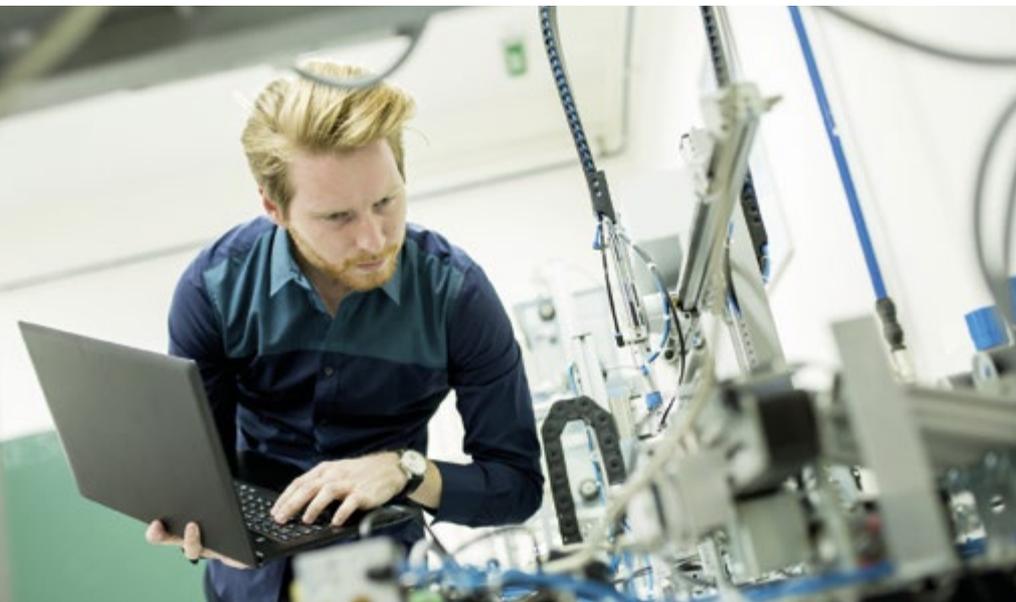


Warszawa, grudzień 2020

Zamówienia publiczne na **innowacje**



Urząd
Zamówień
Publicznych



Public procurement of **innovation**



Public
Procurement
Office

Warsaw, December 2020

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ISBN 978-83-88686-82-5

© Public Procurement Office

Warsaw 2020 r.

Publisher:

Public Procurement Office

www.uzp.gov.pl

e-mail: uzp@uzp.gov.pl

Composition, folding and printing:

CC Professionals Group, www.ccpog.com.pl

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Introduction

*Hubert Nowak,
President of the Public Procurement Office of Poland*

Innovation is one of the strategic directions and aims of the current state policy. Public procurement is one of the tools for its implementation. A number of solutions provided for in the public procurement law has long made it possible to execute contracts with innovative subject-matters. The new Act of 11 September 2019, which will enter into force on 1 January 2021, additionally supports public procurement of innovation (PPI) by implementing new solutions in this area.

However, the PPI is not just about legislation, but about a broader system, which we want to explain, at least in part, in this publication. The system groups, among others, specialised institutions such as the National Centre for Research and Development or GovTech Polska, which carry out or support the contracting authorities in making non-standard purchases. NCRD is paving the way by implementing first Polish projects in the form of innovation partnerships and large projects by the mean of pre-commercial procurement. GovTech Polska leads the contracting authorities in solving their challenges by organising design contests run in conjunction with the agile methodology, which allows for the rapid development of modern solutions in cooperation with start-ups.

The system involves also the world of science, represented in this publication by the Jagiellonian University and its SOLARIS National Synchrotron Radiation Centre. The Academia, on the one hand, is a source of innovative ideas and, on the other, it brings some of them to life directly, thanks to public funding. Such projects as the SOLARIS National Synchrotron Radiation Centre are not only innovative per se, but also serve to create further innovations, in this case, by enabling cutting-edge scientific research in many fields.

However, the most important element of the PPI are the contracting authorities themselves, who can and do try to go beyond typical purchases and typical procedures. The example of Regionalne Centrum Gospodarki Wodno-Ściekowej S.A (Regional Centre for Water and Sewage Management) in Tychy shows how unusual a journey one can make in a relatively short time and how much innovation is addictive; it seems that upon dipping toes in it, there is no return to what was done before. The National Support Centre for Agriculture, on the other hand, proves that the identified needs can be satisfied with the use of traditional public procurement procedures, by creating solutions which have not yet existed nationwide.

We hope that the cases described herein will also inspire you.



1.

1. Public Procurement of Innovation in the light of the new Public Procurement Law

Justyna Pożarowska, Public Procurement Office of Poland

According to the European Commission's Guidance¹ on **Public Procurement of Innovation** (hereinafter referred to as the PPI), such procurement is any procurement involving:

- **buying the process of innovation** – research and development services – with (partial) outcomes; **and / or**
- **buying the outcomes of innovation** created of others.

According to the Guidance, in the first scenario, public buyer buys research and development services to create products, services or processes which do not exist yet. In such a situation, contracting authorities describe their needs and encourage companies and researchers to develop innovation that will satisfy them.

In the second scenario, a public buyer, instead of buying off-the-shelf and typical products that have been on the market for a long time, acts as a first-time user and purchases a new or significantly improved product, service or process that has been on the market for a short time and that is largely innovative. This includes products, services or processes which have already been demonstrated on a small scale and may be marketed in small quantities but have not yet been widely adopted by the market or to existing solutions which are planned to be used in a new and innovative way².

The above definition of PPI, presented in the Guidance, is the first pan-European one. On the other hand, at the level of EU Member States, other countries or international institutions, there are other definitions or references to related notions which have become the basis for implementing the PPI concept in national policies.

As far as definitions are concerned, it is worth stressing that the notion of public procurement of innovation includes different scopes as well as different levels of innovation (degrees of novelty) of the subject-matter of the contract. In terms of scope, the term now refers not only to technical or technological innovation, which has long dominated our understanding of the concept, but also includes social innovation.

As to the degree of novelty, there are several such degrees. The narrow understanding of public procurement of innovation is linked to a narrow understanding of the very concept of innovation. Such a narrow understanding of innovation best reflects its essence and is limited to creating completely new results. Therefore, in **the narrow sense**, public procurement of innovation is a way of awarding public contracts that leads to the creation of completely new, technologically advanced products, services and processes that have not yet existed.

¹ C(2018) 3051 Commission notice. Guidance on Innovation Procurement, pp. 8.

² Ibidem, pp. 8

In a broader sense, public procurement of innovation is a way of awarding public contracts for any improvement, development and technological adaptation of existing solutions, as well. In this sense, procurement of innovation will, for example, include projects that use products, elements, assemblies, components and organisational methods already existing on the market but which, when put together, applied or modified, have resulted in a product, service or process with new, different characteristics, or a product, service or process that addresses new challenges.

In **the broadest sense**, public procurement of innovation is not only the creation of new or improved solutions, but also marketing and dissemination thereof resulting from the demand generated by public buyers. The broadest meaning of the term also includes the acquisition of off-the-shelf goods existing on the market, which are modern but not or rarely used by the public sector and which serve to improve its operation.

PPI is a dynamically changing domain. Traditionally, it has been agreed that procuring innovation involves research and development. It has also been assumed that the procedure leading to the award of a contract for developing a relevant innovative solution requires a certain degree of flexibility, which is guaranteed by procedures that include the element of negotiation. However, as the real-life examples show, it is possible to award public contract and obtain innovative results without meeting these conditions.

The fact that innovation remains innovative only for a limited period of time is also an important factor in analysing and understanding the public procurement of innovation. New solutions automatically make previous innovations obsolete. In light of the above, it can be understood that public procurement of innovation involves public contracts whose subject-matter is innovative in nature at a given moment in time.

The concept of 'public procurement of innovation' seems to be quite clear and leaves no doubt that the innovation factor applies to what is acquired by means of a public contract. Another concept, a concept of '**innovative procurement**' has also become quite common. However, this one is more ambiguous and does not have to concern or be limited to the innovative nature of the subject-matter of the contract. This term often applies to situations where traditional purchases are made, however, using non-traditional methods or tools, e.g. via various types of e-procurement tools or tools supporting its particular stages. In some contexts, digitalisation of procurement systems or digitalisation of procurement procedures is already treated as innovative procurement. In other contexts, innovative procurement includes for example the use of electronic catalogues, digitalisation of procedures managed by central purchasing bodies or the use of tools for the integrated management of framework agreements, dynamic purchasing systems and e-catalogues.

In view of the above, modern methods of conducting tender procedures should be distinguished from public procurement, the aim of which is to purchase innovation and, in a broader perspective, **to develop an innovative economy through public procurement by pursuing an informed policy in this area.**

The Public Procurement Law (hereinafter PPL) has long contained a number of elements and instruments to foster the implementation of public procurement of innovation. Its latest version, the Public Procurement Law of 11 September 2019 (Journal of Laws of 2019, item 2019), which will enter into force on 1 January 2021, additionally and directly links the procurement of innovation

with a broader perspective of national policy. Following the new PPL, we present its most important provisions relating to PPI below.

In Article 7 of the PPL, i.e. the dictionary of definitions used in the Act, **innovation** is defined in item 6 in accordance with the Directives, i.e. as the implementation of a new or significantly improved product, service or process, including but not limited to production, building or construction process, a new marketing method or a new organisational method in business practices, work organisation or external relations.

As indicated above, the new Public Procurement Law links the procurement of innovation by public entities to the broader perspective of the national policy, strategy in this area. The act requires the elaboration of a separate government document, which is **the state purchasing policy**. Pursuant to Article 21 of the PPL, the state purchasing policy shall determine the priority actions of the Republic of Poland in the area of public procurement, as well as the desired direction to follow by the contracting authorities in the area of contracts award, which shall include in particular **the purchase of innovative or sustainable products and services**, taking into account:

- 1) standardisation aspects;
- 2) life cycle costing;
- 3) corporate social responsibility;
- 4) dissemination of best practices and purchasing tools;
- 5) social aspects.

The state purchasing policy is adopted by the Council of Ministers, by way of a resolution, at the request of the Minister in charge for the economy, whose task is to prepare a draft document as well as to coordinate the implementation of the policy. The document shall be drawn up every four years, specifying the planned actions of the government administration and taking into account the objectives and directions set out in the state's medium-term development strategy.



Pursuant to Article 22 of the PPL, contracting authorities, being central government administration bodies, are obliged to draw up their own management strategies for particular purchase categories, being in line with the state purchasing policy. Such strategies identify procurements that are key to the implementation of the state purchasing policy.

As stipulated by the above regulations, the state purchasing policy will cover the purchase of innovative products and services and will outline the desired direction to follow by the contracting authorities in terms of purchasing innovation. While the guidelines for the purchase of innovation by all contracting authorities are soft rather than mandatory (*'desired direction'*), central government administration bodies have been obliged by law to develop their own strategies for managing the purchases in priority categories that are coherent with the state purchasing policy.

A **needs and requirements analysis (NRA)** carried out by the contracting authority has become a new statutory instrument relevant for the public procurement of innovation. Pursuant to Article 83, before initiating a contract award procedure, the contracting authority shall carry out a needs and requirements analysis, taking into account the type and value of the contract. Such an analysis shall include, e.g. market intelligence with regard to alternative means of satisfying identified needs or possible procurement options. Market intelligence on alternatives and options may lead to the decision to include innovative solutions in the next steps as they are best suited to the needs of the contracting authority.

The analysis is also intended to spot the possibility of including innovative aspects in the contract and identify the risks associated with the procurement procedure and performance. Therefore, the contracting authority will have to consider whether to include innovative aspects in the procedure. As far as the risks are concerned, they will undoubtedly accompany any procurement of innovation, especially in large-scale contracts, and the NRA should be the platform to analyse them in detail. Ultimately, the NRA will become the basis for drafting the description of needs and requirements (DNR) and the specification of contract conditions.

Another instrument of crucial importance to the purchase of innovation is **preliminary market consultations**. According to the previous legislation, it was tantamount to technical dialogue. Pursuant to Article 84 of the PPL, before initiating a contract award procedure, the contracting authority may conduct preliminary market consultations in order to prepare the procedure and inform the contractors of its plans and requirements for the contract. When carrying out market consultations, the contracting authority may in particular seek advice from experts, public authorities or contractors. Such consultation may be given with regard to planning, preparation or conducting the procurement procedure, provided that this does not distort competition or infringe the principles of equal treatment of economic operators and transparency.

It would seem that as far as public procurement of innovation is concerned, preliminary market consultations should be an indispensable element preceding the initiation of the procurement procedure. They can be a tool for market intelligence that helps find out if the subject-matter of the contract exists on the market and assess the necessity to address the contracting authority's need by creating a completely new solution. Market consultations also help define the scope for modifying the already existing solutions and adapting them to the needs of the contracting authority by confining to only partial innovation. They may also lead to a discovery of ready-made market solutions that fully

satisfy the needs of the contracting authority; and thus, to abandoning the initial plan to purchase innovation.

The limited provisions of the PPL on preliminary market consultations leave the contracting authorities free as to how they should conduct and organise them, while stressing the necessity to respect the principles of fair competition, equal treatment and transparency. In addition, to meet the concerns of the contracting authorities, Article 85(2) specifies that a contractor involved in the preparation of a procurement procedure shall be excluded from that procedure only if the distortion of competition caused by their involvement cannot be eliminated otherwise. Prior to exclusion, the contracting authority shall provide the contractor with an opportunity to prove that its involvement in the preparation of the procurement procedure will not distort competition.

This Article was to clarify that a contractor participating in the preparation of the procedure, including in preliminary market consultations, must not automatically be excluded from further participation in the procedure. On the contrary, such exclusions will be rare.

The **contract performance requirements** are another element of the procurement procedure where innovation-related issues can be raised. Pursuant to Article 96, the contracting authority may specify contract performance requirements, which may include innovation-related aspects, in the contract notice or documents. Where the contracting authority provides for such requirements, it shall specify in the contract documents the way in which the contractor's compliance with those requirements is to be documented, the contracting authority's rights to control the contractor's compliance with the requirements and the sanctions for non-compliance.

As mentioned earlier, innovation-friendly procurement procedures are those that leave some space for negotiation. Of all the contract award procedures stipulated in Article 129 of the PPL, the following should be considered as such: negotiated procedure with publication, competitive dialogue and innovation partnership. Nevertheless, negotiated procedure without publication and single-source procurement also contain application conditions directly related to innovation. We should, however, bear in mind that innovative effects can also be achieved by way of traditional tender procedures such as open and restricted procedure. In such cases, innovation is often the result of highly defined performance and functional requirements.

As far as the **negotiated procedure with publication and competitive dialogue** are concerned, the PPL indicates four, identical for both procedures, conditions for their application. According to them (Articles 153 and 170 of the PPL), a contracting authority may award a contract in these procedures if at least one of the following circumstances occurs:

- the solutions available on the market cannot satisfy the needs of the contracting authority without them being adapted;
- works, supplies or services include designs or innovative solutions;
- a contract cannot be awarded without prior negotiations due to special circumstances relating to its nature, degree of complexity or specific legal or financial conditions, or due to the risks associated with the works, supplies or services;
- if the contracting authority cannot describe the subject-matter of the contract in a sufficiently precise manner by reference to a specific standard, European Technical Assessment, common technical specification or technical reference.

All of the above premises directly relate to innovation, covering its various aspects. However, according to the newest legislation, the best procedure for purchasing non-existent solutions, which most comprehensively addresses innovations with the highest degree of originality, remains the **innovation partnership** (Articles 189-207, 297-299 of the PPL). This procedure has two characteristics. Firstly, it serves to purchase products, services and works that do not exist on the market at the time the procedure is launched. Secondly, under the innovation partnership procedure, both creation of the subject-matter of the contract and the purchase of its commercial quantities are carried out.

The law establishes a prerequisite for the application of the innovation partnership procedure: the products, services or works sought by the contracting authority must be unavailable on the market. In the light thereof, the contracting authority should make prior market research to ascertain the unavailability of the product, service or works sought. Such a research is intended to prevent the object available on the market from being treated as an innovation and an extensive and lengthy procedure from being initiated if a solution is already in place or there are reasons to believe that it will soon be.

Innovation partnership is a two-stage procedure conducted essentially on the basis of the negotiated procedure with publication. In the first stage, the contractors admitted to the procedure shall be selected. In the second, the tender or tenders constituting the basis for the conclusion of a public procurement contract performed under an innovation partnership shall be selected. Unlike in other procedures, the contracting authority may choose several contractors (partners) to perform the partnership agreement. The cooperation of the contracting authority with the partner(s) over the performance of the contract is of a long-term nature and involves the active participation of the contracting authority in the development of innovation. If the contracting authority enters into several contracts with several partners and more than one of them develops a solution meeting the contracting authority's needs, the contracting authority may purchase solutions from several partners (if such a possibility and terms thereof have been previously provided for).

References to innovation can also be found in the negotiated procedure without publication and single-source procurement. Pursuant to Article 209 of the PPL, a contract may be awarded by way of **negotiated procedure without publication** if the subject-matter of the supply contract is goods manufactured exclusively for research, experimental, scientific or developmental purposes, which do not serve the contracting authority for mass production to achieve market viability or to cover research or development costs. Whereas, pursuant to Article 214, a contract may be awarded under **single-source procurement** if the subject-matter of the supply contract is goods manufactured exclusively for research, experimental, scientific or developmental purposes, which do not serve the contracting authority for mass production to achieve market viability or to cover research or development costs, and which can be manufactured by only one contractor.

A design contest may also be a way of implementing procurement of innovations. Pursuant to Article 325 of the PPL, the contracting authority may organise a design contest to select a creative proposal concerning, in particular, spatial planning, urban design, architectural design, architectural and construction design, data processing, IT design and intended innovation. Here, it is worth noting that the contest itself has been subjected to many changes in the new PPL, taking an open or restricted form, being a one-stage or a two-stage one, which may favour its better adaptation to the demand for innovative solutions.

Pursuant to Article 242 of the PPL, the most advantageous tender is selected on the following basis: 1) quality criteria and price or cost or 2) price or cost. In this context, Article 242(2) directly specifies **innovative aspects** among the **quality criteria**. However, a number of other examples of the criteria indicated in this item (the catalogue of criteria is open in nature) will also be linked to the innovative character of the subject-matter of the contract, including:

- technical parameters, functionality;
- environmental aspects, including the energy efficiency of the subject-matter of the contract; or
- organisation, professional qualifications and experience of persons appointed to perform the contract.

A new solution provided for in the PPL, referring to the public procurement of innovation is the possibility to carry out **an ex-ante control** of the contract documents **at the request of the contracting authority**, for contracts with a value equal to or exceeding the EU thresholds **which include aspects relating to innovation or the subject-matter of which is an innovative product** (Article 614 of the PPL). The ex-ante control supervised by the President of the Public Procurement Office shall not cover the technical part of the contract documents but may cover the entire procedure or the stage of the call for proposals or tenders, the negotiation stage or the tender evaluation stage.

Important matters relating to the purchasing of innovation by public entities are regulated by **exemptions** from the scope of the PPL.

Pre-commercial procurement is covered by such an exemption pursuant to Article 11(1)(3). Pursuant thereto, the Law shall not apply to contracts or design contests concerning research or development services unless they fall under CPV codes 73000000-2 to 73120000-9, 73300000-5, 73420000-2 and 73430000-5, as defined in the Common Procurement Vocabulary³, and all the following conditions are met:

- (a) benefits accrue exclusively to the contracting authority for its own use,
- (b) all remuneration for the service provided is paid by the contracting authority.

Pre-commercial procurement (PCP) is the purchase of research and development services outside the PPL, under a national exemption in accordance with the exception provided for in the directives. As the law/directives do not apply to pre-commercial procurement, it gives the contracting authorities the freedom to organise and conduct cooperation with the contractors participating in it. However, despite the freedom, the contracting authority is not exempt from the obligation to comply with fundamental principles of the Treaty, such as fair competition, transparency and equal treatment.

While pre-commercial procurement leads to the development of certain solutions, they are purchased through a public procurement procedure to which the provisions of the PPL fully apply. Thus, once PCP has been carried out and specific solutions have been worked out, to purchase them, the contracting authority must carry out a regular procedure provided for in the PPL, allowing all interested contractors meeting certain conditions (both those who participated in PCP and those who did

³ 73000000-2 Research and development services and related consultancy services
73120000-9 Experimental development services
73300000-5 Design and implementation of research and development
73420000-2 Prefeasibility study and technological demonstration
73430000-5 Testing and evaluation

not) to participate in it. The contractors' involvement in PCP and the creation of e.g. a test series of a new product does not guarantee them the award of the public procurement contract for a commercial quantity specified by the contracting authority.

The difference between public procurement of innovation and pre-commercial procurement lies in the fact that public procurement of innovation is conducted in accordance with the provisions of the PPL and the subject-matter thereof is innovative, while pre-commercial procurement includes a purchase of R&D services outside the PPL, on the basis of the exemption provided for therein.

The key document relating to pre-commercial procurement is the European Commission Communication COM(2007) 799 'Pre-commercial Procurement: driving innovation to ensure sustainable high quality public services in Europe'⁴. The Communication defines pre-commercial procurement as an approach to the award of contracts for R&D services other than those where the benefits accrue exclusively to the contracting authority for its own use and on the condition that the service provided is paid for in full by the contracting authority and that the remuneration does not constitute State aid. In explaining this definition, the Communication indicates the most important characteristics of pre-commercial procurement:

- the scope of PCP covers only R&D services (search and design of solutions, prototyping, development of a limited number of new products or services in form of a test series),
- PCP involves risk-benefit sharing between the contracting authority and the contractor (the contracting authority does not reserve the results of research and development exclusively for its own use, the contracting authority and the contractor share the risks and benefits associated with research and development),
- the PCP process is performed on a competitive basis as to exclude State aid (ensuring fair competition, transparency, openness, equal treatment and pricing at market conditions).

Finally, the Communication summarises pre-commercial procurement as a purchase of research and development services on market conditions, with the risks and benefits associated with the performance thereof being shared between the contracting authority and the contractor.



⁴ COM(2007) 799 final. *Pre-commercial Procurement: Driving innovation to ensure sustainable high quality public services in Europe*, Brussels, 14.12.2007.

In general, pre-commercial procurement is divided into several stages reflecting the innovation life-cycle, including: a stage of conducting preliminary studies and envisioning the future product/supply/work; a stage of finding and designing a solution; a stage of developing a prototype (or prototypes); a stage of work on a limited number of first products or services and creating a test series.

It should be noted that typical pre-commercial procurement, which takes place in line with the innovation lifecycle, is the basis for the implementation of the contract under innovation partnership, which combines two processes: the development of an innovative solution (as in PCP) and, at the same time, its purchase (the purchase is not an element of PCP but a separate procedure is organised for this purpose).

Another exemption provided for by the PPL is **the exclusion from the public procurement regime of supplies and services for R&D purposes**. Pursuant to Article 11(5)(1), the provisions of the PPL shall not apply to contracts with a value lower than the EU thresholds, the subject of which are supplies or services used exclusively for research and development, experimental or scientific purposes, which do not serve the contracting authority for mass production to achieve market viability or to cover research or development costs.

A number of other provisions of the Law can also be treated as related to the issue of innovation. These include Article 69, which stipulates that, in the case of works contracts or design contests, the contracting authority may require that tenders or contest proposals be drawn up and submitted using **Building Information Modelling tools** or other similar tools. **BIM tools** are modern tools optimising construction projects at every stage of their life cycle. Although such tools are already used for public works contracts in Poland, their use is limited, so they can still be considered innovative. Innovative features are also found in the buildings erected with the use of BIM tools as well as in the processes of managing such buildings with the use of BIM tools.

Variant solutions (Article 92 of the PPL) are favourable to procurement of innovations. In accordance with the provisions of the Act, the contracting authority may allow or require the submission of a variants. The public procurement of innovation is often carried out by several entities, so the rules on **joint procurement** (Article 38) or **cross-border joint procurement** (Articles 42, 43) shall apply.

The elements linked to innovative aspects also have to be included in the **annual report** on the awarded contracts, which the contracting authority shall draw up in accordance with the requirement set out in Article 82 of the PPL.



2.

2. Experiences of the National Centre for Research and Development in acquiring innovations

Agata Miętek and Bartosz Dziadecki, National Centre for Research and Development

1. Introduction

The National Centre for Research and Development (Narodowe Centrum Badań i Rozwoju, NCRD) is an executive agency as defined by the Public Finance Act, established to carry out tasks in the area of the state's scientific, technical and innovation policy. Since 2016, NCRD has been carrying out activities aimed at developing and testing innovative methods of managing research and development programmes. As a result, a method known as problem-driven research was developed, which was inspired by the way programmes are implemented by the US Defense Advanced Research Project Agency (DARPA). The method is based on the assumption that at the heart of every research programme lies an unmet economic or social need, defined by the contracting authority, and that several contractors can join a programme and "compete" with each other to develop a solution to this need.

The legal tools available to implement these objectives include: **pre-commercial procurement (PCP)** and a new public procurement procedure introduced by an amendment to the Public Procurement Law of 2016: **innovation partnership**. NCRD decided to launch pilot research programmes based on both models, adjusting the specificity of each programme to how it was to be implemented.

Pre-commercial procurement (PCP) is a tool known since 2004 and used also under the European Union's Framework Programmes (e.g. 7th Framework Programme, Horizon 2020)⁵. Pre-commercial procurement is not public procurement within the meaning of the PPL, but rather non-statutory purchase of R&D services for the purpose of addressing an important socio-economic problem or challenge which cannot be solved by means of measures already available on the market⁶. Contracts for research and development are awarded on the basis of the so-called EU soft law, excluding the application of the provisions of the Public Procurement Law of 29 January 2004 (Journal of Laws of 2019, item 1843 as amended, further referred to as PPL).

Innovation partnership is an awarding procedure introduced to the Public Procurement Law of 29 January 2004 by way of an amendment made in 2016. Its aim is to develop innovative products, services or construction works not yet available on the market as well as to sell such products, services

⁵ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions of 14 December 2007. Pre-commercial Procurement: Driving innovation to ensure sustainable high quality public services in Europe

⁶ Cf. "Innovative and pre-commercial public procurement, Warsaw 2012, PARP". DOA: 2 May 2020: <https://www.parp.gov.pl/storage/publications/pdf/15742.pdf>

or works. This means that in addition to the R&D stage, during which contractors search for solutions that meet the contracting authority's expectations, a contract also covers the supply stage, where the contractors supply the contracting authority with a specified number of products based on solutions developed during the R&D stage.

One of the first programmes supposed to be prepared using the new problem-driven research method was **“Zero-Emission Public Transport”** (further referred to as: ZEPT), which aimed to develop and deliver innovative zero-emission public transport vehicles for cities. The main reasons for using the innovation partnership model instead of PCP and other grant-awarding procedures was the possibility of a single process covering the research stage and the delivery of solutions. In this way, NCRD was able to create a market for emerging solutions, while at the same time mitigating the risk run by contractors working on such solutions. In addition to NCRD, the ZEPT programme was also joined by several dozen Polish cities, which made it possible to supply a fleet of as many as 1000 innovative vehicles. The need identified under the ZEPT programme was to provide universal, zero-emission public transport vehicles that could be used in the process of transforming urban transport, thus contributing to the achievement of the objectives of strategic documents on e-mobility as well as to the improvement of air quality. Despite the fact that the procedure to select contractors who could proceed to the implementation phase was conducted twice, in the end it was cancelled due to the circumstances defined in the PPL, and the programme was eventually closed.

Another example of such a pilot programme based on the pre-commercial procurement model is **“Hydrogen Storage”**. The programme was established in response to the fact that the lack of a suitable hydrogen storage tank for mobile applications was identified as a critical factor preventing the further development of an economy based on hydrogen energy. “Hydrogen Storage” was also based on the directions of intervention in the modern industry adopted by the Council of Ministers in 2017 in its “Strategy for Responsible Development”. These directions indicated that the importance of electricity-based solutions (e.g. in public transport and passenger transport) would only grow. The generation of electricity from fuel cells combined with hydrogen storage tanks is an alternative to the use of lithium-ion batteries and one of the key areas for technological development in the field of provision of energy for mobile devices and vehicles. A fuel cell powered by hydrogen generates electricity without emitting harmful gases or substances into the environment. The identified need was therefore to find a solution that would contribute to the achievement of the objectives of the ongoing strategic projects by removing cost and raw material barriers, which constitute a significant risk for their implementation. The programme is currently in its third and final stage of implementation, but it can already be concluded that it has had a very interesting effect consisting in the wide variety of innovative solutions that the contractors have been working on. As part of their projects, contractors developed pressure, materials and chemical technologies. The final results of the programme, including the commercialisation of the technology, are yet to be seen.

2. Organisation of the innovation acquisition process

As already mentioned, when looking for new methods of managing R&D programmes, NCRD developed the problem-driven research method, which was combined with two forms of acquiring innovations by the public sector, i.e. innovation partnership or pre-commercial procurement. Each contract is based on a research programme developed by NCRD and aimed to achieve specific objectives. In the course of preparation of individual programmes, NCRD developed a number of good practices covering a series of activities allowing for building the necessary external and internal potential as well as the preparation, execution and implementation of programmes. These are:

1. New model of managing and financing R&D
2. Key stakeholders
3. Programme manager and necessary resources
4. Co-contracting authority in the case of innovation partnership
5. Obtaining information to define the scope of the programme
6. Key elements of the description of the subject-matter of the contract
7. Risk analysis

1. New model of managing and financing R&D

The essence of the problem-driven research method is to search for solutions to a defined problem instead of defining a solution in the procurement documents or technical specifications. This means that the method focuses on the needs of a specific user, emphasising practical solutions that the user will be able to benefit from and involving the user in the entire research process. The approach used by NCRD diverts from the previous model, i.e. financing research by way of awarding grants for individual projects, and instead finances a portfolio of projects which, by competing with each other, allow the contracting authority to achieve solutions that are more innovative. The key element of success for this method is the professionalisation of the way a research programme is managed through programme managers and their active role in the whole process (starting from defining the scope of the programme and active participation in the management of the contractors' research project portfolios). When implementing this new approach, NCRD cooperated closely with the American non-profit research organisation SRI International, which has vast experience in implementing similar programmes. SRI International supported NCRD in developing the bases of the problem-driven research method, including the identification of key elements of the programme, translating DARPA's experience into NCRD's activities and launching first programmes.

2. Key stakeholders

For each programme, it is necessary to identify key stakeholders, in particular those who will help determine the need to be addressed and, consequently, the objective of the project.

In the case of the ZEPT programme, implemented as an innovation partnership, NCRD cooperated with Polish cities ready to implement innovative solutions in public transport, which acted as co-contracting authorities under the programme. Another stakeholder that proved crucial for ZEPT was

the National Fund for Environmental Protection and Water Management, which provided financial resources for the implementation part of the programme.

3. Programme manager and necessary expert support

The key resource in the pre-contract process is the Programme Manager, whose main role is to define, design, prepare, launch and manage the Programme. This is a unique role in the entire programme ecosystem, as it makes one person responsible for both content and organisation of the whole process. This ensures that the programme is run in a way that enables the achievement of its defined objective, i.e. to provide an innovative product or service to the end user of the programme. The manager is responsible for establishing and maintaining communication with programme stakeholders, which gives them full knowledge of the needs and problems to be solved in the course of programme implementation. The manager supervises the selection of contractors for the programme and provides them with mentoring support during its implementation, actively manages the programme, which involves frequent, regular contacts with contractors and potential end users. The Manager ensures the flow of information, both within the NCRD team and with external stakeholders, acting as programme ambassador in various fora and bodies.

The implementation of programmes by NCRD also requires the provision of **expert support** for the Programme Manager and their team. This support is provided by consultative and advisory bodies appointed for the purposes of programme implementation, including expert teams, Steering Committees and Monitoring Committees. Prominent experts from relevant sectors are invited to join these bodies to ensure specialist support for the Programme Manager.

Moreover, a **support team** is appointed for each programme. This is a dedicated team composed of employees of various NCRD units, responsible for coordinating the preparation of formal and legal aspects of the programme. The tasks of the team include close day-to-day cooperation between the content team, the legal department, the public procurement team and the law firm as well as ensuring the **funds** needed for keeping the programme going. To finance the activities under the pilot programmes, NCRD obtained funding as a beneficiary of the Smart Growth Operational Programme (sub-measure 4.1.3. Innovative research management methods).

4. End users (innovation partnership only)

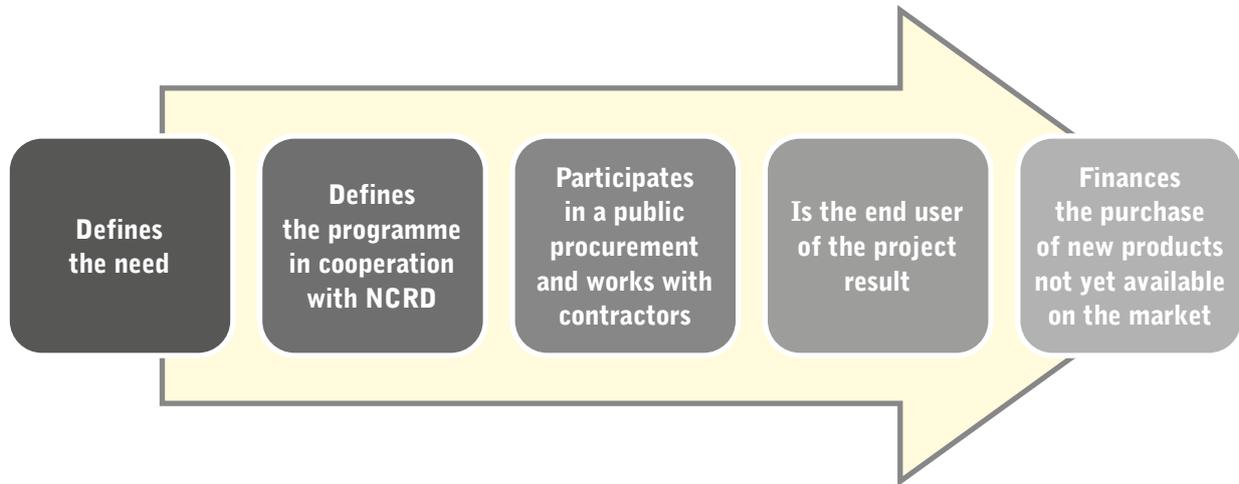
In order to implement the programme in the innovation partnership model, NCRD had to acquire partners (further referred to as public partners) who could identify the problem to be solved as a result of R&D work. These stakeholders were therefore both customers, i.e. end users of the solution, and contracting authorities in the procedure. In order to encourage potential partners, NCRD announced the search for a public partner on its website. It stated that the cooperation would be divided into several stages:

- 1) definition of the target products, objectives and functional requirements by the Partner together with NCRD;
- 2) announcement and implementation of a research programme by NCRD and the partner;
- 3) verification and evaluation of tenders and selection of the contractor(s) by identifying the most advantageous tender(s);

4) purchase of products developed as a result of the research project by the public partner.

It was indicated that the public partner can be any public entity, regardless of its legal status, as long as its primary objective is other than economic activity (i.e. competing on the market). In addition to publishing the announcement, NCRD also undertook a number of other actions (including organisation of conferences, bilateral and multilateral talks, participation in various fora and bodies, conducting market consultations prior to launching the procedure), which allowed it to get potential partners interested in the new programme. Cooperation agreements were signed with the partners.

The diagram below shows a synthesis of the roles of public partners in the model implemented by NCRD (conducting proceedings by NCRD and co-contracting authorities):



5. Obtaining information to define the scope of the programme

The analysis of available solutions and identification of areas for innovation are crucial when planning a contract in the innovation partnership model. To verify the solutions available on the market in order to define the scope of the programme and the subject-matter of the contract in more detail, NCRD uses the following tools:

- **technical dialogue (market consultations)** with producers active in the sector related to the thematic scope of the programme. The purpose of the technical dialogue is to provide guidance and information necessary to describe of the subject-matter of the contract and to draw up the tender specifications, including the contractual conditions. The technical dialogue allows not only to catalogue the solutions already available on the market (off-the-shelf), but also to identify areas where companies are still looking for innovation and which are in line with such companies' strategies. Thanks to the technical dialogue, the contracting authority can verify the initial parameters of the programme, such as: subject-matter, budget, schedule, terms of cooperation with potential contractors, so that it can prepare the contract in a more reliable manner;
- **talks with public partners** (or, in the case of ZEPT, with the bodies responsible for the organisation of urban transport) in order to identify the key needs of a specific partner that cannot be met by solutions generally available on the market,
- **analytical work of the Project Manager** and their support team, including a state-of-the-art analysis, literature analyses, patent and patent application analyses, literature analysis on topics related to the project's thematic scope, participation in national and international conferences,

meetings or study visits, in order to determine the state of development in a given field and search for gaps and opportunities,

- **discussions with experts in specific fields**, including NCRD's expert teams and advisory bodies as well as other experts.

6. Key elements of the description of the subject-matter of the contract

The elements which, in NCRD's experience, are most important in the context of innovative purchases are listed below. These elements are critical to the objectives of the programmes and were the most time-consuming aspect of each of them.

Subject-matter of the contract, including in particular its innovative character

It is a great challenge to describe the innovative character of the subject-matter of the contract in a manner that is sufficient but not too detailed. The description should not include specific solutions, as is usually the case in typical procedures, but rather discuss the elements from a functional perspective, leaving room for contractors to conduct research and development works.

The key here is to balance the precision of the description, so as to clearly indicate what the contracting authority expects, but at the same time to move away from a parametric specification of the subject-matter of the contract. The more parametrised elements, the less room for innovation. It is worth noting that during the negotiations, potential contractors also tend to request certain changes in the specification of the procedure so that it would be as close to their offers as possible. It is therefore the contracting authority's responsibility to balance the description and any amendments that may be made to it in such a way as to enable economic operators to understand the subject-matter of the contract on the one hand and to ensure technological neutrality and room for innovation on the other. The most desirable solution is to describe the subject-matter of the contract in a functional way; however, this makes it very challenging to specify the criteria for tender evaluation (concerning the stage of the procedure) and selection (concerning the stage of contract performance).

Distribution of IPR

The distribution of rights to intangible assets developed in the course of the programme is a crucial issue.

In the case of the innovation partnership implemented by NCRD together with another contracting authority, such distribution was necessary due to the fact that NCRD, as a co-contracting authority, financed the R&D aspect of the programme, whereas the other contracting authorities financed the implementation. In the case of pre-commercial procurement, the Communication from the Commission indicates the need to divide the benefits between the contracting authority and the contractor.

The model developed by NCRD in the course of implementation of a number of programmes is to leave all rights arising under the project with the contractor, while ensuring that in the case of commercialisation of the solution, a certain percentage of revenues derived from that commercialisation is paid to NCRD. The adopted solution should take into account the specificity of the market affected by each project.

Programme implementation adapted to the research and development process

In the innovation partnership model, the procurement procedure is a multi-stage process in which the contracting authority may enter into an agreement with several contractors, also known as partners.

Every NCRD research programme implemented using the problem-driven research method is based on the expectation that its implementation will be divided into phases corresponding to a typical research and development process. A programme usually consists of 3 phases, the duration and subject-matter of which are adjusted to the specificity of the programme. Typically, Phase 1 covers the **development of the solution concept**, Phase 2 covers the **preparation of the solution prototype** and Phase 3 covers the **demonstrator and testing**. At the end of each phase, contractors are required to present a specific result of the R&D process to date. The results of the work of the subsequent phases is subject to a qualitative, technical and economic evaluation, which prevents the contractors with the lowest scores from being admitted to the subsequent phases. In the case of innovation partnership, the research phase is followed by an implementation phase in which more than one contractor may be allowed to participate.

Budget management

The budget of each programme depends on the number of phases planned for it, the expected remuneration for the research work in each phase and the maximum number of contractors that may be admitted to each phase. The budget of the programme and, consequently, of the tendering procedure launched in order to implement the programme, is determined in terms of maximum values.

However, in the course of both the procedure and the subsequent contract, it may turn out that, firstly, the remuneration proposed by the contractors is lower than estimated and, secondly, a smaller number of contractors than estimated are admitted to the procedure itself and its subsequent phases. As a result, savings are generated under a project.

Due to the fact that NCRD had at its disposal resources from European funds to finance the research programmes discussed here (this applies to non-contest projects in which NCRD acts as a beneficiary⁷), and therefore aimed at maximum absorption of these resources within a defined period, a special solution was developed. It is assumed that if funds are released in the programme budget, they may be allocated towards the next phase of the programme to finance a larger number contractors in a specific phase of the programme than originally expected.⁸ Such solutions have been included in the procedure documentation⁹.

⁷ Non-contest projects are projects financed under Sub-measure 4.1.3 Smart Growth Operational Programme which provide NCRD with financial resources to develop and launch programmes implemented in the PCP and innovation partnership models.

⁸ This solution is available exclusively for PCP. It only applies to situations where savings are generated after Phases 1 and 2 are completed. In practice, this right has not been exercised. In accordance with the Regulations: "The NCBR [NCRD] allows the possibility of increasing the funds allocated to Phase 3 at the latest at the time of announcing the Ranking List before Phase 3, if in Phase 1 and Phase 2 it is not contracted or NCRD is not obliged to pay the entire amount allocated for the indicated Phase or NCRD obtained additional funds for implementation [of the] Programme. Funds allocated for Phase 3 obtained as a result of a transfer within the Phase 1 and Phase 2 budget or as a result of obtaining additional funds by NCRD may be allocated for the admission of a larger number of Contractors in Phase 3, but may not be used to increase the remuneration of individual Contractors."

⁹ Cf. Chapter V of the Regulations for the contest procedure in the Hydrogen Storage programme. The document is available on the Bulletin of Public Information website for NCRD: <https://bip.ncbr.gov.pl/index.php?id=20875&L=0%25253FcHash%253D407c3f90878f65a7839e9b5e10f182f7>

Revision clauses and flexibility at the stage of contract performance

The revision clauses laid down in the procedure file ensure that the information on any future rules for making possible amendments to the contract are as widely available as possible to all contractors involved in the procedure. It is very important for the contractors competing for the award of the contract to know the terms on which a future contract can be modified, all the more so in situations where the contract performance is going to take several years.

7. Risk analysis

One of the aspects of the preparation of a research programme for which a procedure is launched is risk analysis. The analysis is based on the procedures that are in place at NCRD and is aimed to ensure effective programme management. The analysis identifies potential risks that may occur and determines the degree of probability of their occurrence as well as how to respond to such risks. The analysis includes preparation of risk tables and a risk map.

3. NCRD's practical experience in acquiring innovations

The first experience related to pre-commercial procurement was acquired by NCRD as early as 2013. It was further developed in 2016 thanks to the implementation of the e-Pionier [e-Pioneer] project, aimed to support talented programmers in solving identified social or economic problems¹⁰. E-Pionier is a joint project of NCRD and the Accelerators selected by NCRD, which uses the pre-commercial procurement model. The programme supports ideas that address socially or economically relevant problems and are based on information and communication technologies (ICT). In this case, PCP is not used directly by NCRD, but serves as an obligatory project implementation tool for the Accelerators selected by NCRD in the contest. The task of the Accelerators is to define, in cooperation with public institutions, a problem that needs to be solved; the search for solutions takes place in the form of pre-commercial procurement and is done by the end users of the instrument: selected interdisciplinary teams. Two contests were held under the e-Pionier project, as a result of which activities in the PCP formula are now implemented by a total of 7 accelerators (see details below). The e-Pionier project is financed under the Operational Programme Digital Poland.

Akcelerator EduLab Sp. z o. o.

- **Universality**

The project of the Krakow-based team addresses a problem reported by the Jagiellonian University, taking into account also the needs of the EdTech market, students and IT companies. The tool allows students to create a real CV with code samples and update it with each completed task. It provides an opportunity for self-improvement, acquisition of skills in selected areas and building market competences that the business sector is going to need in the near future. Career orientation through artificial intelligence mechanisms that indicate in which direction it would be best to develop one's skills is an

¹⁰ Details available on NCRD's website: <https://www.ncbr.gov.pl/programy/fundusze-europejskie/program-operacyjny-polska-cyfrowa/>

innovative solution aimed to train qualified professionals ready to work immediately after graduation. Tasks performed during classes reflect real expectations and requirements of the labour market for IT specialists. They allow quick response to changes and easy implementation of a new technology-related subject. Therefore, the platform enables real monitoring of the final product developed by the university and its adjustment to market expectations.

From a lecturer's perspective, Universality is a virtual assistant whose task is to quickly plan and prepare attractive classes for students. The main advantages of the Universality interactive platform are that it saves the time normally dedicated by a lecturer to the preparation of activities, and makes it easier to conduct classes and evaluate students' learning progress.

In the near future, Universality will be further enhanced through the development and implementation of the AI driven HR functionality, an intelligent assistant of a student and recruiter with the ability to select the candidate that appear most promising as far as the development of a specific technology is concerned.

The platform is currently being tested and implemented by the following universities: Jagiellonian University in Krakow, University of Rzeszów, National University of Water and Environmental Engineering in Rivne, University of Lodz, University of Silesia in Katowice, Maria Curie-Skłodowska University in Lublin and many others.

Companies that have expressed interest in the solution include: Microsoft, Infosys Poland, HCL, Miquido, Altkom Akademia S.A., Edge One Solutions, PrimeBit Games SA, Zaven, Reality Games, Work Service S.A., KPT/ Digital Dragons Academy, infoShare Academy Sp. z o.o., SmartShack, Servocode.

- **PixBlocks**

Created by specialists from the Adam Mickiewicz University in Poznań, the application provides an effective and comprehensive tool for learning programming, which can be used by anyone. PixBlocks is all about acquiring knowledge and developing practical skills through play: the platform supports creativity, for example by giving the possibility to create original games.

The tool is tailored to each level of IT literacy. The application is popular among primary and secondary schools, as well as some universities. PixBlocks can also be used for self-study. What makes the platform unique is the fact that it teaches both visual and text programming. The tool has standards consistent with the guidelines of the Ministry of National Education and the updated core curriculum.

Following the acceleration, the application now has more than 50,000 active users. It is used for work with students in over 1,000 Polish schools.

The application was tested at the Faculty of Mathematics and Informatics of the Adam Mickiewicz University in Poznań. The tests focused on how the PixBlocks System affects teaching programming to IT students and future computer science teachers. The system was tested by eight lecturers, including academic staff from the Faculty of Mathematics and Informatics and teaching staff. PixBlocks is perfect for learning the basics of programming in Python. In addition, it is an excellent tool for future computer science teachers that will allow them to teach programming to primary and secondary school students in an accessible way. In addition to classes for university students, there were also workshops for teachers and primary and secondary school students.

Akcelerator Excento Sp. z o. o.

- **Smartula**

To address a problem submitted under the programme by the Pomeranian Agricultural Advisory Centre in Lubań, a system consisting of a network of energy-saving devices for monitoring apiaries was developed. The devices collect temperature, humidity and sound data, as well as information about attempts to steal hives or incidents of vandalism. The device also alerts the beekeeper to any negative events taking place in the hive. In order to ensure higher reliability of information provided to the beekeeper, the alert is also sent to a remote server when an emergency situation occurs. The data are analysed for any events that beekeepers consider critical. Critical situations include: opening the hive outside the time window defined by the beekeeper, exceeding the critical value of certain parameters or the hive turning over. Then, a summary is sent to the beekeeper via a web application. Such a flow of information enables a rapid response and prevention of further losses.

- **Precision landing system on an unstable platform for unmanned aircraft**

In response to a challenge submitted by the Scientific and Research Centre for Fire Protection, the project team developed a system for autonomous landing of unmanned aircraft on a mobile docking station, which also enables fully automatic battery replacement. Precise and autonomous landing, especially on a moving object, is possible thanks to modern optical navigation technology, which autonomously identifies markers on the docking station. In addition, the application of active markers makes it possible for aircraft to land even at night and in limited visibility.

The originators of the project went on to establish the Solutions 4 Tomorrow company, which focuses on the implementation of the solution and on the development of unmanned aircraft technologies.

- **A system for monitoring exposure of Gdańsk residents to selected endocrine-active compounds in drinking water supplied by public water networks and disposed of in municipal sewage**

Constant exposure of people to endocrine-active compounds (EDCs) in everyday life is associated with an increased risk of developing diseases of civilisation such as obesity, diabetes, cardiovascular diseases, endocrinopathy, fertility disorders, hormone-sensitive cancer (breast cancer, prostate cancer) and abnormal foetal and child development. This is because EDCs are structurally similar to natural hormones and, as a consequence, disturb the proper functioning of the endocrine system and body homeostasis. In response to the problem reported by the Gdańsk Water and Sewage Infrastructure (GIWK), a device was created which will enable GIWK to carry out ongoing monitoring of drinking water and municipal sewage for the presence of endocrine active compounds. This is a crucial measure to be taken in order to reduce the exposure of city residents to these harmful substances. The detector can take measurements automatically, marking the levels of selected EDCs, and send alerts to GIWK using the IT system developed in the course of the project. The project team members established the Detoxed company, which is working on the implementation of the developed solution. The institution reporting the problem and receiving the MVP is Gdańsk Water and Sewage Infrastructure.

Akcelerator SmartLab sp. z o. o.

Regulations at European Union level oblige airport operators to implement and maintain effective mechanisms for training and examining staff responsible for baggage, cargo and mail inspection at

airports. A problem related to that matter was reported by the Goleniów Municipality Office and a relevant project is being carried out in cooperation with Port Lotniczy Szczecin Goleniów Sp. z o.o. (Szczecin-Goleniów Airport).

Until now, on the Polish and EU market there have been no simulators for comprehensive training of security check operators, not only combining theoretical and practical issues, but also allowing for full profiling of the trainees and creating individual training programmes. The Goleniów Municipality Office suggested developing a complete IT system that would enable training of airport staff. The system should operate in a wide area network so as to make it is possible to conduct training in any location using workstations equipped with a standard web browser. The possibility to introduce dedicated training layers to each training level will be an added value. The simulator manager will have an active solution to keep track of the trainee's progress.

Akcelerator Accelpoint Sp. z o. o.

- **Cleanbox**

Cleanbox is an easy-to-use, modern device with antibacterial and antifungal properties, which eliminates 99.99% of microbes and bacteria, ensuring an additional antibacterial effect for up to 30 days. With its functionalities, the project helps to prevent common infections and answers the growing need for surface disinfection, contributing to the fight against the spread of coronavirus. Thanks to the acceleration under the AccelBox programme, the MVP of the project was created and tests were successfully carried out using the infrastructure of the public partner (Municipal Sport and Recreation Centre in Lublin).

Since 2016, NCRD has been working on the application of new forms of acquiring innovations on a wider scale, within the framework of the discussed programmes based on the problem-driven research model, implemented by way of innovation partnership and pre-commercial procurement¹¹. As a result of this work, pilot research programmes were launched in the following years: **Zero-Emission Public Transport** and **Bloki 200+** in 2017, **Hydrogen Storage** in 2018 and **eVan** in mid-2020.

For example, the need identified under the **Bloki 200+** programme is to enhance the capacity of the existing 200 MW class power units to provide new services commissioned by the National Power System operator. This aim is to be achieved by using the fact that units originally intended to function as the so-called base were designed with a large excess of technical parameters. The contractors carry out R&D projects which prove that stable and safe operation of those units with much more rigorous operating parameters is possible, in particular: (a) operation with power reduced to 40% of the nominal power, where today's technical minimum is typically 80%, (b) shortened times of power intake and discharge (c) without exceeding the authorised environmental standards. Such solutions do not exist. A review of the presented concepts and work results proves that it is possible to perform the contract in two ways: (1) through investments in the power generating infrastructure of the unit, potentially providing a longer perspective of operation or (2) through much cheaper investments in

¹¹ Details available on NCRD's website: <https://www.ncbr.gov.pl/programy/fundusze-europejskie/program-operacyjny-polska-cyfrowa/>

control and measurement equipment, ensuring the operation time adequate to the existing excess energy. The Bloki 200+ programme is currently in its Phase 3 – the final phase, in which demonstrators are developed.

On the other hand, the **e-Van** project stems from the desire to incentivise the Polish market of manufacturers of vehicle and component for the electromobility sector to develop innovative products that will become competitive to those currently available on the market. This will be achieved by developing an electric van (BEV or FCEV) up to 3.5 t with parameters currently not available on the market: 1,000 kg payload with a range of 250 km for a BEV or 400 km for a FCEV. The parameters defined in this way cannot be achieved by simple integration of the technologies available on the market, which means that the project is an impulse for the development of new solutions and methods in areas such as vehicle construction, chemicals, mechanics, energy, materials and IT. Each of the contractors will propose solutions that allow them to address the problem from different perspectives. Consequently, the entities with the best solutions will be able to compete with each other, so that they can finally achieve the desired vehicle parameters. The project was announced in May 2020 and is currently under way.

All the above initiatives were aimed at testing the problem-driven research model and as such can be considered pilot initiatives. NCRD's experience acquired in the course of these initiatives can be grouped as follows:

- **competence:** the organisation gathered individuals and experts with knowledge, experience and competences related to new forms of acquiring innovations by the public sector, which initiated the establishment of a relevant competence centre within NCRD,
- **organisation:** development of coordination mechanisms and terms of cooperation between relevant units within the organisation, as well as rules of cooperation with external stakeholders,
- **processes:** working out a path for initiating the programme, specifying concepts and key tools within the process, all of which was consequently used to lay down a dedicated internal procedure,
- **documentation:** developing model solutions for key documents (e.g. regarding industrial property rights, the course of the procedure and contract performance) and building a document repository that can be used for further initiatives,
- **social and cultural factors:** promoting NCRD as an agency which not only finances innovation but also carries out innovative activities itself, presenting new forms of research programme implementation to the market and potential contractors to encourage a larger pool of interested contractors to participate in each subsequent programme,
- **risk management:** identification and reasonable mitigation of the risks associated with programmes in a problem-driven research model, e.g. by correct identification of needs and formulation of programme objectives and scope, documentation requirements and contract provisions, ensuring legally acceptable flexibility in the performance of contracts by contractors.

As far as pre-commercial procurement is concerned, contracts are executed outside the PPL, on the basis of the exemption provided for in PPL. Due to the fact that the Act does not apply to pre-commercial procurement, the contracting authority can conduct the PCP process in any way it chooses. However, this process is still carried out on a competitive basis, i.e. using an open, transparent and non-discriminatory awarding procedure.

NCRD developed the following PCP process:

1. Preparation of PCP regulations, establishing rules for selection of contractors¹² in subsequent stages (phases) of PCP, schedule, description of the subject-matter of PCP, drawing up a model agreement, model request to participate in PCP; what is important, the documents specify programme budget and terms of financing;
2. Initiation of PCP by publishing the PCP documentation on the Bulletin of Public Information (BIP) website of the Contracting Authority and voluntary submission of a prior information notice to the Publications Office of the European Union;
3. Providing explanations, answers regarding the published documentation, making possible modifications; contractors have about 30 days to prepare the request;
4. Submission of requests to participate in PCP and admission of contractors; the opening of requests is not public, but a relevant notice is prepared and published on the BIP website;
5. Formal evaluation of the submitted requests, which includes requesting missing information or explanations, is made in accordance with the procedure provided for in the regulations; the committee or team appointed for content evaluation also evaluates the submitted requests in terms of their content;
6. A list of entities eligible to participate in PCP is prepared;
7. Contractors receive decisions on the awarding of financial resources, on the basis of which the parties conclude agreements to carry out and finance the project.

Under such an agreement, each project contractor ensures the development of an innovative product, whereas NCRD, under the terms of and within the scope specified in the agreement, ensures co-financing of R&D works carried out by the project contractor in accordance with the agreement. PCP provides for a gradual reduction of the number of participants through further selection, in accordance with the criteria defined in the agreement. As a result, some of the agreements with participants may expire after each phase of R&D work.

8. Contractors may lodge an appeal against the decision with the Director of the Centre or bring an action before a common court. However, they are not entitled to legal protection measures in the form of an appeal to the National Appeals Chamber (as it is in case of public procurement).
9. During the contract implementation, after each phase, the contractors are obliged to deliver the results of their R&D work, which serve as the basis for admission to the next phase. After qualifying for the next phase, contractors apply for partial payment of the remuneration.

As far as the qualification stage is concerned, a pre-commercial procurement procedure, as opposed to statutory awarding procedures, is not a time-consuming or formalised process, making it more accessible to potential contractors. At the same time, it allows for the development of innovations in the field of R&D. PCP procedures conducted by NCRD have been attracting growing interest among contractors.

It is also noteworthy that with regard to both non-contest projects and individual programmes implemented under them, monitoring, audit and evaluation activities are carried out, allowing for improvement of processes and solutions adopted by NCRD.

¹² The selection of contractors in the course of PCP is understood as the selection of the results of work achieved by individual contractors in its subsequent phases. Contractors are selected according to the terms of the contract.

With the experience gained so far and the competences built within the organisation, the National Centre for Research and Development has been working since 2020 to launch further initiatives based on pre-commercial procurement. By doing so, NCRD wants to ensure that this instrument is permanently included in its portfolio of support instruments.

4. Summary

Taking into account the tasks of NCRD as an executive agency of the minister in charge of science, which was established, among others, to finance research programmes and thus stimulate innovation in the economy, it should be concluded that pre-commercial procurement is a more suitable formula for this purpose. PCP leads to the development of technology demonstrators, which, after testing and publishing test results and key parameters, can then serve as a basis for contracts made by those units which will be able to directly use the product/solution developed under the contract. Therefore, it appears that NCRD could serve as a catalyst for solutions, assuming the risk of financing the research process, where the final contract for the end product could be made only with the end customer. In such a model, the end contracting authority would also have access to the technical and functional parameters, thanks to the demonstrators developed in PCP, and would thus significantly reduce the risk of difficulties in describing the subject-matter of the contract. However, such an approach would also mean much greater involvement of contracting authorities in carrying out public procurement through a tender procedure organised to purchase innovations (e.g. a competitive dialogue, negotiated procedure with publication) and the need to develop mechanisms for coordinating procurement with NCRD.

NCRD already has quite extensive experience in organising the purchasing of innovation, both under innovation partnerships and pre-commercial procurement.

Both of these forms are naturally consistent with the NCRD mission, being an agency that finances innovative solutions, as both are adapted to procuring solutions that cannot be specified at the beginning of the procedure, i.e. those that require research and development works. In both cases, it is possible to sign contracts with several contractors, which would mitigate the risk of failure of both R&D works and delivery of contracted demonstrators/products. The last element, perhaps the most important for both contracting authorities and contractors, is the fact that contractors compete with actual solutions, which are verified on subsequent milestones and tested under real conditions; thus, we can test how they really work and not rely only on empty promises.

The purchase of innovation by the public sector is also a new opportunity for contractors who, by being awarded contracts that generate innovation, will gain not only financial resources but also motivation to engage in research and development. Innovative procurement as a new instrument in NCRD's portfolio also influences a switch in perception of the role of the state in financing R&D programmes. It complements the commonly used grant system, in which the state was merely funding and not stimulating innovative solutions. In such a model, contractors must be more careful in planning their work, because they are only rewarded for what they have completed, and so they must take into account that they may not be able to finish the project. Such an approach will, in the long term, drive change in the perception of public money, which is particularly important in view of the potential economic crisis resulting from the Covid-19 pandemic.

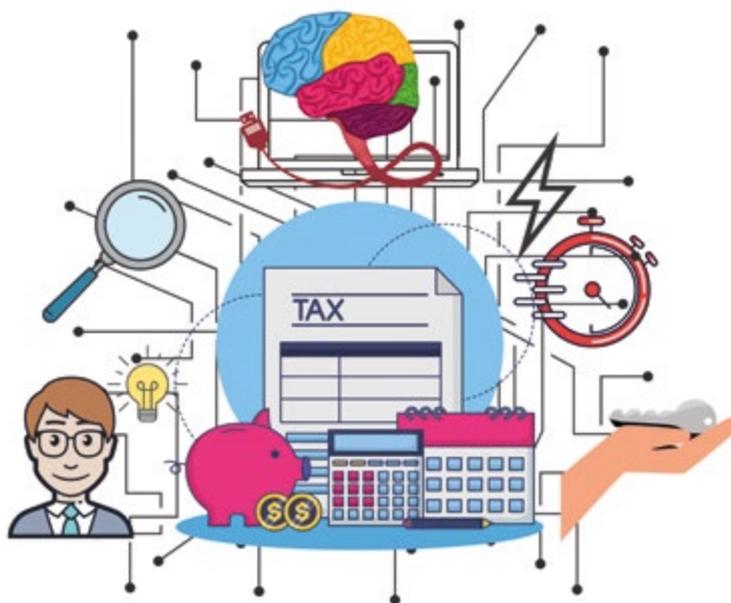


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3. GovTech Polska, or how modern public administration must turn to start-ups. A short tale on how the Polish treasury initiated public procurement of innovation

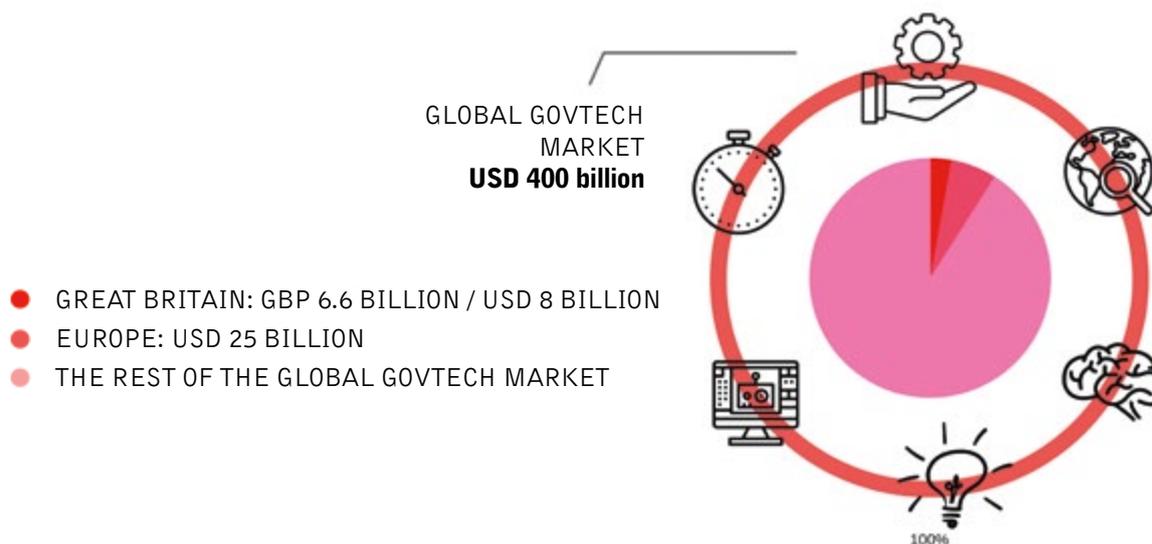
Izabela Kalita, GovTech Polska

When talking about public procurement of innovation, we should go back to 2017, when the Polish tax authority, as the first public institution in Poland, decided to look for solutions using GovTech-like tools. The Polish Ministry of Finance, the unit supervising tax authorities, was the first tax institution worldwide that wanted to join forces with the entities using new technologies, in the broadest sense of the word, to seal the tax system. This is how the idea of solving the tax problem came to life at the hackathon that gathered together over 250 participants, including the best programmers from all over the country. The effect surpassed all expectations: they have created a programme, which to this day helps the Polish tax authority fight VAT frauds. The hackathon itself has proved to be the one largest in Europe, and new editions are held every year.



The success of the Ministry of Finance has become an inspiration for the entire government administration. The idea was born to extend the GovTech cooperation also to other ministries and local government units. Thus, on 29 May 2018, Mateusz Morawiecki, the Prime Minister of Poland, established the GovTech Polska inter-ministerial team, which on 22 October 2019, by virtue of a resolution adopted by the Council of Ministers, formally became a government programme. The aim of the

programme is to increase the effectiveness of innovation implemented by the public administration, with great emphasis on the cooperation with corporate sector, especially start-ups and SMEs, and also based on social dialogue and exchange of experience with foreign partners.



Establishing GovTech Polska has undoubtedly opened a new chapter in the relationship between the public administration (gov) and SMEs and start-ups (tech). Poland has joined such countries as Austria, Canada, the United States, Great Britain, Israel, Malaysia and Singapore, which boldly search for innovative solutions to social problems in their 'own resources', by partnering with innovative thinking citizens and entrepreneurs and not focusing on generic technology copied from other countries. And these are not just fine words: the statistics show that in the United Kingdom alone opening up to this form of cooperation saves up to GBP 3.5 billion a year. Undoubtedly, the GovTech market has enormous, largely untapped, potential. Globally, it is valued **at around USD 400 billion, and Europe itself spends around USD 25 billion on GovTech.** The value of public procurement in Poland is also growing dynamically YoY. In 2017, the procurement market was worth PLN 163.2 billion, while in 2018, it rose to PLN 202.1 billion, so the value increased by almost a quarter (23%)¹³.

GovTech Polska as a new standard for awarding contracts for innovation

Thousands of small and medium-sized Polish companies and IT start-ups develop ground breaking solutions based on machine learning, big data, computer vision, blockchain, 5G and other technologies of the fourth industrial revolution. However, despite having the right qualifications and creative potential, they are awarded only 3% of public contracts. Why? The traditional public procurement model favours the monopolisation of these contracts by large corporations specialising in providing this type of services to the public sector. That is why, GovTech Polska team decided to find such a model and

¹³ Report of the President of the Polish PPO on the functioning of the public procurement system in 2017 and 2018, available at <https://www.uzp.gov.pl/baza-wiedzy/analizy-systemowe/sprawozdania-o-funkcjonowaniu-systemu-zamowien-publicznych>

such a form of public procurement that will be easier to apply, will include minimum red tape, and will take significantly less time from the call for proposals stage to the implementation stage. Most importantly, however, it had to ensure fairness and bring together all entrepreneurs (micro, small and medium-sized companies) and citizens who would like to take up the challenge together and, with the help of various modern technological solutions, would be able to solve socially important issues and, at the same time, improve the quality of life of the society and increase the general effectiveness of public administration. The design contest formula offers such possibilities.

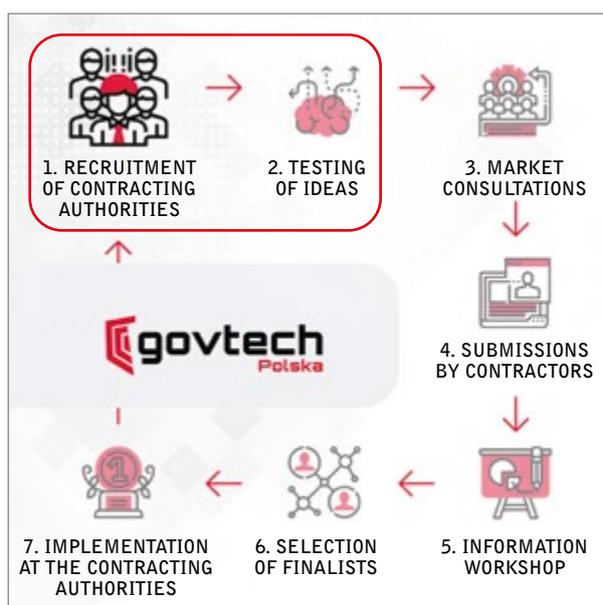
Design contest – a way to overcome barriers in public procurement

Unlike ready-made products, which cannot always be implemented in every institution and adapted to its technical infrastructure, innovation is rarely purchased. Most often, it has to be designed from scratch. Usually, the only information that the contracting authority has is the list of features required in the target solution and the maximum budget it can spend for it. This is far too little to describe the subject-matter of the contract in detail and issue a call for tenders. It is precisely in such situations that a GovTech design contest, consisting of two stages preceded by the so-called zero stage, is a perfect tool.

Framework and course of the design contest

ZERO STAGE¹⁴: need identification

Although the contest starts on the day it is announced, it is important to prepare for it in good time. The first step is to identify the need that can be satisfied by a technological solution. It is also important to make sure that there are no existing products on the market that would solve the problem and that could be purchased more easily and quickly in another procedure. If the contracting authority is convinced that the problem they face may be resolved by taking part in the GovTech programme, it should report its needs, which shall be carefully analysed by the team in terms of feasibility and reasonableness. The GovTech team and the contracting authority then work



¹⁴ Zero stage is understood as a preparatory stage; it is divided into two phases: needs identification and technical dialogue (market consultations). The dialogue is optional.

together on the terms of cooperation and a roadmap. At this point, the problem becomes a challenge, which is to be solved by creative participants of the GovTech design contest. During the period, the contracting authority needs to build on its side a team responsible for preparing and running the contest, from the moment of its announcement to the target product implementation stage. The team should be decisive, dynamic and have quick and unlimited access to the following resources:

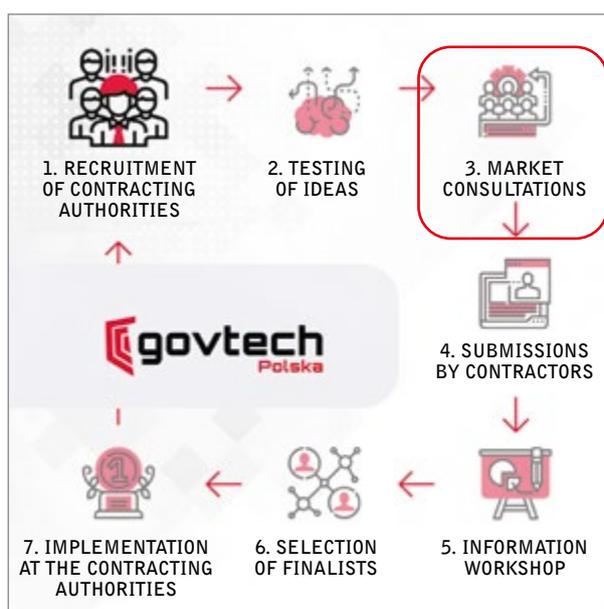
- a) The business owner of the final solution who is a person who knows everything, not only how and for what purpose the final product will be used, but also knows all the material and technical limits resulting from its implementation. At all times, such a person may advise on which feature is needed and required and which one is redundant or optional.
- b) An IT technician who has to test the ideas of other team members in terms of their technical feasibility, cost efficiency and time required for their implementation in relation to the financial capabilities of the contracting authority. They are also responsible for providing the necessary technical infrastructure to carry out potential tests.
- c) A lawyer/public procurement specialist whose task is to ensure that the team is able to navigate freely through legal requirements, best practices developed by GovTech Polska and the Public Procurement Office, as well as the internal regulations of a given institution.
- d) A person responsible for budgeting who will be able to ensure smooth financing and secure the funding for the planned service.

Each of the above should have a decisive voice in the team, in their respective areas of expertise. Only this way will the challenge developed be useful, lawfully executed and adequately funded.

“0” stage: business consultations and technical dialogue

It is safe to say that the challenge is taking shape at this stage. Regardless of how competent the team is, especially the technical staff of the contracting authority, the market verifies any challenge best. To avoid potential bias allegations, a technical dialogue is advised for running consultations. Unfortunately, this tool, which is simple by definition, is sometimes over-expanded by the internal regulations of the institutions. Thus, the following is worth reminding:

- a) A dialogue is, in principle, a way of conducting non-binding consultations. The participants in the dialogue are not bound to participate in the planned contest, nor is the contracting authority obliged to organise it if, for example, during the consultation, it turns out that the expected service is not feasible or the planned budget for this purpose is insufficient.
- b) The technical dialogue may take any form: by electronic means, by telephone or face-to-face. It can also be organised as a hackathon. Consultations may be

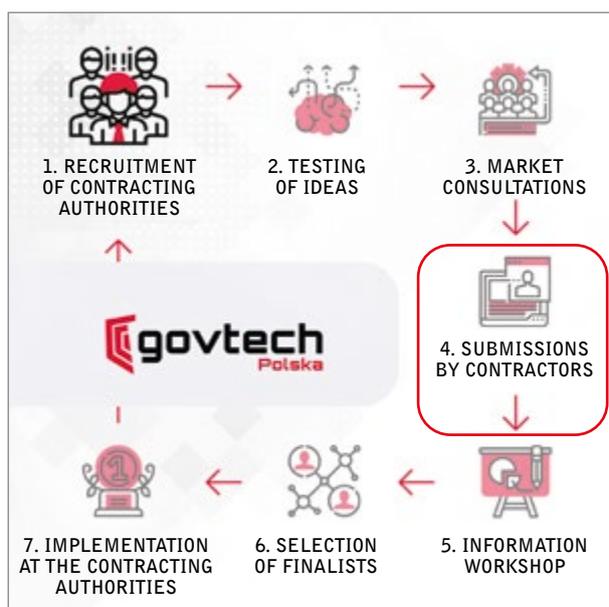


held with all participants at the same time, as well as with each participant individually. The dialogue should always respect the principles of fair competition and equal treatment with regard to potential contractors. Each participant should receive the same amount and content of information, which does not necessarily mean that each participant should be given the same amount of time or be contacted in the same way.

- c) The duration of the technical dialogue is unlimited, except that it may not overlap with the contest itself. It is possible to announce a single dialogue and hold consultations until the contracting authority decides that the challenge is ready.
- d) The contracting authority does not have to condition the participation in the dialogue on complying with any terms and may terminate it at any time with any participant if it comes to the conclusion that the latter is no longer able to bring anything new to the discussion.
- e) It is recommended that the dialogue be conducted in such a way that non-permanent residents of Poland may also participate in it if they wish to.
- f) The dialogue may be held to get advice on the technical feasibility of the challenge. At this stage, the contracting authority does not yet need to know the details of the expected solution or even the questions it will ask during the dialogue. Neither does it have to have drawn up the terms and conditions of participation in the contest nor a model implementation agreement.
- g) It is recommended that a person who will be the end user or business owner of the solution is present during the dialogue stage. They should be actively involved in formulating the questions, as well as participate in deciding on how and when to conduct the dialogue.

1st stage: submissions by participants (call for proposals) and POC

The first stage begins with a call for proposals. The contractors then create a study, commonly referred to as POC (*proof of concept*). It can either be software operating on a narrow pool of crafted data, an application with only several functionalities or another element allowing the contracting authority to see that a given participant is able to implement solutions in a given area and that the presented concept has the potential to solve the problem that the challenge stems from. Another important element is a presentation or other document containing a visualisation of the target solution. It describes which modules are required, which are optional and includes other key parameters of the target product. Due to the fact that, at this point, the participants are not familiar with the specific infrastructure of a given contracting authority, it is recommended that the presentation requirements refer rather to the functionalities ensured by the given process within the solution rather than technical details.

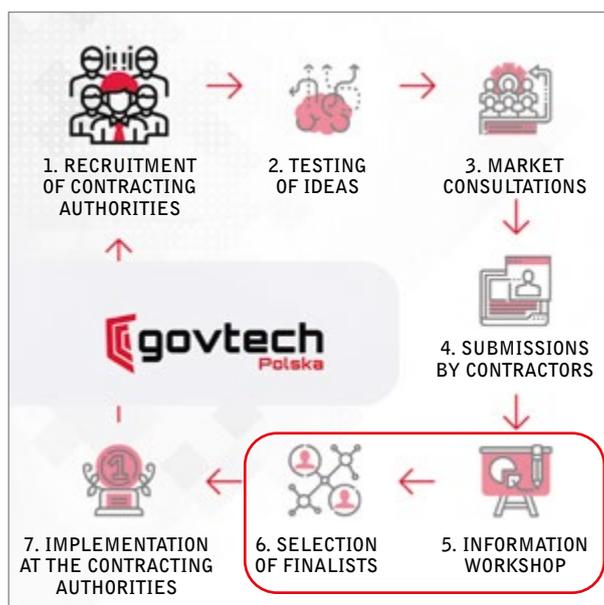


It should be stressed that the works submitted by the participants in both stages are **anonymised and encrypted**. The Secretary of the Contest Jury is the only person in the jury who has access to the works and is in regular contact with the participants. To ensure impartiality and equal treatment to all participants, other members of the jury shall not contact the participants until the contest ends and the winner is selected. The experts who are not members of the jury may answer questions from participants and keep in touch with them.

The two-stage process proposed by GovTech Polska also includes a procedure for awarding prizes to contractors after the first stage of the contest, which is to compensate for the costs incurred in preparing contest entries. A special prize is an invitation to negotiate the single-source procurement, which the winning team receives.

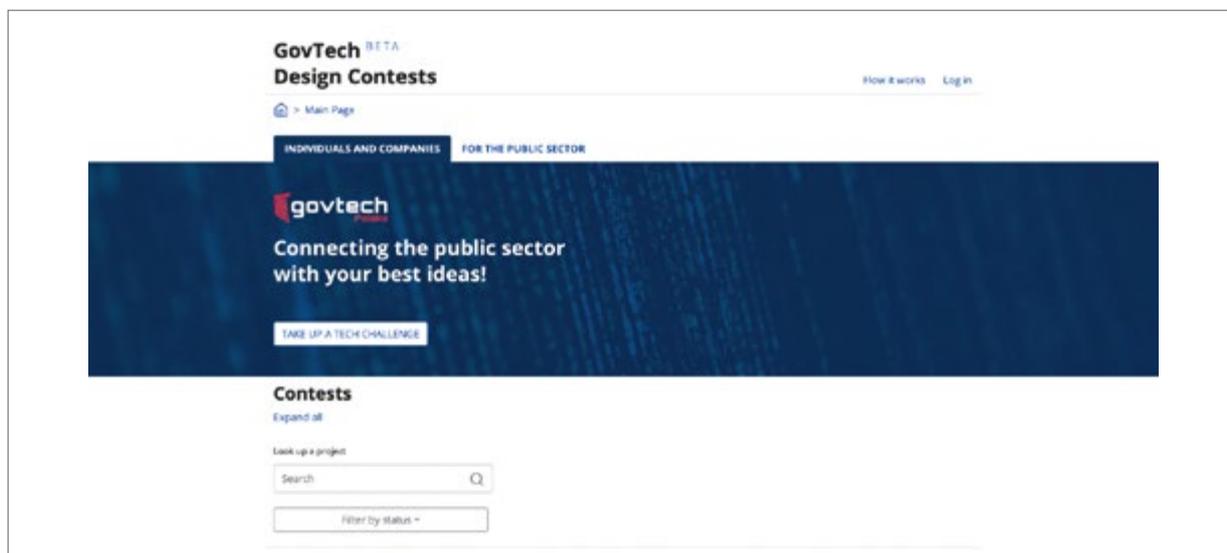
2nd stage: information workshop and MVP

The second stage begins with information workshop organised by the GovTech Polska team. The workshop involves a meeting between the contracting authority and contractors held to specify and clarify the criteria of the 2nd stage, so that the participants have no doubts as to different aspects of the target product. The second stage of the contest allows for assessing whether a given participant has well understood the business needs of the contracting authority and is able to prepare the target product with the required functionalities. At this stage, a design is created according to the specific needs of the contracting authority. It should, however, be stressed that this does not mean creating a ready-to-use product. We are talking here about the so-called MVP, i.e. a *minimum viable product*, or, to put it simply, a demo version of the target product, which is only developed to a full version after the contract is signed. The second stage ends with selecting the winning design and inviting its author to negotiate the single-source procurement.



Contest platform: moving contests to digital

GovTech Polska contests gain in popularity due to their accessibility for innovative entrepreneurs who do not have time to fill in long forms, go to the post office or follow procedures via Public Information Bulletins. To meet their demands, since September 2019 all GovTech Polska contests have been held fully online.



Not only can platform users participate in contests and consultations, but they can also ask questions, check the procedure status, submit works and other documents and much more. Online procedure is not only more convenient for participants, but also more transparent and easier for contracting authorities. The platform operates in two language versions (Polish and English) and is still being improved with new features. Following its success, the European Commission, in its strategy paper 'An SME Strategy for a Sustainable and Digital Europe', proposed the creation of a similar tool on a pan-European scale.

Why a design contest?

One of the advantages of GovTech design contests is the fact that the finalists, i.e. the participants of the second stage, develop their prototypes in real-world environment, matching them to the specifics of a given institution, and based on actual data provided by the subsequent recipient of the product. An implementation agreement that guarantees the execution and operation of the product based on the infrastructure and technical capabilities of the institution, is signed with the winner.

The contest also allows for involving and inviting to cooperation a much wider group of potential, creative citizens than in the case of other procurement procedures; these include start-ups, small software houses, academia and individuals without their own businesses. They all have equal opportunities and can face any challenge that the GovTech Polska programme has to offer, regardless of the company size, number of employees, access to infrastructure, number of public contracts performed or the size of network.

■ Why is it worth organising and taking part in the design contests?

Problem

- Lacking knowledge of technologies in public institutions
- Rigorous terms of participation in public procurement procedures
- One big tender for all technological services
- In 97%, the contracts are awarded to large companies and corporations
- Contracts are disconnected from market standards
- Public institutions look as if they were closed to ideas and innovative solutions

Solution

- ➔ National Brainstorming – citizens provide technical knowledge and public institutions define functional needs
- ➔ Only formal conditions to be met to participate in the contest
- ➔ We teach modular approach to procurement, introducing a more favourable alternative for smaller procedures
- ➔ What counts in contests is the idea, not the size and number of contracts performed
- ➔ New contracts are developed according to international standards and consulted with business sector
- ➔ Engaging hundreds of people nationwide and internationally, increasing competitiveness and promoting the attractive image of public institutions

■ Key role of technical dialogue (market consultations)

Technical dialogue as a part of consultations with the businesses is a valuable source of information necessary to develop a reliable and detailed description of the subject-matter of the contest. It guarantees that in the end the resulting product will meet all needs and include all functionalities relevant to the institution. During the dialogue, the contracting authority can get answers to such issues as:

- ➔ Estimation of the market value of the product with the expected features and parameters: is the planned budget sufficient, should certain functionalities be abandoned or the financial outlay increased?
- ➔ Secure system of data transfer by the contracting authority allowing for reliable preparation of the contest work;
- ➔ The quantity, quality and type of data that can be provided by the contracting authority at each stage of the contest, especially important for machine learning;
- ➔ The evaluation criteria used to assess the designs: do they guarantee equal treatment of all participants, are they not too high? Which criteria should be included in the 1st stage and which should refer only to the 2nd stage of the contest?

- ➔ Technical data of the submissions and their feasibility (also taking into account the budget): which features should be requested by the contracting authority at MVP creation stage, and which of them should be developed at the stage of product implementation by the winner?
- ➔ The condition of institution's technical infrastructure and product implementation in its environment;
- ➔ Product adaptation criteria, including acceptable rates of 'false positive' and 'false negative' errors, prediction time;
- ➔ The time needed to manufacture and implement the product;
- ➔ Type of cooperation in product implementation: Waterfall vs Agile;
- ➔ Determining the number of simultaneous target users for the solution;
- ➔ Should the solution allow remote access, does it include elements verified by the access rights check, do all users have equal status?
- ➔ Are there plans to add other modules in the future?
- ➔ What types of files and input will the solution process? What is their volume and how are they to be identified?

While consulting the contest participants, GovTech Polska team noticed that the problem most frequently identified by the businesses is too little test data provided by the administration, especially when it comes to machine learning, as well as licensing restrictions preventing further development of the product by the company and the possibility to offer it to other counterparties. Excessive formalism and red tape are also the 'downsides' of partnering with public administration according to the entrepreneurs. Such mistakes and many other ones could be avoided by entering into technical dialogue.

There is no doubt that technical dialogue allows for confronting the officials' expectations with the market reality. It is also a big time saver, since even at the initial stage, before the whole formal procedure is launched, the contracting authority is able to find answers to a number of basic questions:

1. Can the expectations be met within the planned budget,
2. Are there any entities on the market that will undertake to perform the project,
3. Can the product requirements be met,
4. How must the contracting authority prepare for product implementation,
5. Does the implementation entail additional formal or legislative changes.

If a classic tender procedure was conducted, the contracting authority would find that out after a few months, when not a single offer would be submitted or the offers submitted would not meet its expectations. Thanks to this solution, the institution saves time and increases the probability of successful project implementation. Technical dialogue also makes it possible to establish the terms of cooperation from the start, and thus avoiding undesirable misunderstandings in the future, especially at the product implementation stage.

■ Single-source procurement

The second stage ends with selecting the winning design and inviting its author to negotiate the single-source procurement, in accordance with the provisions of the Public Procurement Law. This procedure is the equivalent to the negotiated procedure without publication described in the EU Directives

2014/24/EU (Classic Directive – Article 32) and 2014/25/EU (Utilities Directive – Article 50). The negotiations consist in working out common provisions and general terms and conditions to be incorporated into the contract to be concluded. It is also possible to jointly establish and work out a target model contract and a roadmap for the implementation of a service or product. What is crucial, especially for small enterprises or start-ups, is that the provisions on deposits and performance bonds do not apply to single-source procurement. The contracting authority also does not draw up tender specifications, as the related provisions of the PPL do not apply to this public procurement procedure¹⁵.

First edition of the GovTech programme – what was a success?

The first pilot edition of the GovTech Polska programme took place in 2018. The following five contracting authorities, looking to solve their problems, took part in it:

- ➔ Ministry of Digital Affairs,
- ➔ Ministry of Finance,
- ➔ Ministry of Entrepreneurship and Technology,
- ➔ Ministry of Health,
- ➔ The city of Świdnik.

250 entities submitted their applications, and 100 companies and individuals submitted their designs (40% of all applications!). The first edition led to developing solutions worth PLN 2 million, which backed financially young innovators.

Among the five developed innovations, two are worth special attention: the one created for the protection of Polish borders, and the other created to tighten the city waste management system.

An application protecting the borders of the Republic of Poland

One of the challenges of the first edition of the GovTech Polska programme was the task mandated by the Ministry of Finance, which consisted in developing the world's first application based on a self-learning IT system that quickly and automatically identifies objects and groups of objects on X-ray images made by the equipment installed at the Polish borders. The system is designed to distinguish between everyday objects and those that pose a threat or their transport across the border is completely prohibited. The application was developed for the employees and officers of the Customs and Fiscal Service, who analyse X-ray images made to control parcels and



SUCCESSES OF THE 1st EDITION

- 5 CHALLENGES (4 MINISTRIES, 1 CITY)
- OVER 250 APPLICATIONS
- OVER 100 SUBMITTED DESIGNS
- PLN 2 MILLION FOR SME AND START-UPS
- INTERNATIONAL COOPERATION WITH 19 COUNTRIES
- 4 GLOBAL PIONEER GOVTECH AGREEMENTS

¹⁵ *Single-source procurement*, Polish Public Procurement Portal. Law and Tenders, <https://www.portalzp.pl/z/zamowienie-z-wolnej-reki-8869.html> [accessed on 29.05.2020].

containers at Polish borders on a daily basis. Every year, they stop thousands of attempts to smuggle, among other things, cigarettes, alcohol, drugs, weapons and explosives, endangered animal species and even people – victims of kidnapping and human trafficking. How a winner was selected? Tensor-flight Poland's victory was confirmed by a test to their application, which almost flawlessly identified all classes of items. At the second stage of the contest, the solution submitted by the winning team scored high at cigarette identification test, which are most difficult to detect on X-ray, and had relatively low rate of false alarms. The budget for the app implementation was PLN 600 000, and the implementation time was estimated at 6 months.



What are the actual benefits of the application?

Thanks to the implemented system, customs officers at Polish borders have thwarted smuggling attempts of goods worth tens of millions of zlotys, which remained in the state budget. There is only one such solution and success on a global scale!

An application tightening the city waste management system

Each year, the city of Świdnik has been losing PLN 1 million in waste disposal subsidies. The number of inhabitants has increased only minimally, but tons of waste have continued to grow. Money that could have been repurposed to satisfy other needs, for example to build playgrounds, roads or better street lighting, had to be spent on cleaning waste, so that it would not end up lying in the streets. The challenge that the City of Świdnik posed in the first edition was to develop a spreadsheet that, on the basis of anonymised data on the activity of residents in various areas of life and their declarations of residence, by way of correlation, would select those addresses where it would identify irregularities in the declaration of municipal waste management fee. The system would select the addresses to which an official request for clarification should be sent on a quarterly basis. The solution was intended to increase the effectiveness of detecting irregularities while reducing the working time of civil servants devoted to identifying potential irregularities. The challenge was met by RapidSoft Sikora, Wróbel from Gliwice, which had a few months to develop a solution within the budget of PLN 20 000.



How does the implemented solution perform?

The very first use of the purchased application allowed the City of Świdnik to obtain a total return on investment, which amounted to PLN 20 000. Additional revenue for the city resulting from the use of application amounted to PLN 150 000. It is worth noting that we are talking about a single use of the spreadsheet. Further attempts have been put on hold until the coronavirus epidemic is over because, once the irregularities are detected, residents are invited to the office to clarify and amend the declaration. On the basis of the Świdnik case study, the supplier of the solution has developed a similar product that other local authorities have expressed their interest in, which has had a positive effect on the market. The City of Świdnik has also shared its solution with several local governments as part of good cooperation; they are now in the implementation phase. The application contributed to the City of Świdnik being awarded in the 2019 Smart City Awards contest for using modern IT solutions to tighten the waste collection system.

Second edition – what are we working on?

The second edition of the programme, which started in February 2019, gathered 12 contracting authorities, including ministries and state-owned companies. Over 619 contest applications have been submitted, which gives more than 50 applications for each challenge and represents an almost 2.5-fold increase compared to the previous edition! A total of over 200 designs were submitted in the first stage, so on average there were 16 proposals for solutions per contest.

Compared to the first edition, this was an increase by over 100%! The value of all solutions in the second edition amounted to over PLN 6 million, which backed IT companies and start-ups.

Currently, the solutions are at the implementation stage, however, some of the challenges faced by the participants of the 2019 GovTech Polska contests are already worth mentioning:

- 1) Refuelled vehicle identification system for mFlota app users (PKN Orlen);
- 2) Classification system for applications for granting protection for inventions and utility models (Polish Patent Office);
- 3) Ticket price management system for railway (PKP Intercity and PKP Informatyka);
- 4) Development of a system and application evaluating the capacity and potential of a PV installation (Tauron Polska Energia);
- 5) Intelligent robot to fight cybercrime (National Revenue Administration - IAS Opole);
- 6) Training platform for National Revenue Administration officers performing customs and treasury control with the use of X-ray equipment (National Revenue Administration - IAS Gdańsk);
- 7) Photo validator (Ministry of Digital Affairs);

2nd EDITION

- 12 DESIGN CONTESTS IN THE FIELD OF IMAGE AND SOUND ANALYSIS, BIGDATA, AI
- 619 SUBMITTED APPLICATIONS
- OVER 200 SUBMITTED PROPOSALS
- PLN 6 MILLION FOR IT COMPANIES
- 5 SIGNED IMPLEMENTATION CONTRACTS

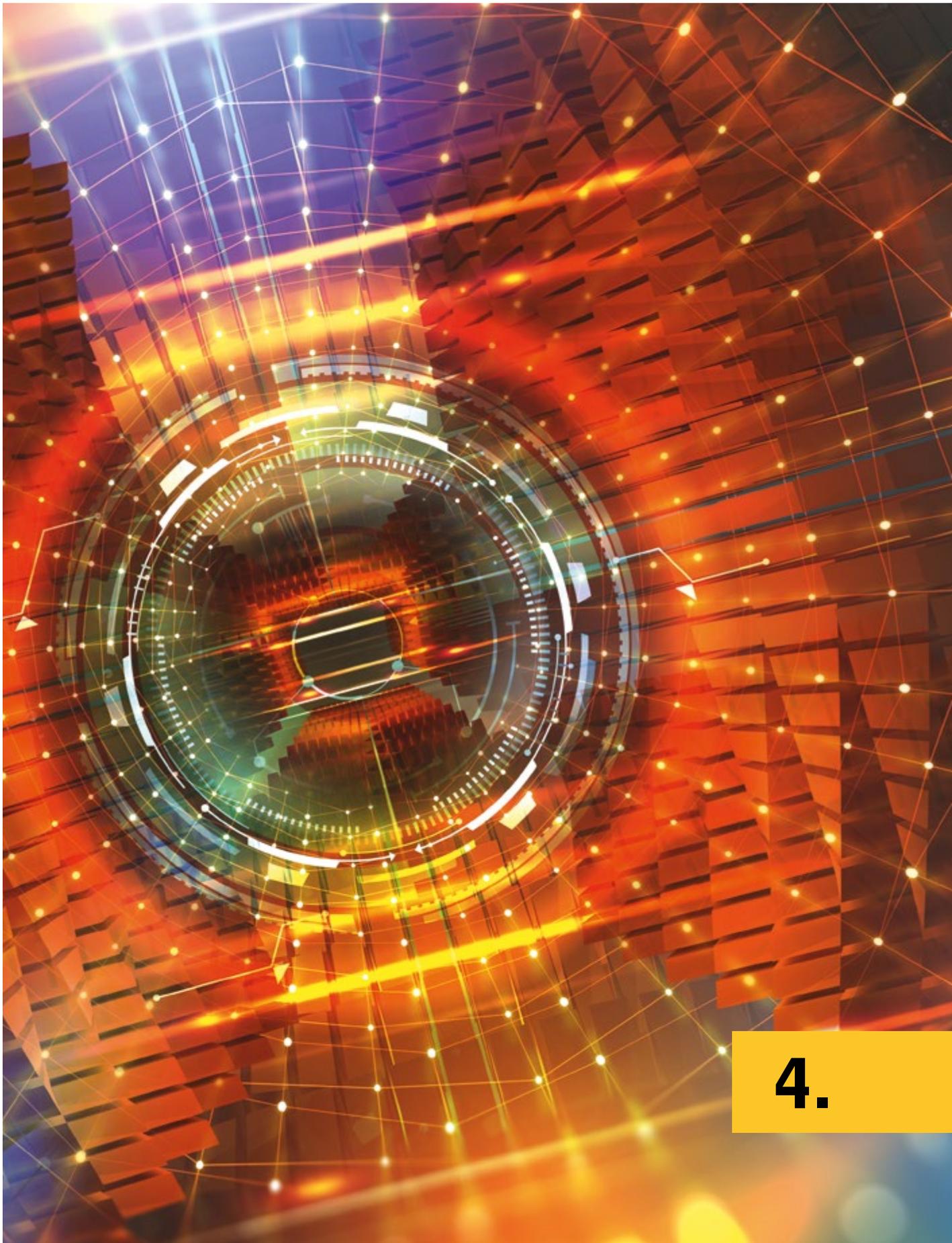
- 8) Virtual Assistant for the Individual Client Department (PGNiG Obrót Detaliczny);
- 9) A platform presenting investment attractiveness in the area of white spots in Internet access (Office of Electronic Communications).

From the market shark to an involved citizen

The two-stage design contest formula described above as well as the technical dialogues that the contracting authorities conduct with the participants have another very important (yet rarely mentioned) value: they allow for creating a certain bond between the participants and the contracting authority, which results in much greater involvement and a more personal approach to the project, unattainable in classic tender procedures where only large, profit-oriented companies, treating each project as one of many, take part.

As GovTech Polska team, we have noticed that the vast majority of companies winning the contests are very committed to the projects, and they want to implement the product effectively and quickly. They are determined and proud of the fact that, apart from receiving financial backing, their solution may be useful in many important areas of life, such as safety or health. This is perhaps the greatest reward and example of how cooperation between public administration and businesses (Gov-Tech) can be symbiotic and profitable for the society as a whole and, at the same time, develop young innovators' national capacity.

That is why, at the end of the day, we should emphasise the contribution of and pay tribute to all young creators: start-ups, entrepreneurs, and simple ordinary citizens, because it is they who come up with creative and sometimes unusual solutions. Without them, GovTech would not exist. They are the driving force of innovation; they make the public sector increasingly innovative. For this, we would like to thank them on behalf of the entire GovTech Polska team.



4.

4. SOLARIS National Synchrotron Radiation Centre

Edited by: dr Małgorzata Moras¹⁶, NSRC SOLARIS

In the years 2010-2015, the Jagiellonian University performed a pioneering project in Central and Eastern Europe entitled Narodowe Centrum Promieniowania Elektromagnetycznego dla celów badawczych (etap I) [National Electromagnetic Radiation Centre for research purposes (1st stage)].¹⁷ It was aimed at building a source of synchrotron radiation with a diameter of 30 meters and beam energy of 1.5 GeV to be the heart of the largest research device in Poland. The resulting synchrotron is located on the Campus of 600th Anniversary of the Jagiellonian University Renewal.



Synchrotron is a type of circular accelerator, i.e. a device in which particles moving in a circular motion are accelerated, as opposed to linear accelerators in which accelerated particles move in a straight line. The SOLARIS synchrotron accelerates electrons. When the path of electrons, moving at a speed close to that of light in a vacuum, is curved, electromagnetic radiation called synchrotron light is produced. The light is brought out of the synchrotron and sent to research lines, where it is used for scientific research at end stations. Synchrotron is therefore a device that produces synchrotron light for scientific purposes. The synchrotron light is unique. One of its characteristics is, among other

¹⁶ Assistant professor at the University of Economics in Krakow.

¹⁷ The project was implemented under the Operational Programme Innovative Economy, Measure 2.1 Development of high research potential centres, under the contract no. POIG.02.01.00-12-213/09 of 09.04.2010 concluded by and between the Minister of Science and Higher Education and the Jagiellonian University.

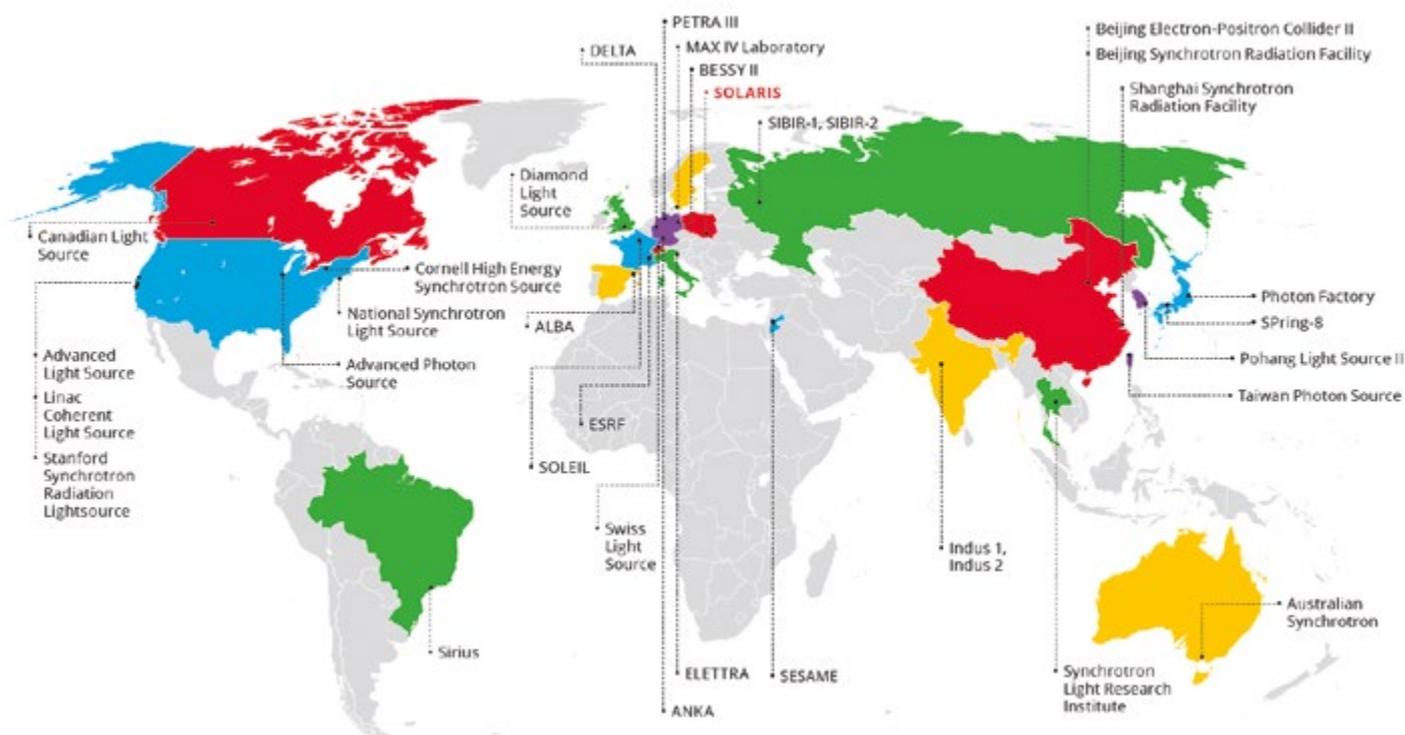
things, its great intensity: it is millions times brighter than the sunlight that reaches the Earth. Moreover, synchrotron radiation extends from infrared, through visible light and ultraviolet to X-rays. It is also very much collimated (concentrated in a narrow beam of parallel beams). Thanks to it, scientists can explore in many ways both surfaces and interiors of various materials, discovering how they are built and what their chemical composition and electrical or magnetic properties are. Synchrotron-influenced reactions and transformations occurring in samples are also investigated. These characteristics mean that many measurements can only be made using the synchrotron light. It provides more and better quality information in less time than traditional light sources. Since synchrotrons operate 24/7, they become real research factories. The enormous research opportunities they provide make them useful in many scientific fields, such as biology, chemistry, physics, material engineering, nanotechnology, medicine, pharmacology, geology and crystallography.



The majority of the research carried out in synchrotrons is primary, i.e. research aimed at gaining new knowledge about the structure of materials and processes taking place inside them. This knowledge lies at the heart of new discoveries and is applied in practice. For example, primary research has given rise to LED bulbs and screens for modern TV sets and mobile phones. The knowledge gained through synchrotrons is used to design more efficient electronic devices, e.g. faster and less energy consuming computer processors. Synchrotron measurements can also result in faster recording of information on smaller data carriers, such as computer hard drives. For years now, the materials used in the production of solar cells have been tested in such a way as to increase the efficiency of converting solar energy into electricity. In turn, research into the structure of protein and biomolecules leads to an understanding of life processes and helps develop new drugs. In synchrotron centres, research on chemical conversion of carbon dioxide to fuels, alcohols, hydrocarbons, polymers and plastic is also conducted¹⁸.

¹⁸ https://synchrotron.uj.edu.pl/documents/1457771/138966987/02+folder+SOLARIS_PL_web.pdf/b951d0e3-3e82-467b-b6ea-973be235f301 (accessed on 1/06/2018)

There are currently about 30 synchrotron centres worldwide. They are located mainly in Europe, East Asia and the United States, i.e. highly developed regions whose economic development is based on knowledge and innovation¹⁹.



The Krakow synchrotron was built using the most modern technology, following an innovative project run by the specialists from the MAXIV Laboratory, Swedish research unit of the Lund University²⁰. Thus, circulating electron beam has excellent parameters with a relatively small size of the device²¹. It should be stressed that the knowledge and experience already acquired in the construction and use of such devices was essential in implementing the project. In the corresponding period, the Lund University (the MAXIV Laboratory) launched its own MAX-IV project, which included the expansion of the existing research infrastructure. The plan was to design and build two new 3 GeV and 1.5 GeV synchrotrons using modern, unique integrated magnet technology. Therefore, on 21.12.2010, the Jagiellonian University and the Lund University (the MAXIV Laboratory) came to a partnership agreement on building the Krakow synchrotron. Both entities shared the same objectives and similar schedules for the projects under way, so it was rightly assumed that this would have a positive impact on the effectiveness of design work, the drafting of technical documentation, purchases of equipment

¹⁹ https://synchrotron.uj.edu.pl/documents/1457771/138966987/02+folder+SOLARIS_PL_web.pdf/b951d0e3-3e82-467b-b6ea-973be235f301 (accessed on 1/06/2018)

²⁰ On 31 October 2009, the Jagiellonian University signed a so-called *memorandum of understanding* with the Lund University, which forms the basis for cooperation in the field of synchrotron radiation research.

²¹ https://synchrotron.uj.edu.pl/documents/1457771/138966987/02+folder+SOLARIS_PL_web.pdf/b951d0e3-3e82-467b-b6ea-973be235f301 (accessed on 1/06/2018)

or the possibility of joint use of human resources²². Synchrotrons are built from many components, most of which are created as unique, individual solutions, tailored strictly to the contracting authority's needs, and design works and prototyping have a significant share in their manufacture cost structure. The partners to the agreement intensively sought for the possibility of contracting the design of parts of the device for both projects simultaneously, realising that the returns to scale can bring multi-million dollar savings.

As a result, in order to take advantage of the purchasing synergy of the two projects, when defining the terms and conditions of the contract for the supply of synchrotron parts, the Lund University introduced provisions allowing the Jagiellonian University to order identical devices. It was stipulated that the Polish contracting authority has the right to use the contractually agreed conditions and requirements, resulting from the procedure conducted by the Swedish contracting authority, while indicating that if the Polish contracting authority decides to use this stipulation, then the final conditions and requirements will be set out in a separate public procurement contract concluded between the Jagiellonian University and the contractor. The contractual terms and requirements set by the Swedish contracting authority were treated as minimum, i.e. the Polish contracting authority subsequently concluded a public procurement contract on terms identical to or possibly better than the Swedish contracting authority. The above brought actual benefits to the contracting authorities, especially due to the fact that by contracting several specific parts of the synchrotron, they were offered attractive discounts and favourable terms of transfer of proprietary copyrights to the equipment design documentation and guarantees. This did not, however, relieve the contracting authority from the obligation to carry out a proper public procurement procedure in accordance with existing national legislation²³. The Jagiellonian University usually awarded contracts in a single-source procurement procedure, based on the premise of having only one supplier, for objective technical reasons. Individual device components had to be identical to avoid incompatibility of solutions at individual stages of accelerator integration. However, such a solution also had a disadvantage: in its contracts, the MAXIV Laboratory had to include a clause stipulating that the authorisation to perform the contract given to the Polish contracting authority shall not be considered its liability. The University had no grounds to give such an assurance prior to launching the public procurement procedure, which resulted in that not every contractor respected the tender conditions previously agreed with the MAXIV Laboratory, especially the offered prices. Table 1 presents the summary of single-source procurement procedures.

²² M. Moras, Transgraniczne zamówienia wspólne na innowacyjną aparaturę badawczą na tle zamówień realizowanych przez Narodowe Centrum Promieniowania Synchrotronowego SOLARIS UJ, in: *Potrzeby i kierunki zmian w Prawie zamówień publicznych*, ed. M. Stręciwilk, A. Dobaczewska, Warsaw 2018, pp. 210.

²³ M. Moras, *Transgraniczne...*, p. 211.

Table 1. Contracts concluded following a single-source procurement procedure

Contractor - Country	Subject-matter of the contract	Remuneration in PLN (gross)
Sweden	Pulse power supplies for a linear accelerator	7,572,718.90
Sweden	High-power radio frequency power supply (RF units)	1,976,139.14
Great Britain	Iron for electromagnet production	1,587,482.72
Germany	Three linear accelerator units	4,438,415.99
China	Waveguides	159,714.64
Sweden	E and F-type electromagnets	306,568.50
Denmark	SM1A and SM1B septum magnets, D-type correction magnets and E-type correction magnets	650,676.84
Denmark	High-current power supply systems for accumulation ring electromagnets	1,130,669.76
Sweden	Power supply systems for electromagnets	387,231.14
Italy	Electron beam absorbers in the transfer line of a synchrotron	181,152.76
France	Control system for stepper motors dedicated for IcePAP accelerators	687,011.13
Denmark	Integrated magnets for bending the accumulation ring of SOLARIS synchrotron	11,377,792.19
France	Power supply systems for correction electromagnets	805,411.74
Germany	Resonant cavities of the accumulation ring and facility equipment	2,757,365.76
Germany	Non-standard vacuum chambers	2,138,774.00
Great Britain	High radio-frequency amplifiers	297,296.97
Germany	Vacuum chambers	5,421,500.61
Sweden	High-power high-frequency amplifiers with the necessary accessories	2,438,449.96
Sweden	RF circulators and dummy loads with the necessary accessories	812,648.18
Russia	B-type and F-type quadrupole electromagnets for the linear accelerator of the synchrotron and a system of two impulse dipole magnets with an additional ceramic vacuum chamber	1,673,229.41
Slovenia	Controllers for the BPM system, GDX modules and software, including accessories	3,784,779.43
Sweden	Active filter with current transformers for K2 modulators	238,012.67
Total:		50,906,654.39

Source: M. Moras, Transgraniczne..., p. 212.

During the synchrotron construction stage, when awarding other contracts, the open tender procedure was applied, and since the amendment of the Public Procurement Law of 14 March 2014 (Dz.U. of 2014, item 423), which entered into force **on 16 April 2014**, science-related contracts were also awarded based on the exclusion set out in Article 4(8a) of the Public Procurement Law and the framework procedure included in the Act of 30 April 2010 on the principles of science financing.

Regardless of the procurement procedure, contracts have been complemented by certain provisions enabling flexible response to the changing factual circumstances. Firstly, the provisions concerning quantitative options and options for the subsequent purchase of additional components increasing the functionality of the contracted synchrotron part were introduced pursuant to Article 34(5) of the PPL. Secondly, it was also a standard practice to reserve supplementary procurements, which made subsequent contracts relatively quick to proceed with. Thirdly, the provisions regarding modifications to the contract were worded in a broad and forward-looking manner, especially with regard to potential changes in technological aspects or execution dates of the subject-matter of the contract due to acceleration (or delay) in the preparation of other device elements or NSRC SOLARIS-related construction works.

Fourthly, the applied contractual penalties were moderate and tailored to the specific nature of contract. The amount of the contractual penalty was determined in such a way that it would discipline the contractor, but at the same time it would not increase in the contractor's remuneration proposed in the tender offer. It should be stressed that during market intelligence it came to light that severe contractual penalties affect the amount of remuneration offered by foreign contractors, and even their interest in participating in the procurement procedure.

Fifthly, prior to launching any purchasing procedure, the market was thoroughly analysed and the technical and functional requirements for the equipment were established. Prices, guarantee terms, copyrights and licences were checked. The intelligence was carried out by way of consultations with the MAXIV Laboratory and market surveys conducted by electronic means of communication, usually by email or online videoconferencing tools, and properly documented. The amendment to the PPL of 12 October 2012 on technical dialogue (the equivalent of market consultations indicated in the EU directives) resulted in the use of this tool as well. This was particularly important when the contracting authority had difficulties in obtaining information on potential contractors for the subject-matter of the contract. The first technical dialogue took place in 2013 and concerned a public contract for the supply of control racks with accessories²⁴. As a result, the description of the subject-matter of the contract has been clarified, the issues relating to payments and possible advance payments have been cleared out, and the estimated contract value has been provisionally determined.

Sixthly, in order to increase competition on the market, the contracting authority drafted tender documents in Polish and English.

Currently, NSRC SOLARIS supports research on three beamlines. Scientists also have Titan Krios G3i, the latest generation of a cryo-electron microscope at their disposal. Soon, one more beamline will be available (XMCD), and there are four more in the construction or design stage. Two diagnostic lines come with the synchrotron as well. A brief description of the beamlines and Cryo-EM is available below:

²⁴ http://przetargi.adm.uj.edu.pl/pliki_z_formularza/zalacznik3258.pdf (accessed on: 30/05/2020)



PEEM / XAS

Status: active line

Source: bending magnet

Photon energy range: 150-2000 eV

Radiation polarisation: linear (horizontal) and elliptic

Research stations: PEEM and XAS

Research methods:

PEEM station — XPEEM, micro-XAS, micro-XPS. These methods enable surface imaging of chemical, electron and magnetic properties of a sample.

XAS station — XAS, XMCD, XMLD. X-ray absorption spectroscopy provides information on the chemical state and local structure of the tested material with element selectivity. In addition, controlling the polarisation of absorbed radiation makes it possible to analyse the magnetic order and crystalline structure of materials using XMCD and XMLD.

UARPES

Status: active line

Source: quasi-periodic undulator

Photon energy range: 8-150 eV

Radiation polarisation: horizontal, vertical, circular, elliptical, slant linear

Research station: UARPES

Research methods: ARPES. This method enables measurements of electron energy and momentum, and thus, studying the electronic band structure in three dimensions, including the effects of electronic correlations.



PHELIX

Status: active line

Source: undulator

Photon energy range: 30-1500 eV

Research stations: PHELIX

Radiation polarisation: linear in any direction, circular and elliptical

Research methods: photoelectron spectroscopy (ResPES, ARPES, SX-ARPES, SR-ARPES, XPS, UPS, CD-ARPES), XAS (TFY, TEY).



XMCD

Status: line under construction

Source: undulator

Photon energy range: 100-2000 eV

Radiation polarisation: clockwise and anti-clockwise circular, horizontal and vertical linear:

Research stations: PEEM | Octupole station | STXM

Research methods: Scanning transmission X-ray microscopy (STXM), XMCD, XMLD, XPEEM, micro-XAS, micro-XPS.

SOLAIR

Status: line under construction

Source: bending magnet

Photon energy range: 500 meV — 12.5 meV

Radiation polarisation: linear, circular

Research stations: FTIR microscopes, AFM

Research methods: microscopy and IR imaging (including with FPA detector), AFM-IR-sSNOM imaging identifying the chemical composition of materials of different origins, from nanometres to several centimetres.

POLYX

Status: line under construction

Source: bending magnet

Photon energy range:

5000-15000 eV

Radiation polarisation: linear

Beam type: white, monochromatic

Research stations: TOMO, XRF

Research methods: multimodal X-ray imaging (μ XRF, XRF-CT, μ XAFS, μ XRD, μ CT).

SOLABS (XAS-HN)

Status: line under construction

Source: bending magnet

Photon energy range: 1000-12,000(15,000) eV

Radiation polarisation: linear

Research stations: station for measuring absorption using transmission and fluorescent methods

Research methods: X-ray absorption spectroscopy, XANES, EXAFS.

SOLCRYS

Status: line under construction

Source: superconducting wiggler

Photon energy range: 5000-25000 eV

Research stations: SAXS/bioSAXS | MX/HP XRD

Research methods: protein crystallography | structural analyses of single-crystals under extreme conditions (i.e. high pressure) | powder diffraction | SAXS/bioSAXS.

Cryo-EM Cryo electron microscope Krios G3i²⁵

Status: active

Optimum accelerating voltage: 200 and 300 kV

Detectors: Gatan K3 BioQuantum, Falcon 3EC, Ceta 16M Camera 300 kV

Research methods: single particle analysis (SPA), electron tomography in structural biology.

²⁵ https://synchrotron.uj.edu.pl/en_GB/aktualnosci/-/journal_content/56_INSTANCE_ZEhuXSihDJbq/1457771/146338189 (accessed on: 01/06/2020).

Currently, NSRC SOLARIS awards public contracts based on the Order No. 57 of the Jagiellonian University Rector of 5 May 2017 concerning the implementation of the Public Procurement Law of 29 January 2004²⁶. The Rules and Regulations contain provisions allowing for flexible shaping of purchasing procedures in accordance with the PPL and other generally applicable laws. The requirement to draw up a material and financial schedule (cost estimate), expenditure plan or other document in order to agree on appropriate procedures and deadlines for the award of contracts for projects financed or co-financed from external sources such as the European Union, grants or subsidies is particularly important for implemented projects. The requirement to draw up an appropriate purchasing plan makes it necessary to group the purchases properly at the outset, to make their initial estimate and to establish a time frame for granting contracts. This therefore promotes the efficient award of public contracts.

While preparing to individual tender procedures, NSRC SOLARIS thoroughly and comprehensively analyses the market and the solutions offered thereon. The Centre's membership in the following associations enables the possibility of extended consultations:

- The League of European Accelerator-based Photon Sources (LEAPS), a consortium of European synchrotron centres and research units with free electron lasers;
- Central European Research Infrastructure Consortium (CERIC-ERIC), a consortium bringing together specialised laboratories and research centres from Central Europe and Italy. The consortium was formed thanks to communication specialists' partnership. It brings together synchrotron centres and research units with free electron lasers from Europe and the Middle East, the Americas, Asia and Australia.
- A consortium associating 10 research units from all over the world, involved in the development of the Tango Controls used, among others, to control accelerators, lasers and telescopes.

Consultations are therefore held at conferences, symposiums, etc. as well as through market surveys, usually carried out by email or other available electronic tools allowing for direct communication with potential contractors. Based thereon, contractors are able to present a description of the offered solutions, contract terms, preliminary pricing, etc. The Centre has also engaged in technical dialogue (market consultations). For example, such a dialogue was carried out in 2019 for a contract for the design, supply and installation of a PX/SAXS/PD measurement line at the SOLARIS National Synchrotron Radiation Centre²⁷. Only foreign contractors participated in the dialogue, namely two entities from Germany, one from France and one from England. The dialogue was conducted in English. The meetings with the contractors' representatives were held by means of electronic communication (videoconferencing) and face-to-face. In the end, a summary record of all meetings was drawn up. To establish the terms of the dialogue and ensure its smooth conduct, the Rules and Regulations were established. Its provisions on the use and sharing of information acquired during the dialogue are

²⁶ The Order is available online at: <https://przetargi.uj.edu.pl/akty-prawne-zarzadzenia-plany> (accessed on: 30/05/2020), and hereinafter is referred to as the Order of 2017.

²⁷ https://przetargi.uj.edu.pl/zakonczzone/ogloszenia-o-postepowaniach/2018?p_p_id=56_INSTANCE_0XNchqSWlp1k&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-2&p_p_col_count=1&groupId=1378124&articleId=141493201&widok=ogloszenie (accessed on: 30/05/2020)

particularly important. They have been worded in such a way as to encourage potential contractors to share it with the contracting authority.

In most cases, the SOLARIS Centre awards public contracts under the basic procedure, i.e. an open tender. In the case of public contracts with an estimated net value not exceeding the so-called EU thresholds, and where other statutory requirements are met, contracts are awarded under the so-called scientific procurement procedure. In exceptional cases, the single-source procurement is also applicable, which is always preceded by a notice of intended procurement (*ex ante* notice). The contracting authority has also conducted a competitive dialogue procedure for a contract for the design, manufacture, delivery and installation of a Phelix beamline in the SOLARIS Centre in Kraków²⁸.

For this procedure, the contracting authority did not specify the weighting of the criteria in the needs and requirements description, but merely grouped them from the most important to the least important.

Example:

2) Tender evaluation criteria in descending order of importance:

1. Lowest price

2. Quality – the contracting authority shall take into account the following quality criteria for tender evaluation:

- Stream of photons on the sample
- Energy resolution in the photon energy function – optimal for the entire energy range
- Size of the region excited on the sample, lower values are more highly valued.
- Distribution of radiation harmonics allowing for optimal measuring of resonant photoemission and absorption spectroscopy – no deep minima of intensity in the photon energy function.
- Experience of the contractors

Throughout the dialogue, the contractors may also suggest other objective qualitative criteria for the evaluation of tenders and ways of verifying them upon final acceptance of the subject-matter of the contract.

3. Term of guarantee and technical support period – the longer the period, the higher scored.

The procedure was conducted in Polish and English. Technical, legal and financial aspects were discussed during the competitive dialogue. The meetings held were grouped thematically and gathered specialists from particular thematic domains, and at least one representative of the contracting authority was present at each of them. The proceedings have been successful. The contract was signed after about 7 months and, in addition, the final and winning tender was valued at EUR 2,495,000.00, which means that significant savings were made compared to the original net estimated contract value.

Regardless of the procurement procedure, SOLARIS Centre applies solutions developed at the project implementation stage in the years 2010-2015. This applies in particular to the option clause

²⁸ <http://przetargi.adm.uj.edu.pl/tresc.php?Id=5146> (accessed on 30/05/2020)

in the so-called supplementary contracts, a broad but at the same time detailed definition of possible changes to the contract, the structure of contractual penalties, pre-financing and partial payments. It should be emphasised that, pursuant to the Jagiellonian University's internal regulations, to pay an advance in excess of PLN 20,000, the University needs to obtain a security in the form of, for example, a bank guarantee and get the approval of the quaestor. Most agreements also provided for the following statement:

The Parties take into consideration the fact that continuous development and changes in technology may create new situations (matters of fact) not expressly described in or regulated by this Contract, which may affect the way in which this Contract is performed. In such a case, the Parties shall endeavour to reach a common accord during the term of the Contract in light of the occurrence of the above-mentioned circumstances and the requirements of the other Party. This Contract is based on mutual trust between the Parties.

When establishing the terms and conditions of the contract, NSRC SOLARIS also pays special attention to the tender evaluation criteria. Two examples in this regard are presented below:

- 1) Public procurement procedure conducted by means of an open tender for the supply of an electron cryomicroscopy lab together with the necessary accompanying infrastructure²⁹.

Example:

Tender evaluation criteria and their weighting:

Total price: 47%

The points awarded under the "Tender price" criterion shall be calculated as shown below:

$$C = (C_{\text{lowest}} / C_{\text{tender}}) \times 47$$

where:

C indicates the number of points awarded to the tender,

C_{lowest} is the lowest price among the evaluated tenders,

C_{tender} is the price of the evaluated tender.

Therefore, the maximum number of points that can be obtained under this criterion is 47.

Warranty/guarantee period: 28%

Points for the "guarantee/warranty period" criterion will be awarded for extending the guarantee/warranty period beyond the required minimum of 3 years for the microscope and at least one direct electron detector.

The contractor shall receive 7 points for each full 6-month extension of the aforementioned period, but not more than 28 points in total.

²⁹ https://przetargi.uj.edu.pl/zakonczzone/ogloszenia-o-postepowaniach/2018?p_p_id=56_INSTANCE_0XNchqSWlp1k&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-2&p_p_col_count=1&groupId=1378124&articleId=141186968&widok=ogloszenie (Access: 30/05/2020)

Efficiency: 25%

The contractor will be awarded points under this criterion if the automatic grid loading system offered by the contractor allows more than 4 grids to be loaded into the microscope at one vacuum break.

The contractor will receive 5 points for each subsequent grid (over 4 grids), which can be loaded into the microscope at one vacuum break, with a total of no more than 25 points.

- 2) The procedure conducted by means of an open tender for the development of complete documentation for the reconstruction and extension of the NSRC SOLARIS building in Kraków.

2. Tender evaluation criteria and their weighting:

2.1. Total price (C): 60%

Points awarded for the 'Lump sum price for the entire order' criterion will be calculated as shown below:

$$C = (C_{\text{lowest}} : C_t) \times 60$$

where:

C indicates the number of points awarded to the tender,

C_{lowest} is the lowest price among the valid tenders,

C_t – price given by the contractor.

The maximum number of points that the contractor may obtain is 60.

2.2. Chief designer's experience: 15%

Points for the 'Chief designer's experience' criterion will be awarded based on the information contained in the tender form. The person under evaluation will be a person designated as the chief designer pursuant to Article 5(3) of the TS. The Contracting Authority will award additional points for their experience as the chief designer in drawing up the design documentation for a facility with usable floor space of not less than 600 m², housing technological installations, including necessary cooling technologies with a rated cooling capacity of at least 100 kW.

Only the experience exceeding the minimum experience required to meet the conditions necessary to participate in the proceedings stipulated in **Article 5(3) of the TS** shall undergo assessment.

The contracting authority shall take into account only the experience gained during the last **5 years** preceding the term for the submission of tenders.

In a separate part of the tender form, contractors are obliged to specify the experience consisting in the performance of the aforementioned services by a designated person, indicating the name of the contracting authority and the name of the project.

The points will be allocated as follows:

- 1 project exceeding the minimum specified in the conditions necessary to participate in the proceedings stipulated in Article 5(3) of the TS completed within the last **5 years** before the term for the submission of tenders: **10 points**,

- 2 or more projects exceeding the minimum specified in the conditions necessary to participate in the proceedings stipulated in Article 5(3) of the TS completed within the last **5 years** before the term for the submission of tenders: **15 points**,

The maximum number of points to be awarded for the contractor in this criterion is 15.

2.3. Joint team projects: 15%

Points for the 'Joint team projects' criterion will be awarded on the basis of a list of joint projects completed by the key personnel, in accordance with the content of a separate part of the tender form, where the contractor shall specify only projects completed within the last **5 years** before the term for the submission of tenders, involving the development of all components of the design documentation, i.e. a building permit design together with the Specification for the Performance and Acceptance of Works, an all-discipline detailed engineering design and an investor's cost estimate for buildings with usable floor space of not less than 600 m².

In the evaluation process, the contracting authority will take into consideration those projects which at least three of the listed key personnel members have participated in simultaneously, and the points will be awarded as follows:

- 2 projects completed within the last **5 years**, engaging at least 3 persons from the key personnel of the contractor: **5 points**,
- 3 projects completed within the last **5 years**, engaging at least 3 persons from the key personnel of the contractor: **10 points**,
- 4 projects completed within the last **5 years**, engaging at least 3 persons from the key personnel of the contractor: **15 points**,

The maximum number of points to be awarded for the contractor in this criterion is 15.

2.4. Warranty period: 10 %

Points for the 'Warranty period' criterion will be awarded for extending the warranty period beyond the required minimum of 36 months.

The contractor shall receive **5 points** for each full 6-month extension of the aforementioned period, but not more than 10 points in total.

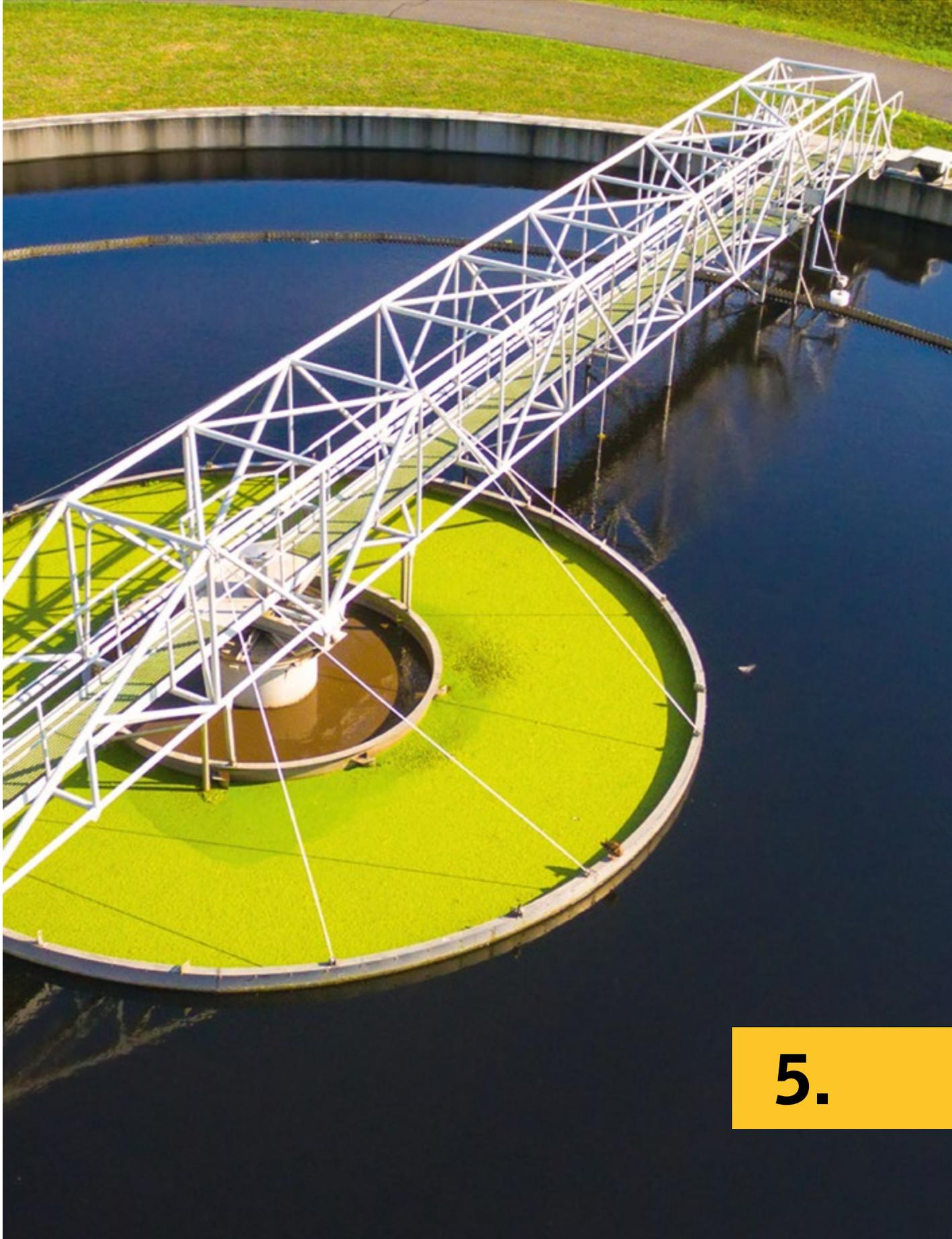
The terms of contract awarded under the scientific procurement procedure for the purchase and subsequent delivery of liquid helium for NSRC SOLARIS illustrate the quota reservation while specifying the minimum scope of contract that will definitely be performed.

The contracting authority provides for the possibility of increasing or decreasing the quantity of contracted and settled litres of liquid helium by +/- 800 l in relation to the quantity stated in Article 2(1) above. If the expected quantity of contracted helium is not exhausted, or it is increased, the contracting party reserves the right to extend the term of contract to ...

Moreover, in the scientific procurement procedure negotiations between the contractor and the contracting authority are usually reserved (see example below), which allows more flexibility in the procedure phase:

During the tender analysis and evaluation stage, the contracting authority may request the contractors to clarify the content of submitted tenders, as well as negotiate their content and prices in compliance with transparency and fairness principle.

NSRC SOLARIS spent last 10 years on the implementation of probably the most complicated research infrastructure project in the history of Poland. During this period, the Centre awarded several hundred public contracts, most of them for specialised and innovative supplies. This has allowed us to gain very broad experience, including, in particular, on international markets, and to build relationships with other research centres in Europe.



5.

5. Best practices in innovative public procurement. Regionalne Centrum Gospodarki Wodno-Ściekowej S.A. (Regional Centre for Water and Sewage Management) in Tychy

Regionalne Centrum Gospodarki Wodno-Ściekowej S.A. (RCGW S.A.) in Tychy is the owner of over 400 km of sanitary sewers, 34 municipal pumping stations, the owner and operator of Tychy-Urbanowice Sewage Treatment Plant, currently ranked one of the most innovative facilities of this type in the entire country, an investor and operator of Tychy Water Park and a producer of cogenerated renewable energy. The company responds quickly, effectively and comprehensively to the emerging eco-challenges by implementing a sustainable development policy and meeting the needs of the local community. The ecological, economic and social impact of actions taken up by RCGW S.A. bring the city of Tychy closer to its goal, which is becoming a Smart City, whose important element is water and sewage management and free flow of energy within the urban tissue, the so-called SymbioTychy concept. By implementing green, innovative and pro-social public procurement, RCGW S.A. has gained the status of a leader in eco-innovation and a pioneer of pro-eco solutions in the field of wastewater treatment as well as generation and management of energy from renewable sources, as evidenced by a number of awards received in environmental and quality competitions. The impact of the Company's innovative actions taken up in the spirit of sustainable development have been noticed both on the Polish and European market; RCGW S.A. was the first ever Polish company to receive the **2015 European EMAS Award**.

■ 'Sewage management in Tychy' project: the beginnings

The changes in Tychy sewage management were started by a project being at the same time an example of a green and innovative public procurement under which over 337 km of sanitary sewers and rainwater drainage systems were built and modernised, ditches and streams were regulated, 28 pumping stations were built and the sedimentary part of the Urbanowice Sewage Treatment Plant was modernised. An outstanding environmental effect of over 100% of properties connected to the sanitary sewers places the Tychy commune among the biggest beneficiaries of similar projects run in other cities. 99.6% of properties in Tychy have the possibility to connect to the sanitary sewers. The environmental benefits were achieved by introducing environmental requirements into the description of the subject-matter of the contract that had to be achieved during the contract performance stage.

■ Tychy-Urbanowice Sewage Treatment Plant: innovation

As recently as 18 years ago, the Tychy Sewage Treatment Plant was considered one of the worst in Silesia, and its technical condition resulted in significant environmental pollution. The situation has made it necessary to modernise the facility and has given impetus to including environmental, innovative and socially beneficial provisions in public procurement.

The modernisation has improved the process of **wastewater treatment and sludge and biogas management** and has significantly reduced the negative impact of the treatment plant on the environment and city residents. The modernisation and operation of two independent technological lines of biological wastewater treatment with removal of biogenic compounds made RCGW S.A. meet, and even exceed, the requirements specified in the permit required by Water Law Act. The high flexibility of the processes allows for the treatment of wastewater to the required extent, even when the flows and loads in raw wastewater are increased. What is more, discharging the treated wastewater into Gostynka River clearly improves the river water quality.



Photo 1. Modernised biological part of the plant - C-TECH Technology sequenced chamber

A similar change has occurred in **air emissions**. **Biogas** has been used as a primary source of cogenerated renewable energy to produce electricity and heat. High-performance fine-bubble aeration was applied, objects were airtightened and biofilters were installed. By implementing innovative solutions such as blowers using the technology successfully applied in Boeing jet planes, with a 20 dB less noise level, and optimised pumps, the loud noise which has been a nuisance for residents has been reduced.

Table 1. Biogas production by methane fermentation and heat production by biogas cogeneration at the Tychy sewage treatment plant over the years 2010-2019

YEAR	BIOGAS PRODUCTION [M ³]	HEAT PRODUCTION [GJ]
2010	3,151,323	29,214
2011	3,877,366	25,016
2012	4,198,968	32,786
2013	3,727,753	33,001
2014	4,356,538	35,298
2015	5,619,618	38,731
2016	6,015,424	38,793
2017	6,351,122	40,047
2018	6,490,662	56,618
2019	6,596,686	66,334



Photo 2. Digesters (2x5500 m³)

The strategy for modernising the plant is based on the concept of **energy efficiency**. The energy efficiency optimisation of the Tychy sewage treatment plant’s operation, reflected in the relevant requirements included in the tender documentation, resulted in a 25% reduction in the overall capacity of the installed equipment and a similar drop in the electricity consumption, with a twofold increase in the number of installed equipment. Currently, the energy consumption of the wastewater treatment

process is only 0.33 kWh/m³ of treated wastewater. According to the Polish Waterworks Chamber of Commerce (PWCC), the average value among Polish large enterprises is 0.68 kWh/m³, and the European Benchmarking Co-operation report shows that the average energy consumption in Europe is as much as 0.8 kWh/m³.

Tychy-Urbanowice is the first passive plus wastewater treatment plant in Poland. The energy self-sufficiency of the Tychy sewage treatment plant currently amounts to about 200%. It is the best result in Poland and one of the best among water and sewage companies in Europe. According to the Polish Waterworks Chamber of Commerce, in large companies, the value of this indicator reaches only 40.86%, and in MSCs, 47.71%.

Sustainable procurement has become a tool for change and a driving force for the development of RCGW S.A. All modernisation measures have been carried out via public procurement, where the requirements for the environment, including energy efficiency, were very high. The electricity consumption was, and still is, one of the basic criteria for the selection of facilities and technologies at the Tychy sewage treatment plant.

Zbigniew Gieleciak, President of RCGW S.A: "As far as public procurement is concerned, for each project, we appoint a dedicated team to draft a technical description of the subject-matter of the contract and establish technical and organisational measures, and a second team that sets these requirements in motion in accordance with public procurement regulations. Each contract requires a multi-task, multidisciplinary approach to achieve the expected result. External co-operation with designers, design control and supervision, constant monitoring of the scope and quality of design, as well as internal cooperation with specialists in various fields are essential."

Innovation driving innovation: Tychy Water Park

By operating in accordance with the principles of sustainable development and green growth, Tychy sewage treatment plant not only achieved energy self-sufficiency, but could also fully cover the energy demand of the Tych Water Park with energy coming from the cogeneration of biogas produced at the plant.



Photo 3. Tychy Water Park

Zbigniew Gieleciak, President of RCGW S.A: “We have set ourselves this goal that we will power Tychy Water Park with biogas recovered from the sewage treatment plant; we wanted to transform it into electricity and heat on site. The challenge was not only the technology we used for the co-digestion of sewage sludge with biodegradable waste (how to ensure its effectiveness and technological regime?), but also the issue of where and how to obtain biodegradable waste. No European country has set any example in this respect. Polish universities did not have any suggestions or research experience either; they were leaning towards the solution of using for co-digestion a small amount of one type of waste. We managed to outrun research and scientific solutions by about 8-10 years. It was only in 2018 that five universities undertook more extensive research into the co-digestion of sewage sludge with other biodegradable waste, while at that time, we already used 99 000 tonnes of biodegradable waste with 20 different codes! This came as a surprise to Polish scientists and numerous foreign delegations visiting our installation, who noticed that they did not achieve such optimal results. The key to success was the research stations built by our employees according to their own ideas. It is what made it possible to study the digestion process and the side effects of the use of various types of waste in the sewage treatment process.”

Based on many years of experience, also during the implementation of the Tychy Water Park project, appropriate provisions were introduced to describe the subject-matter of the contract, taking into account innovation, environmental and social issues. These concerned primarily the definition of standards for energy-saving solutions or energy recovery, as well as emission standards. The provisions on energy-related standards included: heat recovery from the pool air-conditioning unit, heat recovery from grey water (sullage), excessive energy class of the used equipment and high-efficiency cogeneration units. As a result of implementing these provisions, the energy consumption of the facility has been reduced by:

- recovering heat considered as loss (from air and wastewater);
- increasing the efficiency of equipment;
- reducing energy losses and fuel consumption to produce the same amount thereof.

The provisions of the tender documentation on emission standards included the determination of maximum sound levels for air handling units and maximum levels of carbon dioxide and nitrogen oxides emissions from cogeneration. By setting high requirements in this area, the Company has helped reduce the burden on the environment and, consequently, reduce environmental charges. Additionally, the provisions influenced a social aspect, mainly helped increase the comfort and safety of maintenance staff. The investments made have also brought economic profits. The introduced innovative technological solutions enabling the operation of both facilities, Tychy-Urbano-wice Sewage Treatment Plant and Tychy Water Park, in the so-called energy symbiosis contributed to a significant reduction in operating costs. Efficient cogeneration installations located both on the premises of the treatment plant and the water park allow for securing the energy needs of both facilities, and the energy surplus, sold to the external DNOs, is an additional source of profit for the Company.

Table 2. Power generation efficiency of the cogeneration installation at RCGW S.A. and the amount of electricity sold to the external DNOs over the years 2018-2019 (period of energy symbiosis)

2018 (MAY-DECEMBER)*	EL (GENERATED) [MWh]	AXIS	4,914.544	9,324.475	4,878.507 [MWh] Σ OF ELECTRICITY SOLD (EXCESS)
		TWP	4,409.931		
	EL (SOLD) [MWh]	AXIS	669.878	1,961.768	
		TWP	1,291.89		
2019	EL (GENERATED) [MWh]	AXIS	7,449.190	13,953.706	
		TWP	6,504.516		
	EL (SOLD) [MWh]	AXIS	1,077.165	2,916.739	
		TWP	1,839.574		

* may 2018 - launching the Tychy Water Park and the internal cogeneration system

Biogas Purification Module (treatment with process water)

An innovative project allowing for establishing the energy symbiosis mentioned above is the Biogas Purification Module (BPM) with a biogas pipeline. The installation was launched in the first quarter of 2018 as part of the sewage treatment plant. The tender requirements concerned the selection of proper gas compressor. Biogas obtained in the process of sewage sludge and biodegradable waste co-digestion is composed in 50-60% of methane and in 40-50% of carbon dioxide. To increase the biogas methane content, and thus its calorific value, the process line of the sludge treatment part of the plant has been equipped with the Biogas Purification Module. The aim of the system is to purify the obtained biogas from unnecessary carbon dioxide in such a way as to make the cogeneration units operate most efficiently, i.e. to enable them to operate at maximum output. Already at the stage of sourcing a designer, the company presented its expectations for the system operation, primarily concerning the development of technology based on its own resources of process water. In addition, the choice of a solution based on physical absorption of carbon dioxide was dictated by economic and environmental considerations. The innovative nature of the applied solution lies in the use of process water, i.e. treated wastewater generated in the process of treating municipal wastewater reaching the Tychy plant, as a wet scrubber in which carbon dioxide is absorbed. It is the first system in Poland to remove carbon dioxide from biogas using this method. The applied solution allows for saving water taken from the water supply system, and thus has a measurable both economic and ecological impact. Increasing methane content from 50 to 75% with the biogas flow of 1200 m³/h requires over 500,000 m³ of water per year. The use of process water obtained in the treatment plant for this purpose significantly reduces the system operating costs.



Photo 4. Biogas Purification System absorbing carbon dioxide

The treated biogas is transported from the sewage treatment plant to the Tychy Water Park by a dedicated, zero diffusion gas pipeline with a total length of 6.2 km. The innovative design of the gas pipeline (aluminium lagging enabling the application of voltage) allows for constant monitoring and quick detection of failure (with an accuracy of 0.5 m) or damage to the gas pipeline.

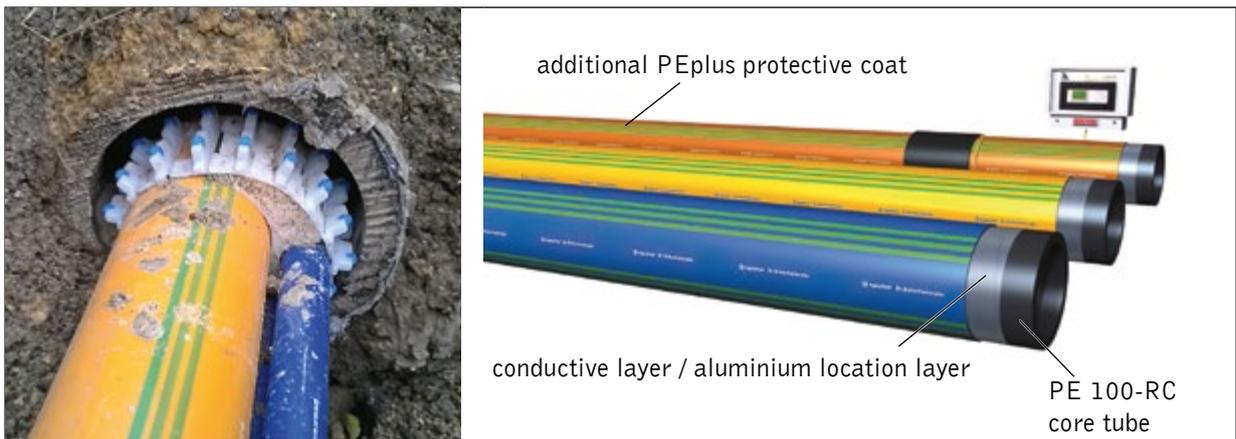


Photo 5. Biogas pipeline connecting the sewage treatment plant with the Tychy Water Park

Water recycling and recovery: circular economy

For years now, RCGW S.A. has been effectively implementing the principles of smart and sustainable development, forming circular economy. Therefore, a very important part of its operation is to rationalise the use of natural resources, maximise their recovery and recycling. One of those resources is water. On the premises of the sewage treatment plant, the company has built an internal process water supply system (treated wastewater) with a total length of 1.5 km. Process water is used, among other things, for cooling cogeneration units, rinsing grids, as well as in the sludge drainage module and the Biogas Purification Module. The yearly use of process water oscillates between 117,000 and 185,500 m³. The use of treated wastewater as process water, where water of potable quality is not re-

quired, significantly reduces the intake from the water supply system, contributing not only to reducing the costs of facility operation but, above all, to minimising the consumption of this resource, which has a direct environmental impact.

Grit reclamation

Another example of an innovative and green procurement revolving around circular economy is the grit reclamation system. In the tender procedure, the minimum operating parameters of the grit separator / grit washer were indicated as the relevant conditions, which had to be met during the evaluation phase of the submitted tenders. The low efficiency of the grit separator / grit washer in the mechanical part of the sewage treatment plant, and thus the unsatisfactory quality of the end product, was the reason behind its modernisation and new investment. As a result, in November 2015, an innovative, integrated device for grit separation, washing and drainage with the use of process water was launched on the technological line for water-sand pulp treatment. The used technology allowed for significant improvement in quality of the end product, which was confirmed by the lab results. On the basis of the obtained results, it was identified that the grit separated in the new separation and washing installation ceased to be waste within the meaning of the Waste Management Act of 14 December 2012. Therefore, the Company submitted a relevant application to the Marshal's Office of the Silesian Voivodeship, which resulted in the formal repealing of the waste status from waste (code 19 08 02) produced so far at the treatment plant in Urbanowice. The installation of a grit separator reduced grit production from 400 Mg to about 150 Mg per year, while the produced secondary raw material poses no threat to the environment and can be used for the Company's own needs. The investment has therefore a large positive ecological impact.

Operational activities within RCGW S.A.

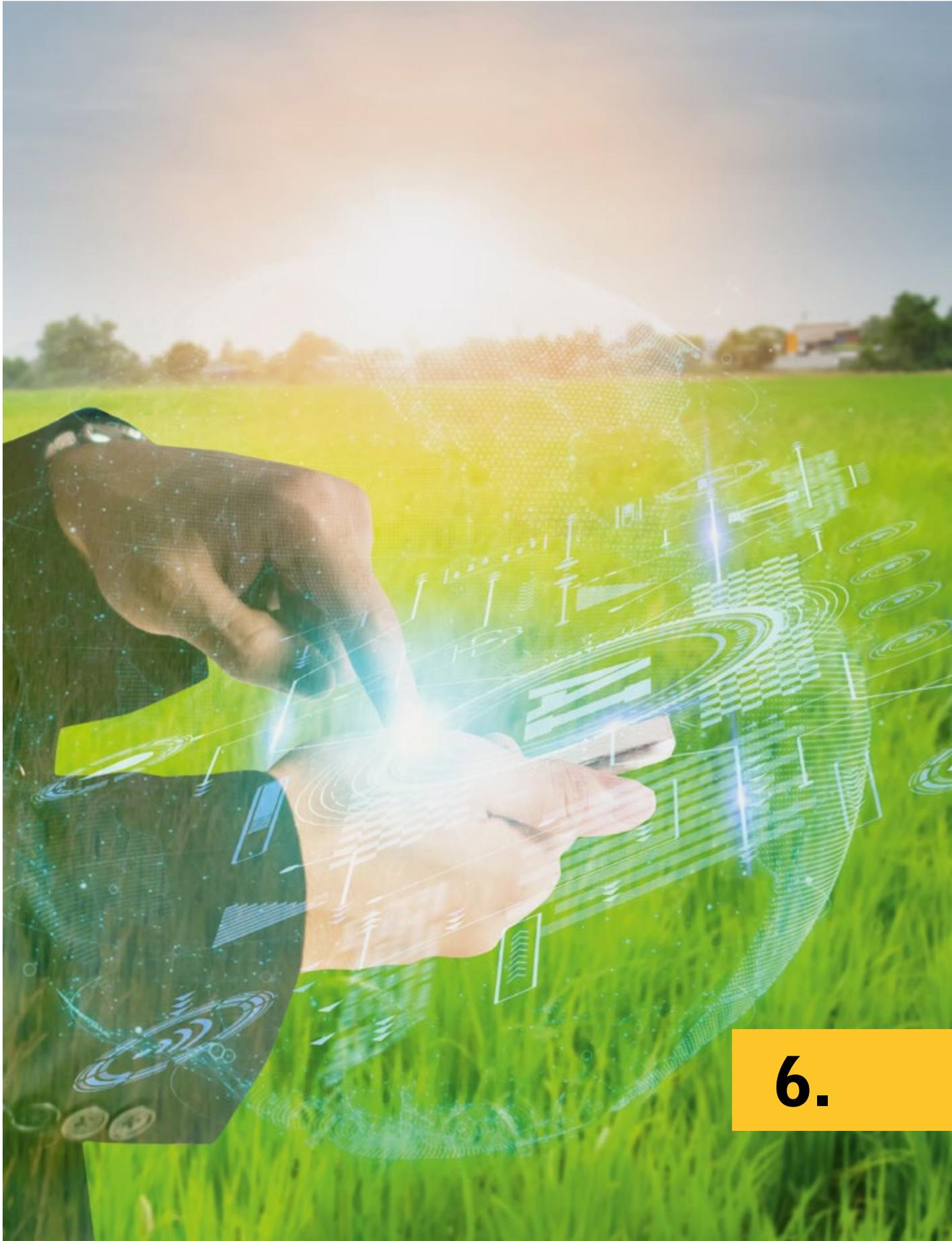
To achieve sustainable effects, it was necessary to introduce internal regulations relating to the inclusion of social, environmental and innovative issues in tender procedures. RCGW S.A. Suppliers' Code perfectly exemplifies this approach. It contains provisions on the need for Suppliers to comply with environmental protection rules, including rational energy consumption. The Code also addresses issues of social responsibility, setting standards for mutual cooperation and issues relating to human rights, the employment of minors, forced labour, discrimination and health and safety at work. Environmental aspects have also been accounted for in the Purchase Regulations drawn up by RCGW S.A., and the compliance with environmental and social requirements in actions taken up by individual organisational units has been regulated by the Orders of the President of the Management Board of the Company issued in 2007, 2009 and 2010.

Innovation-friendly management

Maintaining the above standards and effects became possible thanks to RCGW S.A. implementing a number of management instruments. A comprehensive system of complementary procedures and standards makes it possible to run a socially responsible, credible business that works for the benefit of the environment. One of the main drivers of eco-development is the European Union Eco-Management and Audit Scheme. For the Company and its stakeholders, it is a basic tool of green business assuming voluntary, continuous commitment and consistent fulfilment of goals. RCGW S.A. is also one of few companies in Poland that have implemented a certified management system according to the **PN-EN ISO 50001:2012** 'Energy Management System' standard. Compliance with the standard guarantees a reduction of the Company's negative environmental footprint, a reduction of costs related to energy consumption and an increase in the efficiency of renewable energy use. The above-mentioned tools and the implemented Environmental Management System in accordance with the **PN-EN ISO 14001:2015** standard allow for effective monitoring of the Company's processes in terms of their impact on the environment and local community. The Company's Corporate Social Responsibility Strategy according to the **SA 8000** standard, which consists in the voluntary inclusion of environmental but also social aspects in commercial activities, both within the Company and within its stakeholders, also contributes to running a sustainable business. SA 800 confirms high ethical standards, which are the foundation for building good relationships with customers, employees and the external environment of the Company. The Company maintains an open dialogue with the public and informs them of the actions taken and their results. How RCGW S.A. develops is also determined by the guidelines on corporate social responsibility contained in the **PN-ISO 26000** standard.

Zbigniew Gieleciak, President of RCGW S.A: "The development of innovative solutions at RCGW is supported by a young team, hungry for success and challenges. For several years now, the Company has implemented hybrid and project management. Every engineer works in a research and investment team and co-creates future solutions that are later managed by them. To that we adapted our remuneration policy: we reward primarily for creativity, involvement, self-improvement and cooperation with others. In the Centre, we develop a 3-5 Year Strategic Research Agenda and an Annual Research Agenda. Teams that create and implement innovations are required to assess and manage the risks associated with the implementation of innovative projects. In the course of such works, it often turned out that innovation generates more innovation: many a time, we have created new innovative projects to reduce or eliminate the risks associated with ongoing innovations."

Multidisciplinary and innovative approach to technical solutions at RCGW S.A. has made it possible to design and implement many technologies and methods which have set the course for other water and sewage companies as well as enabled the development at the municipal level. Innovation is still one of the main areas of interest for the Company to this day.



6.

6. Public Procurement of Innovation at the National Support Centre for Agriculture

NSCA

The National Support Centre for Agriculture (NSCA) is an agricultural institution established in 2017 to provide support in activities and projects aimed at improving the competitiveness of Polish agriculture both internally and abroad. Public procurement of innovation stems from a change in the business profile of the NSCA, which, as a body continuing the work previously carried out by the Agricultural Market Agency and the Agricultural Property Agency, also takes up innovative measures resulting from state policy, in particular those regarding the implementation and application of agricultural support instruments, active agricultural policy and rural development.

Innovative procurement was initiated by NSCA in 2018 and was related to the launch of SELLFOOD Platform, an innovative and pioneering project on the Polish market. The aim of the project was to create a trading platform (exchange), which would enable participants of the agri-food market (producers, traders, processing companies) to conclude SPOT contracts and, in the long term, also futures contracts.

SELLFOOD Platform



The project started on 1 June 2018 and ended on 31 August 2020. The launch of the national electronic sales platform (Food Platform) as an organised and regulated market for SPOT contracts for agricultural products opens a new stage in Polish on-exchange trading and provides new trading opportunities, while eliminating the risks inherent in modern globalised agricultural commodity markets.

Origins of the Food Platform: an identified need

The Food Platform came to life due to the situation on the Polish agricultural market. It has been prepared in response to postulates and following consultations with representatives of the agri-food sector. They were interested in introducing SPOT and futures contracts to the Polish market as instruments of supply concentration, price and trading risk management, transaction hedging and market and income stabilisation.

The problems of the Polish agri-food sector, to which the project is a solution, include, among others:

- the lack of a generally available and reliable source of reference prices for Polish agri-food products,
- uncertainty of commercial transactions, in accordance with the terms of contract (in particular as regards the delivery, quantity and quality of as well as payment for the goods),
- possible difficulties in regular purchasing of large and homogeneous batches of goods meeting minimum quality criteria,

- the frequent need to use intermediaries to buy/sell a certain batch of goods, which translates into less favourable prices for the producer and the end user,
- poor exposure to foreign customers looking for large, homogeneous batches of goods.

In Poland, there was no organised SPOT and futures market for agricultural goods. The lack of standardised SPOTs, the execution of which would be supervised by a transaction moderator, and possible disputes resolved by independent arbitration significantly reduced the involvement of domestic entities in the global economy.

Maintaining income stability in agriculture required modern tools to concentrate supply and stabilise producers' income.

Main characteristics of the Polish agricultural market are: high-volume production, industrialised processing and good quality of products at competitive prices. Businesses look for efficient distribution channels for their products. Distribution channels should guarantee reliability in the performance of concluded contracts, as well as prevent the abuse of power by better-positioned trading partners in negotiations.

The launch of Food Platform as an organised and regulated market for SPOT contracts and, subsequently, a futures market for agricultural products, has opened a new stage in Polish on-exchange trading and has provided new trading opportunities while eliminating the risks inherent in today's globalised agricultural commodity markets.

Prior to launching the Food Platform, the feasibility study analysing the global trading platforms, both for SPOT and futures contracts, which were the reference point for the solution developed as part of the project, was carried out.

The analysis identified on the Polish market electronic trading platforms which are not exchanges, i.e. they are not controlled by the Polish Financial Supervision Authority. The analysis of these platforms has shown that they are not nationally significant participants in the trading of wheat or other agri-foodstuffs and, due to the lack of supervision by the Polish Financial Supervisory Authority, they are not as safe as the Food Platform either.

Concept designs for the Food Platform

The analysis of the specific nature of food trade and identification of key stakeholders and their needs was followed by a comparative analysis of the current global solutions in the area of commodity exchanges trading in agri-foodstuffs under SPOT and futures contracts, as well as by an analysis of the legal and institutional environment of commodity exchanges. Eventually, two concept designs for the Food Platform were taken into consideration.

Option 1

Under Option 1, in the pilot phase of the project, only **professional storage service providers** that pass the authorisation procedure defined by the exchange would be allowed to act as authorised warehouse.

The platform would enable two-way trading, i.e. in the single-price auction system (under the developed option, two sub-options of the spot contract structure (A and B) were distinguished in the single-price auction system) and in the auction on demand system.

Option 2

Under Option 2, the following entities would be allowed to act as authorised warehouse in the pilot phase of the project:

- 1) professional storage service providers which have passed the authorisation procedure defined by the exchange, and**
- 2) the sellers' own warehouses with a minimum storage space to be determined by the commodity exchange operator, which will pass the authorisation procedure determined by the exchange.**

The platform would enable two-way trading, i.e. in the single-price auction system and auction on demand system.

The **analysis led to selecting Option 2**. This is the most advantageous option for the Food Platform to operate against the adopted criteria and should contribute to achieving the desired benefits. It has the greatest potential to maximise turnover on the Platform, as it addresses needs to the greatest extent and minimises the constraints on its operation.

Such a solution:

- eliminates the costs of transporting goods to an external authorised warehouse;
- eliminates the costs of storing goods until they are sold or removed from storage by the buyer;
- allows for further effective use of own storage space while participating in the exchange system.

Additionally, the selected option also meets the expectations of buyers. Under this option, both in the single-price auction system and auction on demand system, buyers will know the exact location of physical delivery before placing their order through the exchange system.

Food Platform Operation: Agricultural and Food Commodities Exchange (Rynek Towarów Rolno-Spożywczych, RTRS)

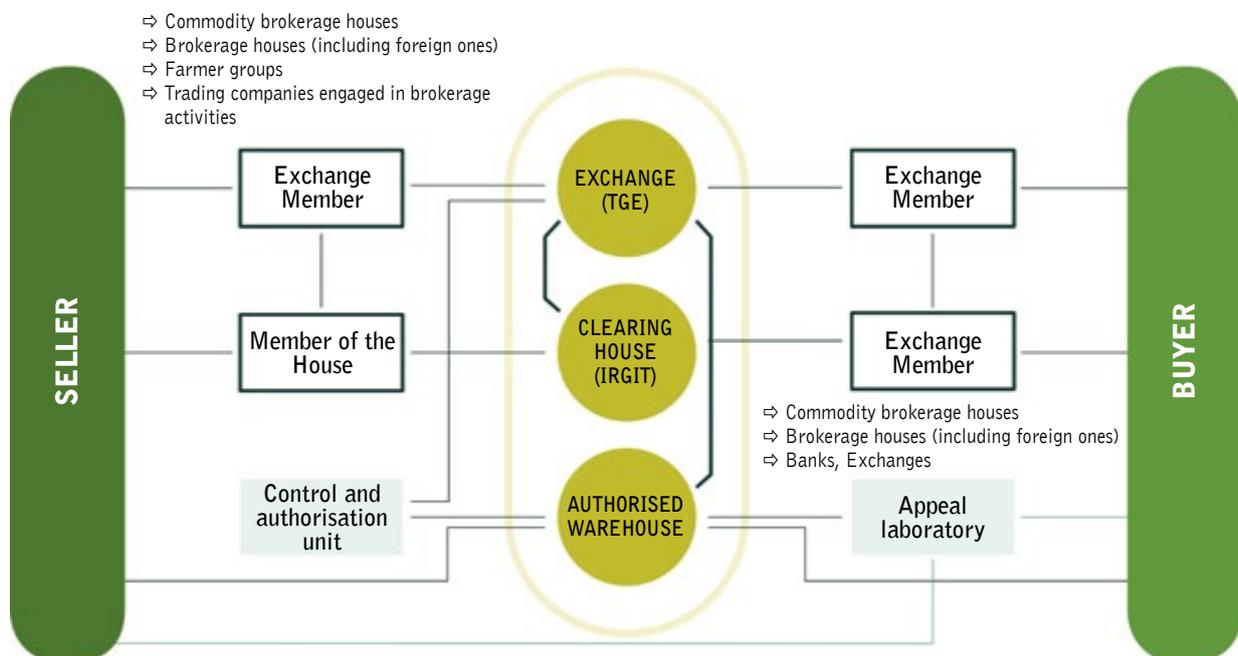
The Food Platform is an electronic tool for on-exchange trading in agri-foodstuffs. Since March 2020, i.e. since the launch of the pilot project, the Platform has functioned as an organised **Agricultural and Food Commodities Exchange** (Rynek Towarów Rolno-Spożywczych, RTRS), run by an authorised entity, i.e. Towarowa Giełda Energii S.A. (TGE), under an exclusive licence granted by NSCA. RTRS constitutes a separate segment of the TGE Commodity Exchange. Trading via RTRS is conducted in the cash (spot) market formula, which means that the transactions are executed immediately through the transfer of ownership against payment. The terms of participation, the terms and conditions of transactions and the manner of their execution shall be determined by the exchange, which shall ensure that trading is conducted in a transparent and identical way for all participants.

The basis for the RTRS operations is the following:

- **The Exchange** (i.e. Towarowa Giełda Energii S.A./TGE), which organises the trade and keeps the listing for commodities allowed for trading;
- **The Exchange Clearing House**, which organises and manages the transaction security system and conducts settlement and clearing of transactions made via the Exchange;

- **Authorised Warehouses**, which – having been approved by the Exchange for the participation in the Authorised Warehouse System (System Magazynów Autoryzowanych, SMA) – are responsible for verifying and maintaining the quality of goods traded on the Exchange and clear goods subject to transactions made on the Exchange, making the physical transfer of goods from the seller to the buyer possible.
- **Trading Participants/Contractors**, i.e. entities entering into RTRS transactions on their own account, including entities having the status of an Exchange Member approved for operation on RTRS and persons acting through Exchange Members.
What is more, the activities of RTRS are supported by the following entities:
 - **Brokerage Houses/Brokers**, who act as intermediaries between sellers and buyers, enabling the on-exchange transactions and settlement thereof;
 - **Appeal laboratories**, the role of which is to carry out appeal laboratory tests upon an order from the trade participants with the aim to determine whether a specific batch subject to an on-exchange transaction meets the quality requirements;
 - **Control and authorisation unit**, which, upon the Exchange’s order, verifies whether entities applying for being included in the Authorised Warehouse System or already operating within the System meet the technical and organisational requirements.

Participants to the Food Platform



Access to the Agricultural and Food Commodities Exchange

Transactions may be made by any entity, whether natural or legal person, which has been authorised thereto, whereas two types of access is possible: direct and indirect:

- direct access is reserved for the so-called exchange members and grants the possibility to place orders and enter into transactions directly on the exchange. Only entities indicated in the Act on Commodity Exchanges that meet the requirements set out by the Exchange in the Trading Regulations for the Exchange Commodity Market may become an exchange member;
- indirect access is the recommended option to operate on the RTRS for all other market participants, which consists in placing orders, making and settling transactions through an exchange member.

Marketed Production on the Agricultural and Food Commodities Exchange

The RTRS trades in type and quality labelled agri-foodstuffs. The introduction of a specific batch of goods to on-exchange trade is conditioned by placing it in an Authorised Warehouse. The first marketed agricultural commodity is wheat in three quality standards (premium, consumer and feed) and rye in two quality standards (consumer and industrial).

Trading Systems on the Agricultural and Food Commodities Exchange

The RTRS operates in two parallel systems:

- **single-price auction system**, which consists in keeping regular listings of standardised contracts, the subject-matter of which are goods stored by market participants in Authorised Warehouses providing storage services;
- **auction on demand system**, which consists in organising and carrying out ad hoc exchange auctions for goods sold directly from owners having their own authorised warehouses that do not provide storage services.

Spot market trading under the single-price auction system

The single-price auction system consists in keeping regular listings of standardised contracts by the exchange. Listings for wheat are made once a week, every working Wednesday. All exchange transactions for a given instrument shall be made in a given session at the same price, determined by the exchange according to a specific algorithm based on buy and sell orders placed. Such a formula ensures that the transaction price is objective, transparent and reflects the actual supply and demand for the commodity. Single-price auction system makes it possible to sell commodities to entities which do not have their own authorised warehouse, and gives buyers access to large standardised batches of goods stored in one place. Two quality classes of wheat (consumer and feed) and two quality classes of rye are allowed to be marketed under the single-price auction system. Single-price auctions allow only grain stored in the Authorised Warehouses.



How to buy grain in the single-price auction system?

The list of instruments available in single-price auctions and the schedule of sessions is available on the TGE website. Each listed instrument is assigned to a specific Authorised Warehouse and grain class.



Spot market trading under the auction on demand system

The auction on demand system consists in organising and conducting ad-hoc auctions for a specific batch of goods belonging to an entity having its own Authorised Warehouse. Auctions shall be held on dates and at times specified each time by the exchange. They are non-public, i.e. neither the minimum price set by the seller nor the prices and quantities offered by the buyers are disclosed during the auction. All interested parties approved for the RTRS, who have paid appropriate financial security, may take part in the auction as buyers. Auctions shall be settled by executing orders in sequence from the highest to the lowest bid price, provided that they are at least equal to the minimum price set by the seller. The seller is obliged to make the goods sold available to buyers for collection from the warehouse

indicated in the terms and conditions of the auction within the time limit resulting from the exchange regulations. Fulfilment of this obligation conditions the payment for the goods. Three quality classes of wheat and two quality-classes of rye are allowed to be marketed under the auction on demand system.

How to sell grain in the auction on demand system?

Only a member of the Authorised Warehouse System not providing storage services may sale goods (minimum 250 tons) by way of auction on demand.



How to buy grain in the auction on demand system?

Information on planned auctions is published on the TGE website.



Food Platform Pilot

The Food Platform pilot was launched on 1 March 2020 and ended on 31 August 2020. During this period, market participants were able to enter into actual transactions under the single-price auction system and auction on demand system for wheat in three quality classes, as well as rye, marketed in July 2020 in two quality standards.

The entire project was completed on 31 August 2020, and since 1 September 2020, commodities on the Food Platform have been traded using the solutions tested during the pilot phase. In further stages of the Platform's operation, the list of marketed goods is planned to be gradually extended (depending on the current needs of the stakeholders) by commodities recommended during the research phase of the project (including maize, rapeseed, white sugar, concentrated apple juice, skimmed milk powder and 'E' class pork half-carcasses). The launch of futures market is also projected.

Innovation

The Food Platform is a modern and innovative solution, which fits in with the market trend of modernising agricultural production. It may have a positive impact on the marketability of Polish agricultural produce, and it may encourage small and medium-sized farmers to join forces and form producer groups, which will be able to put larger batches of goods up for sale via the exchange. The platform will ensure Polish farmers access to new markets which have not been accessible to them before. It can be expected that in medium and long term, the Polish agri-food sector will become more competitive on the EU and global market.

The number of market participants using this new tool for on-exchange trading is gradually increasing. Operators from other agricultural markets, such as maize and rapeseed, are also expressing interest in and need for their products to be marketed.

The long-term benefits of the project are closely linked to the achievement of the medium- and long-term objectives of the project and include:

- increasing the liquidity and transparency of the agri-foodstuffs market,
- reducing transaction costs in trade in agri-foodstuffs,
- increasing the competitiveness of the Polish agri-food sector on the EU and global market, and
- enabling the effective presentation of the national agri-foodstuffs offer and its promotion on the EU and global market.

Public procurement

The implementation of the project required a number of actions on many levels, including in the area of public procurement. For the purpose of the project, NSCA conducted two open tender procedures. The choice of the procedure was dictated in particular by a strictly defined time frame in which the project had to be completed, regulated in the contract concluded with the institution financing the project, the estimated value of the contract, as well as the intention to enable the largest possible group of contractors to participate in the procedure and thus to obtain as many tenders as possible.

Technical dialogue (market consultations)

Prior to launching the first procedure, two technical dialogues (market consultations) were held that included (i) designing a feasibility study for the project, (ii) developing rules, procedures and templates for documents related to the pilot product implementation, and (iii) piloting the Food Platform. The purpose of the dialogues was to consult the subject-matter of the contract with external entities operating on the market in order to rationally determine the terms of the contract. Technical dialogue was of key importance, as NSCA did not have sufficient knowledge and experience in the subject-matter of the contract to describe it in detail and determine the proper way of its implementation. Therefore, obtaining information from potential contractors to the extent necessary for describing the subject-matter of the contract, drawing up the tender specifications and defining the terms and conditions of the contract was necessary prior to launching the contract award procedure.

Specific objectives of the dialogues included:

- recognising the latest, most advantageous technical, technological, legal and executive solutions related to the contract performance;
- identifying the market of potential contractors, also in terms of their experience and potential;
- obtaining information on solutions offered on the market, appropriate to the subject-matter of the contract;
- drafting an unambiguous and exhaustive description of the subject-matter of the contract enabling the award of the contract;
- laying down the terms of the contract;
- estimating costs of individual components of the purchase, its implementation and continued operation of the designed solution;
- defining the terms for running the Food Platform after the pilot project has been completed.

Through the dialogues, the contracting authority has confirmed the relevance of its concept for drafting the documents which were the subject-matter of the contract.

The dialogue allowed for obtaining information about the solutions offered on the market, relevant to the subject-matter of the contract, and for confronting the needs of the contracting authority with the capabilities of the entities operating on the market. Barriers that may limit economic operators' access to the contract have been identified. Other relevant information included estimated costs of the subject-matter of the contract, possible risks, their distribution between the parties to the contract and possible ways of limiting them, as well as the type, detail and scope of tasks covered by the contract. The plan for running the Food Platform after the pilot was completed has been discussed as well. The dialogue has made it possible to define the optimum criteria for tender evaluation and to clarify the key provisions of the contract. Additionally, the ownership of products obtained in the project was discussed, and the technical issues relating to the pilot launch of the Platform were clarified. The dialogues revealed that consulting the proposed solutions with market participants from the grain sector will be an important element for the proper contract performance, especially for the preparation of the Feasibility Study, and it was recognised that it will be important in the future to expand the Food Platform with other features.

Holding technical dialogues at the stage preceding the launch of the public procurement procedure allowed the contracting authority to correct inaccuracies appearing in the description of the subject-matter of the contract on an ongoing basis, and in the long term resulted in a more efficient course of subsequent stages of the contract award. The technical dialogue procedure entailed additional costs on the part of the contracting authority, due to the need to involve staff in organising the dialogue, but the benefits in terms of obtaining the relevant know-how exceeded the expenditure incurred.

Procurement procedures

As a result of the conducted procedures, NSCA awarded two public contracts for innovation, which formed part of the Food Platform project. There is no stable practice in this area yet. However, such types of procurement are expected to appear more often due to the change in the NSCA's profile and, consequently, the implementation of further innovative projects.

All conducted procedures enriched NSCA with new knowledge and experience in drafting non-standard tender documentation, which enabled it to develop the course of action for the innovative contracts. They required tightening both internal and external cooperation. It was crucial to hold a technical dialogue (market consultations) for the first public contract, which contributed to the proper drafting of the tender documents. This resulted in the efficient contract performance, which eliminated the time restriction risk and reduced administrative costs.

On the other hand, there are also several challenges related to procurement of innovation. Those include difficulties with proper description of the subject-matter of the contract, with determination of the estimated value of the contract, with correct determination of the conditions for participation in the procedure, difficulties with specifying the criteria for tender evaluation and proper determination of the provisions of contract concluded between the contracting authority and the contractor. The reason for the above was the fact that NSCA could not benefit from any solutions and procedures already existing on the Polish market due to the pioneering nature of the Food Platform project.

The tasks covered under the public contract were innovative and complex, which made it very difficult to define clearly and precisely the subject-matter of the contract and which created a high risk

of making erroneous or unrealistic assumptions. This, eventually, could lead to a failure of the entire tender procedure.

In order to mitigate the risks associated with improper drafting of tender documentation, NSCA held two technical dialogues, consulted with project stakeholders, and participated in study visits to the most developed platforms for agricultural commodity on-exchange trading.

The consultations were conducted with market participants, especially from the grain market sector, due to the fact that in the application for project financing the grain market was indicated as prospective for on-Platform trading and was subject to analyses and research in the research phase of the project, which was conducted by two institutes: the Institute of Agricultural and Food Economics and the Institute of Agriculture and Food Biotechnology. To identify the best solutions for the project, prior to launching the tender, as well as during its course, regular meetings were held with market participants and other project stakeholders.

The study visits took place, among others, at Euronext Paris, as well as at trading exchange e-platforms for agricultural commodities (e.g. Royal Flora Holland, Dutch Flower Auctions Association (VBN) and Royal ZON Fruit and Vegetables). During these visits, NSCA employees got acquainted, among others, with organised market models, terms of participation therein, types of traded goods, catalogue of on-exchange trading participants, quality requirements and standards set for traded agricultural commodities and the ways of controlling transactions.

The information obtained as part of the above activities contributed to proper drafting of tender documents and proved to be crucial for the positive contract performance. The tender documents were clear and unquestionable, and the implementation of the whole project ended successfully.

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ISBN 978-83-88686-82-5