

ENERGETYKA WODNA

1/2021 (37)

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HYDROTECHNICAL INVESTMENT PROJECT IN MAKÓW MAZOWIECKI

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FROM EDITORIAL OFFICE



I sometimes think that "Energetyka Wodna" could be entitled "Hydropower Engineering - a Legal Compendium" or similar, and revolve around the subject matter that is entirely devoted to legal issues. The dynamics of changes occurring in the national and EU legislation is so rapid that we could easily fill each issue with analyses of new laws and regulations. This is more or less the topic of the current issue of our quarterly. The ongoing legislative changes will be crucial in shaping the hydropower industry in the years to come, so I hope that our readers will "forgive" us for being so monothematic.

To begin with, it is necessary to mention the document named Energy Policy of Poland

until 2040, which was published this March in "Monitor Polski", the Official Journal of the Republic of Poland. We are glad to hear that such an important document grants hydropower the status of a strategic project in the Strategy for Responsible Development, as well as emphasises the importance and role of hydropower plants in power engineering and the water resources management.

The second important issue is this year's amendment to the RES Act, which included a provision that extended the FIT/FIP fixed feed-in tariff system to seventeen years. At the same time, there appeared a draft regulation concerning the reference price in 2021, in which the hydropower rates were maintained at the same level as last year. However, the project was met with a suggestion made by the Polish Association for Small Hydropower Plant Development, which proposed adopting higher prices.

We have not forgotten about companies participating in public tenders and those that have contractors in the UK. With those in mind, we have prepared publications concerning the new law on public procure-

ment, new taxation rules and the settlement of customs duties after the end of the transition period associated with Brexit.

It is also worth noting that the State Water Holding "Polish Waters" announced a tender for the preparation of documents for the construction of a hydroelectric barrage on the Vistula River in Siarzewo, which, with an estimated budget of PLN 4.5 billion, is the largest investment project in Polish hydropower engineering in decades. Pending the outcome of the tender, I invite you to read our "Projects" section where we present smaller scale investment projects, which are nonetheless of high importance for the local communities, including the main topic of the issue – SHP in Maków Mazowiecki.

Moreover, the spring issue features a publication dedicated to this year's World Water Day, carried out under the motto "What does water mean to you?"

With this note, I wish you a pleasant reading!

Michał Kubecki
Editor in Chief

STRATEGIC PARTNER



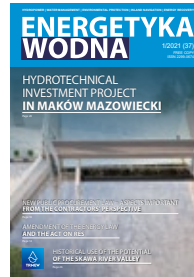
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Visualisation of the hydrotechnical system at the damming weir on the Orzyc river. Source: IOZE hydro

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THE OFFICIAL RELEASE OF POLAND'S ENERGY POLICY BY 2040

On 10 March, a month after its adoption by the Council of Ministers and a week after its content was leaked online, Poland's Energy Policy by 2040 was officially published in the "Monitor Polski" (Official Gazette of the Government of the Republic of Poland). According to its creator – the Ministry of Climate and Environment – PEP2040 is meant to be a "compass" that will guide entrepreneurs, local governments and citizens in the process of transforming the Polish economy into a low-emission one.

The strategy is to increase the share of Renewable Energy Sources (RES) in all sectors and technologies. By 2030, the share of RES in gross final energy consumption will be at least 23%, including no less than 32% in electricity (mainly through wind and photovoltaic power), 28% in heating, and 14% in transport, in no small part thanks to electromobility.

The installed capacity of offshore wind energy solutions will reach about 5.9 GW by 2030 and about 11 GW by 2040. There will also be a significant increase in the installed capacity of photovoltaic solutions, by about 5-7 GW by 2030, and 10-16 GW by 2040.

By 2030, coal's share of electricity generation is not to exceed 56%. "The reduction in the use of coal in the economy will take place in a manner ensuring a just transition", the document reads. High CO₂ allowance prices and environmental costs will result in a sharp decline in coal-fired electricity between 2020 and 2040; by 2040, coal-fired power plants will generate just 11 TWh compared to today's 90 TWh.

The provided amounts of electricity produced by coal-fired facilities do not include

that generated by coal-fired thermal power plants. The ministry has adopted two scenarios for potential future developments. Coal's share of electricity generation will reach 37-56% by 2030 and 11-28% by 2040, depending on whether emission allowance prices rise faster or slower. Depending on prices, hard coal consumption will range from 11.1 to 19.1 million tonnes. This is assuming that CO₂ allowance prices will be €40 per tonne per 20 years. However, they may also be as high as €60.

The share of gas in the energy mix is expected to reach 17-33% by 2030. It will be a bridging solution of the energy transition process, providing the power system with the necessary control capacity. The move away from coal will result in a 30% reduction in CO₂ emissions (compared to 1990) and a 23% reduction in primary energy consumption by 2030 (compared to 2007 consumption projections).

The energy generation gap caused by coal phase-out is to be filled by nuclear power. The first nuclear power plant unit with a capacity of 1-1.6 GW is to be commissioned by 2030. Additional units are planned to be built every two to three years,

with a total of six to be constructed under the nuclear programme.

The strategy states that "Poland's energy transformation outlined in PEP2040, which is to be carried out in a socially acceptable way while ensuring energy security, maintaining economic competitiveness and limiting environmental impact, will require enormous investment outlays that may reach as high as PLN 1,600 billion in the 2021 – 2040 period. The latter may amount to about PLN 867-890 billion across the entire fuel and energy sector alone, whereas in non-energy sectors (industry, households, services, transport and agriculture), they may reach about PLN 745 billion".

The sources of funding for this transformation include European funds, including the Just Transition Fund that according to PEP2040 is expected to provide 3.5 billion euros in the 2021 – 2027 period, as well as the Modernisation Fund, which is expected to provide 2 – 4.8 billion euros in between 2021 and 2030, and the Reconstruction Fund (21.9 billion euros).

The projected expenditures in the electricity generation sector will reach approx. PLN 320-342 billion, with about 80% allocated to zero-emission capacity, i.e. renewable and nuclear energy, the document reads.

Interestingly, PEP2040 also refers to the hydrogen economy. "The hydrogen market will be subject to development, supported by successive regulatory work and adjustment of support schemes for investment, research and development activities and the evolution of domestic technological resources", it reads.

Hydropower in PEP2040

Hydropower – the use of hydropower potential – is meant to ensure the development of water resource management, as well as increase the role of retention and inland waterways and enable the refurbishment of water dams, leading to an increase in the number of water barrages, which are vital for the regulation of watercourses. The implementation of these measures will affect hydropower development. It should be noted that while the operation of run-of-the-river hydropower plants can be regulated, it can only be done so to a limited extent. The energy generated in pumped-storage plants is partially counted as RES energy, but such power plants also have a regulatory function for the National Power System. Considering the regulatory potential of hydropower, finding new ways to harness it – including on a small scale – is well worth it. The use of hydropower potential is a strategic project in the area of Technology Development – PS.3(4) and part of the Strategy for Responsible Development.

Wojciech Jakóbiak
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SIARZEWO WATER BARRAGE PREPARATORY WORKS TENDER

The State Water Holding Polish Waters has published a procurement notice concerning the preparation of documentation for the construction of a water barrage on the Vistula river, which is to be located in Siarzewo, below Włocławek, along with obtaining a project implementation permit. The announced tender procedure will be a competitive dialogue under the EU procedure.

|| The construction of the Siarzewo water barrage is a highly anticipated investment project that is primarily aimed at increasing the water retention and flood control capacity of the Vistula River. The implementation of such projects ensures Poland's water safety, especially in the event of flood and drought hazards", said Marek Gróbarczyk, Deputy Minister of Infrastructure.

The tender announced in mid-March includes the development of both pre-design and design documentation, as well as conducting the accompanying studies for the "Construction of a River Barrage on the Vistula below Włocławek – WB Siarzewo, including obtaining the project implementation permit" investment project.

The reservoir will be created only within the natural riverbed and will feature embankments to protect the lives and property of the communities living along the Vistula River, with its function being limited to reducing the effects of drought and floods – including winter floods. The Siarzewo water barrage will also positively affect the region's water retention conditions, as well as the economic and tourist development of the Vistula river area. The hydropower plant with a planned capacity of 80 MW also falls within the new Green Deal principles. The Siarzewo water barrage construction pro-

Fig. Visualization of the Siarzewo Water Barrage



Source: State Water Holding Polish Waters

ject will also bring financial benefits – the Lower Vistula Cascade will reduce the costs of transportation, renewable energy and dealing with hazards, increasing national revenues and improving regional development at the same time.

The construction of the Siarzewo water barrage is a vital and highly-anticipated investment project for the entire region. The project received the approval of dozens of organisations, including pro-environmental ones, and tens of thousands of residents of

central Poland as early as 2017. More than 100,000 signatures of project supporters were collected in the Aleksandrów County alone.

The expected maximum cost of the investment project is PLN 4.5 billion. The project is scheduled to be finished by 2029, with construction works to commence in late 2023 or early 2024.

Szymon Hupłyś
Press Officer
Ministry of Infrastructure

CALENDAR

16–18.08.2021 Guangzhou, China	Power China 2021 Organizer – Guangdong Grandeur International Exhibition Group	www.bspexpo.com
7–10.09.2021 Legnica, Poland	XIX Technical Dam Control International Conference Organizer – Politechnika Warszawska	www.tkz.is.pw.edu.pl
22–24.09.2021 Rytro, Poland	XXIX Technical and Science Conference Design & Exploitation of Electrical Machines & Drives Organizer – Sieć Badawcza Łukasiewicz, KOMEL	www.komel.katowice.pl
14–15.10.2021 Gdansk, Poland	Polish Hydropower Conference HYDROFORUM 2020 Organizer – Towarzystwo Elektryków Wodnych	www.hydroforum.tew.pl
25–27.10.2021 Strasbourg, France	HYDRO 2021 Organizer – The International Journal on Hydropower & Dams	www.hydropower-dams.com



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Szewalski Institute of Fluid-Flow Machinery, Gdansk, 14-15.10.2021



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- Hydropower in the climate change context
- Hydropower under legal and economic constraints
- HYDROFORUM Panel Debate
- Experience in design, erection and operation of hydropower plants and their equipment
- New technical concepts and R&D activities
- Technical visit

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FROM THE WORLD

13.01.2021

INITIATIVE AIMS TO SUPPORT SUSTAINABLE HYDROPOWER IN THE WESTERN BALKANS

A new initiative has been launched to support authorities, investors and developers to implement international good practices in hydropower development in the Western Balkans.

Launched by the International Hydropower Association (IHA), the Albanian Power Corporation (KESH) and the Swiss government's State Secretariat for Economic Affairs (SECO), the three-year initiative will start in early 2021.

The initiative will see IHA Sustainability, the organisation's non-profit subdivision, work with project developers, alongside regulators, investors and civil society organisations from Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro and Serbia.

"One of the main outcomes of this programme of support will be to ensure local stakeholders from the Western Balkans are better equipped with the necessary tools to understand and assess the sustainability performance of hydropower projects in line with internationally recognised guidelines," explained Alain Kilajian, Senior Sustainability Specialist at IHA. "Reaching key decision-makers as well as non-governmental organisations (NGOs), the training programme will strengthen institutional capacity and widen awareness about the good practice requirements expected of all hydropower projects and provide a common language to discuss important sustainability concerns in the region."

International Water Power & Dam Construction

25.01.2021

PLATFORM TO PROMOTE SUSTAINABLE SEDIMENT MANAGEMENT

A global collaborative platform of leading research and academic has been launched to share knowledge on how to best support sustainable sediment management.

The HydroSediNET initiative aims to connect experts and innovators supporting the planning, implementation and operation of effective and sustainable sediment management in storage reservoirs and run-of-river hydropower plants. The initiative has been funded

by the Austrian Federal Ministry of Finance and administered by the World Bank's ESMAP Hydropower Development Facility. It aims to support the work of universities and research institutions, hydropower companies, utilities, manufacturers and consultancies, as well as public sector agencies, multilateral organisations and financial institutions.

International Water Power & Dam Construction

26.01.2021

STORTEMELK SMALL HYDRO PLANT RECOGNISED AS EXAMPLE OF SUSTAINABLE DEVELOPMENT

The Stortemelk hydropower project in South Africa has been recognised as an impressive example of sustainable small hydro development using an industry-leading assessment tool.

The 4.3 MW run-of-river plant developed by Stortemelk Hydro, a subsidiary of Renewable Energy Holdings (REH), achieved global good practice across 10 environmental, social and governance (ESG) performance criteria in the independent assessment.

Commissioned in 2016, the Stortemelk project has received awards for its architecture and environmental performance. The project's

site selection and design have enabled it to avoid significant environmental and social impacts and reduce costs during construction and operation.

"The assessment of the Stortemelk project really showed the power of smart siting and design choices. Because the project was built on an existing dam with a very small footprint, it has low impacts and enjoys broad stakeholder support," explained the project's assessor, Joerg Hartmann.

International Water Power & Dam Construction

28.01.2021

SATELLITE-BASED DAM MONITORING SYSTEM LAUNCHED

Binnies and Rezatec have launched an intelligent satellite-based dam monitoring system, with the strategic partnership combining Binnies' reservoir expertise and digital ecosystem services with Rezatec's Geospatial AI techniques to deliver strategic reservoir safety, operational and commercial benefits. iDMS, a remote monitoring service, uses Geospatial data to pinpoint any movement in the dam's structure, down to a few millimetres of displacement. In addition

to precise movement, satellite data identifies other indicators of problems with dam infrastructure, such as vegetation moisture and vigour, which can signal water seepage. This provides a unique risk management tool that supports and enhances existing reservoir safety best practice, while being both scalable and cost effective.

International Water Power & Dam Construction

IRENA AND IHA PARTNER TO **ADVANCE SUSTAINABLE HYDROPOWER**

05.02.2021

The International Renewable Energy Agency (IRENA) and the International Hydropower Association (IHA) are to work together in a bid to accelerate the development, financing and deployment of sustainable hydropower.

Two organizations signed a formal partnership agreement which sets out their joint ambition. This will involve future policy and

market initiatives aimed at better rewarding hydropower for the clean storage and flexibility services it provides to the energy system. Cooperation will facilitate public-private dialogue, strengthen international cooperation and promote sustainable hydropower through the development and dissemination of knowledge.

International Water Power & Dam Construction

PLANS APPROVED TO EXPAND KRUONIS
PUMPED STORAGE PLANT, LITHUANIA

25.02.2021

Ignitis Group subsidiary Ignitis gamyba has approved plans to expand the Kruonis pumped storage plant in Lithuania and has initiated the first stage of the development – a tender for technical consultation services.

A feasibility study and socioeconomic analysis of the 5th unit of Kruonis was carried out in 2020, where several possible scenarios for expansion were assessed – from modernising the current unit, to installing a new 110–225 MW hydropower unit. After assessing the

needs of the energy distribution system operator and according to the recommendations of the socioeconomic analysis, it was decided that the most reasonable solution was to install a 110 MW hydropower synchronous unit. The socioeconomic analysis found that this solution would be more economically beneficial in the long-term. According to the preliminary assessment, the 5th hydropower unit of Kruonis will commence operations in 2025.

International Water Power & Dam Construction

KEEYASK STATION STARTS GENERATION **AHEAD OF SCHEDULE**

09.03.2021

The Keeyask Generating Station in Manitoba, Canada, has begun producing hydroelectricity six-months ahead of the project's control schedule, with a further six units to be added in the coming months.

The 695 MW Keeyask Generation Project is located on the Nelson River approximately 30 kilometers west of Gillam, in the Split Lake Resource Management Area and within the ancestral homeland of the four partner First Nations.

The Keeyask project has been running ahead of its control schedule by working year-round through sub-arctic winters (down to -40° C), and more recently the pandemic. The Bechtel, Barnard and EllisDon Joint Venture team employed on the project have been using innovative logistics measures and tools, including placing extreme cold weather concrete during the winter months.

International Water Power & Dam Construction

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Kaplan turbines with an installed capacity of 250 kW each set off on a journey to their destination, which is SHP Zabrzeż. Source: Archive of IOZE hydro

A (NON)BRIEF OVERVIEW OF THE IOZE HYDRO BRAND DEVELOPMENT

The history of IOZE Hydro – a company that now provides comprehensive services for hydropower projects – began in rather practical circumstances during the renovation and conversion of a mill into a hydropower plant. It would be hard to find a better origin story for a company that currently provides its services – at various stages of investment processes – to about a dozen SHP facilities every year.

The event that commenced the process of gaining practical expertise in the creation and operation of small hydropower plants was the reconstruction of an old water mill in Wolica, Świętokrzyskie Voivodeship, Poland, which took place 20 years ago. The building, owned by the Kubecki family for decades, was heavily damaged due to flooding in 2001.

PRACTICAL BEGINNINGS

Both the need to rebuild some of the hydro-technical infrastructure and the progressing economic transformation in Poland convinced the owners to convert the mill into a hydropower plant. A Francis turbine – the heart of the facility – underwent a major overhaul, with all of the construction, mechanical and electrical work performed with the owners' resources – and, much of it, literally by the work of their own hands. The formal and legal aspects of the project – including all administrative procedures – were carried out independently by the facility owners, who had been inspired to undertake similar initiatives in the future. Over time, other mill owners began turning to Kubecki family for help and advice on converting their mills into small hydropower plants.

Moreover, the administrative procedures related to commencing SHP operations have started to become increasingly complex and time-consuming as time went on. Mr Michał Kubecki, the owner of the Wolica hydropower plant, recognised the enormous potential of the small hydropower plant segment and established a company to provide specialised design and consulting services for it. His technical education in the field of mechanics, postgraduate studies in the field of RES, experience gained while operating an SHP and working with other investors, as well as active participation in power plant construction – all those elements have become a vital foundation for his good understanding of the entire hydropower plant construction process and the effectiveness of the design services provided. Thus, although Instytut OZE Sp. z o.o. (commonly referred to as IOZE) was formally established only in 2009, its practical and theoretical know-how date back to several years before that.

AN EFFECTIVE BUSINESS DEVELOPMENT STRATEGY

The subsequent years of IOZE's market activity brought even more completed projects. Initially, it primarily focused on sup-

porting local entrepreneurs but it has eventually expanded nationwide.

The project flow of a small hydropower plant construction, reconstruction, or modernisation process is fairly complex. While expanding its market presence, the company often encountered investment projects in which the successful completion of the design stage and obtaining all required construction permits did not necessarily result in the success of the overall project. There were too few construction companies that were affordable and capable of implementing SHP projects properly, whereas the services of large, specialised companies were too expensive for small hydropower plants. The limited accessibility of efficient water turbine technology also posed a challenge as the solutions offered by foreign suppliers were often unaffordable while those of domestic ones did not provide the same performance parameters.

For these reasons, the company owner decided to respond to the existing market need for comprehensive SHP services. The basis of our activity is to ensure the effective handling of the complete investment project, provide highly efficient water turbine

technologies and attain maximum investment project profitability. The RES industry is strictly regulated and the profitability of SHP projects depends not only on the electricity prices but primarily on an optimally designed and constructed SHP system. A good hydropower design features such elements as a water turbine specifically adjusted to local conditions, an optimised hydraulic system (ensuring the maximum electricity output possible), as well as structural and construction solutions appropriate for the scale of the project. All that ultimately determines the construction costs of the complete object. Those issues may seem fairly obvious. However, our experience has shown that in the case of many projects they were not apparent at all. Some projects are directed to our office for optimisation and market study because they fail to allow the investors to get an adequate rate of return on investment.

IOZE HYDRO – A HOLISTIC APPROACH TO BUSINESS

Having observed the development of the hydropower industry and having noticed the deficits of modern and comprehensive approaches to hydropower projects over the years, we decided to establish a brand dedicated strictly to the hydropower industry. The quality of our new brand is a result of a combination of the competencies of a design office, consulting company and general construction contractor, as well as the effects of the ongoing research and development. Working with renowned European and international hydro turbine technology research experts, operating a proprietary Hydroelectric Technology Research and Development Centre and managing the work of an interdisciplinary team of specialists every day enables us to provide investors with tailor-made and cost-effective solutions. We deliver solutions for SHP facilities ranging from the smallest ones generating several watts, up to and including multi-megawatt installations.

Over the years of servicing hydropower investment projects, we have built unique

competencies which allow us to offer investors comprehensive hydropower investment consulting, including supplying proprietary technologies and turnkey construction service one brand – IOZE Hydro.

We want send a clear message that IOZE Hydro is a brand that ensures the best interests of its customers. We efficiently implement the full investment project – from the environmental decision, through the water resource law permit, up to acquiring the construction and occupancy permits. We approach each project responsibly, willingly engaging in the execution of construction works along with the delivery of proven, highly efficient water turbine technologies designed and manufactured to the highest European standards. Any investors who approach us can count on our comprehensive support, not only in terms of concept-making, auditing, design and implementation phases but also in winning sources of funding and providing full maintenance services during the facility's operation.

TURN WATER INTO PROFITS

Among the numerous projects we "reactivated", the SHP Zabrzeż as an example of our business approach. The process of making this project come true is a testament to both our effectiveness and determination in action. Upon meeting with us for the first time, the investor's project had already been going on for 5 years and had virtually stalled. The project criteria assumed in the administrative decisions obtained posed a major challenge for our project team, especially in terms of making it profitable and finding the funding required. The facility had to be redesigned nearly from scratch, even more so, changes in the permits issued by the authorities needed to be made over the course of the following year – everything in order to meet the return rates specified in the businessplan. Despite many difficulties and appeals, a decision issued by the General Inspector of Construction Supervision finally gave the green light for the facility's construction process to commence. Thanks to the efforts of our specialists, a loan was successfully arranged

to finance 80% of the investment project. Today, after 13 months of intensive design, legal, administrative, technological, production and construction works, the project is already in the technological start-up phase. This is an incredible success for the whole IOZE Hydro team involved in the project, but most of all for the investor, whose business concept finally came true. The power plant will be commissioned in just a few weeks and will become part of the power grid. Our commitment made it possible to reduce the investment project payback time by more than 5 years.

PROFESSIONAL SERVICES AVAILABLE TO ANYONE

At first glance, the services of a company that employs more than 80 people, including a specialised staff of designers and site managers, and has its own design office and production space with modern machinery may seem hardly affordable. Nothing further from the truth! Professional and effective services do not have to be expensive. The experience gained during the implementation of dozens of SHP projects – both large, systemic ones as part of public procurement contracts and small ones for private clients – enabled us to build an effective project management system. We apply professional energy industry standards to all projects and we consider each of them individually. Comprehensive project handling is a guarantee that the investment project will be profitable upon its completion. Our ultimate goal is to provide professional and cost-effective services to any hydropower market company. Regardless of the project stage at which you decide to begin a cooperation with us, your investment project is bound to pay off if you do so.

We encourage anyone who expects professional advice, as well as up-to-date knowledge on the market, technologies and legal regulations to contact us anytime. IOZE Hydro is always happy to share its knowledge and assist in SHP project development.

IOZE hydro in numbers

- 86 full-time professionals
- PLN 24 million in funding obtained for SHP construction
- More than 8,000 locations in Poland evaluated for SHP development possibilities
- 80 construction permits obtained in the last 5 years

IOZE
hydro

Łukasz Kalina
Development Department
IOZE hydro
www.ioze.pl

NEW PUBLIC PROCUREMENT LAW – ASPECTS IMPORTANT FROM THE CONTRACTORS' PERSPECTIVE

The new regulations on the procurement procedure not only have established a number of new solutions but have also considerably modified the existing ones. The legislator has introduced a lot of simplifications that enable contractors to compete for public contracts.

The purpose of the new public procurement law is to increase tender competitiveness by making the procurement market accessible to a larger number of entities, including contractors running small and medium-sized enterprises, such as entities from the hydro-engineering and hydro power industries. Below we present changes that are most important for contractors participating in public tenders.

BID BOND – SMALLER AND NON-OBLIGATORY

One of the crucial changes under the new public procurement law is that demanding a bid bond from contractors wanting to participate in a tender is no longer obligatory. Contracting authorities may decide themselves whether or not contractors should provide a bid bond document. Importantly, the new regulations limit a contracting authority's discretion as to the bid bond amount. The legislator has provided that for domestic tenders a bid bond cannot be higher than 1.5% of a contract net value, whereas for EU tenders a bid bond cannot exceed 3% of a contract net value.

PERFORMANCE BOND – LOWER THRESHOLD

Another important change made to respond to contractors' needs is a lower value of

a performance bond. Under the previous regulations, contracting authorities could demand contractors to provide a performance bond for an amount of up to 10% of a bid price. The new public procurement law lowers this limit and stipulates that the bond value may not be higher than 5% of a total price indicated in a bid or a maximum nominal value of a contracting authority's obligation under a contract. The legislator has not introduced any more radical changes in terms of the performance bond, however it has provided for grounds allowing a contracting authority to demand a higher bond (up to 10% of a price). This will be possible only if it is justified by a contract subject-matter or due to a risk relating to the contract performance. If a contracting authority wants to obtain a bond higher than 5% of a total bid price, it must justify its decision in the Terms of Reference or other tender documents.

GROUND FOR EXCLUSION FROM THE PROCEDURE – NEW RULES

In the new public procurement law the legislator has changed the catalogue of grounds for excluding a contractor from a tender procedure. Under the new regulations the exclusion grounds are still divided into obligatory and facultative ones. The obligatory and the

facultative exclusion grounds are governed in article 108 and 109 of the amended act, respectively. However, under the new provisions, a number of the obligatory grounds has been moved to the catalogue of the facultative ones. For instance, the legislator has turned the exclusion ground regarding the provision by a contractor of untrue or misleading information as to the fulfilment of a requirement to participate in the procedure, bid assessment criteria or grounds for exclusion, into a facultative exclusion ground. Accordingly, unlike in the case of the previously obligatory examination of the exclusion grounds relating to the potential provision of misleading information, under the amended act the information that a contracting authority will verify this exclusion ground must be provided in the Terms of Reference.

A novelty when it comes to the exclusion grounds is the long-term consequences of the exclusion (with particular focus on a possible future exclusion of contractors providing untrue information). Article 111 of the new public procurement law provides for within what periods the exclusion grounds specified in this provision remain valid for future tender procedures. Periods for which a contractor may be excluded from tender



Source: www.pixabay.com, Paul Brennan

procedures vary depending on the exclusion ground, and can last from 1 year (in the case of the facultative exclusion ground regarding the provision of misleading information) to 5 years (for most of the violations indicated with respect to the obligatory exclusion grounds). To increase the chances of a contractor for which one of the facultative exclusion grounds may arise, the legislator has provided for a mechanism of verifying the exclusion proportionality. This means that with respect to specific situations verified in terms of the facultative exclusion grounds, a contracting authority does not have to exclude a contractor where such exclusion "would be obviously disproportionate".

BID VALIDITY PERIOD

Contractors competing for a public contract in accordance with the new public procurement law should also be aware of important

changes regarding the bid validity period. First of all, they should keep in mind that the bid validity period for tenders with a contract value the same as or higher than EU thresholds has been extended. Under the previous regulations, this period was 60 and 90 days, respectively. Now, contractors' bids will be valid for 90 and 120 days (the 120-day period applies for construction contracts whose value equals or exceeds EUR 20,000,000, and for supplies or services contracts whose value equals or exceeds EUR 10,000,000). Also a new regulation has been introduced under which a contracting authority, when determining the bid validity period, must specify not only the duration of this period but also an actual date (a calendar date) until which the bids are valid.

The legislator has also regulated the extension of the bid validity period. Under the

new provisions, the bid validity period can be extended only on a contracting authority's initiative (pursuant to the practices shaped based on the previous regulations, a statement of the bid validity period extension could also be submitted by a contractor). It is worth mentioning that even if the bid validity period lapses, a contracting authority may still select the most advantageous bid. However, to do so, under article 252(2) of the new public procurement law a contracting authority must request a contractor whose bid was assessed best to give its written consent to the selection of its bid within a time limit set by a contracting authority. Accordingly, the lapse of the bid validity period does not negatively affect the possibility of obtaining a contract by a given contractor. As a matter of fact, after the end of the bid validity period, contractors are free to decide whether they still want to partici-

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pate in a tender procedure and to conclude an agreement conforming with their bids.

MEANS OF LEGAL PROTECTION – ONE COURT FOR PUBLIC PROCUREMENT MATTERS, CASSATION APPEAL

Generally, under the new public procurement law the catalogue of legal protection means remains the same. Contractors may still appeal to the National Appeals Chamber and file an appeal against the National Appeals Chamber's judgments to a regional court. However, there is a number of changes regarding certain means of legal protection, seeking to clarify and facilitate the appealing process. There are no revolutionary changes in the appeal procedure before the National Appeals Chamber itself, however, under the new regulations it is possible to appeal against in fact every action taken (or omitted) by a contracting authority in a tender procedure. This is particularly important for procedures with a contract value below the EU thresholds where only some of a contracting authority's actions could be appealed against before.

More important (and advantageous to contractors) changes can be noticed when appealing against judgments issued by the National Appeals Chamber. A change that certainly may positively impact the number and the scope of appeals against the National Appeals Chamber's judgments is the time limit for lodging an appeal. The legislator has extended it from 7 to 14 days, and the jurisdiction of the regional court competent to examine appeals against the National Appeals Chamber's judgments has been changed permanently. Under the new public procurement law contractors will file appeals against the National Appeals Chamber's judgments to one regional court, namely the Regional Court in Warsaw designated in the provisions as "the court for public procurement matters".

Before the amendment, a contractor who wanted to challenge a decision of the National Appeals Chamber had to reckon with a high appeal fee. It equalled 5 times the fee for accepting an appeal for examination (accordingly, for tenders above the EU thresholds, it was PLN 100,000). As the appeal procedure was less accessible due to a high appeal fee, this fee has been reduced to 3 times the fee for accepting an appeal for examination (which comes to PLN 60,000 for procedures above the thresholds).

A brand-new regulation is the possibility to file a cassation appeal against the regional-court judgment to the Supreme Court. Under the previous provisions, only the Head of the Public Procurement Office was entitled to file a cassation appeal. Now, also the parties to the appeal proceedings may lodge a cassation appeal.

CONTRACT PERFORMANCE – BALANCED POSITION OF THE CONTRACTOR

In the new public procurement law the legislator has also ensured that during the performance of a public contract the parties (in particular a contracting authority) are bound by the statutory regulations. So far, contracting authorities were free in formulating contract conditions. This often resulted in contractors' liability on which they had no influence. Therefore, the legislator has introduced to the act the so called abusive clauses (prohibited clauses) seeking to restrict contracting authorities in stipulating contractual provisions unfavourable to contractors (i.a. prohibition to provide for contractual penalties for a non-culpable delay, prohibition to stipulate contractual penalties for a contractor's conduct not directly or indirectly connected with the contract subject-matter or its proper performance, prohibition to formulate contractual provisions that provide for a contractor's liability for circumstances for which a contracting authority is exclusively liable).

Under the new provisions, contractors performing high-value contracts (especially from the hydro-engineering industry) will also be allowed to index their remuneration. This concerns contracts concluded for longer than 12 months, for construction works or services. These agreements will include provisions regarding adjustment of a contractor's remuneration for the event of an increase in the materials prices or costs of the contract performance.

For public contract agreements concluded for a period longer than 12 months, another privilege for contractors has been introduced, namely payment of a remuneration in parts (advance payments). The new public procurement law obliges contracting authorities to pay a remuneration in parts after the completion of a contract part or to make an advance payment in the case of agreements concluded for a period longer than 12 months.

The legislator expressly stressed the importance of parties' balanced rights and obligations for the proper operation of the regulations regarding the performance of a public contract. This is shown in the explicit statutory obligation imposed on contracting authorities and contractors to cooperate with each other in the performance of a contract. However, without doubts the aim of the cooperation obligation is to increase the involvement of a contracting authority in the contract performance. A contracting authority should actively participate in the performance process, and together with a contractor strive for the proper completion of a contract.

SUMMARY

The new public procurement law has been in force since 1 January 2021. The amendment has introduced many changes favourable to contractors who want to actively participate in tender procedures. A number of modifications can be considered positive. The provisions have become clearer and more favourable to tender procedure participants, which may translate into better functioning of the entire public procurement system. Certainly, the direction of the changes is right, and the modifications genuinely increase contractors' chances to take part in tenders. Nevertheless, new regulations mean new interpretation of provisions and their application. Therefore, how the new regulations will operate, depends on tender procedure participants.



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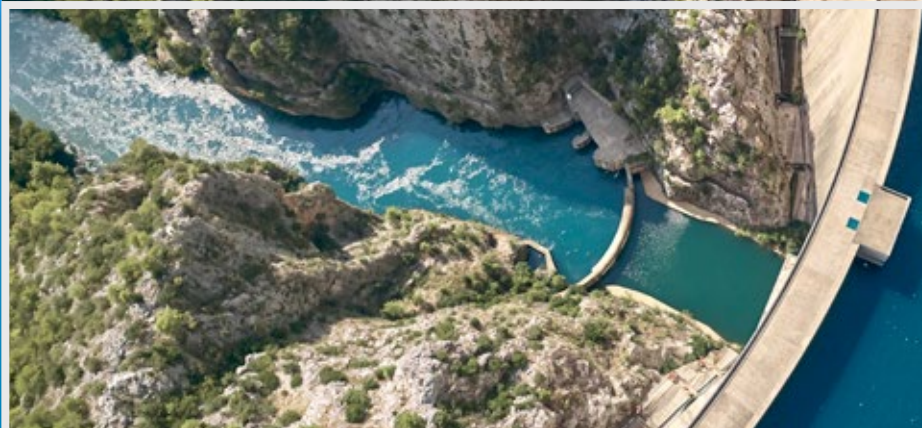


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AMENDMENT OF THE ENERGY LAW AND **THE ACT ON RES**

The approaching implementation date of the EU Directive on promoting use of energy from renewable sources, commonly known as RED 2, has resulted in intensifying work on changes to the current legislation on renewable sources. That Directive focuses attention on supporting decentralized production of electricity, and promoting pro-consumer and cooperative models of generation.

The intensive implementation works overlap the long-standing appeals to adjust regulations to dynamically changing reality. Particularly clear in the public sphere were appeals to adapt the legislation to the challenges posed to the distribution systems by uncontrollable production of electricity from renewable sources, and the dynamic increase in installed capacity and falling costs of storing electricity. The multitude of areas that have undergone changes mean that the amendments to do with those issues have been divided into several autonomous legislative processes.

THE TURBULENT FATE OF HYBRID SOURCES

Currently, hybrid RES installations are defined by the cooperation of renewable sources of different types and features of availability (controllable and uncontrollable, e.g., a hydropower plant equipped with PV panels), and none of them can be responsible for more than 80% of total installed capacity, with total capacity factor of 40%.

In the first version of the amendment to the definition, which is in the draft government bill amending Energy Law and other acts of December 3, 2020, it was proposed to extend it to an installation of a renewable

energy source together with a storage of electricity cooperating with it. The storage facility would need to feed power to the grid at a level of at least 40% of the installed capacity in that system for at least 4 hours.

The proposed change were a response to the appeals of mainly operators of distribution network ("DSOs") because of the growing installed capacity of uncontrollable RES (in particular photovoltaic power plants) which contributed to an increase in destabilization of distribution grids forcing operators to invest in costly adaptation of grids.

As a result, it was expected to redirect the interest of developers from the photovoltaic basket to a hybrid basket. These trends have been strengthened by the anticipated change in reference prices for hybrid installations. The regulation on the maximum amount and value of electricity from renewable energy sources that can be sold on auction in 2021 provides that reference price is to be increased in the proposed regulation on reference prices for 2021 from PLN 410 / MWh up to PLN 595 / MWh and from PLN 415 / MWh to PLN 615 / MWh, respectively, for installations having an installed capacity of more than 1 MW and smaller. As a result of an amendment tabled in the course of parliamentary work on

January 8, 2021, the original proposal was changed. The new definition provided that a hybrid RES installation was to be a set of sources having different types and features of availability that are connected to a storage of electricity, with CP increased from 40% up to 60%. That change put into question the government's declarations of supporting the self-balancing of non-controllable sources because it excluded from the hybrid auction mix installations composed only of non-controllable renewable energy linked to a storage facility. Therefore, the main beneficiaries of the mentioned change would be new hydropower plants because after adding photovoltaic panels and an energy storage, they would "leap" to a basket with an expected higher reference price; respectively, from 535 to 595 PLN / MWh for greater and equal 1 MW and from 560 to 615 PLN / MWh for smaller sources. All those plans, to the complete surprise of observers of the legislative process, were, however, withdrawn in the next version of the bill that was published in March, two months later. As a result, the amendment, if it remains unchanged, will not change the situation of hybrid RES installations. However, the dynamics of making further changes to the bill means that it is possible that the problematic definition will be updated further.



Source: DrAfter123, iStock

NEW SOLUTIONS FOR ENERGY COOPERATIVES

The mentioned amendment to the Energy Law requires a DSO to install remote meters that are connected to a remote metering system at grid connection points. The amendment provides that DSOs are required to equip at least 80% of the total number of grid connection points at end users by the end of 2028. The operators are to bear the costs of installing the meters and decide the order in which to install them at end-users'.

The legislator made an exception for producers of electricity belonging to energy cooperatives by permitting them to independently apply for the installation of a remote meter that enables the meter to communicate with an end-user device and equip a charging point belonging to a member of an energy cooperative with a meter. The DSO will have 4 months to

install a meter, 2 months to enable the meter to communicate, and one month from the date of submitting the application to equip the charging point. However, that will be combined with the need for a member of an energy co-operative to bear the full costs of installing these meters (the DSO will still have to pay the cost of enabling the remote reading of the meter to communicate with the devices of the recipient who is a member of an energy co-operative).

There is also no limit for members of an energy cooperative by which one end-user DSO can install meters at grid connection points which are a maximum of 0.1% of the total number of points belonging to the network. The amendment also abolishes the obligation on a cooperative to obtain a license to sell electricity or gas as part of the activities for all members. The principle of exempting an energy cooperative from the costs of accounting and distribution of

energy produced has also been made more specific. Pursuant to the amended provision both energy fed into a grid, subject to the discount system and energy produced and used for own needs by members of the cooperative are to be exempt from the mentioned charges.

CHANGES TO THE FIT AND FIP SYSTEMS

In the bill amending the Act on renewable energy sources and some other Acts (of July 29, 2020, taking into account the changes to the bill on January 27, 2021), the rules on the periods of support granted under the FiT and FiP mechanisms for producers of renewable energy in power plants were changed for biogas and hydropower plants having an installed capacity of less than 2.5 MW and biomass power plants having a capacity of less than 1 MW. The proposal of the legislator is that a maximum period of operation of the support system for these installations is to be extended by



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8 years and will last until June 30, 2047. At the same time, the time to enter the FiT / FiP system was extended to June 30, 2024, and in the event of a positive decision of the European Commission on the compatibility of state aid and the internal market, the time to enter the system will be until December 31, 2027.

An additional, specific "bonus" was granted to the owners of hydropower and biogas installations having a capacity of no more than 1 MW that were granted certificates of origin. If they were issued for a period equal to or longer than 5 years, the support from the FiT / FiP system can be extended to 17 years. Importantly, under transitional provisions, additional support is provided for both producers who migrated to the FiT / FiP system and those who remained in the green certificate system and in the auction system. It is also foreseen for those instances when whereby the 15-year support period has expired and the installation is no longer in the support system. At the same time, further proposed changes to the regulations regarding the FiT and FiP support system were included in the bill amending the Energy Law and some other Acts of December 3, 2020. It was specified there, first, that the regulations on the sale of energy in the FiT / FiP system by installations having a capacity of less than 500 kW at a fixed price of 95, and not 90% of the reference price, which remained in suspension pending the EC notification decision, will be suspended. In addition, a transitional provision has been introduced to clarify the application of the increased 95% multiplier to installations that received a certificate or submitted a declaration before the entry into force of the provision with the new multiplier.

FACILITATION FOR DEVELOPERS OF RES INSTALLATIONS OF UP TO 1 MW

A revolutionary change in the renewable energy market is the extension of the definition of "small renewable energy installation" to include installations having a capacity of more than 500 kW, but not more than 1 MW. This change will also apply after the adoption of the draft amendment to the RES Act of July 29, 2020. As a result, those installations will be released from the obligation to be licensed, and the licenses already granted to such entities will be converted into an entry in the register of energy producers in small installa-

tion. It is worth noting that such installed capacity dominated in the so-termed photovoltaic mix and it is these installations that are responsible for the unprecedented increase in installed capacity in that technology. The legislator, therefore, complied with the long-term appeals of the owners of installations who succeeded in RES auctions in previous years. The relatively short time from an auction, in which the devices had to produce electricity for the first time, despite the increase in that period from 18 to 24 months, meant that some developers reported significant difficulties in complying with the obligation. It was also emphasized that that requirement discriminates against RES installations because the concession obligation for conventional sources applies only to installations having an installed capacity of 50 MW, and more. Therefore, the change can be taken to be rational and desirable.

The amendment also includes the very definition of installed capacity. So far, it has functionally resulted from the provisions of the RES Act, but the different features of energy sources sometimes resulted in inaccuracies in understanding it. Therefore, the legislator decided to add a statutory definition. After the amendment enters into force, the installed capacity of electricity of a renewable energy source installation will mean for users of biogas, or agricultural biogas, ...specified by the producer of a set of devices used to generate electricity – generating sets, on the identification plate, and in the absence of it, the rated active power of the set determined by an accredited body of the Polish Center for Accreditation ", and for other sources...the total rated active power given by the manufacturer on the rating plate of a generator, photovoltaic module, or fuel cell . Those changes harmonize with the common and intuitive understanding of the concept and it should be agreed that that refinement will help to dispel doubts that arise in practice. The changes resulting from the adoption of the mentioned Act will come into force 14 days after the date of it is announced.

VOLUME OF PLANNED AUCTIONS SET FOR THE NEXT 5 YEARS

So far, volumes specifying the quantity and value of energy to be contracted in auctions have been shown in one-year periods. The legislator wants to ensure a stable investment perspective for private entities and

has decided to define 5 years in advance the volumes to be contracted in auctions. The first such schedule is to be announced in the regulation for the calendar years 2022 - 2027. The value and amount of energy under the planned support will not be able to be reduced which is meant to provide predictability of development trends in the RES sector in Poland. The provision on the obligation to issue that regulation will enter into force on June 1, 2021.

REVOLUTION IN POWER EXCHANGE

The dynamics of changes in the Energy Law significantly accelerated on January 26, 2021 when the Ministry of Climate and Environment sent for public consultation another bill to amend the Energy Law (bill amending Energy Law and the Act on renewable energy sources of January 22, 2021). The bill abolishes the requirement to sell the generated electricity on the Polish Power Exchange (the so-termed power exchange obligation). The obligation, relating to all energy sold entered into force on January 1, 2019 and replaced the requirement to sell at least 30% of the energy on the Polish Power Exchange. It was intended to increase transparency on the electricity market and stabilize prices for end users. The authors of the bill state that the stock exchange obligation has fulfilled its task, i.e., limiting the market force of producers and facilitating third party access to the market. Moreover, as indicated by the Ministry of Culture and National Heritage, the order to use TGE limited the freedom of contracting entities to participate in the market and, thereby, resign from it...creating the possibility to sell electricity at individual prices lower than the marginal price, for example, as part of the implementation of long-term market strategies." It is, however, somewhat impossible not to take the decision to be kowtowing by legislators to the lobbying of producers of energy in conventional and high-emission units which are less competitive than producers of energy from renewable sources. The exchange obligation will finally disappear from Energy Law 30 days after the mentioned Act enters into force.

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POST-BREXIT TRADE WITH GREAT BRITAIN HAS CHANGED SIGNIFICANTLY

On December 31, 2020, the transitional period related to the so-called Brexit finally expired, and Great Britain officially ceased to be a member of the European Union and the European Economic Area. The change was revolutionary and completely remodeled the rules of taxation and customs duty on transactions conducted between London and the EU. Polish companies already feel the outcome.

As a word of reminder, for a long time we have heard about the danger that UK would leave the EU without concluding a trade agreement. This would mean, inter alia, a painful revolution in the field of tax and customs clearance. Trade in many industries could be even paralyzed. However, on December 24, 2020, the trade agreement was concluded, and soon we have found the optimistic information that in fact almost nothing will change in 2021. Such messages turned out to be greatly exaggerated.

Why? Mostly, because the agreement of 24 December 2020 did not guarantee both parties an automatic right to benefit from a zero rate of customs duty. Tax settlements, which have already changed significantly, had been further complicated by the Northern Ireland protocol, which had become an integral part of the trade agreement. What is it of practical importance for Polish entrepreneurs who are present on the British market?

A ZERO TARIFF MUST BE FOUGHT

First of all, goods that they sell to Great Britain or goods imported from UK will only avoid customs duties if their origin is properly documented. Under current rules it is possible to import duty-free products only if they have been entirely manufactured in the territory of a given party or those that meet the specific requirements set out in the contract. In the first case, it is a product entirely made of EU or British components in the territory of one of the parties. In the second scenario, the preferences apply to goods that, although produced with the participation of non-EU countries (e.g. China, Australia, Russia, Ukraine or the USA), other factor prevails. We take into account how the goods were processed or where they were processed, as well as from where most of its components come from. Both the UK and the EU have already published official guidelines to help entrepreneurs comply with the customs rules of origin of goods.

Tab. Zero-rate rules for goods sold to Great Britain

GOOD	DUTY FREE
Imported into EU from Australia and then sold to Great Britain	Not applies
Imported from Russia and subjected to a change in structure or appearance in the territory of EU	Not applies
Manufactured in EU territory from Chinese, Russian and EU components with the largest shares of the last category	Applies
Manufactured in the EU territory from Egyptian, Chinese and Russian components with the largest shares of the last category. Despite produced in EU will not be labeled as EU product	Not applies

Source: Own study

The rules of origin of goods are much more complicated than in the described example, hence it is advised for entrepreneurs to analyze their assortment on their own. Mostly in terms of the content of guidelines published by the EU and British parties.

To label properly the origin of goods is just the beginning. Another condition for the application of a zero duty rate is that the exporter submits a statement on the origin of the goods, which should be done on an invoice or other document detailing the goods covered by the statement. The declaration may be filed retroactively up to three years after the transaction. Any exporter can submit them if he sells goods whose value does not exceed PLN 6,000 euro. If the limit is exceeded, the declaration should contain a reference number that will confirm the exporter's registration in the REX system (registered exporter system). In exceptional cases, the importer may also confirm, in the customs declaration that, to the best of his knowledge, the imported goods have an origin that allows for a zero duty rate.

SALE OF GOODS

Changes also apply to VAT settlements, both in the case of the sale of goods and the provision of services to Great Britain, as well as their import. In the first case, a Polish entrepreneur who wants to sell goods to the Brit-

ish Isles should first determine whether his recipient is based in Northern Ireland. If the answer is positive, he will be still able to settle the transaction as before, as an intra-community supply of goods (i.e. according to the same rules as for example for trade with Germany or France). If the recipient of the goods is based, for example, in Wales, the transaction must be treated as an export of goods for VAT purposes.

This means that the application of the 0% VAT tax rate will be possible after obtaining customs documents confirming the export (export of goods outside the territory of the EU).

TAX OBLIGATION AND FOREIGN VAT

The seller of the goods must also remember that the moment when the tax obligation arose on the basis of VAT already changed in 2021. In the case of export, it arises basically at the time of delivery of the goods, except when the Polish entrepreneur receives all or part of the payment in advance.

Another surprise is that the UK goods and services tax is no longer treated as an EU VAT tax. This means that Polish tax offices will most likely start recognizing VAT due in Great Britain as the seller's Polish income, and the tax charged on invoices received from abroad as tax deductible costs (except

for situations where such tax is still recoverable). Most entrepreneurs are not yet aware of this danger and there is no clear position of the Ministry of Finance on this subject.

... CHANGES IN THE BILLING OF SERVICES

Different rules apply to the provision of services. In this case, the entire territory of Great Britain is treated as a third country. What does it mean? An entrepreneur providing services in Great Britain should first determine the place of their taxation pursuant to Art. 28a - 28o of the Value Added Tax Act (i.e. Journal of Laws of 2020, item 106, as amended). Those regulations will determine whether the tax should be paid in Poland or in Great Britain. The biggest changes in 2021 mainly concern services provided to consumers.

As a general rule, in such a case, the tax should be paid in the country where the service provider has his registered office or permanent place of business, i.e. in Poland in our case. The exception applies to the services specified in Art. 28l of the VAT Act, because in their case VAT will be due in Great Britain. It goes, among others for services;

- sale, transfer and assignment of copyrights, licenses or sub-licenses, etc. ;
- advertising;
- advisory, engineering, legal, accounting and similar to those described;
- data processing, information provision and translation services;
- delivery (staff secondment).

IMPORT WILL HIT THE POCKET

Other regulations concern importers of British goods into Poland. From January 1, 2021, they have to pay VAT on imports. In this case, the taxable amount will be based on the customs value of the imported goods, increased by the duty due, and in some cases also by the excise duty (Article 30b (1) of the Goods and Services Tax Act).

In principle, the importer should calculate the amount of tax and pay it to the tax office within 10 days from the date of notification by the customs authority about the amount of tax. Then, importer can deduct such a tax, but he is entitled to deduction only in the VAT declaration submitted for a given period. Therefore, it bears negative financial consequences of the changes. The exception applies to companies that meet

the conditions set out in Art. 33a of the Act on tax on goods and services, including those with the status of an authorized entrepreneur (AEO). They can settle the tax due and charged in the same return.

SUMMARY

The end of the Brexit transition means a real "earthquake" for all companies trading with the UK. The effects of the changes were partially limited by the agreement signed on 24 December 2020. The reassuring statements in the media that the changes would be small were not true. First of all, the sale and import of goods from Great Britain requires the correct determination of their origin, because only in this case the entrepreneur is entitled to a zero duty rate, and thus will save huge amounts. Even more changes concern VAT, where the rules differ depending on whether it is the sale of goods or the provision of services, as well as on where the recipient is located. Entrepreneurs trading with the UK should be aware of this.

Mariusz Szulc
PhD in law, journalist
Dziennik Gazeta Prawna

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Fig. 1 Visualisation of the hydrotechnical system at the damming weir on the Orzyc river

HYDROTECHNICAL INVESTMENT PROJECT IN MAKÓW MAZOWIECKI

The city of Maków Mazowiecki, Poland, will soon gain not only new recreational facilities for the existing reservoir and its adjacent areas but also a hybrid system to generate electricity from renewable sources. The energy generated by the small hydropower plant, photovoltaic system and mini wind turbine will be fed into the power grid. By implementing this investment project, the prosumer concept will be put into practice and both the Town and the Maków Commune will make their first step towards energy independence.

The idea of using the Orzyc river in Maków Mazowiecki for hydropower purposes dates back to a similar concept from several decades ago. The new small hydropower plant featuring a modern spatial form will be built on the left bank of the Orzyc river, opposite a small hydropower plant building from the 1920s. It is worth noting that this SHP is not the only such project that is planned to be constructed on the Orzyc river. A few kilometres downstream, in Smrock-Dwór, there is another facility that is more than a century old and has recently been modernised and expanded to increase its production capacity. As such, despite its lowland nature, the Orzyc has long been a "busy" river thanks to its hydropower resources that have been generating

electricity for decades. The planned facility will simply be a continuation of this area's standard economic practices.

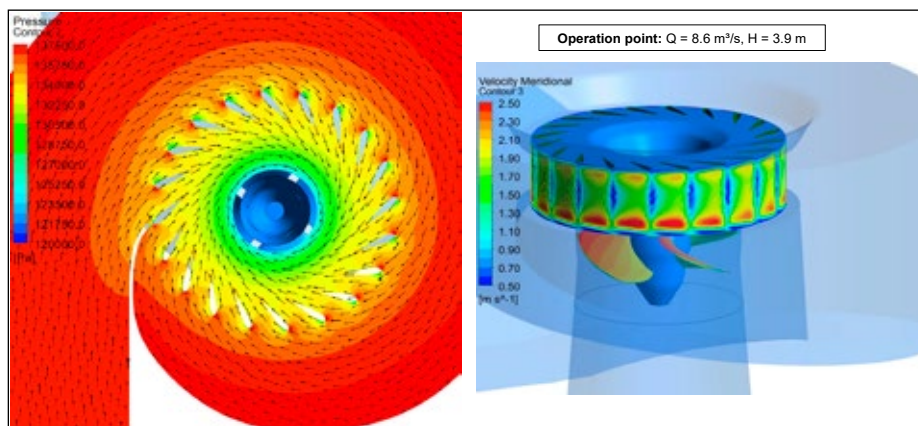
RUINED HYDROTECHNICAL INFRASTRUCTURE TO REGAIN ITS ORIGINAL FUNCTION

The investment project's technical concept assumes the reconstruction of the weir on the Orzyc river by partial demolition of its existing components, including the footbridge above it, and construction of a rubber weir with a total clearance of approximately 20.7 m. Such a device, which typically features a rubber shell attached to a fixed weir that can be filled with air or river water, makes it possible to dam up water at a specific height, similarly to gate and flap weirs. It

is also a simpler and less expensive solution that still fulfils its function well. At the same time, in the case of areas with a particularly high flood risk – including those surrounding the Orzyc river and the weir's construction site (according to the ISOK maps) – it is crucial to ensure that the dammed water can be released quickly and enable the safe passage of floodwaters.

At the new hydropower plant, the river flow energy will be processed by two classic vertical Kaplan turbines with a generator output of 55 kW each. The Kaplan turbine technology selected for the site is characterised by high efficiency and low failure rate, which results in stable and uninterrupted electricity generation for such facilities as SHPs.

Fig. 2 Visualisation of the results of a Kaplan turbine CFD analysis conducted using specialised ANSYS software



Thanks to the use of Computational Fluid Dynamics simulation results (Fig. 2) obtained using specialised ANSYS software, the designed turbines will enable optimal water flow through the generating system (this includes using a rotor with an adjustable pitch and guide vanes, which makes it possible to direct the water jet and control the turbine's flow rate). The hydraulic efficiency of the entire system (inflow, steering system, rotor, intake pipe) will exceed 92%.

The manufacturing technology of key hydropower system components is vital to ensure that the turbine achieves its designed efficiency parameters under real operating conditions. The rotor blades and guide vanes will be cast from high-quality stainless steel and then machined using an advanced 5-axis OKUMA machining centre. The assumed quality parameters, including the shape of the specific components, Ra 1.6 surface roughness and material property assessment, will be confirmed by tests under such quality control procedures as non-destructive

testing (magnetic particle inspection, penetrant and ultrasonic testing), as well as measurements using a measuring arm and FARO laser scanner. The results of the tests will be collected and included in a measurement report.

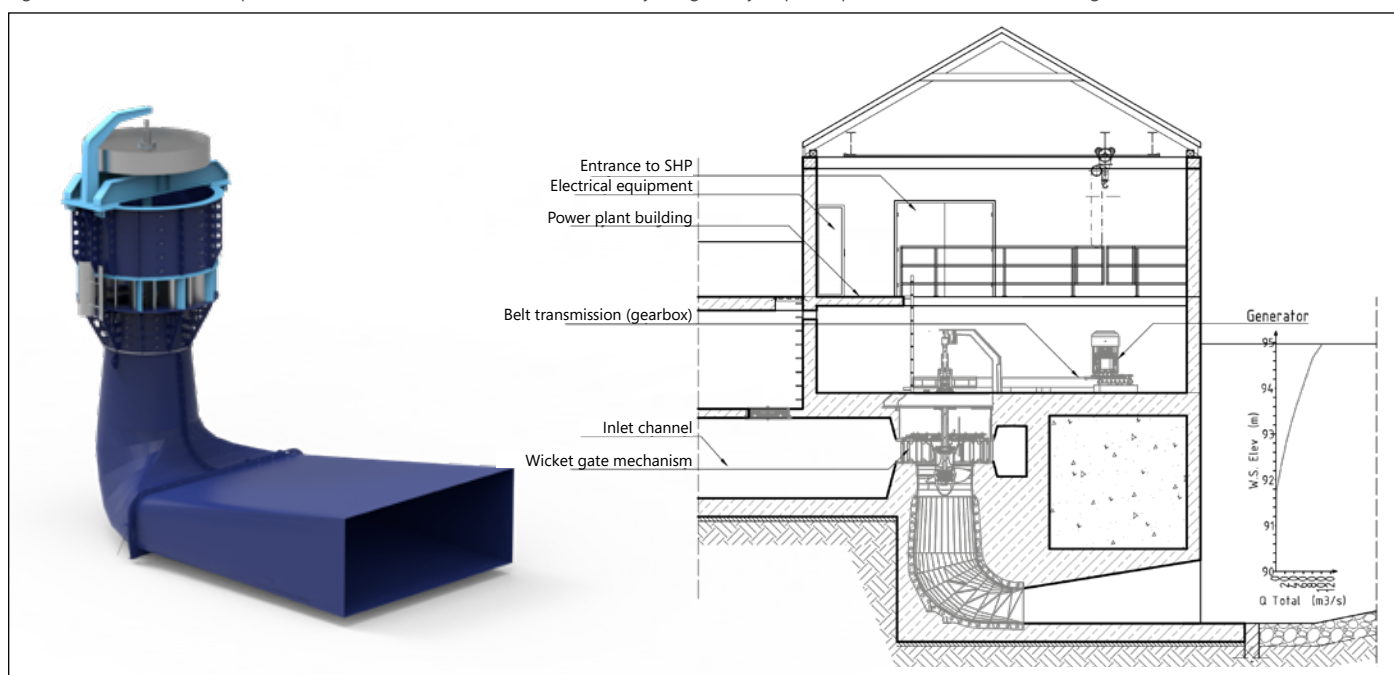
The SHP (Fig. 3), the photovoltaic and wind power systems to be located in the project area, and the pumping station (now being refurbished) that directs the water supply to the tank will all be connected to a single Supervisory Control And Data Acquisition (SCADA) system that will be designed and created specifically for this investment project. The system will make it possible to visualise each source's energy production purpose as it will be possible to view the SCADA system data on the screen of any multimedia device.

To comply with the environmental requirements related to ensuring the biological flow

capacity of the watercourse (imposed by such regulations as the Water Law), a vertical slot fish pass will be constructed at the SHP to enable two-way migration of aquatic organisms (upstream and downstream).

Apart from actions aimed at creating a new source of renewable energy and restoring the biological continuity of the Orzyc river, the scope of the investment project will also include works aimed at regulating and strengthening the river banks near the hydropower system, construction of a French drain system on the right riverbank, as well as the construction of a drainage system in the nearby Sapper's Park. The latter is required due to the way the watercourse affects the adjacent areas, which results in high groundwater levels in certain periods or outright flooding (as a result of rainwater downflow and snowmelt, among others). The existing ditch in the central area of the Sapper's Park will be renovated and expanded; additionally, a surrounding drainage ditch will also be built along with all accompanying infrastructure to enable the removal of excess water and its discharge into the Orzyc river. These actions will make it possible for the Park to retain its recreational function. The recreational value of the hydropower plant's area will be further enhanced thanks to the planned expansion of the earth embankments on both the right and left riverbank, along with the construction of the accompanying infrastructure in the form of lighting installations, stairs and street furniture. Ultimately, the surroundings of both the weir and the SHP itself will

Fig. 3. Visualisation of the Kaplan turbine (left) and its location within the newly designed hydropower plant in Maków Mazowiecki (right).



become a new open area in Makowo's urban space, accessible to residents for recreation and leisure. The site's educational value is no less vital, as it will allow anyone to see first hand how modern technology makes it possible to generate electricity in an environmentally friendly fashion.

A RESERVOIR ADAPTED TO THE LOCAL RESIDENTS' NEEDS

The comprehensive hydropower investment project in Maków Mazowiecki will also include several actions aimed at increasing the recreational values and improving the retention functions of the existing reservoir as part of initiatives undertaken by public sector units to counteract the threat of significant water shortages.

The 17-hectare reservoir was created in the 1970s in the old riverbed of the Orzyc river and is used for recreation purposes, including fishing and water sports. As of today, due to the lack of comprehensive maintenance works and significant silting-up of its bottom, the average depth of the reservoir has been determined to be 1.7 m while its maximum depth is about 2 m. The investment project undertaken by the Maków authorities

includes dredging the reservoir basin, providing a permanent supply of water thanks to such actions as renovating the existing pumping station, as well as improving the tourist potential of the area around the reservoir. The tourist development of the area will include constructing a pedestrian and bicycle path around the reservoir, a wooden viewing platform, a slipway for boats and angling piers, as well as expanding the existing beach, creating separate sports and recreation zones, building a car park and constructing a fountain in the southern part of the reservoir (apart from serving as a decoration, it will also help mix and oxygenate the reservoir's waters).

Since access to a common public space not only encourages the residents to meet, communicate and generally recreate but also shapes the image of the town and promotes proper behaviour models while also setting their limits,¹ the Maków authorities were interested in an investment project that

¹ Sikorska P. 2010, Przestrzeń otwarta miasta pod presją rozwoju – przyczyny zjawiska i kierunki działań naprawczych – przypadek Mazowsza (The open space of a city under development pressure – causes and directions of remedial measures – the case study of Mazowsze). MAZOVIA Regional Studies No. 5/2010

would be able to integrate the city's various needs. These needs are determined by both social (the need for a high-standard leisure and recreation zone in the town) and economic factors (the project should be affordable so as not to burden the town budget in the long run), as well as investment project feasibility and the current legal and administrative conditions (obliging local governments to carry out actions aimed at increasing the share of RES in the overall energy mix and improving the retention capacity of the existing hydrographical systems to prevent water shortages).

A SMART WAY TO REACH THE GOAL

To meet the above criteria, a decision was made to implement a comprehensive hydro-technical investment project using the "design-build" system. This system makes it possible for the construction works contractor to predict any potential difficulties that may occur during the investment project as early as the pre-design stage. Not only does this increase the chances of the investment project being successful, but it also expedites its completion. The formal and legal part of the project began with the conceptual work that is still in progress, with a Permit required under the Water Law having recently been obtained based on the developed Water Quality Impact Assessment and water management instructions. Subsequently, a construction and design project will be developed and all analyses and expert reports needed to acquire a building permit and commence construction works will be obtained.

The general contractor of the Maków Mazowiecki investment project is IOZE Hydro, which offers comprehensive consulting in the field of hydropower plant investment projects, including the delivery of proprietary technologies and turnkey construction.

IOZE
hydro

Wioleta Smolarczyk
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The graphics come from the archive
IOZE hydro

Tadeusz Ciak, mayor of Maków Mazowiecki, on the investment project

The motivation for undertaking this project was multi-dimensional. On the one hand, it is about the pro-environmental approach that is close to our hearts, as environmental protection is the responsibility of public authorities. Run-of-the-river power systems provide one of the cleanest ways to generate electricity; it is good for the public to be reminded about it first hand. As a local government, we wish to make a significant contribution to the fight against climate change and fulfil the commitments included in our strategic studies. Nonetheless, every investment project is determined by its financial impact, hence the idea that it should also provide additional revenue from electricity generation. We believe that with today's difficult economic situation and rising inflation, it is a safe and competitive choice. Finally, there is also the matter of the reservoir's role in the life of the local community, i.e. serving as a place of recreation. We wanted to make it possible to take advantage of the area's existing features. It was vital for us to develop it in a way that would enable it to fulfil leisure and recreation but also educational functions for visitors and the local community alike.

I am pleased that we were able to take advantage of the existing hydrotechnical infrastructure for this project. A small hydropower plant once operated here. The project is demanding and involves multiple industries, and as such, we decided to organise the public procurement process using the "design-build" system. We also wanted to ensure comprehensive services for our project.

At the same time, I would like to encourage other local governments to undertake similar initiatives. Using the natural resources of cities and communes, as well as the existing infrastructure, to improve their functioning quality is well worth it.



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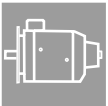
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small hydropower plants



autonomous weir closures of retention and drainage reservoirs



synchronous generators for small hydro



rubber shell weirs/ flap-shell weirs (water or pneumatic type)



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POWER PLANTS OF THE DAJNA RIVER

By implementing development works as part of the "Development of high-efficiency Kaplan hydropower turbines for low, medium and high damming at WTW Poland Sp. z o.o." programme, WTW Poland Sp. z o.o. will help refurbish two hydropower plants on the Dajna River.

The project is co-financed by the European Union from the European Regional Development Fund under the Intelligent Development Operational Programme 2014-2020. It has received the funding required as a result of the National Centre for Research and Development: Fast Track competition. Taking into account the results of R&D work and using the already developed series of tubular turbines, we selected the most advantageous solutions for both SHPs. To avoid terminological confusion, please note that the classification adopted in the project title is relative. The lower high-head threshold for the Kaplan turbines produced was assumed at 20 m.

MOUNTAINOUS NATURE OF THE DAJNA RIVER

In terms of energy generation, the Dajna is one of the most interesting rivers in the entire Mazury region. The river section between Pilec and Biedaszki includes such SHPs as Pilec, Niewodnik I, Niewodnik II, Stachowizna, Wilkowo, Pręgowo, Smokowo and Biedaszki. Their heads range between 4 to 6 m, except for SHP Niewodnik I (ca. 2.5 m) and Niewodnik II (ca. 9.0 m). The mean flows amount to ca. 1.50 m³/s in Pilec to

2.08 m³/s in Biedaszki, and the mean low flows range from 0.5 m³/s in Pilec to 0.64 m³/s in Biedaszki. The river has balanced annual flows, as in its initial course it flows through a number of lakes of the Mrągowo Lake District (through lakes Wągiel, Wierzbowskie, Czos, Czarne, Kot, Juno, Kiersztanowskie and Dejnowa), which provides it with high retention. Floods practically do not occur there and the mean annual flows at Biedaszki amount to 8.50 m³/s. The total elevation drop between the SHP Pilec reservoir water level and the lower water level at SHP Biedaszki (about 15 km away) is 52.7 m.

HISTORY OF THE DEVELOPMENT OF THE DAJNA RIVER SHPS

The Niewodnik II, Wilkowo, Pręgowo and Biedaszki power plants were built from the ground up in the 1990s while the others date back to before World War II. The Wilkowo, Pręgowo and Biedaszki power plants were designed by Kazimierz Rydel, an engineer who worked on many projects in the 1980s and 1990s. The Pręgowo and Biedaszki projects were designed to utilise horizontal-shaft tubular turbines. At SHP Wilkowo, vertical-shaft tubular turbines were used instead. All power plants were equipped with overflow wells to drain floodwaters, with water intakes on both of their sides to supply the turbines.

Six of these power plants feature turbines manufactured by WTW Poland Sp. z o.o. They are simplified propeller turbines with fixed runner and vane blades. Because of their small runner diameters and sizable heads, most are equipped with generators directly coupled to the turbine shafts. Simple butterfly valves are used to start and stop the turbines. Wherever possible, the turbines were selected in such a way as to provide a flow rate of 1:2:3 or 1:2:2, with the smallest turbine's flow rate not to exceed the mean low flow value.

Such a flow rate made it possible to "regulate" the volume of water flowing through the power plant and its retention in the reservoir limited the turbine switching frequency. WTW Poland also supplied auto-

Photo 2. Tubular turbine – 1992



mation solutions allowing the turbines to start and stop automatically depending on the river flow. This approach made it possible to start-up the power plant with little investment. Turbines manufactured by ZRE Gdańsk and Dozamet in Nowa Sól in the 1990s were several times more expensive – and those offered by western companies several dozen times – than those offered by WTW Poland and were virtually beyond the financial capabilities of the investors. Both the investors and WTW Poland planned to replace the propeller turbines with Kaplan turbines once the plant has become operational, as soon as they have repaid the loans and can accumulate sufficient capital. Nonetheless, the simple turbines proved durable and most of them are still in operation today.

FURTHER DEVELOPMENT PLANS

The loss of financial support for facilities commissioned before 2005 caused the investors to consider replacing the power plant equipment not only for technical reasons but also due to the chance of receiving further support. Coincidentally, this happened during the implementation of the "Development of high-efficiency Kaplan hydropower turbines for low, medium and high damming at WTW Poland sp z o.o." Currently at its development stage, the project enabled the selection of turbines with optimal parameters from among the series

¹ SHP Pilec and Stachowizna are currently closed from electricity production

Photo 1 – Overflow well at SHP Biedaszki

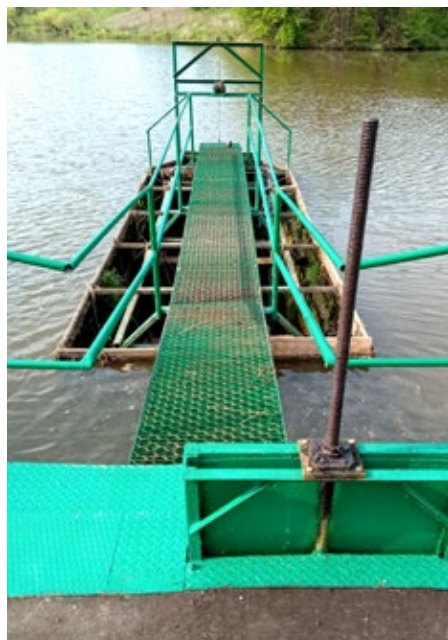


Photo 3. Z-type turbine for a developer from Caluso Bassa (Italy)



designed by the company (runner speed and diameter, flow rate). The owners of the Wilków and Biedaszkі power plants have decided to replace the turbines and automation at their facilities. WTW Poland Sp. z o.o. has just signed the relevant contracts.

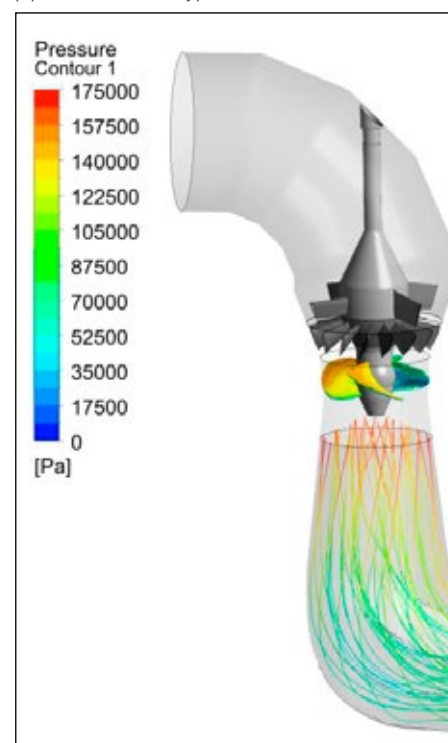
Based on the experience of operating their power plants, both investors ordered two vertical-shaft Kaplan tubular turbines each. The turbines will be equipped with straight suction pipes. They will have a speed of 600 rpm which will make their direct coupling to the generators possible. Thus, the turbines at SHP Biedaszkі will feature runner diameters of 600 mm, whereas those at SHP Wilkovo will feature runner diameters of 560 mm (the power plants differ both in damming height and flow rate). The solutions developed by WTW Poland as part of the R&D project will be quickly put into pro-

duction and, in the following months, also to work at the refurbished facilities.

WTW Poland has extensive experience in the production of such turbines and is among the few professional manufacturers producing Kaplan turbines with such small flow rates.

The turbine flow system has been tested at the HFM Institute in Graz (a vital part of implementing the project as part of the "Fast Track" competition of the National Centre for Research and Development), which guarantees high turbine performance and very high efficiencies reaching above 90% – for a turbine with a runner diameter of only 560 mm. This will result in a significant increase in electricity production, effectively improving the facility's profitability. Installation of full auto-

Fig. Pressure distribution in the runner and suction pipe sections of a Z-type turbine



mation, including SMS failure signalling, as well as the possibility of checking the facility's parameters and controlling the turbines via the Internet, is bound to positively affect energy production at the refurbished power plants. The estimated average annual energy production for each of them will be between 450 and 550 MWh.

eng. Grzegorz Wiszniewski
President of the Management Board
of WTW Poland Sp. z o.o.

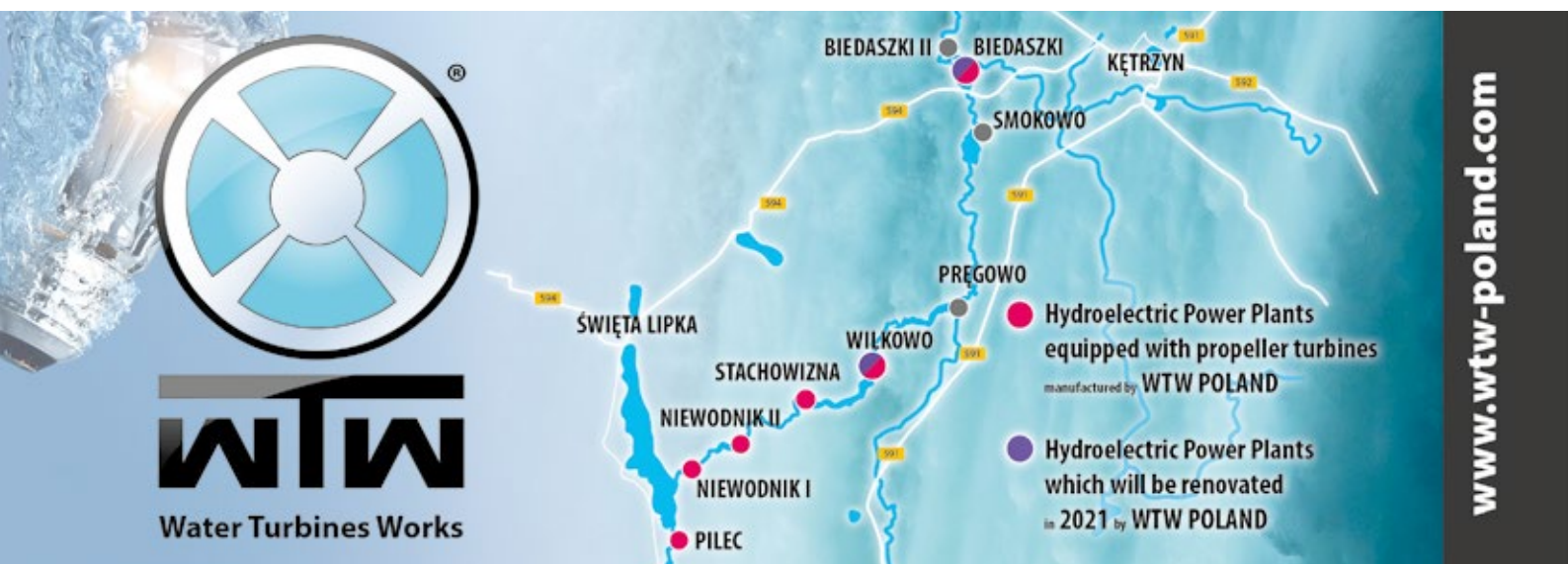
The graphics come from the archive
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HISTORICAL USE OF THE HYDROPOWER POTENTIAL OF THE SKAWA RIVER VALLEY

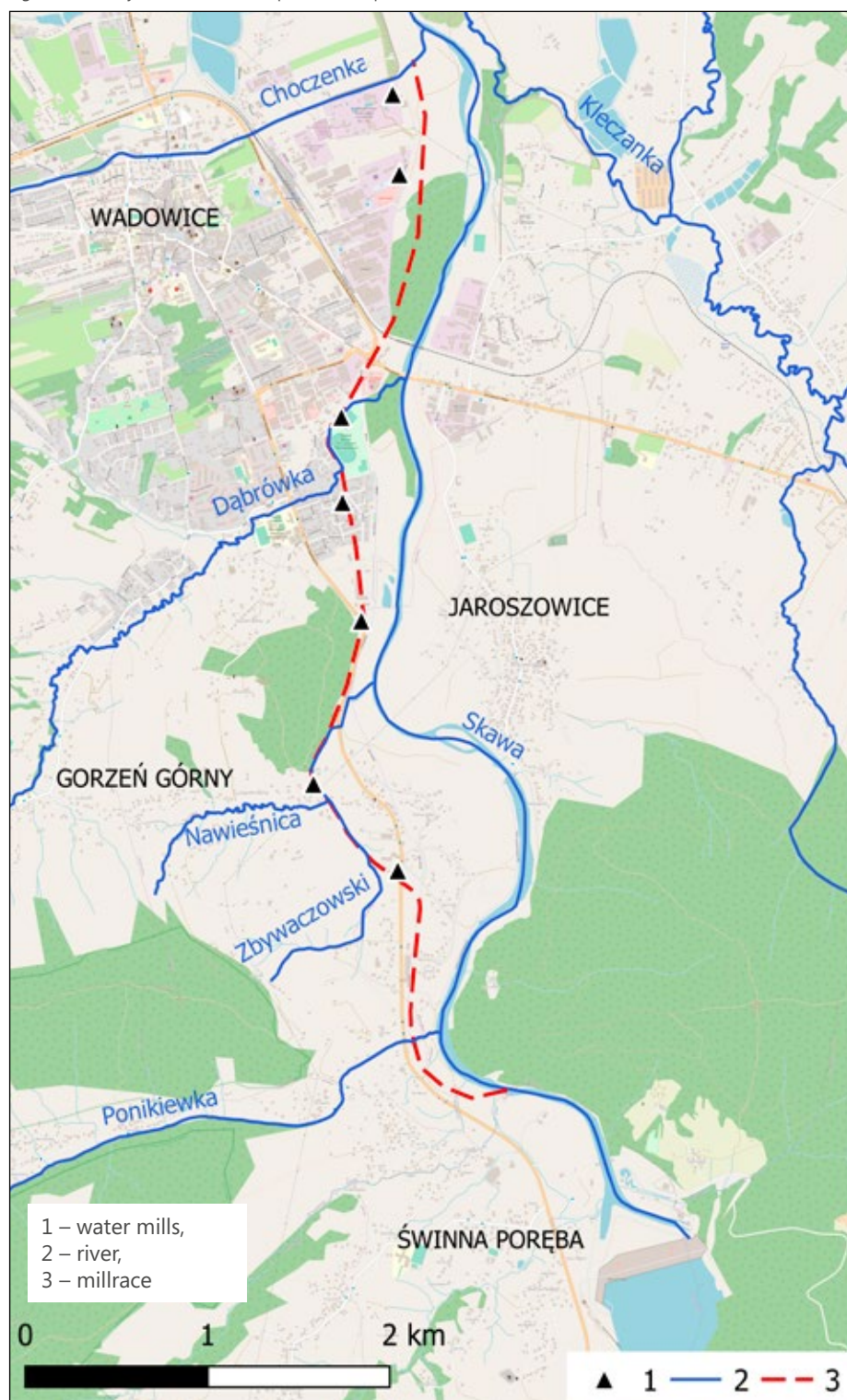
The hydropower potential of the lower Skawa River valley has been used by man for over 500 years. In the period between the 16th and 19th centuries, an artificial mill leat was maintained at the bottom of the Skawa River valley, over which grain mills, sawmills, and fulling mills were located. After the collapse of traditional water milling, the power of running water was not used for nearly a hundred years. Numerous ideas for the production of electricity on the Skawa River or its tributaries came to fruition only in 2019 at the dam in Świnna Poręba.

The history of the use of the water wheel in Poland dates back to 1071, when the first water mill was built in Zgorzelec. The popularization of the milling industry progressed in Poland from west to east, developing fastest in the 16th century. The largest number of water mills operated in the northern and central part of the country. Despite unfavourable natural conditions, water milling also developed in the mountains and foothills. The aim of the article is to present the history of using the hydropower potential of the Skawa River and its tributaries in the Wadowice Region during the last 500 years.

The Skawa River, from its sources to Świnna Poręba, is a mountain river that drains, inter alia, the Babia Góra and Police massifs. In its upper reaches, the bottom of the valley is narrow, except in the vicinity of Maków Podhalański. It is only in the downstream section, below dam now standing in Świnna Poręba, that the valley floor gradually widens. The width of the valley near Wadowice reaches 3 km. Until the end of the 19th century, in its extensions the Skawa River had a multi-channel or multi-stream pattern, i.e. braided. The numerous streams were separated by gravel bars or islands covered with trees. The channel pattern changed after each flood, and its width was often more than 500 m, reaching 900 m at its widest point, near Zator. The morphology of the channel made it impossible to build mills directly on the waters of the Skawa River. Therefore, as early as in the 16th century, the natural expansion of the valley bottom was used, making it possible to run an artificial channel parallel to the Skawa River, but at a safe distance.

Mills, as well as other water devices (sawmills, shoemaker's peg factories, groats mills, fulling mills, etc.), were built in the mountains over natural small watercourses or artificial

Fig. Skawa Valley near Wadowice, OpenStreetMap foundation



Source: Own study

Photo 1. Former railway bridge over the mouth of the młynówka in Jaroszwicka Zbywaczówka



Source: Author's archive

mill leats. The Carpathian tributaries of the Vistula were not used to drive water wheels because of the flood risk, the large seasonal fluctuations in water levels, and the frequent changes in the morphology of the channels. The stabilization of the flow in mountain mill leats made it possible to use the power of water flowing freely at high speed. The natural morphology of the area favoured the use of undershot waterwheels, the lower part of which was submerged in the water and the wheel rotated in the opposite direction to the current. Large slopes of the land made it possible to abandon the construction and maintenance of expensive mill ponds, popular in the north of Poland. These ponds made it possible to discharge water onto the overshot waterwheel, which generated power unattainable on the watercourse with a very small longitudinal slope. Despite the lack of the necessity of damming water in the Carpathians, it happened that before the mills, weirs were built which were to protect the devices during floods, as well as to obtain more power, especially in the case of mills with a larger number of waterwheels.

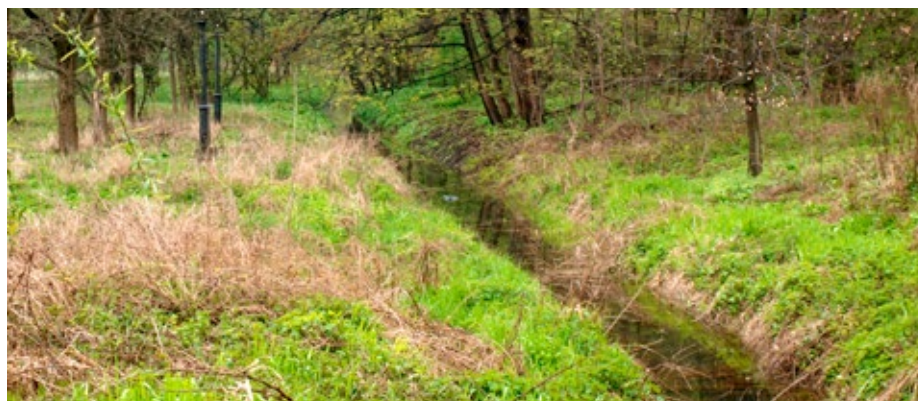
LEGAL CONDITIONS FOR THE DEVELOPMENT OF WATER MILLING

Despite the unfavourable physical and geographic conditions in the Skawa valley, as early as in the 15th century, mills were built on Cistercian estates, including in the village of Woźniki located in the forks of the Zygodówka and the Skawa. At that time, the Cisterian order had no less than 5 mills, located in the mouth sections of the Skawa tributaries. Other water mills in the Wadowice Land were built after obtaining princely or royal charters, in accordance with the ownership of the village or town. In 1569, King Sigismund II Augustus issued a charter for the town of Wadowice, one of the provi-

sions of which were as follows: [- -] the farm near the town is to have a mill, with three waterwheels, on the Skawa River. In fact, this law allowed the construction of a mill leat parallel to the Skawa River channel and fed by its water, and a large grain mill with three mill waterwheels above it. This charter was the beginning of the golden age of water milling in the vicinity of Wadowice. Already the 16th century, permission had been for the building of a fulling mill and a sawmill on the mill leat.

A number of acts regulating the functioning of the Wadowice milling industry were issued in the 18th century. In 1726, King Augustus II the Strong approved all the charters concerning the use of the Skawa waters by the residents of Wadowice. In the middle of the 18th century, King August III, in two separate documents, allowed the establishment of new mills on the mill leat in the town. At the end of the century, when the Wadowice Land was within the borders of the Austrian partition, the imperial milling ordinance began to apply, allowing the construction of mills by anyone who received the consent of the authorities. In the 19th century, mills in Wadowice and the surrounding area were run by local noblemen and town Jews.

Photo 2. The mill trough at the Zegadłowicz manor in Gorzeń Górny



Source: Author's archive

THE FUNCTIONING OF WATER MILLING IN THE SKAWA RIVER VALLEY

Most of the mills in the vicinity of Wadowice were located above the mill leat constructed in the second half of the 16th century. An artificial cutting fed the weir on the Skawa River in Świnna Poręba. Then, mountain streams draining the western ends of the Little Beskids, i.e. the Ponikiewka, the Zbywaczowski, and the Nawieśnica flowed into it (Fig. 1). The last two today still enter the Skawa River through an artificial cutting, flowing in the bottom of its valley parallel to its channel. After entering the area of Wadowice, the mill was fed by the Dąbrówka and flowed to the Choczenka. In the southern part of the town, an artificial cutting crossed the Groble housing estate, the name of which is directly related to the protection of this part of the town against the unpredictable, braided Skawa River.

The mills on the artificial cutting, fed by the Skawa, operated in 7 locations. Another 4 mills were located on the tributaries of the Skawa River in Wadowice. On the basis of an analysis of historical maps, it was found that, in two places on the mill leat, water devices operated continuously from 1763 to 1909. However, it is to be expected that these facilities had already operated before. In other locations, mills operated for 50-100 years, and the end of their activity was often caused by fires. The presence of 11 water devices in such a small area proves how common water milling was in the Carpathians at the turn of the 19th and 20th centuries. In the mid-19th century, 1,246 mills operated throughout the Polish Carpathians.

The 11-kilometre-long mill leat was maintained until the beginning of the 20th century. Along with the gradual replacement of water devices with steam, and later with electric ones, water milling was in decline,

¹ Meus, K. (2013). Wadowice 1772-1914 Studium przypadku miasta galicyjskiego. Kraków. s. 181.

and with it the subsequent sections of the mill leat. After the liquidation of the weir in Świnna Poręba on the Skawa River in the 1940s, the mill leat was fed only by the Ponikiewka, flowing into the Skawa River in the village of Jarosław-Zbywaczówka (Photo 1). To this day, there is only a short section of the former mill leat, connecting the channel of the Zbywaczowski Potok and the Nawieśnica, flowing past the Zegadłowicz manor in Gorzeń Górny (Photo 2, 3). Most of the parts of the mill leat were included in the drainage system, and in Wadowice in the rainwater drainage system.

The historical use of the Skawa River's hydropower potential is evidenced not only by the preserved sections of the mill leat. In his novel *Godzina przed jutrznią* [One Hour before Mattins], the poet and writer Emil Zegadłowicz, a poet of the Beskids from Gorzeń Górny, wrote: The last pole in the west was already standing above the mill leat, a masterful cutting from the 16th century; at this, as referred to by the local people, "przykopa" or "krzykopa" [local pronunciation variations of the original word przekop – cutting, ditch], water mills were located on a stretch of a dozen or so meters for a long time. The hard-working, roaring, rumbling mill leat attentively raised its ears to the forest echoes of mill hootings"².

DEVELOPMENT OF THE HYDROPOWER POTENTIAL OF THE SKAWA RIVER

In 1903, the Diet of the autonomous Kingdom of Galicia and Lodomeria, together with the Grand Duchy of Kraków and the Duchies of Oświęcim and Zator, decided to prepare a list of the existing water forces, i.e. to investigate the possibility of using the energy of flowing and damming water in Carpathian rivers. In the Skawa catchment area, this study was prepared by Karol Pomianowski,

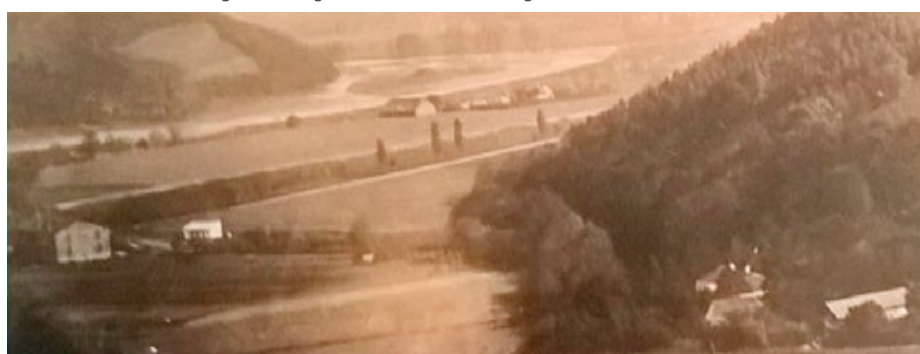
² Zegadłowicz, E. (1927). *Godzina przed jutrznią. Żywot Mikołaja Srebrzempisanego*. Poznań – Warszawa – Wilno – Lublin. s. 6.

Photo 4. Eastern abutment of the Świnna Poręba dam with a water intake for the power plant



Source: Author's archive

Photo 3. The former millrace in the Jarosław Zbywaczówka. The large building on the left is a water mill in Jarosławowice, the buildings on the right are the manor buildings in Gorzeń



Source: Collections of the City Museum in Wadowice

the author of the first design of the dam on the Dunajec River in Rożnów. He planned the construction of three reservoirs located 1) on the Skawica and on the Skawa. 2) in Grzechynia, and 3) downstream of the Skawica estuary. The most advanced conceptual work was carried out on the reservoir on the Skawica River.

In 1919, the construction of a dam on the Skawa River in Świnna Poręba was proposed by Gabriel Narutowicz, who later became the first president of the Republic of Poland. In 1935, a reservoir was planned on the Skawica and on the Skawa in Witanowice. The location of the dam below Witanowice, in Graboszyce, with a backwater of the reservoir near Wadowice, was considered in the 1960s. Rejecting this concept, it was decided to build a dam in its current location, and its primary purpose was to retain water for the Silesian agglomeration. Along with the construction of the dam, work began on the water main intended to transfer the waters of the Skawa River to the Soła channel, and further to Upper Silesia. The intake was located at the weir in Graboszyce.

The dam and the Lake Mucharskie reservoir were built in the years 1984–2017. In March 2019, the hydroelectric power plant in Świnna Poręba began to produce electricity. The 4.4 MW facility, capable of producing 14.8 GWh per year, is located at the east-

ern abutment of the dam (Photo 4). Among the many functions of the dam in Świnna Poręba, electricity production remains one of the basic. The main function of the reservoir, from the retention of drinking water to the protection of the Skawa and Vistula valleys above Krakow from flooding, changed during the economic transformation.

The commissioning of the hydropower plant at the dam in Świnna Poręba is a continuation of the hydropower use of the Skawa River waters, which, with a break of several decades in the second half of the 20th century, has been going on for 500 years.

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2019

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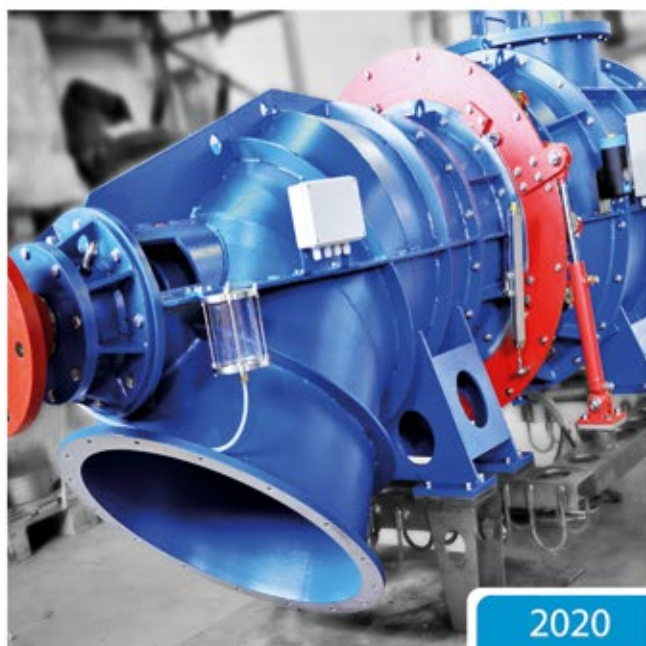
6x136 kW (d=1090mm, H=3.1m)



2020

SHP San Secondo, Italy

1x92 kW (d=720mm, H=5.4m)



2020

SHP Naviglio, Italy

1x84 kW (d=560mm, H=7.6m)



2013

SHP Chancza, Poland

1x177 kW (d=590mm, H=11.9m)

WORLD WATER DAY 2021

In 1993 during the International Conference in Rio de Janeiro, which was under the headline Environment and Development, all countries which belong to the Organization of United Nations assumed unanimously the proposal to celebrate each year on 22 March World Water Day (WWD). Each year WWD was celebrated under special headline connected with water, which indicated the importance of this problem for the social, economic and ecological realm.

For the first time WWD was celebrated on 22 March 1994. This year we celebrate it for the 28th time. Today after nearly 30 years the problem of water is more and more often mentioned as extremely important for the human existence and development. Now very often there is information about the possibility of world water crisis.

It could appear that the problem of water is in an unjustified way enlarged, taking into account the fact that 71% of our globe surface is covered by water. The total volume of this water amounts to 1 386 million cubic kilometers, volume which is difficult to imagine. If we could distribute this water uniformly over the globe's surface it would form the layer 2700 m thick. In the predominant volume this water is brackish, however, we are mainly interested in fresh water which amounts only to 2.5% of the total water volume. Moreover, 70 % of fresh water is frozen in the glaciers and nearly 30% of fresh water is deep in the ground. There is only about 1% of fresh water which is in the rivers, lakes, water reservoirs, marches, soil, ground waters and in the atmosphere. This water is in constant movement, called hydrologic cycle including evaporation from water surface, soil and plants, water in the atmosphere, condensation, atmospheric precipitation, surface runoff, and river flow to the seas.

The amount of water in the hydrologic cycle (fresh water) is constant, but the number

of people, who use it is constantly increasing. It is worth to mention, that in 1950 the world population amounted to 2.52 billion, in 2000 it increased to 6.02 bln. and in 2020 rose to 7.8 bln. Because the volume of fresh water in the hydrologic cycle is constant, thus the amount of water for the disposal to one inhabitant of our globe constantly decreases and in some regions reached even critical value. Demand for fresh water increases not only because of the increase of population, but also due to the growth of the standard of living. Moreover, very often the access to fresh water is restricted by its pollution or ecologic limitations (Program NATURA 2000). Therefore the management of fresh water resources becomes at present a priority problem.

WHY DO WE CELEBRATE WWD

It is necessary to present the question why do we celebrate each year WWD? It can be explained as follows. It is necessary to enlighten people, politicians and especially decision makers, that water is indispensable for life, to carry out numerous industrial and energy processes, for the production of food and that without water there is no life and economic development. The assumed each year headlines of WWD present special global and regional problems, which are very important from social, economic and nature point of view. Are these problems possible to be solved during one year? The answer is of course negative, because their solution requires many years and large financial

expenditures. To show these problems has the aim to indicate how important they are for the economy and society.

In the course of many years it appeared that the water problem on our globe, especially fresh water, becomes more and more compound and concerns numerous aspects of our life. It is possible to see that there is more and more economic sectors, which influence the state and management of water resources. The basic problem, which appeared as very essential for the development of life, on our globe is sustainable development. In relation to fresh water, which is renewable in the hydrologic cycle - we can use only such amount of water, which is in our disposal. We cannot waste water, but use it in a rational way e.g. by using closed water systems or purify waste water, which becomes now a very important problem in the era of urbanization, but also is the source of water recovery.

WORLD WATER DAY 2021

This year the headline for WWD is very untypical. It does not mean the solution of a particular water problem such as floods, droughts or water supply for people or agriculture. It is a difficult question presented to the societies, because water means many different aspects for different people. The authors of this question would like to know, what water means for you, your family, your house, your work or your hobby.

The answer to this question is very difficult, because we have numerous water users both individual and corporate. We have also large group of naturalists and ecologists, who regard water only as the source of life. There are also many people for whom water is the beauty of the landscape and inspiration for artistic creativity. The meaning of water for for such large and diversified group of people and water users might be very controversial. Looking at the importance of water for me or my sector of economy it may appear that there will not be enough water for oth-

Photo. About 70% of the world's total water withdrawal is used in agriculture.



Source: www.pixabay.com, distelAPPArath



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ers. The naturalists may justly consider that the life in inland waters is specially regarded and may restrict its economic use.

Supply of water for the population requires its adequate amount and quality in order to secure appropriate standard of living. Water withdrawal for agriculture achieves now nearly 70% of the total intake in order to produce needed amount of food. Similar requirements present energy and inland navigation rationally motivating their needs. If we consider all, who take advantage in a varying degree of water benefits, and to fulfill all their requirements, it may appear that we are not able to fulfill all needs and to find rational compromise will be very difficult.

The organizers of WWD 2021 presenting such question would like, that all people are aware of the fact how wide is the water requirement and that simultaneous secure of all these needs is not possible. In order to solve this problem and to find the best way of the use of available water resources, rational discussion of all water users is necessary, the acceptance of the requirements of other water users, as well as the ability for compromises. Such discussion is now missing not only in a global but also in a regional scale. Today considering all available water resources and water requirements we are in front of the possibility of severe water crises, both on the global, regional and also

local scale. It is well known that there is no life without water and its lack may result in serious economic, social and ecological disturbances and we must be aware of this fact.

PRESENT CONDITIONS OF WWD

The Assembly of the United Nations in 2015 determined 17 problems which formulate the goals of sustainable development (SDG) till 2030. Among these 17 goals, the goal 6: clean water and sanitation is totally devoted to water problems. At present it is estimated that 1 billion people on our globe has no safe drinking water, 2 billion (nearly 1/4 of world population) has no access to proper sanitary facilities, which results in considerable amount of diseases and deaths, especially among small children.

The next extremely important problem is the production of food for constantly increasing world population. This problem is connected with significant water intake from rivers and reservoirs for agricultural irrigation, which at present reaches 70% of total water abstraction. This may change our hydrologic cycle.

At present a very important problem for the functioning of societies is energy. We observe constant increase of possibilities to obtain energy from renewable sources, such as wind energy, photovoltaics or hydroenergy. The last one has now visible renaissance. In classic thermal power plants a very

important problem presents water for cooling condensers of steam turbines. These are considerable volumes of water and very often they can limit the operation of these powerplants. The decrease of available water resources, which are allotted for the inhabitant of our globe there is visible influence of urbanization. Today more than half of the world population lives in the cities, which constantly grow in size. This results in increasing problems with domestic water supply, but also problems with increasing amounts of sewage.

In the last decades one can observe constant increase of living standard. This is connected with the increase of water supply, which very often is difficult to fulfill. At present we observe very often supply of fresh water from desalinization. It is an energy consuming process, but in some situations the only source of fresh water.

The world economy and its functioning is characterized with large transport needs. The raw materials are in one place, the production facilities in the other, and the consumers of these goods also in other place. This requires large transport facilities. One of the advantageous transport means is the inland navigation, which however requires appropriate parameters of the waterway.

■ WHAT DOES WATER MEAN FOR YOU?

Presenting long list of various activities and spheres connected with water, it is difficult not to mention one very important aspect which has influence on the water understanding in human lives and societies. These are climate changes which cause the appearance of extreme situations especially floods and droughts. We try to avoid or decrease the reasons of climate changes, which is very difficult, but we must concentrate on the actions - how to adapt to these climate changes.

This year WWD we will celebrate taking also in account one additional aspect, which did not exist in previous years. It is pandemonium of Covid - 19. This pandemonium completely changed our global life, both from economic and social point of view. A very important problem is the fact, that we do not know in which direction these changes will go.

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WHAT WATER MEANS FOR POLAND?

In connection with the WWD 2021 it would be interesting to consider what water means for Poland as the country and their inhabitants. Poland has very meagre water resources, with relation to one inhabitant. In the average year it is about 1 600 m³ per year. In dry years this value drops down to 1 000 m³, which is critical. At our disposal we have small retention volume, which ranges about 6,5% of the average annual outflow from the terrain of Poland (62 km³). The neighboring with us countries have this factor over 10%. This state makes the rational management of water resources very difficult. The state of water quality in our rivers did not reach the level, which was imposed by Water Framework Directive. Hydraulic power plants produce about 1% of the total electric energy in Poland. Inland water transport covers about 1% of the total transported goods. It is worth informing, that Poland signed in 2017 AGN Convention which obliges us to modernize 3 navigable Polish routes to international standard.

The majority of large river valleys in Poland is covered by the Program NATURA 2000, which introduces significant restrictions for new hydraulic projects. The ecological societies are also against these projects, postulating even their dismantle. Dissonant between ecological representatives and specialists of water resources management is constantly deepening. Solution of this difficult situation may be only a straightforward discussion of all water interested stakeholders. However, who will decide to carry out such task?



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