

## Construction of an energy-efficient kindergarten

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MUNICIPALITY OF PREDDVOR, SLOVENIA

### Background

Preddvor (population of 3,230) is situated in north western Slovenia in the region of Gorenjska. Sixteen years ago, it was decided that appropriate measures would be taken to ensure that the Municipality of Preddvor would become as energy independent as possible. Through the concrete steps taken to promote energy self-sufficiency, Preddvor has already achieved the following noteworthy results:

- The central town of Preddvor and some surrounding villages are all heated by local biomass (since 74% of the region is covered by forest);
- Solar energy is produced from six solar power roof installations on the primary schools and kindergarten;
- Preddvor owns four small hydropower plants;
- Charging stations are available for electric vehicles and bikes;
- At the end of 2011, Preddvor Municipality adopted the "Local Energy Concept".

### Procurement objectives

Preddvor's old kindergarten's prefabricated construction was poorly insulated and allowed for significant energy waste. In May 2009, the Municipal Council decided to invest in a new, low-energy kindergarten facility to improve energy efficiency. The initial objective was to set up a public-private partnership, which would have required a private company to build, and then rent the kindergarten to the Council for a period of fifteen years. However, the leasing scheme was ruled out by the Slovene Court of Audit, resulting in contractual changes which allowed Preddvor to obtain immediate ownership of the kindergarten.

### Criteria used

**Subject matter:** Demolition of Preddvor's old kindergarten and construction of a new, low energy kindergarten

**Technical specifications:** The plan was to construct a low energy building using environmentally friendly materials, emphasising the use of wood products and renewable energy. The goal was for the kindergarten facility to become a passive building with an annual heating demand of less than 15kWh/m<sup>2</sup> (energy class: B1). The following criteria were also included in the open public tender process:

- The orientation of the kindergarten had to maximise natural light and the roof had to be suitable for solar module installation and energy production;
- Strict technical specifications were given for the maximum allowed heat transfer coefficient ( $k < 0.35 \text{ K/m}^2 \text{ K}$ ) and for the characteristics of external and internal construction materials (triple glazing, for e.g.);
- Local heating specificities (heating through wooden biomass) had to be taken into consideration during construction;
- Local Slovenian legislation regarding heat transfer, solar radiation transparency (>50%) and the use of renewable energy sources (>25% of total heating) had to be respected.

External experts were consulted during the development of technical specifications.

### Results

The project requirements were developed in January 2010, and the public tender was launched in October of the same year. Two companies were initially interested in the contract, however one of them pulled out because it could not fulfil the required technical specifications. The successful bidder did not encounter major challenges with the technical specifications because they are one of the leading actors in energy efficient wooden buildings in Slovenia and throughout Europe. The contract was awarded in January 2011 and construction began shortly after. In November 2012, the first wooden passive kindergarten in Slovenia received permission for use.

The project had a total budget of €2.5 million, of which €420,000 were subsidised by the Slovenian Eco Fund. The rest was provided by the Municipality of Preddvor.

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The building's high environmental performance is achieved, thanks to the following features:

- Natural materials were used to construct most of the building. More specifically, wood from *Larix sp.*, commonly known as Larch tree was used;
- Built-in wooden doors and windows with triple glazing;
- The kindergarten is heated by biomass from a central boiler in Preddvor;
- A central ventilation system was installed (air recuperation efficiency is over 80%);
- A 96.7 kW photovoltaic system set up on the roof.

The new construction has received the following environmental awards: Gold medal for the *Most Energy Efficient Public Building* (awarded by EKO Fund, International Craft fair of Celje and My home edition); and The Finance newspaper & Slovene EKO Fund Award for *Environmentally Friendly Company of the Year 2012 in Slovenia*.

### Environmental impacts

Current requirement for new buildings in Slovenia is 48kWh/m<sup>2</sup> (-10% for public buildings). Preddvor's passive wooden kindergarten's annual heating demand should be lower than 15 kWh/m<sup>2</sup>.

The use of renewable energy sources enables the kindergarten's carbon footprint to be further reduced by cutting down the need for fossil fuels, decreasing CO<sub>2</sub> emissions from the generation of energy and heat and reducing air pollution from carbon monoxide (CO) and nitrogen oxides (NO<sub>x</sub>).

Initial results from Gorenjska's Local Energy Agency will be available at the end of 2013. Actions will be taken to further improve the kindergarten's energy efficiency. The initial tests have shown that the facility's air tightness (one of the main indicators of energy saving and low heat loss) is three times lower (0.2) than the requirements of the Slovene Eco Fund for passive energy buildings (less than 0.6).

### Lessons learned

The kindergarten is used by local authorities as an example of a best practice for how to build energy efficient buildings. Preddvor would like to repeat the GPP process for future investments. Furthermore, it was understood that being the investor in such projects is a more convenient solution than leasing the building from a developer.

A follow up on the kindergarten's energy consumption is also scheduled in order to ensure that good progress is maintained. In 2013, the local energy agency for the region of Gorenjska developed an energy database method for the building.