NCBR
Narodowe Centrum Badań i Rozwoju

The National Center for Research and Development

(hereafter referred to as "**NCBR**", or "**contracting authority**")

Chmielna 69
00-801 Warsaw
NIP 701-007-37-77
Regon 141032404

Open Market Consultation for the Pre-Commercial Procurement for the development of ICT tools for energy monitoring and management towards "Green Transition and Digital Transformation"

REPORT OF RESULTS

Activities conducted:

Request for Information (RFI) questionnaire: https://ec.europa.eu/eusurvey/runner/NCBR-Green-Digital-transition

Webinar registration form: https://ec.europa.eu/eusurvey/runner/NCBR_ICT-OMC_REGISTRATION

Date of publication of the Pre-Information Notice (PIN) on TED: 23 October 2025

Date of publication of OMC documents and questionnaire: 31 October 2025
https://www.gov.pl/web/ncbr/konsultacje-rynkowe-dialog-techniczny

Date of OMC webinar in English: 25 November 2025

Date of OMC webinar in Polish: 26 November 2025

Questionnaire submission deadline: 05 December 2025

Date of e-pitching session: 09 December 2025

Date of publication of OMC report: 2 January 2026

Date of closure for the OMC: 12 January 2026

ul. Chmielna 69, 00-801 Warszawa
tel. +48 22 39 07 401
gov.pl/NCBR

Disclaimer and copyright

This document (including the accompanying annexes) has been drafted with the utmost care, but no guarantees are given regarding its soundness and/or completeness. Any errors or inaccuracies can be reported via **email to: izp@ncbr.gov.pl**

NCBR is not responsible for the correct operation of any URL mentioned in this document nor for the proper functioning of any used electronic platform (for example the EU survey system). Any problems encountered when using a URL and/or an electronic platform must be reported to the organisation that makes the URL or the electronic platform available. Problems with downloading and uploading (of documents) must also be reported **via the email above.**

In conducting this procurement project NCBR benefits from assistance offered under the EAFIP initiative (European Assistance for Innovation Procurement (EAFIP) | Research and Innovation), which is supported by the European Commission Directorate-General for Research and Innovation (DG RTD). Economic operators are being informed that any information regarding the setup and execution of both the procurement process and the execution of any contract/framework agreement/framework contract as a result of the procurement process as well as public summaries of the results of the PCP project can be shared after consultation with the respective supplier by the NCBR with(in) the context of the EAFIP initiative and consequently can be analysed, (re-)used and published by the EAFIP initiative. Details should not be disclosed that would hinder application of the law, would be contrary to the public interest, would harm the legitimate business interests of the suppliers involved in the PCP or could distort fair competition between the participating suppliers or others on the market.

A Prior information notice, or PIN, has been published in TED to announce the Open Market Consultation on a potential future procurement activity (notice publication number: 700134-2025 - Planning https://ted.europa.eu/en/notice/-/detail/700134-2025).

The original language of this open market consultation is English.

ul. Chmielna 69, 00-801 Warszawa
tel. +48 22 39 07 401
gov.pl/NCBR

Abbreviations and acronyms

CET	Central European Time
COTS	Commercial Off-The-Shelf
EC	European Commission
EMS	Energy Management System
EU	European Union
GDPR	General Data Protection Regulation
GPA	Government Procurement Agreement
IPRs	Intellectual Property Rights
NCBR	National Centre for Research and Development
OMC	Open Market Consultation
PCP	Pre-Commercial Procurement
PPI	Public Procurement of Innovative solutions
PIN	Prior Information Notice
RES	Renewable Energy Systems
RFI	Request For Information
R&D	Research and Development
SMEs	Small and Medium Enterprises
TED	Tenders Electronic Daily
SOTA	State Of The Art

ul. Chmielna 69, 00-801 Warszawa
tel. +48 22 39 07 401
gov.pl/NCBR

1 Open Market Consultation

The OMC started on the date of the publication of the Prior Information Notice (PIN) in the Tenders Electronic Daily (TED) and ended on the date indicated in this document.

The objectives of this OMC are as follows:

1. Validate the conclusions of the preliminary state-of-the-art (SOTA) analysis and the viability of all technical and financial provisions.
2. Raise awareness of the future PCP among the industry and relevant stakeholders.
3. Collect insights from the industry and relevant stakeholders to inform purchasing decisions and fine-tune the tender specifications.

This OMC was conducted in accordance with the law of NCBR, which is Polish law.

Polish Public Procurement Law provides for the possibility to conduct preliminary market consultations as part of the preparation of the public procurement (art. 84 of PPL). NCBR is not legally bound in any way by the outcome of the OMC. Starting an OMC does not mean that NCBR will start a tendering or purchasing procedure. If this OMC is followed by a tendering procedure and/or purchasing procedure, NCBR reserves the right to adjust and/or supplement the solution described in this document on every element. No rights can be derived from statements and/or communications during this OMC in any future tendering procedure and/or purchasing procedure.

The OMC is not part of any pre-qualification or selection process. No advantage or disadvantage will be given to any technology provider/group of technology providers to the detriment of others during the OMC and the sub-sequent competitive procedure for the award of contracts.

Based on the information obtained, the NCBR may engage in discussions with the parties that provided it. In such cases, the NCBR will take all necessary measures to ensure fair competition.

All information provided during the OMC and other background information will be published online in English and Polish.

Where appropriate, parts of the information received from market parties can be shared with the EC.

All interested parties were invited to take part in the OMC. SMES and startups were encouraged to participate. The OMC was also open to end-users and cities interested in ICT tools for energy transition.

Participation in the OMC was voluntary and non-binding and at the expense and risk of market operators. A market operator cannot charge any costs to NCBR for participation in the OMC or for (re-)use of its information in the context of a future procurement procedure.

Participation in this OMC is not a condition for submitting a tender in the subsequent procurement, does not lead to any rights or privileges for the participants, and is not part of any pre-qualification or selection process. The provided input in this OMC will not be used to evaluate future proposals.

The schedule of activities is provided on page 1 of this document.

The events and webinars organised within the framework of the OMC were recorded. In this case, by attending the events parties agreed to be recorded by using video and microphone during the webinars and/or ask questions using the online chat. NCBR only uses those records for the purpose of the project only.

The NCBR supported interested parties throughout the whole OMC during the events and answered questions during the informative webinar and were applicable through this OMC Report.
Additional written contributions in the form of a Request For Information (RFI) questionnaire (via the EU Survey platform) aiming to collect market information on innovative and commercial solutions was requested.

The responses to the questionnaire could not contain any confidential information.

As the questionnaire is intended to explore the market "as is", there are no wrong or right answers. The responses provided will serve as a basis for the procurement strategy and contractual terms and conditions.

After processing and analysing the answers, the NCBR disseminates the results through this report to the widest possible audience. Nevertheless, all answers provided by market parties are anonymised and treated as confidential. The NCBR does not provide information about specific answers from market operators. Only the general findings and a summary of the answers is provided. The results of this OMC will be published on the **portal site:**

- **https://www.gov.pl/web/ncbr/konsultacje-rynkowe-dialog-techniczny**
- in case the information provided in this document needs further clarification, market operators can **contact: izp@ncbr.gov.pl**

Market operators that wished to provide additional confidential information during the OMC could send an email to the email address indicated above. The information had to be clearly marked as confidential. Confidential information is not included in the OMC report.

The Request for Information (RFI) questionnaire was an integral and inseparable part of the OMC document. The results are summarised below.

Any personal data collected, processed, stored, and used by NCBR is solely for the purpose of gathering market information within the framework of the OMC. This data will be treated as strictly confidential, in accordance with the GDPR (Regulation (EU) 2016/679 of the European Parliament and of the Council).

2 Green Transition & Digital Transition

NCBR aims to procure the development of **ICT tools for energy monitoring and management towards Green transition and Digital transformation** to assist Polish cities in modelling scenarios that support decision making and planning the transition to renewal energy and future projects' implementation. This initiative aligns with Poland's overarching energy strategy. The Energy Policy of Poland (EPP2040[1]) sets the tone for local transitions. The policy emphasises:

- Decentralised energy planning at the municipal level.
- Expansion of district heating networks to reduce low-stack emissions.
- Development of electricity and gas distribution networks to support economic activity.
- Activation of local governments to identify needs and manage funding.

In this context, the envisioned innovative ICT tools (to-be-developed beyond the state of the art and applied to the reality of Polish cities) should provide insights that could help implement the plans for active energy and climate transformation, energy security, lower energy prices and economic development in Poland.

2.1 PCP challenge and main requirements

NCBR intends to implement a Pre-Commercial Procurement (PCP) process to acquire R&D services aimed at developing an innovative solution that addresses the energy transformation challenges faced by Polish cities, leveraging digital technologies to support informed decision-making.

The envisaged future PCP – i.e. a joint procurement of R&D services – is intended to be launched to reinforce **public demand-driven innovation on the Green transition and Digital transformation domain**. PCP has the potential to be an effective demand-side innovation action and a useful tool to close the gap between supply and demand for innovative solutions. Solutions are expected to achieve TRL 7-8.

The potential future PCP should deliver successful innovative and fully tested product(s) and/or service(s) that meet the common need of the public buyers to procure research, develop innovative marketable solutions, speed up the time-to-market and provide best value for money.
The innovative solution is expected to cover the main functionalities as described in Chapter 2.2.

2.2 Challenge brief and Use cases

Challenge : Digital-Driven Energy Transition in Polish cities
Polish cities must transition into net-zero municipalities by 2040. Achieving this goal requires a strategic approach to deploying digital technologies that support energy planning, scenario modeling, and the integration of renewable energy systems. These efforts should be closely aligned with Poland's national energy policy and strategy, EPP2040, to ensure coherence and effectiveness.

Policy Framework
The Energy Policy of Poland until 2040 (EPP2040) outlines three pillars :

- Just Transformation – supporting fossil-dependent regions.
- Zero-Emission Energy System – expanding renewables and nuclear.
- Good Air Quality – reducing coal use and improving heating.

Key features include:

- A long-term vision for sustainable urban development.
- Short-term actionable steps for energy efficiency and spatial planning.
- Focus on transport, energy consumption, and renewable integration.

Expected outcomes:

The innovative ICT tools – designed to go beyond the current state of the art, tailored to the specific needs of Polish cities—should enable advanced scenario modeling to support energy monitoring and management. As example, the following table shows the expected outcomes.

Metric	Target by 2040
RES Share	≥ 80%
CO_2 Reduction	≥ 90% vs 2020 baseline
Energy Efficiency	≥ 30% improvement
Digital Integration	Full smart grid and EMS coverage
Citizen Engagement	100% public buildings with educational dashboards

Use cases : ICT Tools to support the energy transition in Polish cities

The ICT tools should be designed with consideration for a structured implementation pathway, serving as a practical example to guide their integration and use. For example:

- **Short-Term (2025–2027):**
  - Deploy smart meters and IoT sensors across public buildings.
  - Launch pilot projects for solar PV and heat pumps.
  - Integrate digital energy management platforms.
- **Mid-Term (2028–2032):**
  - Expand district heating using RES and waste heat.
  - Implement AI-driven demand-response systems.
  - Use Earth observation data for climate resilience planning (via PCP-WISE).
- **Long-Term (2033–2040):**
  - Achieve >80% RES share in municipal energy demand.
  - Full integration of digital twin systems for predictive maintenance and optimisation.
  - Establish a local energy community with blockchain-based peer-to-peer trading.

In the table below are some of the main use cases and functionalities to be tackled by the to-be-developed solutions.

"As is"	Desired situation
Use case 1: Cities need to understand how they are using energy and how they can optimise its use. Cities need to know how to start the transition with the best Total Cost of Ownership (TCO). **End-user:** municipalities, public officials	Cities have access to a dashboard with indicators or digital tools to see the networks and the consumption of energy to find potential points of optimisation. **Functionalities:** • Access to real-time data, aggregated data and indicators. • System enables categories (e.g. energy for infrastructure, city operations, building consumption, etc.). • Identify critical points. • Provide information and recommendations for optimisation. • Analyse and show the best TCO in different scenarios • Modeling the costs and alternatives.
Use case 2: Cities need to evaluate scenarios for the energy transition (how, where to start, how much it costs to move in a direction). Cities need to plan for the next 15 years on how to become net-zero municipalities. **End-user:** municipalities, citizens, public institutions, industry	Cities can make decisions based on the analysis of "as is" situation of the energy network system and the best roadmap to implement the changes based on data/indicators/metrics. **Functionalities:** • Describe potential scenarios • Model possible situations • Provide workflows and/or decision-making trees • Calculating costs and benefits • Identification of risks • Show steps to achieve the future situation (understanding limitations and budget constraints) and best course of action • Analyse the impact on the residents/citizens and public institutions.
Use case 3: Cities need to provide citizens with insights about the benefits of transition to RES **End-user:** citizens, public officials	Residents of a city understand the benefits of transition, accept and engage in the process of transition. **Functionalities:** • Provision of information made for the residents based on indicators. • Provide data that is relevant for residents • Allow access to citizens in a platform and interact to find their preferences • Customise tools to engage several users (e.g. children)

ul. Chmielna 69, 00-801 Warszawa
tel. +48 22 39 07 401
gov.pl/NCBR

3 NCBR

The National Centre for Research and Development (NCBR) is an executive agency within the meaning of the Act of 27 August 2009 on Public Finance, operating on the basis of the Act of 30 April 2010 on the National Centre for Research and Development and the statute attached to the regulation of the Minister of Science and Higher Education of 9 September 2010 on the statute of the National Centre for Research and Development. The functioning of the National Centre for Research and Development also regulates several executive and legal acts related to the implementation of programmes financed from European financial instruments.

NCBR's motto: The future is happening with us.
NCBR's mission: We create the world of Polish innovation. We are building modern present times and future.
NCBR's vision: NCBR is a center for supporting and developing innovative technological and social solutions, creating an ecosystem of knowledge of, and information about, innovation. It organises and implements undertakings contributing to the civilisation growth of the country.
NCBR's values

- Cooperation
- Client-centered approach
- Trust
- Engagement
- Development

In this context, NCBR is supporting and leading public buyers in Poland towards innovation for the "Green transition and Digital transformation", for which it aims to develop new ICT solutions to tackle the needs of cities and explore what the market can offer.

More info: NCBR - The National Centre for Research and Development - Gov.pl website

ul. Chmielna 69, 00-801 Warszawa
tel. +48 22 39 07 401
gov.pl/NCBR

4 Preliminary results of the market analysis

The market overview focused on patents that support the energy transition, especially in urban areas. These patents show a clear focus on improving energy systems through the use of digital twins, smart monitoring, and integrated control systems. Many of the innovations use digital twins to model and monitor systems in real time, which helps make better decisions and improves overall performance. This is supported by the use of sensors and data platforms that bring together information from buildings, energy grids, storage systems, and other infrastructure. Several patents also explore automation and intelligent control, using data and algorithms. Smart grid integration is another key theme, helping different energy resources work together more efficiently. Altogether, these developments show a strong wave of innovation.

However, despite the amount of innovation, no single solution currently addresses all the specific needs and integrated requirements that NCBR is looking for. More specifically, strategic planning and spatial tools are underdeveloped. Areas such as AI for planning**,** big data analytics**,** scenario modelling**,** are largely not covered, revealing clear gaps and opportunities for further development.

5 Results of the Request for Information

The Request for Information survey was part of the OMC of NCBR project. It provided the project with feedback from the market about the challenge of Green transition and Digital transformation. Technology providers and potential end-users were invited to answer all the questions of the survey (one survey per company). The results will be considered when drafting the tender documents for the future PCP.

The survey was filled out online and submitted via the following links:

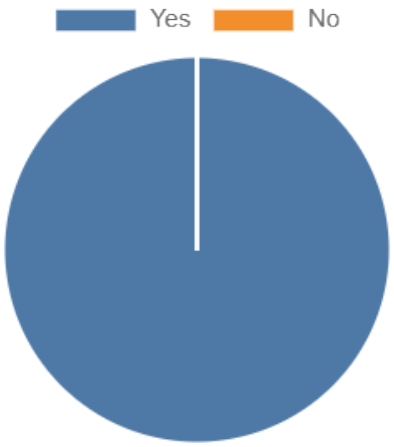
- **Survey for technology providers:**
  - https://ec.europa.eu/eusurvey/runner/NCBR-Green-Digital-transition
- **Survey for potential end-users (e.g. municipalities):**
  - https://ec.europa.eu/eusurvey/runner/NCBR_OMC_end-users

Taking part in this survey was not a prerequisite for participation in the future PCP and did not give any advantage to any technology provider. All information provided in the questionnaire are anonymised, summarised and published online on the OMC's website.

Below is a summary of the responses obtained in response to the questions in the survey.

1. Do you offer ICT tools for energy monitoring and management?

All the participants offer ICT tools for energy monitoring and management.



		Answers	Ratio
Yes		4	100.00 %
No		0	0.00 %
No Answer		0	0.00 %

Among the offered tools are the following:

- Standard cloud architectures and services to design and implement custom energy data solutions
- AI technology
- Data integration, modelling and analytics
- BMS/SCADA systems
- Smart meters and IoT sensors to a unified cloud environment
- Dashboards and alerts to support decision-making
- Visualisation
- Simulators and digital twins
- Distributed Ledger Technology
- Automated tool for energy management optimisation

2. How do you propose to tackle the challenge of NCBR of developing ICT tools for energy monitoring and management towards "Green Transition and Digital Transformation"?

The respondents through their answers propose the following ideas in order to tackle the main challenge of NCBR:

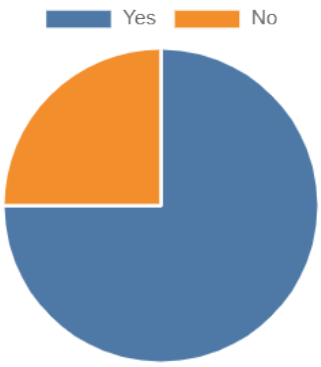
- Develop a modular ICT layer for energy monitoring and management that runs on standard cloud infrastructures, combining data integration, advanced analytics and decision-support tools.
- Focus on interoperable data models, connectors and AI services that can be easily replicated across buildings, campuses and industrial sites.
- Integrate BMS/SCADA, smart meters, IoT sensors, renewable generation, weather and tariff data into a unified energy data model.
- Use AI-driven monitoring and optimisation
- Develop ICT tools for real-time dashboards and KPIs (kWh/m², kWh/unit, CO_2e, costs), anomaly and wastage detection (standby losses, abnormal loads, comfort vs. energy trade-offs), forecasting and scenario analysis (peak demand, tariff optimisation, impact of retrofits) and decision-support modules that prioritise energy saving actions with quantified ROI and CO_2 reduction.
- Design an open, API-based architecture, integrating with ERP, maintenance systems and ESG/CSRD reporting tools.
- Adopt data governance, standardisation and documentation so that organisations can reuse the same energy data layer for other digital initiatives (asset management, predictive maintenance, sustainability reporting).
- Utilisation of capacity building (training and guidelines) so facility managers, engineers and decision makers can fully use the ICT tools in their daily routines.
- Use IoT devices acting as an independent, secure unit integrating HEMS, PV, batteries and other prosumer devices
- Benefit from software running on-premises (edge) and in the cloud, with a distributed DLT database (blockchain) for recording and exchanging events/metrics.
- Adopt a bi-directional integration and controls
- Utilise automatic optimisations features on a real-time database
- Ensure end-to-end security
- Make use of DLT as a layer of trust and auditable record
- Use Big Data in the cloud for aggregation, analytics and export to external ecosystems

3. What kind of technologies do you propose to integrate?

The respondents propose the following:

- Field & automation layer: existing BMS and SCADA systems, utility meters, submeters and IoT devices (sensors for temperature, occupancy, power quality, EV chargers, on-site renewables such as PV and heat pumps), connected via standard industrial protocols (BACnet, Modbus, OPC UA, MQTT) and vendor APIs.
- Connectivity & edge: industrial/IoT gateways and edge devices providing secure connectivity (VPN, TLS), local buffering, basic validation and aggregation of time-series data before sending it to the cloud, reducing latency and bandwidth and increasing resilience.
- Cloud data & analytics layer: leverage standard cloud services (data lake/warehouse, time-series storage, stream processing, serverless functions) to build a unified, governed energy data model. Use of analytics and AI/ML services for anomaly detection, forecasting, optimisation and scenario analysis, with proper MLOps practices for versioning, monitoring and retraining of models.
- Application & integration layer: web and mobile dashboards, reporting and decision-support applications, plus APIs and connectors to integrate with ERP, CMMS/maintenance, ESG/CSRD reporting and corporate BI tools. This can ensure that insights from the energy layer are embedded in both operational workflows (O&M) and strategic planning (investment, retrofits, Green Transition roadmap).
- IoT Gateway/device "behind the meter" (hardware) — measurements, control, secure connection.
- HEMS / PV inverters / battery BMS - protocol-level integration (API/Modbus/IEC-standards)
- DLT/blockchain technology (distributed base) – an auditable record of energy events and transactions.
- Edge computing (on-premises software) + Cloud (Big Data) – real-time computing + historical analytics.
- Standards and interoperability: OIRE/CSIRE, 225 Attributes, KSB (KIR).
- API / integration with DSOs, energy exchanges, billing systems.
- Security mechanisms (encryption, key management, IAM).
- Optimisation algorithms/rule-engine/ML for automated management scenarios and forecasts.

4. Have you developed similar ICT tools for scenario modelling, monitoring and management for cities towards renewable energy systems transition?

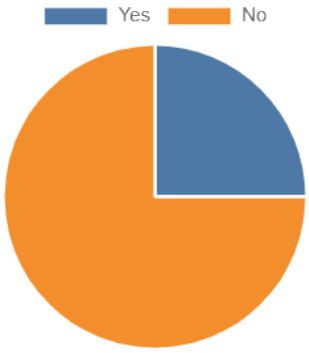


		Answers	Ratio
Yes		3	75.00 %
No		1	25.00 %
No Answer		0	0.00 %

Three out of four respondents indicated to have developed ICT tools for scenario modelling, monitoring and management for cities towards renewable energy systems transition. The activities mentioned include:

- Development of energy-industry–oriented digital solutions, although not yet at full city scale or specifically targeted at large-scale renewable energy system transitions,
- Security and command-and-control programme,
- Complex finance data migration and modernisation programme,
- Implementation of projects for the needs of cities in the area of thermal energy, heating & water supply networks and electricity,
- Architecture, DLT and analytics modules allow for scenario modelling (forecasting, balancing, prosumer optimisation) and are ready to be used in wider urban scenarios.

5. Have you tested such technologies in real environments in cities?



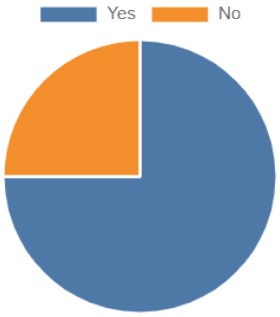
		Answers	Ratio
Yes		1	25.00 %
No		3	75.00 %
No Answer		0	0.00 %

The majority of respondents have not tested the relevant solutions and technologies in real environments in cities. For example:

- A respondent has been involved in testing and researching heat technology,

- Another participant has carried out PoC and field tests in the infrastructure of operators and in distributed locations,
- A participant has designed a system that is architecturally adapted to quickly scale to an urban pilot.

6. Have you good knowledge of the needs of Polish cities with regard to energy transition?



		Answers	Ratio
Yes		3	75.00 %
No		1	25.00 %
No Answer		0	0.00 %

Three out of four respondents have a good knowledge of the needs of Polish cities with regard to energy transition. Some propose to work in cooperation with local leaders for a more detailed assessment, while others have repeatedly worked with both municipal governments and entrepreneurs operating in cities for multiple years.

7. Do you have the skills and capabilities to address the challenge of NCBR by yourself, or do you need to engage in consortia?

		Answers	Ratio
Yes		2	50.00 %
No		2	50.00 %
No Answer		0	0.00 %

The respondents are divided regarding this question. Half of them believe that they have the skills and capabilities to address the challenge of NCBR by themselves, while the other half would prefer to engage in consortia.

8. Have you already participated in a Pre-Commercial Procurement?

		Answers	Ratio
Yes		2	50.00 %
No		2	50.00 %
No Answer		0	0.00 %

Half of the respondents have already participated in a PCP procurement procedure, while the other half do not have such experience.

9. What should NCBR consider when implementing a PCP to develop ICT tools that help Polish cities to make decision towards Renewable Energy Systems (RES)?

The feedback from respondents includes the following:

- The initiative should be driven by concrete urban energy decision needs, not by technology push, with clearly defined use cases and measurable KPIs linked to cost savings, emissions reduction, RES uptake, network performance and social impact.
- Cities, network operators and relevant authorities should be involved from the outset to ensure practical relevance, regulatory alignment and adoption.

- A robust data, interoperability and governance strategy is essential, requiring open standards, common data models, integration of diverse urban and energy datasets, clear data quality responsibilities, and reuse of existing national and European data infrastructures.
- The PCP should be structured in phased steps (design, prototyping, pilots, scaling), with each phase reducing both technical and adoption risks and including clear go/no-go criteria based on measurable outcomes.
- The solution should prioritise transparent, explainable decision-support, offering scenario-based planning, understandable optimisation logic, and the ability to include non-technical criteria such as social, environmental and spatial constraints.
- Outputs should be aligned with EU climate, energy and funding frameworks, enabling cities to use results directly for investment planning, funding applications and compliance with standard indicators.
- Scalability, vendor neutrality and long-term public ownership should be ensured through modular, API-based architectures, open interfaces, and retention of control over data, models and documentation by public stakeholders.
- The PCP should include capacity building and change management, such as training, practical guidance for embedding tools into planning and procurement processes, and mechanisms for peer learning between cities. Evaluation, learning and dissemination should be built in, with clear assessment criteria, systematic documentation of lessons learned, and communication of results for reuse beyond the initial participants.
- Solutions should rely on real-world, preferably real-time data and adopt a multi-energy perspective (electricity, heat, gas and energy efficiency), allowing comprehensive urban energy analysis.
- Real-life urban pilots with relevant operators should be mandatory, alongside strict requirements on interoperability, security, GDPR compliance, legal and regulatory alignment, and integration with existing operational IT systems.
- The PCP should assess business and financing models, including integration costs and value for cities and users, and allow for gradual, modular deployment.
- Both technical performance and social acceptance should be tested, with provisions for user feedback, contingency scenarios, and cooperation with research and innovation partners.

10. What should be the budget be for developing such ICT tools applied to the reality of Polish cities?

The respondents replied to the question related to the estimated budget as follows:

- At this stage, it is difficult to provide a precise budget estimate without further clarification of the intended scope. The total cost will depend on multiple factors, but a rough estimate based on previous experience is likely in the range of €8–12 million, assuming multiple suppliers, multi-phase prototyping and real-city pilots.
- The budget should be adapted to the capabilities of the local government and the scale of the phenomenon. The total cost of the service should probably not exceed the equivalent of 20EUR/month/inhabitant, including both services for residents and for the city. An increase in this value is justified in a situation where it provides quantifiable benefits to residents or the city (on the basis of commissions or a share in savings).
- Proposed overall budget with a comprehensive implementation program: • ~4 000 000 EUR (approximate) Cost structure by stages (approximately, in EUR): • PoV (Proof of Value, 3-6 months): €350,000 – €600,000 • MVP phase (functional model, 6-12 months): €900,000 – €1,500,000 • Urban pilot (12 months, integrations with DSOs and urban systems): EUR 1 600 000 – 2 200 000.

11. What should be the timeline for development and testing of such ICT solutions?

The respondents replied to the question related to the estimated timeline for the development and testing as follows:

- Overall, a 30–36-month PCP gives enough time to de-risk both the technology and the adoption by cities, while still being aligned with typical funding and municipal planning cycles.
- From 12 to 18 months.
- About a year of time.
- Recommended phased (indicative) schedule: • Months 0-4: Requirements analysis, architecture design, test environments, cybersecurity audit. • Months 4-10 (PoV, ~6 months): IoT integration + edge computing + blockchain/energy event documentation, lab and virtual testing. • Months 10–19 (MVP, ~9 months): Functionality extension, alert system, prediction, Big Data / AI module, first field tests with dozens of installations. • Months 19-30 (urban pilot, ~11 months): Integration with DSOs, interoperability tests, regulatory audit, KPIs, preparation of recommendations for commercialization. The final result after 30 months: a ready-made pilot model for scaling in other cities and a documentation package (procedures, APIs, regulatory recommendations, business models).

12. What should be the budget be for testing such ICT technologies?

The respondents replied to the question related to the estimated budget exclusively for the testing as follows:

- For an overall envelope in the range of €8–12 million, this would correspond to approximately €3–6 million dedicated specifically to testing, broken down into: Lab / controlled testing (Phase 2): integration, performance, security and interoperability tests with several suppliers in parallel, using synthetic and initial real data. City pilots (Phase 3): deployment in 2–3 (or more) Polish cities, integration with real municipal and utility systems, local support and training, iterative refinement based on user feedback, and independent evaluation of technical performance and impact on RES-related decisions. Allocating €3–6 million to testing is necessary to ensure that the selected ICT solutions are not only technically sound in a lab environment, but also usable, scalable and replicable across Polish cities in real operational conditions.
- It depends on the scale of the tests.
- It should not be greater than the double cost of the equivalent of 20EUR/month/inhabitant. At the same time, the scale of activities should allow bidders to cover the costs of preparatory work and project implementation.
- Indicative costs of the tests (extracted from the general budget): • Laboratory tests, safety audits, certifications: EUR 200,000 – 500,000 • Field tests (pilot plants, DSO integration): EUR 500,000 – 900,000 • Urban pilot (end-users, KPIs, evaluation report): EUR 800,000 – 1,300,000 Total for testing: ~1,500,000 – 2,700,000 EUR (depending on the number of locations, required certifications and scope of cybersecurity audits).

13. What is the Technology Readiness Level of ICT technologies applied to Polish cities?

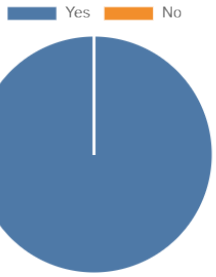
The respondents replied to the question related to the TRL of ICT technologies applied to Polish cities as follows:

- The enabling components (cloud platforms, GIS tools, BI dashboards, basic data integration solutions) are typically at TRL 7–9. However, the integrated, city-wide ICT tools specifically designed to support RES planning and investment decisions in the Polish regulatory and grid context appear to be at a lower maturity, roughly TRL 4–6 (concepts and prototypes validated in lab or limited pilots). The role of an NCBR PCP would move these

integrated decision-support solutions from TRL ~4–5 up to TRL 7–8, i.e. system prototypes demonstrated and qualified in real operational environments in several Polish cities.

- It depends on the city, in some high and in others very low.
- It depends on the area.
- Estimated TRL: it ranges from TRL 6 to 9 depending on the specific technology and city.

14. Are there any standards that should be considered?



		Answers	Ratio
Yes		3	75.00 %
No		0	0.00 %
No Answer		1	25.00 %

Three out of four respondents highlighted that there are several standards that should be considered by NCBR during this procedure. The main input include:

- Interoperability and data models (e.g. INSPIRE, OGC standards, CityGML, IEC CIM 61970/61968)
- Building and automation protocols (e.g. BACnet, Modbus, OPC UA)
- Standard in the construction of the Smart-Grid-Architecture
- Grid and metering standards (e.g. IEC 61850, smart metering standards)
- Information security and privacy (e.g. ISO/IEC 27001, GDPR by design)
- OIRE/CSIRE — functional compatibility (indicated in the material).
- KSB (National Blockchain Network) / KIR - Compliance with the national DLT/settlement infrastructure.
- Industry energy standards: integration protocols (e.g. IEC, Modbus, MQTT), DSO metering and billing standards.
- GDPR / National Data Protection Laws – Personal Data Processing Requirements.
- Cybersecurity standards (e.g. ISO 27001, as well as audit requirements at the level of financial systems due to integration with KIR).
- It is advised to explicitly include the requirements of compliance with the above in the PCP specification.

Others replied that it depends on the data and the area, which once established the standards can be determined.

15. What kind of data do you need to develop the tools?

The respondents provided comprehensive and qualitative responses to this question. Some of their answers can be found below:

- Access to an integrated, well-governed data ecosystem combining spatial, technical, energy, market and socio-economic datasets, with clear metadata, governance rules and privacy safeguards.
- Geospatial and urban context data, including administrative boundaries, land use, transport networks, and 2D/3D building footprints and heights.
- Building stock data, such as building typology, construction year, floor area, and—where available—heating/cooling systems and insulation characteristics.
- Energy consumption data, including historical electricity, heat and gas time-series at building, feeder or district level, with smart metering or sub-metering data aggregated to ensure privacy.
- Typical granularity: 15-minute electrical, hourly thermal, daily gas, weekly fuel, monthly other datasets.
- Grid and energy infrastructure data, covering simplified MV/LV network topology, transformer capacities, congestion points, and district heating assets (e.g. CHP units, boilers, storage).
- Renewable energy source (RES) data, including location and capacity of existing installations (PV, wind, biomass, heat pumps, storage) and resource/potential maps (e.g. solar irradiation, rooftop PV potential, wind resources).
- Operational and asset data for pilots, such as BMS/SCADA data from key public buildings and infrastructures, including maintenance and incident logs, to validate analytics and decision-support tools.
- Market, regulatory and environmental data, including tariffs (time-of-use structures), network charges, incentives, planning and regulatory constraints, weather and climate data, and CO_2 emission factors.
- Socio-economic and planning data, such as population indicators, vulnerability metrics, priority renovation or RES zones, and urban development plans.
- Behind-the-meter and prosumer data, including:
    - Energy import/export measurements with timestamps and sampling rates
    - PV inverter productivity, battery management data (SOC, cycles, charge/discharge limits)
    - Home or local energy management system data
    - Weather data and forecasts (e.g. solar radiation, wind, temperature) to support demand and RES production forecasting.
    - Tariff, market and settlement data, including energy prices, network fees and prosumer exchange mechanisms.
    - Device and system metadata, covering type, location and technical attributes, including those relevant for energy communities.
    - Network operator operational data, such as constraints, limits and event notifications.
    - User preferences and operational priorities, collected and processed in anonymised or aggregated form where required.
    - Event logs and audit trails, including transaction records, settlements and consent management, potentially supported by distributed ledger technologies.

16. How are you going to process data?

The participants of the questionnaire highlighted the following approaches in relation to the data processing aspects:

- Data processing should be based on a secure, cloud-based architecture aligned with European data space principles, ensuring interoperability, data governance, and privacy-by-design.
- Multiple heterogeneous data sources (e.g. energy, buildings, grids, weather, tariffs, operational systems) can be integrated through standard interfaces and protocols into a central data environment.
- Robust ingestion pipelines are used, including automated data quality checks, harmonisation of formats and units, and mapping to a common energy and city data model to enable consistent cross-source analysis.
- A curated data layer supports advanced analytics, including time-series and geospatial analysis, forecasting, anomaly detection, and scenario simulations to inform energy and sustainability-related decisions.
- All data transformations and analytical processes are transparent, documented, versioned and auditable, enabling reproducibility and accountability.
- Strong security and privacy safeguards are applied throughout the lifecycle, including role-based access, encryption, anonymisation/aggregation of sensitive data, and compliance with applicable data protection rules, while ensuring data ownership remains with participating stakeholders.
- Where required, real-time data processing is enabled via streaming architectures, allowing near-real-time validation, enrichment, monitoring, and alerting, alongside historical storage for long-term analysis.
- Edge and cloud processing are combined, with basic filtering and resilience mechanisms at local level, secure transfer to the cloud, and scalable analytics and optimisation capabilities at central level.
- An auditable trust layer supports secure data exchange and traceability of events between participants in the energy ecosystem.
- Results and datasets are made available via APIs and dashboards, enabling integration with external systems and informed decision-making by relevant stakeholders.
- Automated optimisation mechanisms (rules-based and data-driven) can operate within predefined governance frameworks, with anonymisation applied when sharing outputs externally.

17. How do you ensure the cybersecurity and data protection of ICT tools for energy monitoring and management?

The participants of the questionnaire highlighted the following approaches in relation to the cybersecurity and data protection aspects:

- Compliance with GDPR and national data protection laws
- Use of encryption (data in transit and at rest)
- Regular security audits and penetration testing
- Secure user authentication and access control
- Collaboration with certified cybersecurity partners
- Adoption of a multi-layered cybersecurity and data protection approach
- Application of the privacy-by-design and privacy-by-default principles
- Mapping of all data flows and clearly defining the roles and responsibilities of the different actors (cities, utilities, technology providers) as controllers and processors.
- Data Protection Impact Assessments (DPIA) together with the city partners
- Strict data minimisation and retention rules
- Personal data will only be used in aggregated or pseudonymised form
- All processing activities will be documented and aligned with local DPOs and national supervisory authorities' guidance

- All communication channels between field devices, gateways, city systems and cloud services will be protected using strong encryption (e.g. TLS over VPN or secure tunnels), so that data cannot be intercepted or tampered with in transit.
- In the cloud, all databases, storage accounts and backups will be encrypted at rest, relying on the native capabilities of the chosen cloud providers.
- Regular security audits and penetration testing.
- Threat modelling and baseline security assessments of the proposed architecture.
- Vulnerability assessments and scans
- Strong authentication mechanisms
- Role-based access control (RBAC)
- Sensitive actions (such as changing configurations, exporting large datasets or managing user rights) will be restricted, logged in detail and regularly reviewed as part of security audits.
- Network segmentation between OT (BMS/SCADA, IoT devices) and IT/cloud environments
- Secure development lifecycle with code reviews, dependency scanning and security testing integrated into CI/CD;
- Backup and disaster-recovery procedures aligned with city requirements (defined RPO/RTO).

18. Do you have any recommendations?

Respondents provided some recommendations:

- Involve cities, DSOs/TSOs and regulators from the very beginning, so that use cases, KPIs and data needs are well aligned with real decision-making processes.
- Define a clear reference architecture and data model, with explicit requirements on interoperability, standards and data governance, to avoid creating new silos.
- Reserve a significant part of the PCP for real pilots and capacity building in cities (training, support, change management), as this is often where the main risks and costs appear.
- Plan from the start how the outcomes (architectures, data models, tools, playbooks) will be reused and scaled beyond the pilots, so that other Polish cities can benefit without starting from zero.

19. Do you have any questions?

Respondents asked several questions, which can be currently answered preliminarily as follows:

- How does NCBR envisage the selection and role of pilot cities (number, size, level of maturity, involvement of DSOs/TSOs)?

  Answer: This will be defined in the tender documents.

- Will there be any national or sectoral data platforms (e.g. from regulators, DSOs/TSOs, ministries) that the PCP solutions should integrate with or build upon?

  Answer: A list of relevant data platforms may be provided in the tender documents.

- What are NCBR's expectations regarding the target TRL and exploitation path after the PCP (e.g. follow-up deployments, framework contracts, other funding instruments)?

  Answer: NCBR expects reaching TRL8 in a PCP. The follow up procurement for the deployment the commercial solutions will depend upon the success of the tested solutions, and the specific procedures and framework contracts will be defined in due time.

- How will IPR, open standards and long-term ownership of architectures and data models be handled, to maximise reuse by Polish cities and avoid vendor lock-in?

  Answer: In principle, the IPR will remain vested with the contractors for the further exploitation of the solutions, and the public buyers will have rights to use and licenses only over the results of the PCP up to TRL 8. It is envisioned the use of open standards, data models and architectures that ensure interoperability. The IPR details will be defined in the tender documents of a future procurement.

ul. Chmielna 69, 00-801 Warszawa
tel. +48 22 39 07 401
gov.pl/NCBR

6 E-pitching sessions

In total, four (4) companies registered for the e-Pitching session carried out on 9 December 2025. The content of the sessions is confidential.

The following instructions were provided to each and all participants who were assigned a timeslot of 5 minutes:

- The e-pitching will take place in the timeslot assigned (5 minutes for each supplier) – NCBR provides a Teams link for the call. Please be on time.
- If a supplier pitches for two or more topics, 5 minutes will be allocated for each topic.
- Suppliers will present their company (2 minutes) and their services (3 minutes) based on the questionnaire filled out.
- NCBR may ask question to suppliers.
- If suppliers have questions, these will only be collected by the e-pitching session, and the answers will be published in the OMC report.
- Suppliers need to send the slides with information before the e-pitching session.
- The session and the information provided by suppliers will be handled with utmost care and confidentiality. It will not be made public. Only general conclusions will be made available.

7 Conclusions and next steps

The Open Market Consultation has provided NCBR with valuable insights. Despite the short term planned for the duration of the consultation, the companies who participated in the OMC and delivered the RFI and participated in the e-pitching sessions provided relevant information about the capabilities of providers in the relevant domain and useful recommendations for a future tender, which in principle target the competitive development of solutions with multiple suppliers (and/or consortia) using the Pre-Commercial Procurement (PCP) approach (please refer to the OMC document for more information).

Overall, the inputs of the market and the exchange of practices under the Open Market Consultation highlight a broad convergence on the need for city-driven, interoperable and well-governed digital solutions to support the energy transition. Participants consistently emphasised that effective outcomes depend not only on advanced ICT tools, but on clear use cases, access to high-quality data, strong governance frameworks and close cooperation between cities, network operators, public authorities and other stakeholders. Therefore, the results of the OMC point out that by focusing on outcome-based requirements, open standards, data governance and interoperability from the outset, a potential future PCP can stimulate market innovation while avoiding lock-in and ensuring long-term public control over results in this sector.

As for the next steps, NCBR will analyse the input from OMC and will decide on the future follow up procurement. In case of the decision to launch a tender, a contract notice will be published to announce the tender. the tender documents will provide the details of the services required and address the questions mentioned above where pertinent.

8 GDPR clause

Information Clause Regarding the Processing of Personal Data in the Context of Preliminary Market Consultations

In accordance with the information obligation under Articles 13(1) and (2) of Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation, GDPR), we inform you that:

1. The controller of the personal data of the Participant in the preliminary market consultations is the National Centre for Research and Development (hereinafter: "NCBR").
2. You may contact the data controller in the following ways:

a) by mail: Narodowe Centrum Badań i Rozwoju, ul. Chmielna 69, 00-801 Warsaw, Poland

b) by phone: +48 22 390 74 01

c) by email: kancelaria@ncbr.gov.pl

d) via the ePUAP electronic inbox: /NCBiR/SkrytkaESP

3. The controller has appointed a Data Protection Officer (DPO), who can be contacted:

a) by email: iod@ncbr.gov.pl

b) by mail: Narodowe Centrum Badań i Rozwoju, ul. Chmielna 69, 00-801 Warsaw, Poland

You may contact the DPO in all matters related to the processing of personal data by NCBR and the exercise of your rights under the GDPR.

4. The personal data of the Participant will be processed for the purpose of conducting preliminary market consultations, based on Article 6(1)(c) of the GDPR, in connection with Article 84 of the Public Procurement Law of 11 September 2019 and the NCBR Procedure PW_3.7.2-1 for awarding public contracts.
5. Recipients of the personal data may include entities authorised to process the data under law or under agreements with the Controller, in particular entities supporting the Controller in fulfilling its rights and obligations and providing services, e.g., NCBR+ Sp. z o.o., ul. Chmielna 69, 00-801 Warsaw, and Corvers Procurement Services BV, Spurkstraat 57, 5275 JB, Den Dungen, the Netherlands (entity providing technical and legal support in the preparation of a PCP procurement).
6. The personal data of the Contractor will be processed for the duration of the preliminary market consultations. The data will then be stored for archival purposes for a period of 5 years, in accordance with the Uniform File Classification System of the National Centre for Research and Development.
7. The obligation to provide personal data directly concerning the Contractor is a statutory requirement under the provisions of the Public Procurement Law, related to participation in preliminary market consultations; failure to provide specific data may result in consequences as defined by the Public Procurement Law.
8. The Contractor has the following rights:

a) the right to access their personal data;

b) the right to rectify or supplement their personal data;

c) the right to request the restriction of processing of personal data, subject to the exceptions referred to in Article 18(2) of the GDPR. The right to restrict processing does not apply to data storage for the purpose of exercising legal claims or protecting the rights of another natural or legal person, or for important reasons of public interest of the European Union or a Member State.

9. If the Contractor believes that the processing of their personal data violates data protection regulations, they have the right to lodge a complaint with the supervisory authority, which is the President of the Personal Data Protection Office (Prezes Urzędu Ochrony Danych Osobowych, 00-014 Warsaw, ul. Moniuszki 1a, tel. +48 22 531 03 00).