

Refurbishing an old Kindergarten building with minimal environmental impact

City of Koprivnica (Croatia)

Background

The City of Koprivnica (Croatia) has 31,000 inhabitants and is located close to the Hungarian border. Koprivnica has set new standards for the energy efficiency of its building stock, and a new development policy adopted in 2011 requires that all new public buildings be constructed to low-energy or passive building standards.

Procurement objectives

In 2018, the City of Koprivnica needed to replace a prefabricated kindergarten building (net area 820m²) built in 1982 (prefabricated wooden ground floor building with solid foundation) and expanded in 1995 (masonry ground floor building annex with solid foundations). The building accommodates about 170 children, had never been renovated, had high energy consumption levels and was approaching the end of its useful life.

But instead of demolishing the building entirely, the City aimed to maintain as much of the physical structure as possible, while refurbishing and improving its current state. Through the refurbishment, the City aimed to save construction material, to increase the longevity of the building, to increase energy efficiency, and to significantly improve childcare, learning environment quality, and indoor space functionality.

A market analysis indicated that there was no solution for the refurbishment of a prefabricated wooden house available on the Croatian market. Therefore, the City decided to conduct a public procurement of innovation (PPI). PPI refers to a process by which instead of buying 'off-the-shelf' solutions, the public buyer acts as an early adopter or launch customer of innovative solutions new to the market.

The PPI process started in 2017 through a 'needs identification' exercise, and continued through 2018 with the publication of a Prior Information Notice in [Tenders Electronic Daily](#) and in the National Official Journal, which marked the start of the open market consultation phase. As part of the open market consultation, the City published a market sounding prospectus and launched a dedicated [market consultation website](#), containing market engagement and technical documentation, an expression of interest response form and a possibility to connect with other suppliers. Key for the market consultation was a market consultation workshop, which almost 60 companies attended. The consultation resulted in a feasible plan for the reconstruction of the building, which the market would be able to offer.



By the end of 2018, a competitive procedure with negotiation was selected as the most suitable procurement procedure to finalise the PPI process. The procedure started on 31 January 2019, the contract was signed on 24 April 2019.

Criteria used

Subject matter of the contract: Extensive reconstruction of a prefabricated kindergarten building

This included providing design services for the internal and external reconstruction and the execution of extensive reconstruction works.

Based on extensive market engagement and a needs assessment that involved the end users (kindergarten personnel and parents), Koprivnica defined the technical solutions it was looking for in terms of outcome-based specifications. The outcome-based specifications included the following measures:

- Measure 1: Replacement of all inadequate water supply and drainage systems of the building
- Measure 2: The thermal protection of the building envelope
- Measure 3: Increase of the daylight illumination of rooms by increasing the transparency in the terrace canopies
- Measure 4: Didactic and learning elements as a part of new envelope
- Measure 5: Damaged internal walls replacement
- Measure 6: New floor layer in children's rooms
- Measure 7: High-efficiency heat energy production system
- Measure 8: Ventilation system with recuperation

The procurement was conducted in two stages. Stage one entailed the invitation for tender, during which interested companies could apply to be considered for the competitive negotiation phase. To be eligible, they had to submit proof of capacity to perform the contract, a price estimate, and statements of not falling under criteria for exclusion.

All eligible bidders were then invited to submit initial bids for the competitive negotiation phase (stage two). Bidders were asked to submit technical solutions that fulfill all eight measures listed above. Bidders who submitted technically feasible solutions for all eight measures were considered for evaluation.

Bids were awarded a maximum of 100 points, which could be achieved as follows:

- Price: 50 points maximum
- Innovative features proposed for measure 1: 15 points
- Innovative features proposed for measure 2: 15 points
- Warranty period offered in months: 20 points maximum

For the measures 1 and 2 to be regarded as innovative they had to meet at least the following criteria:

- Measure 1: A) No invasive works in internal or external walls, except works in bathrooms. B) Minimal invasive work for new drainage system. C) No raising the existing ground floor level in order to carry out the plumbing and drainage system. D) Newly installed water supply system (pipes) and drainage system shall not be visible to occupants.
- Measure 2: A) Implementation of thicker thermal protection than usual since 75 % of external walls are wooden and hollow (sandwich walls). The maximum allowed thickness was calculated in a static analysis document issued by Faculty of Civil Engineering. B) Works must be organised to allow kindergarten to be in basic function for the users during the month of June and from the last week of August onward.

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Results

Despite active market engagement efforts and possibly due to risk of engaging in the first such process in Croatia, only one consortium decided to participate in the tender. This consortium of three companies was awarded the contract. The consortium was able to present a plan for the design and construction that included innovative elements as described above. The companies involved were Termika Ruzic Ltd (leading company of the consortium, mechanical and electro installation works), Mijatovic Crafts (member of the consortium, construction building works), and Desing Ltd (member of the consortium, project designing services).

The total contract value was € 370,000.

For measure 1, the replacement of the water supply and drainage system of the building, the following solution was proposed by the bidder:

- A complete replacement of all inadequate water supply pipes and installation of new water supply without invasive works by installing the water supply network in the attic and connecting it vertically down directly to bathrooms and kitchen. In this way the new system is invisible to occupants and there was also no need for a supporting structure, which proved to be cost effective.
- Installation of completely new internal drainage/sewage system, using only minimal invasive works in a synergy with the floor reconstruction. The drainage system was laid in one common narrow route throughout the building, with only one exit tube to connect to external drainage (instead of previous three exit tubes).

For measure 2, the thermal protection of building envelope, the following solution was proposed:

- Implementation of the thicker-than-usual thermal protection of external walls. The solution was possible due to reinforcing the exterior walls using OSB (oriented strand board) panels. The OSB panels enabled additional load capacity, a possibility to properly anchor the External Thermal Insulation Composite Systems (ETICS) façade, and to install windows according to [RAL standard](#) (an internationally renowned quality label for the installation of windows and doors).

Regarding measure 7, the high efficiency heat energy production system, the bidder offered a complete reconstruction of heating system by implementing a condensing heating technology.

This refurbishment approach has not been previously applied in Croatia, as confirmed by a national technical expert from the Faculty of Civil Engineering. In terms of costs, the design and construction of the solution was less than €500 per square metre, which is approximately 50% of a cost of a new building. There was no need for a supporting structure during construction, which proved to be both innovative and cost effective solution.

Environmental impacts

The final impact of the procurement and implemented solution was an improved building with an extended lifetime of 25+ more years. The solution also resulted in 61% savings on heating energy, 66% savings on primary energy and as a result of that 66% less CO₂ emissions per year. It reached an energy performance of 44 kWh/m² per year and generated €4,863 annual savings on heating energy.

Instead of demolishing the old building and constructing new one, by transforming and upgrading the building which was considered to be near the end of its useful lifetime the whole building with net surface of 820m² could be diverted from landfill.

During the implementation of innovative Measure 1 (remediation of all inadequate water supply and drainage system of the building) a complete replacement of all inadequate water supply pipes and installation of new water supply has been done without invasive works.

Lessons learned

One of the main lessons learned was that public authorities in Croatia do not yet invest enough effort to engage with the market, especially in tenders that ask for very specific, innovative solutions. Moreover, most suppliers seem reluctant to give details about the price and technical specificities of their solutions during the open market consultation. Performance-based procurement approaches are not yet common in Croatia and require a cultural shift from all stakeholders.

Construction market players specifically are usually fragmented and prefer detailed specifications. Moreover, many small- and medium-sized companies have no experience in public procurement which may result in significant loss of opportunities for public authorities. Finding the right way to tap into this approach was therefore a challenge. In the case of this procurement, significant resources were dedicated to the open market consultation, but just a few companies were interested and only one took part in the negotiation. This process however has laid the groundwork for similar projects in the future and Koprivnica's initial research has shown that there are other municipalities interested in conducting similar types of refurbishment works.

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For related information, please see [European GPP criteria for Office Building Design, Construction and Management](#), and the [Technical Background Report](#).