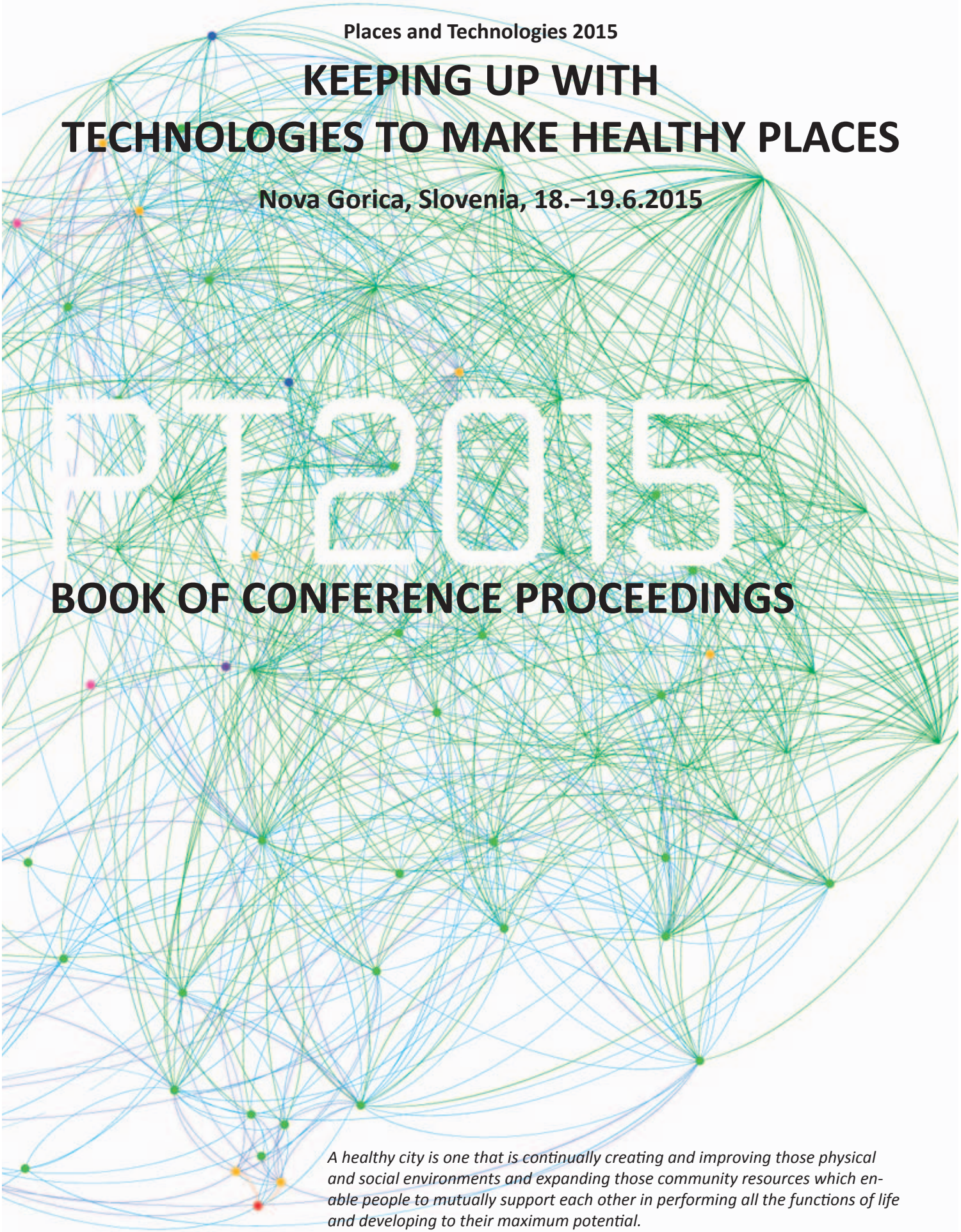
Places and Technologies 2015

KEEPING UP WITH TECHNOLOGIES TO MAKE HEALTHY PLACES

Nova Gorica, Slovenia, 18.–19.6.2015



BOOK OF CONFERENCE PROCEEDINGS

A healthy city is one that is continually creating and improving those physical and social environments and expanding those community resources which enable people to mutually support each other in performing all the functions of life and developing to their maximum potential.
Health Promotion Glossary (1998)

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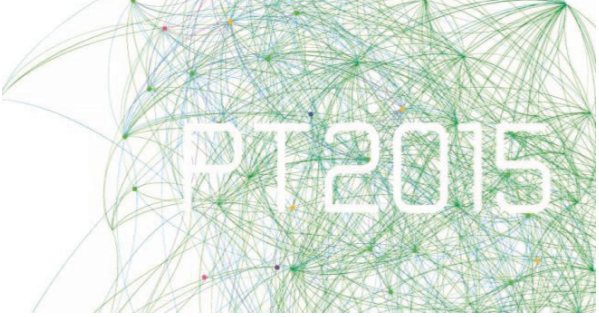
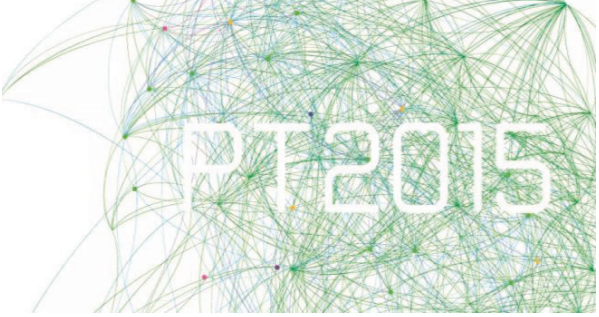
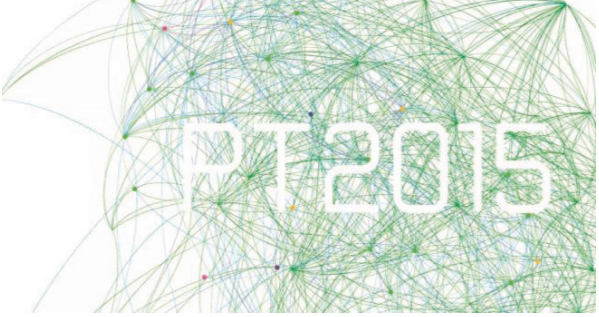
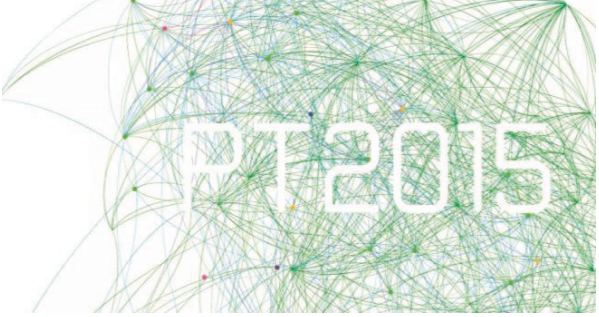
Nova Gorica, Slovenia

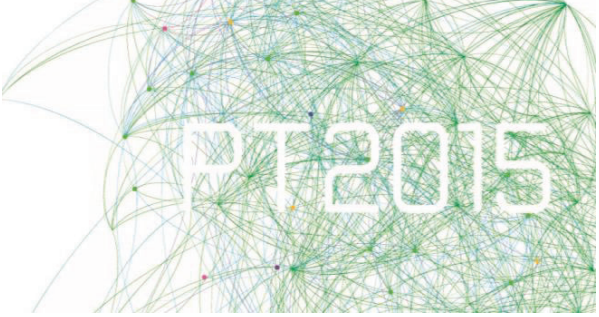


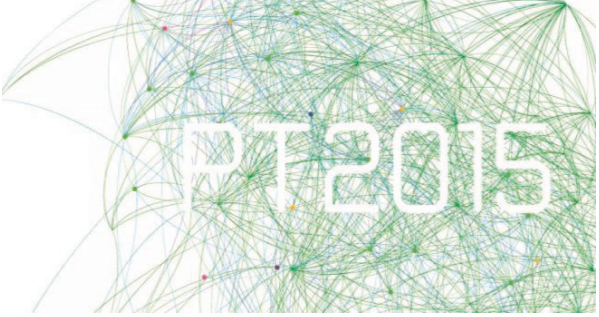
Contents

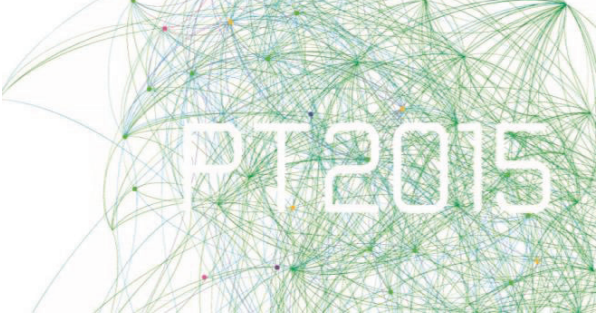


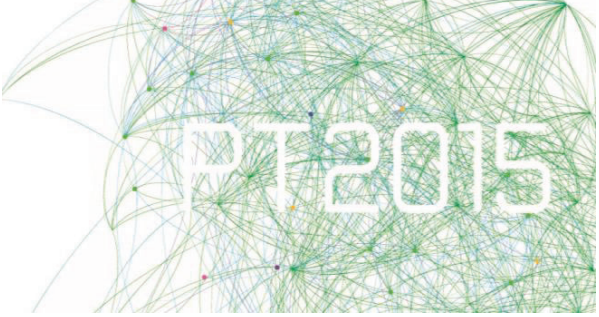












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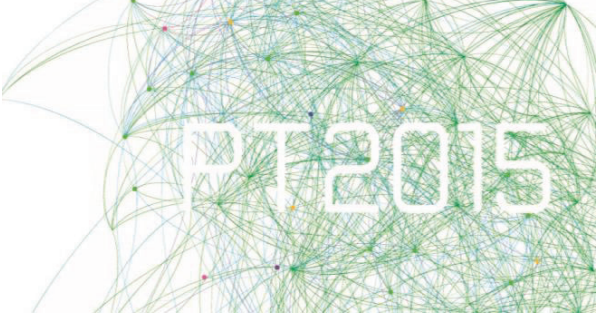

MUNICIPALITY POLICY AS KEY FACTOR FOR THE ROLE OF ARCHITECTURE AND TECHNOLOGY IN PUBLIC HEALTH

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ABSTRACT

The construction of the so-called "social infrastructure" (kindergartens, schools, health centres, hospitals), which is the basis for a "public health" in a broader sense, in many countries is led by the administration (state and municipal). The quality of the built environment largely depends on the quality of financier, in this case embodied in some kind of state/municipal authorities, committees and civil servants. In this paper, an example of the application of up to date high-tech design methods and technologies in the design and construction of public buildings is presented. Belgrade public buildings designed and constructed in the period 2009 – 2013, is shown. The first five projects for construction of energy efficient kindergartens (up to passive house standard) with the use of renewable energy sources and realised through architectural competition, were considered as a passing fad, but such a practice has become standard procedure for the design of the other public buildings, and even the only option for the construction project of 1400 social apartments in Borča. The paper presents these projects, and, in particular, highlights the necessary processes and procedures established to ensure that these projects would be implemented.

Keywords*: municipality policy, energy efficiency, architectural competition, healthy places.*

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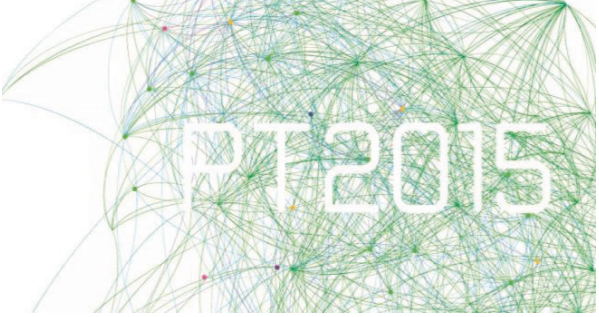


INTRODUCTION

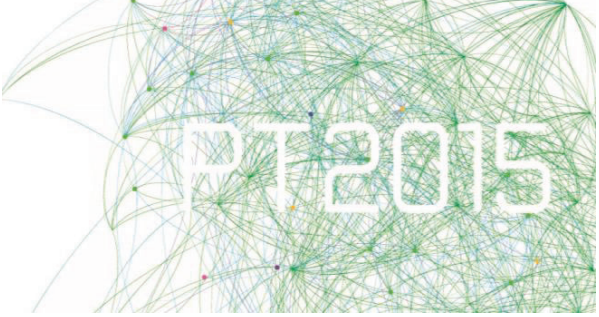
World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). In the broader sense, it means that social well-being is one of the key elements of people's health. Even more, in UNDP study "Stuck in the Past" (UNDP, 2004) it was clearly stated that if the Serbian society wanted to develop, decrease of energy consumption would be mandatory.

City of Belgrade spends around 30% of the energy produced in Serbia (Belgrade's Energy Sector Development Strategy, 2008). Therefore, the decrease of the energy consumption in Belgrade is crucial both for the citizens, and for the City Municipality. However, as the price of the energy sources is subsidised by the Government, there is no economical motivation for the rational usage of the energy or for the application of the renewable energy sources. For that reason, it is the mission of the local authority to be a leader in the energy saving process: on one side, to reduce its own expanses for the energy sources, and on the other to start the development of the energy saving industry (education of financiers, architects, engineers, constructors, supervisors, final users ...). These tasks imply the change of the many administrative bodies which is always a big challenge.

DEFINING OF THE MUNICIPALITY POLICY

The main goal was to improve the design, construction and management of the public buildings, to lower their energy consumption in exploitation and to use renewable energy sources for this lowered energy needs. Having in mind some failed attempts, a decision was made to start more projects in different fields simultaneously. University, professional associations, public companies, interested private companies, relevant city secretariats, agencies and municipalities – they all had their representatives included. To avoid partition and segregation, the projects were linked by the mutually dependent goals, and teams' members took different roles in different projects. Special attention was made to ensure equal presence of the members of the City authority and other contributors in different projects. In that way, one participant could reach more different results, one project would be finished and other one started, the projects which did not progress were put on hold temporarily, while the same participants remained active in other on-going projects. This organisation brought on higher activity of the employees in the city authorities and different ideas how to improve the system itself. The very system started to change itself.

A very important decision was made to acquire all the design solutions through the public competition with more equal rewards, and to have the entries and results published. In this way, all the participants, and not only those rewarded, became the promoters of new ideas.



STUDIES AND SURVEY OF CURRENT STATE

City of Belgrade (Directorate for Energy) provided yet in 2003/2004 energy efficiency studies made for 20 kindergartens and schools ("EnPlus"), projects "Energy revitalisation and comfort optimisation", with the exact outcomes such as economic analysis of measures, recommendations of possible scenarios of energy recovery with precise information about the investment vs. benefit, but nothing had ever been realised due to lack of interest. However, Directorate for Energy continued the activities by making following studies of the housing, hydro potential, and Energy information system:

Atlas of the Energy Characteristic of the Building Envelopes in Belgrade

The study was made by Faculty of Architecture, University of Belgrade in 2012. Atlas made the identification, classification, architectural and thermo-visual analysis of the performance of the building envelopes, suggested the measures to be undertaken accompanied by financial estimation of the costs for 30 typical building in Belgrade. The buildings made in the period before the first thermal protection regulations, mostly during 60-ties and 70-ties (even during 80-ties) have the biggest savings potential. The possible savings, which include all measures, are around 50% of the current consumption.

Detailed Research on Sub-Geothermal Water Resources of Belgrade – Potential, Usage Possibilities and Energy Evaluation

The study was made by Faculty of Mining and Geology, University of Belgrade in 2012. The subject of the Study is sub-geothermal energy with low enthalpy, which can be used in heat pumps, with the depth of 200-300 meters, for the defined temperature range 9-30°C. The conclusion of the study is that one third of the thermal needs of the buildings attached to the central heating system can be obtained by using available sub-geothermal thermal energy. According to general calculation, total available thermal power for Belgrade is around 1.5 MW.

Cadastre of the Geothermal Wells in the Territory of the City of Belgrade and Forming of the Geothermal Information Database

This is the first classification of the information of this type and it covers collection of all available data related to existing geothermal wells in the territory of the City of Belgrade (number of exploitation wells that are or can be used for the heating/cooling needs of the buildings; current number of geothermal energy users). This conceptual approach enables the forming of the base for the sustainable usage and management of the hydro-geothermal resources in the City territory.

Research on Wind Energy Potential and Identification of the Most Favourable Locations for the Wind Power Plants in the Territory of City of Belgrade

The research was made by School of Electrical Engineering, University of Belgrade, and it is an indicative city/regional study made after one-year-measurement in three referential locations (height of 35-63 m). The possibility of development of the wind power plant with the power of more than 3 MW was analysed and there were eight established micro-locations in the broader City territory on the right side of the Danube, with the optimal possibility of usage of the south-east and north-west winds (net usage coefficient of the 25 do 30% capacity on yearly basis, estimated installed power around 110MW).

Informational System of the Energy of City of Belgrade (ISEB)

Implantation of the Informational system of the energy should continuously monitor the energy flows in the territory of Belgrade, so that data analysis might prevent supply disturbances, enable planning and disposal of the energy, define measurements for the loss reduction, influence growth of the energy efficiency, optimise the consumption of all forms of energy and minimise the environment pollution.

REALISED PROJECTS

By Major's decision, City of Belgrade decided to adopt energy efficiency (EE) measures and use renewable energy sources (RES) through construction of new buildings. The first occasion was the construction of five new kindergartens with passive house standard (less than 15kWh/m^2 for heating). Design briefs were acquired through public architectural competition initialised in 2010, when the participants were clearly (for the first time in Serbia) asked to use EE measures and RES. Public competition and following main design completion were used to encourage and educate the professionals to adopt EE and RES knowledge.

Figure 1: Kindergarten "Tesla – Science for Life" in Block 67, New Belgrade. Design: DVA STUDIO. Photo: D. Vasović.

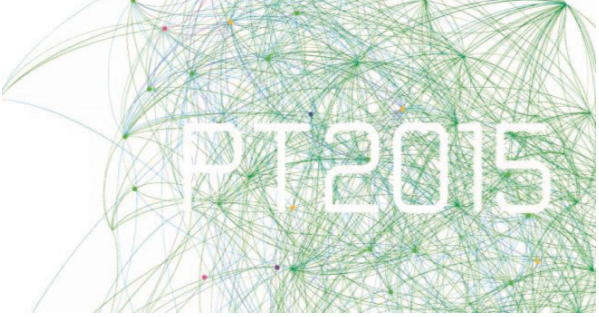
The first one of those kindergartens was opened in Bežanijska kosa (block 12) in May 2012, and the second one in University City (Block 67) in October 2013. The

Kindergarten in Block 67 was awarded with the Grand Prix of 36th Salon of Architecture in 2014. Kindergartens in Stubline (near Obrenovac) and in Bežanija (block 61) were opened in the beginning of 2015, while the construction of the fifth kindergarten in Voždovac (settlement Banjica) shall soon be launched. The project development defined the usage of different RES for each of five kindergartens (sub-geothermal water, geo probes, photovoltaic and water heating solar collectors, in order to reduce to the minimum the costs for heating, cooling and hot water preparation. The cost for energy consumption for these buildings is less than 1 euro cent/m^2. For the first time, there are directions for measurements and verification of the energy consumption defined in the project documentation.

Figure 2: Kindergarten "Dragan Laković" in Block 61, New Belgrade. Design: AGM. Photo: D. Vasović.

There is a small solar power plant in kindergarten in Bežanijska kosa, which should supply the electric power to the EPS (Serbian Electric Power Company) not just for pure economic reasons, but also as a role model (7 photovoltaic panels, 3.2 kW installed power). The construction of this kindergarten was the first opportunity for City administration to pass all the procedures for conditions, agreements and approvals, and also for setting-up of the privileged electric energy supplier to sell the electricity per "feed-in" prices. All five kindergartens and social building "Predah", are subsidised by Republic of Serbia in 4.7% of the total value of the construction of the building, in the RES part - for the works and installations, and thermal exchange.

Successes in kindergarten construction caused the "competition" in application of EE and RES measures in other public buildings. In the end of 2014, "Predah", a new social building for the temporary and occasional accommodation of children with autism was opened in Shakespeare's street. There are two compact EE buildings with whole day stay accommodation for the children, kitchen and administration. The buildings use similar EE measures as the five kindergartens: usage of RES for heating and cooling (underground water wells, heat pumps), solar system for the hot water (also for the kitchen and laundry) is combined with the usage of natural gas.



ONGOING PROJECTS

The biggest EE and RES usage should be future social housing project in Ovča settlement in Belgrade. Design briefs were also acquired through public architectural competition. What makes the project unique is the fact that master plan united seven different rewarded designs. Total number of 965 social apartments and solidarity apartments were designed to be constructed in four phases. In total, around 70.000 m^2 of the apartments and 1.800m^2 of social and commercial usage, were designed. Preparatory works of the first phase (65 social and 185 apartments of Solidarity Fond) started. The project competes for the funding at European Committee, as aimed to accommodate internal refugees from KC Krnjača. The negotiations for the financial support of the second phase (235 apartments) are pending – Central European Bank might finance it from the Regional housing programme. The main challenge was a complete lack of infrastructure, except roads. Due to lack of sewage installation, there is a need for the wastewater treatment plant, due to lack of the heating system and gas pipeline, the thermal energy for this low energy consumption buildings should be produced in hydrothermal RES sources available at the site (during the summer, underground water will be used as technical water for the greenery). Along with low consumption of electrical energy for the heat pumps, these measures will enable remarkable savings for the apartment users and for the City of Belgrade. Energy and economy efficiency of the buildings are made possible through combination of the passive measures in urban and architectural design and usage of the low temperature energy distribution system – floor heating in the apartments. Along with the significant thermal insulation, both in the facades and roofs, PVC windows should be made of six-chamber profiles with low emission cover, double glazing and argon filling.

CONCLUSIONS

Introduction of high-tech projects in public works is always challenging because of to inertia, complicated procedures, and already established routine. It is not only the building process that is challenging, but the operation time even more. Therefore, it is very important to spread the knowledge and information about new technologies to different levels.

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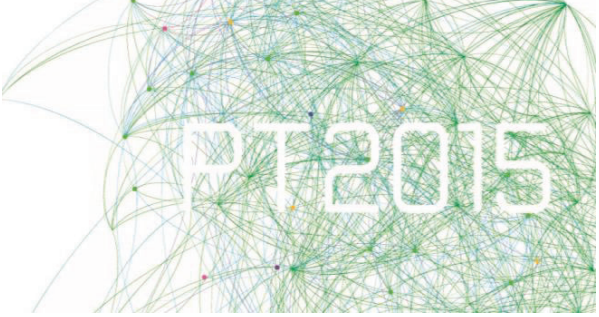

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