MW for the combustion of wood biomass and straw). TTS also deals with equipment for the combined production of heat from biomass by the ORC system, flue gas cleaning systems or technologies for additional heat recovery from flue gases using condensing exchangers. The offered services also include projects with reconstruction of older

heat sources or supplies of hot water distribution. The unique district heating system in the town of Třebíč, owned and operated by TTS, is one of the most modern and efficient sources in the Czech Republic. Thanks to the massive use of biomass and modern technologies, more than 90% of the heat is produced entirely from biomass. One of the most recent biomass boiler plant projects in the Slovak town of Trebišov even received the highest award in the framework of RES projects in the European Union.

TTS eko s.r.o.
www.tts.cz, www.ttsboilers.cz



PETROJET TRADE

A family-owned company launched in 2009 which started with the sale of biomass boilers. Since 2012, they have begun to develop their own products and became successfully certified under the MultiBio brand. The main products are special burners and boilers for wood and non-wood biomass in pelleted and loose form. It is possible to burn surpluses from plant and agricultural products, also almost all types of pellets. Some of the boiler models can also burn coal. MultiBio boilers are hot-water and hot-air boilers. For models that meet the Eco-design emission standard, the company provides everything from development, production, sales and service of their products. Multibio supplies boilers and burners from 10 kW up to 600 kW. When installing

boilers in cascades, it is possible to obtain a total output of e.g. 1.8 MW. The production is fully comparable with the European quality elite. This is illustrated, for example, by the installation of a burner in a 1.8 MW boiler plant at the 2015 Volvo Penta production plant in Sweden, where the MultiBio 600 kW burner model supplements a pair of burners from the traditional Swedish company. The latest models of boilers have an output ranging from 270 to 600 kW. In the MultiBio 400 PLCS it is possible to legally burn chipboard from furniture, coal, wood chips and pellets. The products are in operation in several European countries – England, France, Sweden, Slovakia, Croatia, Macedonia, Lithuania, Moldova, Bulgaria, Croatia and also Finland. Petrojet Trade s.r.o. www.multibio.eu



EKOL

The EKOL Group, a flexible and fast-growing Czech company, was founded in 1991. In the field of energy, it is currently able to provide planning, design, manufacture, construction and commissioning of complete energy units with a capacity of 100 MW in combinations according to the customer's requirements. The company also focuses on environmental issues related to the operation of thermal power stations. In particular, they supply steam turbines, steam boilers and boiler units, and complete turnkey energy units (EPC). The company currently focuses on a significant field of the energy sector, which is the supply of energy units using biomass as a fuel. Examples of biomass power plants include the BENKOVAC power plant in Croatia for the combustion of wood chips and grain pellets with a capacity of 6 MWe, the BARLINEK power plant in Poland for the combustion of wood chips with a capacity of 6.3 MWe and the KERNEL power plant under construction in Ukraine with a capacity of 49.5 MWe. EKOL, spol. s r.o. www.ekolbrno.cz



STEP TRUTNOV

The company Step TRUTNOV a.s. was founded in 1990. The company's premises have been newly built and reconstructed into an ecological and economical production plant since 1997. The main activity of the company is the development, production and supply of cutting-edge technologies in the field of industry and energy. The company's unique products are boilers for burning all biomass, especially boilers for burning whole bales of

straw, hay and other agricultural products. Many of them are patent protected. Implemented boiler rooms are designed with constantly updated technologies, designed and manufactured by Step. The company's priority is to simplify and reduce the cost of the technology and reduce emissions to a minimum. The boilers are manufactured in outputs of 100 kW to 5,000 kW and can be installed in various configurations. The company's other range also includes various types of tanks, pressure vessels, heat exchangers,

water heaters, etc. used for industry, energy and agriculture. As part of the Czech-Polish cooperation, Step Trutnov supplied giant storage tanks to the Walbrzych power plant for the operation of cogeneration units. The future goals of the company are to continue the development of its own boilers and technologies, ensuring their uniqueness. For the future of energy, the implementation of renewable energy projects will be a priority. Step TRUTNOV a.s. www.steptrutnov.cz

BIOGAS

Biogas plants are facilities for processing a wide range of materials of biological origin to produce biogas which is combusted to produce power and heat. The latest trend includes production of biomethane which is a cleaned biogas that is not used to produce energy directly but it can be compressed for the natural gas distribution network or compressed and used in the same way as compressed natural gas (bio-CNG).

Agricultural production waste, biological waste from households and restaurants, or purposely grown crops are most commonly processed. The technology particularly suits farms and farmers that can use waste or purposely grown crops in the biogas plants and simultaneously use the energy that they produce. They can be also employed by municipalities to process biodegradable urban waste. Biogas plants and other renewable

energy sources are increasingly popular in the Czech Republic and Europe, and Czech companies have not missed the boat and have become competitive players on the European market in this field. In many cases, states like to support biogas plants and similar projects because they help them meet their obligations to protect the climate.



HUTIRA GREEN GAS

The Czech company HUTIRA green gas is one of the youngest members of the companies under the brand HUTIRA. HUTIRA green gas focuses on natural gas greening. The company is focused on providing a complete solution for biomethane, which means the upgrading biogas to biomethane and its injection into the gas grid, or the filling of the biomethane into the Bio CNG and Bio LNG tanks. Their professional approach and 30 years of experience in the gas and energy industry are a guarantee of long-term and high quality partnership.

HUTIRA green gas s.r.o.
www.hutiragreen.cz



AGRIKOMP BOHEMIA

The aim of the company is to create opportunities for farmers to quickly and cost-effectively enter the energy economy. The use of end products of animal and plant primary production such as manure, slurry, farm animal feed, grassland and grassland biomass, and targeted biomass mobilize the unused resources. The company has been operating on the Czech market since 2006, and has completed almost 100 projects in the Czech Republic, Slovakia, Croatia and Poland, where it is

currently building new biogas plants. An integral part of the services provided is the servicing of installed cogeneration units, technologies and biological supervision. For several years they have been cooperating with vocational schools and universities in the field of research and development. The company's portfolio also includes agricultural buildings and extension and reconstruction of existing stations. They are members of the Czech Biomass Association CZ Biom. agriKomp Bohemia s.r.o.
www.agrikomp.cz



2 SOLAR ENERGY

SOLAR ENERGY

Gaining energy from sunlight is a promising field of the energy sector. Its benefits include high potential and low price of the produced energy (along with wind energy, it is the cheapest newly constructed source of power). Another benefit is the possibility to get power to remote developing areas of the world without access to power distribution networks. On the international market, Czech manufacturers and suppliers offer their innovative products and services, they engage in the storing of solar energy, financing projects, monitoring operating conditions of photovoltaic

power plants and optimizing costs of maintenance, software and hardware. Specific solar systems to support the development of well-being in developing countries are mostly intended for schools, hospitals and farmers, for water pumping, solar lamps and mobile chargers.

SOLAR THERMICS

While solar systems convert energy from the Sun to electrical energy, solar water heating systems convert energy from the Sun directly into heat and therefore they are more efficient. The produced heat is most commonly used in the form of domestic hot water or for heating



(heating up). The portfolios of Czech sellers include tubular solar collectors, flat plate solar collectors, and all accessories. Companies are developing new ways of solar energy collection and they constantly improve their products to be even more efficient and to keep their customers satisfied.



SOLSOL

The company is engaged in the wholesale of solar panels and invertors. SOLSOL offers its customers and assembly companies solutions for custom PV systems, from pallet volume to containers quantity for commercial projects across the whole EU. Its second division is involved in turnkey implementation of photovoltaic power plants within the CZ market. So far, SOLSOL has supplied over 300,000 panels from the world's leading manufacturers to Central and Eastern Europe, mainly for roof

installations on houses and factory halls. SOLSOL is an exclusive partner to AEG, Canadian Solar, US company SUNPOWER, Italian manufacturer EXE Solar and from 2020 also Austrian manufacturer Energetica PI. Along with great service SOLSOL offers over 15,000 panels in stock with power tolerances of 300-490Wp for immediate consumption. In addition to extended warranties and the superior quality of workmanship, their panels also excel in higher performance per installed metre of roof. SOLSOL s.r.o. www.solsol.cz



WT WINTECH

The ALU division of WT WINTECH develops and offers a wide range of aluminium products, ranging from a versatile construction system, façade and terrace components to complete solutions for photovoltaic and solar applications. With the help of individual components, it is possible to install photovoltaic panels on flat or pitched roofs of any material, but also on façades or open areas. Thanks to many years of experience in the field of aluminium structures and fasteners, but also the company's own production and the possibility to combine individual products of the division, WT WINTECH can be a partner for any difficult or non-standard installation conditions. WT WINTECH a.s. www.wintech.cz/alu

DID YOU KNOW?

Founded and led by Zdeněk Sobotka, the Solek company became the largest developer of small solar power plants in Chile in 2019. The Czech company is building solar power plants in Chile up to 10 megawatts. Some of them will be sold at the project stage, others will be sold completed, and now they want to keep part of the projects at the live operations stage as well. Solek can serve the entire process – from design through complete implementation to maintenance and management.

KRAJICZECH

Since its inception, the company has been manufacturing construction systems for photovoltaic power plants. They focus not only on the Czech market, but also on other European countries (e.g. Slovakia, Hungary, Bulgaria, Romania, Poland, England, etc.). They specialize in complete deliveries of aluminium roof structures, ground aluminium structures and ground steel structures. The services also include complete technical support

including static assessments, drawing documentation for building permission and a detailed breakdown of material prices. The strength of the company is its flexible delivery time (within 24 hours) thanks to a wide range of products strategically located in the centre of Europe. The company is able to cover both small projects from 1kW and large ground projects in the order of several megawatts.

KRAJICZECH s.r.o.

www.krajiczech.cz



IFTECH

The company specializes mainly in sales of solar panels, solar inverters, energy storage and battery systems. Thanks to many years of experience on the market, ifTECH knows what to offer to its clients. The company is constantly working on quality assortment optimization. The main advantages that distinguish the company from the competition are the wide range of offered products, great stock availability, top customer service including PV plant design, and it carries out repairs of post-warranty solar inverters.

ifTECH s.r.o.

www.iftech.cz

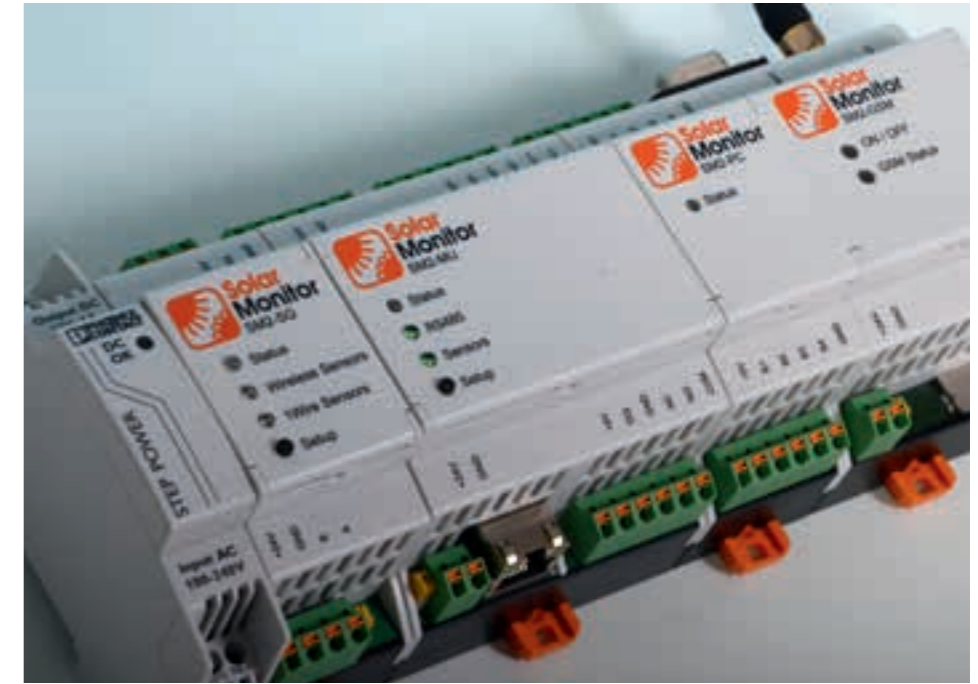


SOLAR MONITOR

This company is specialized in the development of hardware and software for embedded systems. Its employees have been dealing with these systems since 1996. The main product of the company is Solar Monitor – a modular DIN rail-based system for photovoltaic and wind power plants, which is used for data logging and as a communication gateway for renewable resources. SNMP, Modbus and SOAP protocols easily translate proprietary communication into a unified interface for IT, telecommunication industry and for PLCs in automation. They offer not only OEM solutions, but they can also add new communication protocols. Their systems control both small PV plants as well as large 2 MWp field PV plants. They are currently developing new modules and wireless units on a faster and more powerful ARM platform.

Solar Monitor s.r.o.

www.solarmonitor.cz



DID YOU KNOW?

Solar Monitor was awarded third place for their product intended for monitoring and remote control of solar power in the category of heating and solar technology in the survey “Czech Product of the Year 2019”. The company also visualized data from a solar power plant located at a school in Kuwait for the Kuwait Ministry of Education. Such publicly presented information aims to build a better image of an institution that not only saves money, but also tries to be more environmentally friendly by producing power without emissions.

The solar power plant itself (PV panels, inverters, power meter) was installed by a local Kuwaiti installation company. Solar Monitor supplies SM2-MU HWs that the installer connects to inverters and meters. SM2-MU units continuously read data from power meters and inverters, which are then accessible via a standard web browser.



VACUSOL

Founded in 1994, VacuSol focuses on active solar panel / collector production, consultancy, design and installation of solar systems. The products are delivered both to the Czech market and to many European countries, e.g. Austria, Hungary, Slovakia, Italy, Bulgaria, Poland and Germany. They are certified according to EN ISO 9001: 2001, EN ISO 14001: 2005, and last but not least, EN 12975-2. The products are regularly innovated and presented at domestic and foreign fairs. The VacuSol solar vacuum collector is a device that uses photothermal

conversion of solar radiation to heat the working fluid. The collectors consist of glass tubes embedded in a self-supporting stainless-steel frame. In these tubes, the copper absorber is provided with a highly selective absorption layer of TiNOX, which receives solar radiation. From the glass tubes, air is evacuated into a vacuum tube of at least 10⁻³ Pa. The obtained thermal energy can be further utilized through a heat exchanger and used for domestic hot water heating, domestic heating, swimming pool heating or water heating for industry and the food industry. VacuSol s.r.o. www.vacusol.cz



PHOTON ENERGY

Photon Energy N.V. is a global solar energy solutions and services company covering the entire lifecycle of solar energy systems. Since its foundation in 2008, Photon Energy has built and commissioned over 100 MWp of solar power plants across two continents and 75 MWp as part of their own portfolio. It is currently developing projects with 594.6 MWp in Australia (580 MWp in partnership with Canadian Solar), 96.6 MWp in Hungary, 4.6 MWp in Poland and 97.4 MWp in Romania, and provides

operations and maintenance services for over 300 MWp worldwide. In addition, the company is at an advanced stage of building two utility-scale PV power plants with a combined capacity of 14 MWp in Australia. The company's subsidiary Photon Water focuses on developing and providing clean water and remediation solutions and services around the world. Photon Energy N.V. is headquartered in Amsterdam and listed on the Warsaw, Prague and Munich Stock Exchanges. The company has offices in Europe, Australia, and South America. www.photonenergy.com.

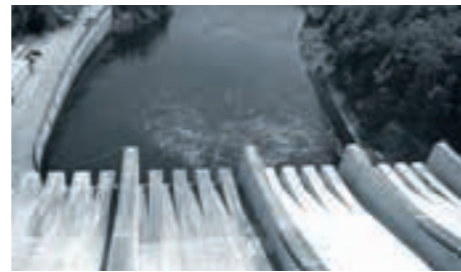


SOLAR GLOBAL

The Solar Global Group has know-how and more than 10 years of experience in the construction of large solar parks and roof installations across Europe. It offers complete services, from designing projects for solar power plants to the supply of individual components and the construction of solar parks. It also provides service and purchases power. In 2009–2010 the company prepared and implemented 10 large solar projects; until now it has owned and managed a half of them. Prior to 2013 a further few hundred photovoltaic power plants for private and corporate clients were constructed.

The Solar Global Group has experience in solar power plant construction e.g. in Germany, Spain and Poland. It is active in the field of construction of photovoltaic sources, battery systems, hydroelectric power stations and the infrastructure of charging stations for electric cars. It invests in modern energy, efficient use of energy, electromobility and other environmental projects. The Solar Global Group is one of the founding members of the AKU-BAT professional association and it is a partner of the Solar Association, Solar Global a.s. www.solarglobal.cz

3 HYDRO ENERGY

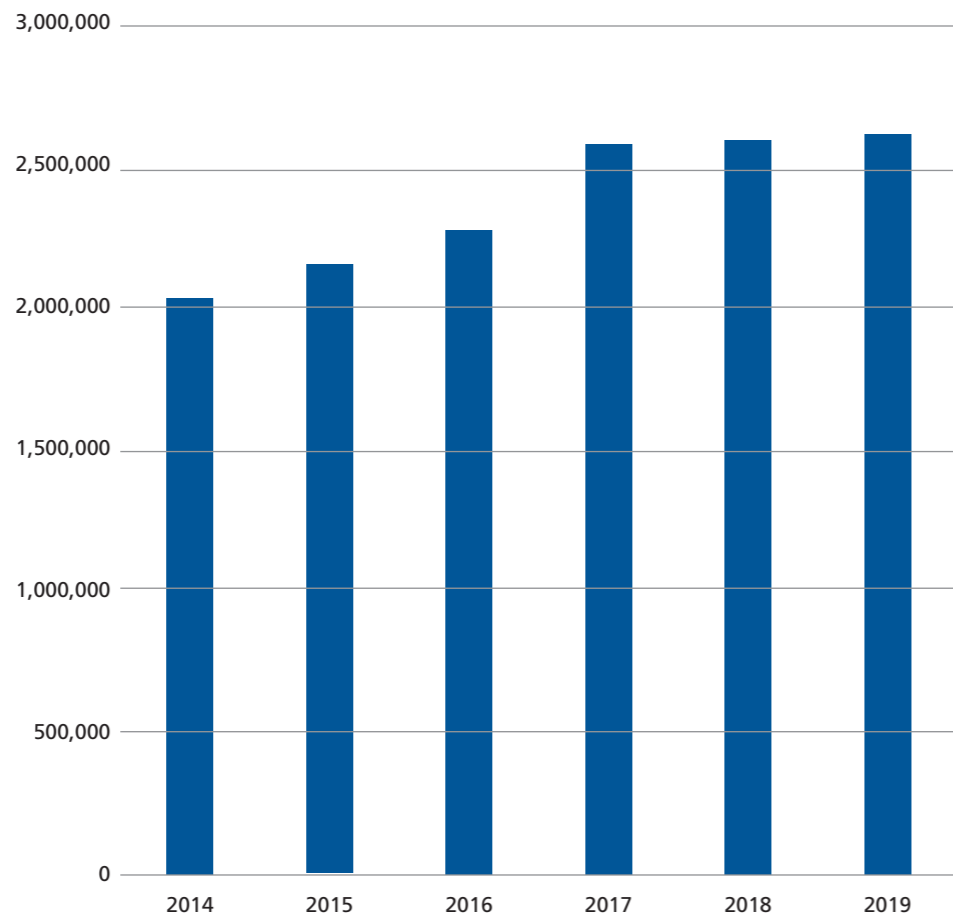


HYDROENERGY LEADERS SINCE THE BEGINNING OF THE 20th CENTURY

The development of hydroenergetics has spurred, first and foremost, technological advances based on the production of suitable and efficient water turbines and the possibility of production and transmission of power. Hydroenergetics has gradually helped the electrification of municipalities and further development of production. Development was on such a huge scale that in 1930 almost 17 thousand power stations, mills and other hydroelectric installations were registered in what was then Czechoslovakia. At present, 1,572 small hydropower plants with power from 1 kW to 10 MW are registered in the Czech Republic. Overall installed capacity amounts to 348 MW, annually generating around one terawatt-hour of power.

Thanks to this, the Czech Republic offers a number of innovative solutions built on their own development.

EXPORT OF PRODUCTS RELATED TO HYDRONERGETICS (IN THOUSANDS OF EUR)



Source: The Czech Statistical Office, calculations by CzechTrade, selected HS4 codes: 8410: Water turbines, 8502: Electric generator sets, 8503: Parts for electric generator motor, 8507: Electric accumulators, including separators, 8537: Boards, panels, switchboards, counters, cabinets. Cross-border movements of goods.

Several companies in the Czech Republic focus on products, technologies and services associated with hydroelectric power stations, some of which have even become world-renowned.

These companies focus on the production of all hydro-technical devices such as turbines, generators, floodgates, screens and cleaning machines, and on planning, designing and providing services, maintenance,

performing reconstructions, control and consultancy. They have their own research centres and are able to provide complete turnkey solutions. Some companies take part in international power trade and operate power distribution networks. Their clients include domestic but mostly foreign operators of hydroelectric machines, watercourse administrators, water resource managers and water companies.

CKD BLANSKO

An industrial company that has been continuously in operation for more than 320 years. It is living proof of innovativeness, competitiveness and especially the quality of human resources. The first water turbine was made here more than 110 years ago in 1904. References can be found in 55 countries around the world with capacity exceeding 21,000 MW. CKD Blansko provides top electromechanical equipment and services – water-to-wire – from small hydroelectric power stations to the biggest ones. All types of turbines – Kaplan, Francis, reverse Francis, Pelton and Deriaz turbines. Butterfly valves, spherical valves, slide gates, stop-logs, weir flaps, radial valves, etc. The company has its own Water Machinery Research

Institute and closely cooperates with educational centre for welders with more than 100 graduates per year. CKD Blansko Holding a.s. www.ckdblansko.cz



DID YOU KNOW?

BLADELESS TURBINE
One of the most recent Czech inventions is the bladeless (rolling) turbine. The creator is Associate Professor Miroslav Sedláček from the Czech Technical University (ČVUT). He received a nomination for the European Inventor Award 2016 in the “Research” category for his invention. The turbine has many advantages. The most important one is the fact that it can handle different gradients. (It can function with a gradient of 5 metres as well as one of 20 metres and more.) The turbine’s construction is very simple, and efficiency is around 40–70%. Thanks to this discovery, half of the potential hydro-energy which has remained unused until now can be harnessed.



PUMPED STORAGE HYDROELECTRIC POWER PLANTS

The highest pumped storage hydroelectric power plant in the Czech Republic called Dlouhé Stráně is at an altitude of 1,350 m in the Jeseníky Mountains. Its task is to perform static and dynamic services for the Czech Republic's power system with its power of 650 MW. Static service means an efficient conversion of surplus energy in the system to peak energy. This process is carried out by pumping water from the bottom tank into the upper

one at the time of its surplus and vice versa – generation of power by turbine operation. Dynamic services include, in particular, the proportion of the pumped storage hydroelectric power plant to regulate power and frequency in the system and the capability of the available reserve in the system. For ecological reasons, the power plant itself with two Francis turbines was built in a cavern underground. The cavern is connected to the upper tank by two feeders, to the lower tank and to two tunnels.

The water from the top tank is led by two pressure feeders with a diameter of 3.6 m and a length of 1.5 km to the turbines. The transition from standby to maximum power takes up to 100 seconds. Ingstav was the main supplier, Energotis was the supplier of engineering investment activities, and subterranean work was carried out by Subterra. The basic technology was produced by ČKD Blansko, transformers were supplied by Škoda Plzeň, and the armour of the conveyors was manufactured by Hutní montáže Ostrava.

The power plant prides itself on being the largest in 3 ways:

- ⦿ the largest reverse water turbine in Europe – 325 MW
- ⦿ the largest gradient in the Czech Republic – 510.7 m
- ⦿ the largest installed power in the Czech Republic – 2x 325 MW

Dalešice hydraulic structure is also worth mentioning. It was built in connection with the construction of the Dukovany nuclear power plant. Dalešice provides it with technological water.

Furthermore, it reduces downstream flood peaks and sedimentation of impurities from upstream and waste water from the nuclear power plant. Besides fulfilling the classical function of the energy accumulator, i.e. power production at peak points and energy absorption at the time of its surplus, with its power and speed of 60 seconds to full power, it assumes an irreplaceable role in controlling the performance of the nationwide power system as well as an immediate failure reserve. For this purpose, the

plant is fully automated and remotely controlled from a central dispatching centre in Prague. In the pumped storage hydroelectric power plant 4 sets are installed with reverse Francis turbines for a 90 m head installed by ČKD Blansko. Both 13.8 kV synchronous generators and bi-directional spin from ŠKODA Transportation are used for power generation as a propulsion pump. Block transformers serve to transform the voltage of generators to the voltage of the 420 kV outlets.

CINK HYDRO – ENERGY

CINK Hydro – Energy specialises in the production of micro, mini and small hydropower plants up to 10 MW per unit. As one of only a few companies in the world, it has the necessary know-how to implement technically perfect deliveries of all major types of turbine: Crossflow, Kaplan, Pelton and Francis. All the equipment is manufactured exclusively in Europe and, since its modernization in 2005, the company has produced, delivered and installed over 350 turbines in nearly 50 countries worldwide, bringing the total installed capacity to more than 300 MW.

CINK Hydro – Energy focuses on installation of hydropower plants not only as *run-of-the-mill projects*, but also in drinking water systems, irrigation canals and waste-water treatment plants. Services provided also include: supervision of turbine installation, commissioning, online technical support, training of power plant personnel, maintenance and perfect warranty and post-warranty care ensured, among other things, with ISO 9001:2016 and 14001:2016 certification. CINK Hydro – Energy k.s www.cink-hydro-energy.com



MAVEL

Mavel is a leading global manufacturing and engineering company specializing in turbines and related equipment and technology for hydroelectric power plants from 30kW to 30 MW per unit, since 1990. Mavel is also able to implement complete hydroelectric power plant units as so-called turn-key projects. Mavel owns more than 100 designs of Kaplan, Francis, Pelton and micro turbines. Mavel's turbines produce energy in 44 countries across

more than 325 locations. In 2020, Mavel successfully commissioned one generating unit at North Bala hydroelectric power plant in Canada a total power output of 4.4 MW. These days, the company mainly supplies water turbines to the USA, Canada and Japan. Currently Mavel is realizing a hydraulic power plant project with two Kaplan turbines and total power of 10.7 MW at HPP Calabogie in Canada. Mavel, a.s.
www.mavel.com



COMPLEX SOLUTIONS FOR USING WATER ENERGY

HYDROHROM is a manufacturer and supplier of complete equipment for small hydroelectric power plants:

- complete supplies of Kaplan, Francis and Pelton turbines including accessories and control system
- fine-spacing screen and inflow equipment
- cleaning machines for screens
- butterfly and spherical valves including controlling
- fishbelly flaps

The company also provides consultations, design work and installation in accordance with customer specifications. HYDROHROM turbines are successfully exported to many countries thanks to their full competitiveness. For some time, exports have amounted to the majority of the total volume of production. Hydrohrom, s.r.o.
www.hydrohrom.cz/en



ZIROMONT

ZIROMONT is committed to designing, manufacturing and supplying water turbines, water microsources and accessories for small hydroelectric power plants (SHPP). Specifically, the company has mainly focused on the development and production of tubular water turbines designed especially for low heads. These turbines are characterised by high discharge, smaller installation dimensions and a range of possible flow control variants. The turbine body, including a shield for mounting the generator together with the diagonal distributor wheel chamber and the imparted compartment of the impeller, is designed as a compact rigid unit. Its shape is designed so that hydraulic losses are kept to a minimum. To hold the weight of the entire turbine, including the generator, the body is provided

at the bottom with a rigid base. The whole system is controlled by a programmable control system which also allows the operator to use remote access and remote communication for control using the internet network, as well as possible servicing of the equipment. The equipment is designed to drive asynchronous generators operating in parallel to the public power grid, or to drive synchronous generators even in island mode. ZIROMONT focuses on developing new solutions as well as improving existing solutions leading to the most efficient use of water potential in the relevant SHPP throughout the year. For this purpose, it also works closely with a number of renowned partners in the field. It also offers construction and projection work in the field of SHPP. ZIROMONT spol. s.r.o.
www.ziromont.cz



SEVCIK HYDRO

Ševčík HYDRO has been specialising in the production of technology and its installation and repairs of water management facilities and buildings since 2003. It exploits the knowledge and expertise of its employees with extensive experience in water management. The company provides complete supplies of technological units as well as the manufacturing of individual equipment, repairs, maintenance and reconstruction of existing equipment. Ševčík HYDRO s.r.o.
www.sevcik-hydro.cz/en

EXMONT-ENERGO

EXMONT-Energo provides comprehensive services in the production and installation of small hydroelectric power plants (power plants of installed capacity up to 10 MW). It is renowned for producing clean "green" energy. For this activity, it has the necessary designers, technical facilities and, last but not least, experienced workers in production. Thanks to many years of experience and a background in production, the company has successfully completed the construction of several hydroelectric power plants, mostly abroad. All implemented projects are equipped with generators from EXMONT-Energo. Important products also include a swirl turbine for small heads, for the production of which Brno Technical University was also involved. The swirl turbine can be used in locations with a head of 1 to 5 metres and a flow rate of 0.2 m³/s. Other types of turbines include the Kaplan turbine, Francis turbine, Pelton turbine and Bánki turbine. EXMONT-Energo a.s.
www.exmontenergo.com



TES VSETIN

The company, founded in the heart of Wallachia, celebrated 100 years of electrical machinery production in 2019, and has also become an internationally operating company. It is one of the leading manufacturers of electrical machines, drives and components. It employs over 600 people in its 100,000 square metres of production area with a large production park. It builds on tradition and an active approach to further development. It invests in expanding production capacities and possibilities. Through cooperation with external experts and the implementation

of its own internal projects, the company introduces new methods of production management, business management, and work organization, along with taking care and responsibility of its customers, employees and the region in which the company operates. Almost 70% of its production is made by direct exports, and it exports its products to the EU, USA, Russia, Belarus, Ukraine, Chile, Mexico, Panama and Indonesia. In the future, the company plans further growth and expansion into new markets.
TES Vsetín s.r.o.
www.tes.cz/en

ENERGO-PRO

ENERGO-PRO is an independent power producer and supplier engaged in the generation, delivery and cross-border trading of power. The Group is involved in the design and manufacture of power generation and industrial equipment as well as hydropower plant engineering. They are specialists in the hydropower sector and related industry. They build, own, and operate hydropower plants and power infrastructure in Central and Eastern Europe, the Black Sea and the Caucasus. Along with their core business they have developed an in depth expertise in power distribution and trading activities in different countries. They offer integrated solutions for hydropower generation equipment with a unit output up to 350 MW. Their business is conducted in a responsible way in order to achieve a solid financial return balanced with long-term growth and fulfilment of their commitment to the community and the environment.
Energo-Pro a.s.
www.energo-pro.com



LITOSTROJ ENGINEERING

Litostroj Engineering is one of the leading suppliers of technology for hydropower plants and pumping stations. The key part of their activities is design and engineering. Litostroj Engineering offers, in cooperation with its partners – especially the sister company Litostroj Power (Slovenia), which belongs to the ENERGO-PRO Group based

in Prague, complete supplies of hydropower plant equipment on a turnkey basis. They focus on supplies of technological equipment for hydropower plants and pumping stations, and on rehabilitations, modernizations and overhauls of hydropower plants and pumping stations. The jewel of their company is their hydraulic laboratory. Thanks to the hydraulic laboratory, they are able to test new hydraulic solutions through physical models of water turbines, pumping turbines and pumps before launching their production, and therefore they can supply hydraulic machines of world-class quality.
Litostroj engineering a.s.
www.litostroj-eng.com





ZDAS

ŽDAS, a.s. is among the Czech engineering and metallurgy elite. ŽDAS produces and supplies parts for hydroelectric power stations, including complete equipment, such as sets of impellers of Kaplan and Francis turbines. It also produces hydraulics for hydroelectric power stations forgings and castings for turbines, water machinery and accessories.

ŽDAS is also the manufacturer of the new generation of the bladeless PROTUR rolling turbine, its main advantage being its ability to work efficiently at exceptionally small gradients of up to 1.5 metres

with different water flow rates. The PROTUR Turbine system was invented by Miroslav Sedláček at the end of the 20th Century. Technical improvement of the original rolling principle was undertaken by companies P.F – Economy consulting and ŽDAS. The PROTUR system is patent protected worldwide now. The manufacturing programme of ŽDAS a.s. focuses on forming machines, open-die forging equipment, metal scrap processing equipment, hydraulic presses, equipment for rolled products processing, material straightening equipment, inspection and straightening lines and supplies of individual equipment for rolling

plants. The company also specializes in the production of castings from 200 to 50,000 kg, forgings from 20 to 9,000 kg, ingots from 500 to 20,000 kg and models or pressing tools especially for the automotive industry. The company provides the equipment at the customer's request. Its production halls are equipped with high-quality machinery to perform heavy and light machining, assembly and testing of individual products. Modern design and a development base along with international certificates are a guarantee of quality and reliability. ŽDAS, a.s.

www.zdas.com

G&EM

G&Em s.r.o. designs and manufactures electric machines (synchronous, asynchronous, and PM), specialising in generators for small hydroelectric power plants up to 7 MVA, for all types of turbines.

Our technicians have extensive knowledge and expertise gained from long-term professional experience in the field of hydropower engineering: they possess more than 40 years of proven technical competences in the design of generators and electric motors. They operate a new production facility with modern equipment that includes a test room for horizontal and also vertical machines. The result – highly reliable machines at competitive prices.

They are very flexible, their design concept enables us to submit our quotations within max. 4 days and binding dimensioned drawings within 14 days after signing the contract. They have supplied generators for projects in Europe, the Americas and Asia.

G&Em s.r.o.

www.gaem.cz



SOLAR GLOBAL

Solar Global offers a wide range of services, including construction and service of hydroelectric power stations. Its portfolio comprises 5 hydroelectric power stations. The company is a member of the small hydroelectric power plant operator guild. The Solar Global Group is active in the field of construction of photovoltaic sources, battery

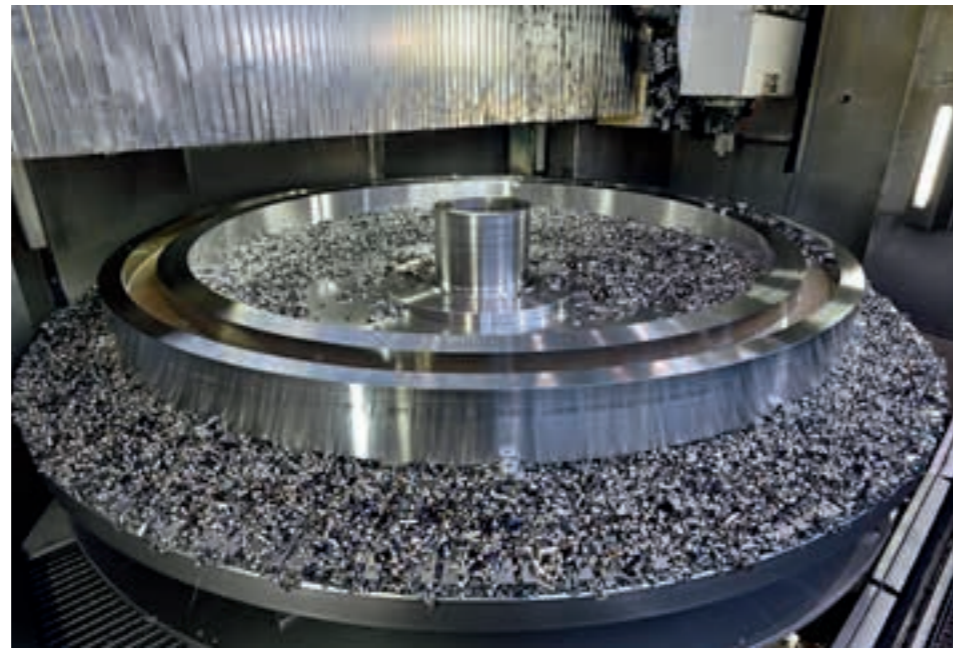
systems, hydroelectric power stations and infrastructure of charging stations for electric cars. It invests in modern energy, efficient use of energy, electromobility and other environmental projects. The Solar Global Group is one of the founding members of the AKU-BAT professional association and it is a partner of the Solar Association Solar Global a.s.

www.solarglobal.cz

4 WIND ENERGY



In the field of wind energy, Czech companies focus on more efficient and higher quality production. Czech manufacturers specialize in the development and production of parts for wind power plants, such as bearings, seals, shafts and generators, and invest in the development of modern technologies, low-cost machining machines or new solutions to variable gearboxes. In addition, Czech companies operating in the field of wind energy provide various technical consulting services, service and monitoring. Czech manufacturers are important suppliers of equipment for wind power stations abroad.



TRINECKÉ ŽELEZÁRNY

Established in 1839. The company's core products include wire rod, steel bars, rails, drawn steel, semis and seamless tubes. The sole shareholder of Třinecké železářny today is the commercial company MORAVIA STEEL a.s. Annually, the company produces approximately 2.5 million

tons of crude steel. They supply approximately 4% of products to the Wind Energy sector, which are round castings, and, to a lesser extent, ingots supplied to several customers who produce rolled rings. Třinecké železářny supplies continuous rolling mills with 410, 525- and 600-mm continuously cast semis. These castings are used to

produce seamless rolled rings up to four metres in diameter.
TŘINECKÉ ŽELEZÁRNY, a.s.
www.trz.cz

BOHEMIA RINGS

Since 2018 company Bohemia Rings has been a subsidiary of Třinecké železářny. It produces components from precision steel, primarily for the wind power sector, such as bearing rings, which account for about 85% of the company's production. Bohemia Rings can also produce rings for cranes and marine applications, flanges for water mains, pressure vessels or submarines and special components designed for CT tunnels used in healthcare. The produced rings reach a maximum diameter of up to 4,000 mm and a weight of 7 tons and can be mounted in wind turbines with an output of up to 5 MW.

Bohemia rings s.r.o.
www.forge-europe.com/en/



TES VSETIN

TES Vsetin have been producing various components for wind power stations for years. Beside this, TES Vsetin has delivered special asynchronous generators for wind power stations with vertical runners. TES synchronous generators have been optimized for outputs up to 30,000 kVA, and they feature high efficiency and precise speed regulation. A new innovation is their generator with permanent magnets with outputs up to 4,000 kVA.

Thanks to the progressive design, the machine is 30 % lighter than machines with a wound rotor. With excellent efficiency, easy installation and longer service intervals, the machine maximizes yield. The generators are optimally compatible with the mains; feeding is ensured with frequency converters. PMG machines are suitable for both wind and water power plants.
 TES Vsetín s.r.o.
www.tes.cz/en



WIKOV INDUSTRY

Wikov has been in the engineering industry for more than 135 years. For over 100 years it has been a traditional manufacturer of gears and mechanical transmissions. The experience created and passed down from generation to generation in combination with modern production technologies enables the company to produce top products with progressive design solutions and above-standard technical parameters. It has five manufacturing plants in the Czech Republic, others in Germany and Russia. It employs over a thousand people and generates revenues of around CZK 2.5 billion annually. It offers a comprehensive range of helical, bevel and especially planetary gearboxes with flexible pin technology from 500 kW to more than 10 MW. Wikov is a world leader in the supply of gearboxes for underwater tidal power plants. The patented flexible pin technology used in wind turbine gearboxes has found application in extreme tidal power environments. Wikov Industry a.s.
www.wikov.com



SOLAR MONITOR

This company is specialized in the development of hardware and software for embedded systems. The main product of the company is Solar Monitor – a modular DIN rail-based system, which is used for data logging and as a communication gateway for renewable resources. SNMP, Modbus and SOAP protocols easily translate proprietary communication into a unified interface for IT, telecommunication industry and for PLCs in automation. We offer OEM solutions and design customization. Solar Monitor s.r.o.
www.solarmonitor.cz

HEAT PUMPS

Czech companies are able to supply even sophisticated solutions in the field of heat pumps; solutions that can significantly save resources for companies as well as households. Heat pumps are a clever solution to heating and water heating, as they

offer a significant energy saving and are environmentally-friendly. Using the heat pump, most energy is gained from the surrounding air, earth or water; therefore the operating costs of the pump are only slightly dependent on the increasing energy prices.

Czech companies continuously develop and produce new modern devices which meet clients' requirements for heating family houses, industrial halls and other large buildings. Some companies also offer custom production of special devices and various additional services.



AC-HEATING

The company produces AC Heating Convert AW heat pumps and supplies a comprehensive home heating solution. It creates solutions that help customers save time and money. It delivers features that help people make effective use of the Convert AW heat pump heating system. All Convert AW heat pumps are equipped with xCC control, which the company has been developing since 2009. It is based on weather-compensated control supplemented by analysis of data of installed systems and new trends in control and heating. Regulation is flexible and can be controlled by everyone.

The company has been working in the field of heating, heat pumps and their trends since 2006. In the Czech Republic, they were the first to install heat pumps that have continuous output control. Using the xCC control, they were able to combine the requirements of heating systems with the technological possibilities of heat pumps. This makes it much easier and cheaper to connect the heat pump to houses and large buildings. This also reduced the space requirements for installation and use in older buildings. The standard for their heat pumps is a 7-year warranty, which is not subject to service inspections. KUFİ INT, s.r.o.
www.ac-heating.cz





NUKLEON

The company produces heat pumps of all modifications. It also focuses on the use of waste heat (waterworks, WWTP, waste heat from industrial facilities, sports facilities, etc.). Another focus of the company is the cooling of office, industrial and agricultural buildings. Some of the most important projects were the cooling of an office building in Prague Na Pankráci –

350kW, utilization of waste heat at WWTP Třebíč – 54kW, cooling of a fruit and vegetable store in Jevíčko – 250kW, heating of the entrance building to the Punkva Caves in the Moravian Karst – 27.5kW, district heating of Nucleon water / water heat pumps in the Russian Federation, and DHW heating in apartment buildings in Teplice using an indoor air / water heat pump. Nukleon s.r.o.
www.nukleon.cz



MASTER THERM

This is a traditional and innovative Czech manufacturer of a complete range of heat pumps with more than 10 thousand heat pumps sold at home and abroad. The company also performs its own research and development. Master Therm has many years of experience with progressive technology of the electronic expansion valve (EEV), inverter compressors and control and monitoring of heat pump operation through special applications via the Internet. Heat pumps are designed and equipped as a heating system, not just as a source of heating. Everything you need is included in the heat pump in one functional unit. This allows for easy and reliable installation and, at the same time, easy and convenient service. Master Therm heat pumps are suitable for the residential, commercial and industrial segments, too. The company has its own network of professionally trained distributors in the Czech Republic and Europe. Master Therm tepelná čerpadla s.r.o.

www.mastertherm.eu

ACOND

This successful heat pump manufacturer with a long history was founded in 1998 by Jiri Hanus sr. and his sons. They offer high quality heat pumps for competitive prices which proves that in recent years ACOND has been installing the most heat pumps in the Czech Republic, therefore they are the largest installation company in the country. ACOND's number one goal is the satisfaction of their customers – constantly measuring and improving it. 99.4% of their customers would recommend them to their loved ones and friends. Offering the quietest heat pumps with the highest efficiency is considered as a standard. By selling care does not end but only begins. All heat pumps are connected to the ACOND control room; if something happens, they will find out before the client does and take care of everything. ACOND also offers manufacturing of high quality heat pumps under a private label or it can supply complete ready-made kits for simple final assembly.

ACOND a.s.

www.acond.com

PZP HEATING

PZP HEATING is a production company operating on the Czech market as well as abroad for almost thirty years. It is engaged in development and production of heat pumps for heating and hot water preparation. Thanks to the long-term development of heat pumps, their products achieve high efficiencies and are rightly considered to be the quietest on the market. Heat pumps are manufactured in a wide range of capacities and their installation is therefore suitable for both family houses and industrial buildings. Particularly in the field of heat pumps manufacture the company has gained the dominant position on the market and ranks among the

most sought-after producers of high-quality devices with outstanding technical parameters, which can be proven by many prestigious prizes from international exhibitions and competitions.

PZP HEATING is a subsidiary of the leading manufacturer of heating and sanitary technology Kermi GmbH, belonging to the large Swiss concern Arbonia Group. With a strong background, PZP HEATING keeps up with the times and supplies high-quality products with a long service life.

PZP HEATING, a.s.

www.pzpheating.com



6 COGENERATION

Cogeneration is a very efficient and eco-friendly method of power production.

It is the combined production of heat and power. This method uses heat that is released during the power production process. Moreover, the losses occurred during traditional power production are minimized. Thanks to the combined production of heat and power, cogeneration units use energy from fuels with minimum losses and a very low emission level. It has a positive impact on the environment.

Cogeneration units are also favourable because they produce power directly at the place of consumption.

Cogeneration units can be used in all places with year-long demand for heating (cooling). These include administrative buildings, spas, hospitals, old people's homes, industrial plants, hotels, department stores, etc. The cogeneration method of energy production is supported in most countries of the European Union. Czech companies offer cogeneration units



with combustion of natural gas, LPG or different types of biogas (including landfill gas and sewage gas). Power production can also use mine gas produced during mining operations or in closed mines, or gas produced during oil extraction. Czech manufacturers offer individual cogeneration units as well as complex turnkey solutions – from project documentation to the construction of the entire energy source.



DID YOU KNOW?

TEDOM won the DHL export award

For the twenty-second time, DHL export awards were given in 2019. TEDOM won the "Export Story of the Year" category, sponsored by CzechTrade. The DHL Export Award competition was established in 1997 by the logistics company DHL Express CZ in order to motivate exporters to conquer foreign markets and gain new outlets for their products. Since its inception, the competition has been organized under the auspices of the CzechTrade government.

TEDOM

TEDOM a.s. was founded in 1991 and has since become world-renowned in the field of cogeneration. It is active in more than 40 countries around the world. It is based in Třebíč and employs over 500 people in the Czech Republic. For its cogeneration units, which are energy-saving devices for the joint production of power and heat, it develops and manufactures its own combustion engines and at the same time modifies the engines of renowned world manufacturers.

It offers gas cogeneration units with an electrical output from 20 kW to 4.5 MW. Subsidiaries are also part of the TEDOM Group, the most important of which is the German TEDOM SCHNELL GmbH. Other members of the group operate in Poland, Russia, the USA and Slovakia. TEDOM Group has five production plants in the Czech Republic and Germany with more than 750 employees.

TEDOM a.s.

www.tedom.com



TTS

The company is engaged mainly in the supply of investment units and technologies focusing on biomass combustion. TTS also supplies ORC (Organic Rankine Cycle) cogeneration units which produce heat and power efficiently and in a user-friendly way. The capacity ranges from 600 kW to 3 MWe.

Thermal oil biomass boilers are the primary source for ORC units. ORC units are used mainly in heating plants of a central heating supply or manufacturing companies (wood drying at sawmills, sawdust drying in wood pellet producing plants, etc.).

TTS eko s.r.o.

www.ttsboilers.cz





7 ENERGY MANAGEMENT



When energy is produced, it is also important to think of its storage and to place emphasis on efficient management. Czech companies which specialize in the supply of systems for more efficient use of renewable source energy potential bring a solution to this problem. Czech companies offer, for example, large-capacity battery modules for the accumulation of electrical

energy and its subsequent use in the industrial sphere or in households. Other companies focus on the network of electric vehicle charging stations, batteries to power electric wheelchairs, sliding equipment, batteries for various applications in railway transport, public transport and telecommunications, and station batteries.

DID YOU KNOW?

HIGH-CAPACITY LITHIUM BATTERY – HE3DA
 Jan Procházka developed a new lithium battery that has a greater capacity than current accumulators and is also cheaper. At the same time, it is much more resistant to damage or overheating. The battery has a unique design and uses nanomaterials. The technology has a global patent protection. On top of that, the battery is fully recyclable.

GENTEC

A manufacturer of cogeneration, micro-cogeneration and trigeneration units for natural gas, biogas, and other fuels. The product range is from 30 to 4 300 kWe, particularly with engines and gensets from the companies MAN, MTU, and MWM. The company's management, development centre and manufacturing are based in the city of Brno, a major centre for science, research and innovative technologies. GENTEC places the highest importance on innovations and continuous improvement of their products and services. In the development and manufacturing of cogeneration units, it also places emphasis on the flexibility and functionality of the structural design. Fair conduct and a partnership approach are of the same importance. GENTEC believes that only in this way is it possible to achieve the satisfaction of their customers and partners. GENTEC partners are international energy companies such as Veolia and innogy. www.gentec.cz

DID YOU KNOW?

The company Energon in Prague's Holešovice, according to its own project, built a fast-charging station, which is the first in the Czech Republic to combine a high-capacity battery storage and its own energy source (30 photovoltaic roof panels). This helps to stabilize the surrounding network. The innovative "energy hub" was built by PRE a.s. in just four months (July to October 2017). The station was officially opened in February 2018. In addition to its technical parameters, it also has a timeless design.





AERS

AERS s.r.o. is a subsidiary of Fenix Group and engages in the development and production of battery storage systems. Power storage in the current energy economy is today a major development trend in the field of distribution networks in the European Union, and AERS is responding to this trend. The AERS team develops some of these technologies in cooperation with universities.

The main product of the company is the AES storage station and its

modifications.

It is a home battery system (all in one, 3-phase, 10kW, asymmetrical load, 2x MPPT, off-grid regime) with a new concept that, thanks to installed batteries, solar electrical energy creates a stable energy source. AES enables smooth operation in network and off-grid mode. The device is designed to allow uneven loading of individual phases.

Another product from the R&D centre includes the large-capacity battery storage system SAS intended for managing energy consumption peaks which occur during production facility operations or during power

equipment startups in commercial buildings. SAS provides reliable power backup to production facilities or commercial-administrative buildings. The stations are designed for operation in the different operating modes: reduction of reserved capacity, therefore load distribution within 24 hours; protection and energy backup against outages; power quality management and compensation; maximizing the use of energy from photovoltaics.

AERS s.r.o.

www.aers.cz

SOLAR GLOBAL

Solar Global was the first battery storage operator in the Czech Republic. Currently, they are using the flexibility of their BESS (battery energy storage system) to cover the deviations of their power seller. In the future when allowed by legislation, they will take part in the tender for the provision of support services for their transmission system operator.

The Solar Global Group is active in the field of construction of photovoltaic sources, battery systems, hydroelectric power stations and infrastructure of charging stations for electric cars. It invests in modern energy, efficient use of energy, electromobility and other environmental projects. The Solar Global Group is one of the founding members of the AKU-BAT professional association and it is a partner of the Solar Association.

Solar Global a.s.

www.solarglobal.cz



DID YOU KNOW?

The Czech company Solar Global is entering the German battery market. Solar Global a.s. will build a large-capacity battery storage (BESS) with an installed capacity of 2 megawatts and a capacity of 2.5 megawatt hours in the area of its photovoltaic power plant in Schönwald, Germany, near the Czech border. The battery storage will serve for primary regulation within the needs of the German distribution system. The device can compensate for unforeseen fluctuations in the distribution network in milliseconds and thus protect the network from blackouts.

FGFORTE

The company has been active on the European market for many years. It is proven that fgFORTE's storage systems are top quality solutions and have gained it the reputation of a reliable company with a quality background, high competence and expertise. Concerning the lack of available comprehensive solutions and performance and energy demands of current buildings, the company specializes in providing better and more efficient power management of industrial/commercial objects. The company's solutions bring benefits such as utilization of the energy potential of renewable sources at the installation site, priority use of available energy stored in batteries, battery degradation protection due to long stagnation and grid feeding / force grid feeding features.

fgFORTE s.r.o.
www.fg-forte.com



DID YOU KNOW?

A Czech high-capacity battery in an industrial company received the highest award.

In FENIX GROUP a.s., since 2018, the battery storage system developed and delivered by its technological startup AERS has been operating in Jeseník. The representatives of the project received two awards at the 17th annual Czech Energy and Ecological Project, Construction, Innovation in the 2018 national competition.

High-capacity battery storage technology is used to smooth off peak demand, reduce micro-outages and back up the operation of the FENIX Jeseník production plant. During its one-year operation, not only its high reliability and functionality, but also its wide flexibility of use within industrial sites and production technologies were proven. The collected operational data suggests that battery storage can be an interesting investment, with a return-on-investment time well before 10 years, and this will continue to accelerate.

It is interesting that the complete battery storage technology was developed by only Czech engineers in the Czech environment and the project was implemented without subsidies.

A battery of 800 kW and a capacity of 600 kWh has brought the company a 20 percent reduction in booked power, eliminating excessive quarter-hour highs, and ensuring quality and uninterrupted power supply for the entire production facility, especially robotic workstations and other computer-controlled manufacturing technologies. In the event of a total failure of the distribution network, the battery can power the production site for up to 3 hours and can cooperate with other power sources such as photovoltaic power plants or cogeneration units.

8 EPC OPTIMALIZATION



A specific method of low-cost project implementation where a chosen provider of energy services guarantees a contractually set energy savings and operating cost reduction that can subsequently cover investments in the implementation of austerity measures. EPS application methods can be considered a high-quality form of energy management. The service is used not only by companies but also by the Civil Service.



EKOL

EKOL is based on the activities of outstanding scientific workers with long-term experience in their respective fields and has become a leading European manufacturer and supplier of energy equipment. The company also focuses on environmental issues related to the operation of thermal power stations. EKOL currently focuses on a significant field of the energy

sector, which is the supply of energy units in the form of EPC where it uses its experience in supplying key components: EKOL steam and hot-water boilers and steam turbines. The most important supplies include: NILE SUGAR Company Energy Centre, Egypt = 2 x boilers 80 t/h, steam turbines 2 x 8 MWe ETIHAD SUGAR Company Energy Centre, IRAQ = 2 x boilers 75 t/h,

steam turbines 2 x 10 MWe JAZAN SUGAR Company Thermal Centre, Saudi Arabia = 2 x boilers 75 t/h, steam turbines 2 x 7 MWe 2nd stage of ETIHAD SUGAR Company Energy Centre construction, IRAQ – 2 x boilers 75 t/h, steam turbines 2 x 20MWe EKOL, spol. s r.o.
www.ekolbrno.cz

CONTACTS

CZECH RENEWABLE ENERGY CHAMBER,
www.komoraoze.cz

The aim of the chamber is to support the sustainable increase of renewable energy consumption, unify and stand up for its member's interests, and it is also dedicated to raising awareness about renewable energy.

ACOND a.s., www.acond.com

Manufacturer of high quality heat pumps for reasonable prices with after care services.

AERS s.r.o., www.aers.cz

Development and production of battery storage systems. The AERS team develops some of these technologies in cooperation with universities. The main product of the company is the AES storage station and its modifications.

agriKomp Bohemia s.r.o., www.agrikomp.cz

Specialized in on the use of end products of animal and plant primary production such as manure, slurry, farm animal feed, grassland and grassland biomass and targeted biomass, mobilizing the unused resources.

BOHEMIA RINGS s.r.o., <http://www.forge-europe.com/en/>

The company from Zámrsrk that is owned by Třinecké železářny, which manufactures mainly bearing rings for wind turbines.



CINK Hydro – Energy k.s., www.cink-hydro-energy.com

A west Bohemian, constantly growing company with a 35-year-long history, manufacturing micro, mini and small hydro power plants up to 10 MW per unit.

ČKD Blansko Holding a.s., www.ckdblansko.cz

An industrial company that boasts a history of over 300 years of experience in production, mainly thanks to innovation, competitiveness and, above all, high calibre human resources.

Energo-Pro a.s., www.energo-pro.com

The core business of ENERGO-PRO is the hydropower sector. The company operates hydropower plants in Central and Eastern Europe, the Black Sea and the Caucasus. They are also engaged in power distribution and power trading. The total installed capacity of their power plants is 1243 MW, while the annual power generation is more than 3 TWh.

Ekol, spol. s r.o., www.ekolbrno.cz

Planning, design, manufacturing, construction and commissioning of complete energy units with a capacity of up to 100 MW. In particular, the company supplies steam turbines, steam boilers and boiler units, complete turnkey energy units (EPC), and energy units for biomass combustion.

fgFORTE s.r.o., www.fg-forte.com

The company focuses on the production, sales and service of lead-acid batteries and various types of industrial batteries and battery accessories.

G&Em s.r.o., www.gaem.cz

This is a young company of dynamic designers who manufacture electric machines – specialising in generators for small hydroelectric power plants.

GENTEC CHP s.r.o., www.gentec.cz

Manufacturer of cogeneration, micro-cogeneration and trigeneration units for natural gas, biogas, and other fuels. The product range is from 30 to 4300 kWe, particularly with engines and gensets from the companies MAN, MTU, and MWM.

HUTIRA green gas s.r.o., www.hutiragreen.cz

The company is focused on providing complete solutions for biomethane.

Hydrohrom s.r.o., www.hydrohrom.cz/en

Producer of devices for small hydro power plants. It provides consultation, projection work and installation to customers as required.

ifTECH s.r.o., www.iftech.cz

A company engaged in the wholesale and retail sale of components for solar power plants

Jaroslav Cankař a syn ATMOS, www.atmos.eu

A Czech family company and currently one of the largest European manufacturers of solid fuel boilers.

KrajiCzech s.r.o., www.krajiczech.cz

Since its inception, the company has been manufacturing construction systems for photovoltaic power plants.

KUFI INT, s.r.o., www.ac-heating.cz

AC Heating is a manufacturer of heat pumps AC Heating Convert AW and provides comprehensive home heating solutions

Litostroj Engineering a.s., www.litostroj-eng.com

Litostroj Engineering is one of the leading suppliers of technology for hydropower plants and pumping stations. The key part of their activities is design and engineering, as well as research which is carried out in its hydraulic laboratory. The company offers complete supplies of hydropower plant equipment on a turnkey basis.

Master Therm tepelná čerpadla s.r.o., www.mastertherm.eu

Traditional and innovative Czech manufacturer of a complete range of heat pumps.

Mavel, a.s., www.mavel.com

Mavel is a global leader in the provision of water-to-wire equipment for hydroelectric power plants utilising turbines with installed capacity of 30 kW to 30 MW.

Nukleon s.r.o., www.nukleon.cz

The company produces heat pumps and cooling equipment from kW units to MW cascades. The machines are always manufactured according to the specific requirements and wishes of customers.

Petrojet Trade, www.multibio.eu

The company provides everything from development, production, sales and service concerning biomass boilers

Photon Energy a.s., www.photonenergy.com

A global solar energy solutions and services company covering the entire life-cycle of solar energy systems

PZP HEATING a.s., www.pzpheating.com

PZP is the largest Czech manufacturer of affordable heat pumps and system solutions with a tradition since 1992.

Smart Heating Technology s.r.o., www.smartheating.cz/en/
This company offers a complete energy solution in the range of 60 to 2000 kW with economical and ecological automated operation.

Solar Global a.s., www.solarglobal.cz
Know-how and more than 10 years of experience in the construction of large solar parks and roof installations across Europe. Complete services, from working out projects for solar power plants to the supply of individual components and the construction of solar power stations, hydroelectric power stations and commissioning of large-capacity battery storage systems.

Solar Monitor s.r.o., www.solarmonitor.cz
This company specializes in hardware and software development for embedded systems, photovoltaics, computer networks and automation.

SOLSOL s.r.o., www.solsol.cz
The company is engaged in the wholesale of photovoltaic panels and inverters from AEG, Canadian Solar, AUO, SUNPOWER and EXE Solar, and turnkey implementation of photovoltaic power plants.

Step TRUTNOV a.s., www.steptrutnov.cz
The main activity of the company is the development, production and supply of cutting-edge technologies in the field of industry and energy. The company's unique products are boilers for burning all biomass, especially boilers for burning whole bales of straw, hay and other agricultural products.

Ševčík HYDRO s.r.o., www.sevcik-hydro.cz/en
The company specialises in the production of technology and its assembly and repairs of water management, equipment and buildings.

Tedom a. s., www.tedom.com
Producer of cogeneration units with its own development center where combustion engines are also developed. With 500 employs it is a stable partner for long-term cooperation.

Tes Vsetín s.r.o., www.tes.cz/en
A leading European industrial designer and manufacturer of tailor-made power generators, motors, drives, and other electrical machines and their system components with a track record of more than 100 years.

TTS eko s.r.o., www.ttsboilers.cz
Construction and reconstruction of heat sources with a focus on biomass combustion, supplies of turnkey investment units, industrial boilers for biomass combustion and cogeneration units.

TŘINECKÉ ŽELEZÁRNY, a. s., www.trz.cz
The company is based in Třinec and produces mainly wire rod, bar steel, rails and semi-finished products.

VacuSol s.r.o., www.vacusol.cz
The company operates in the field of solar panels production, and research and development of new trends and technologies in the field of alternative energy sources. It also provides consulting, design and installation of solar systems.

Wikov Industry a.s., www.wikov.com
The company designs, manufactures, supplies and services a complete portfolio of drives for wind, tidal and hydro power plants.

WT WINTECH a.s., www.wintech.cz/alu
A dynamic Czech company based in Přerov engaged in the sales of fasteners and own technical solutions made of aluminium.

ZIROMONT spol. s.r.o., www.ziromont.cz
ZIROMONT is involved in designing, manufacturing and supplying water turbines, water microsources and accessories for small hydroelectric power plants (SHPP). It also offers construction and project work in the field of SHPP.

ŽĐAS, a.s., www.zdas.com
For 70 years, ŽĐAS has been a modern and reliable manufacturer of machines and equipment, pressing tools and metallurgic products.



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