

## **SPIN - Energy Efficiency & Urban Development Planning.**

### **Energy efficiency in Eastern Europe's city centres. What lesson can be learnt?**

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The SPINE project (*SPIN-Energy Efficiency & Urban Development Planning*) receiving funds from the European Union within the CIUDAD program (*Cooperation in Urban Development and Dialogue*). CIUDAD is aiming at helping local Governments that are partners in ENPI (*European Neighbourhood and Partnership Instrument*)<sup>1</sup> to enhance their capability to design sustainable and integrated urban development plans through good governance principles. CIUDAD wishes to reach these targets through the promotion of mutual understanding, sharing of expertise and cooperation in the implementation of shared projects between EU local bodies and between countries belonging to regions that are ENPI partners.

This is the setting in which the SPINE project – scientifically coordinated by the Veneto Eurosportello<sup>2</sup> and the Iuav University of Venice<sup>3</sup> (as an associated partner) – deals with two cities from recipient countries like Russia and Ukraine and with an important cultural heritage that has remained partly untouched in Vladimir and that has been partly lost in Cherkassy. Therefore, SPINE has been focusing on the restoration, preservation and improvement of the building heritage and of energy efficiency in these difficult city centres scenarios by following three guidelines:

- Raising awareness of local institutions and administrators about the importance of preserving and enhancing the historical heritage of city centres;
- Promoting strategies and technologies for the integration of EE (Energy Efficiency) and RUE (Rational Use of Energy) actions when dealing with buildings and urban planning upgrading of city centres;
- Supporting and fostering the development of local policies, regulations and expertise with a view to preserving and increasing the value of the cultural heritage of urban centres abiding by the EE and RUE policies.

The path undertaken in 2010, when the project was started, has been long and difficult, and this will be the case until the end of 2012, when all its activities will be concluded. All began with the analysis of policies, strategies and technologies in the fields of energy and urban historical heritage preservation adopted by

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<sup>1</sup> The European Neighbourhood and Partnership Instrument (ENPI) is part of the European Neighbourhood Policy (ENP). It involves EU neighbouring countries to strengthen the overall stability, security and wellbeing. Beyond countries in the southern area of the Mediterranean Sea, namely: Algeria, Occupied Palestinian Territory, Egypt, Jordan, Israel, Lebanon, Libya, Morocco, Syria and Tunisia. The policy also includes neighbouring countries from Eastern Europe and the southern Caucasus region, namely: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine).

<sup>2</sup> [www.eurosportelloveneto.it](http://www.eurosportelloveneto.it)

<sup>3</sup> [www.iuav.it](http://www.iuav.it)

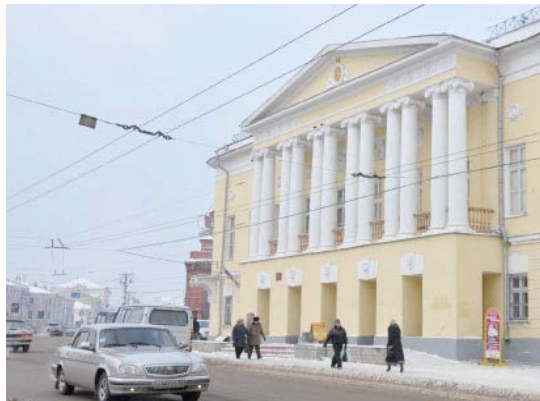
recipient countries and other countries within the ENPI regions and, most of all, in comparison with what has been done in Italy.

The sharing of knowledge and expertise will be carried out with a view to creating guidelines, project ideas and feasibility studies for the use of innovative materials. The two buildings will be a training field to assess the output of the project and they will promote the generated know-how. Therefore, these test cases are two restoration and energy upgrading projects for two buildings marked by a crucial historical and architectural value within the city centres of Vladimir (Russia) and Cherkassy (Ukraine).

The first test case (picture 1) is a building called *The Noble Assembly Building* at n°33, *Bolshaya Moskovskaya Street* in Vladimir, Russia. The second (picture 2), called *Civil Acts Registration Office Building* (*"The House of Shcherbyna"*, or *"The Palace of Weddings"*), is at n°3, *Lenina Street* in Cherkassy, Ukraine.



picture 1 – *The Noble Assembly Building*, built between 1825 and 1827. (Picture by Max\_Badaev, in Panoramio)



picture 2 – *The Noble Assembly Building*, the picture was taken in December. (Picture by Massimiliano Condotta)



picture 3 - *Civil Acts Registration Office*, built in 1892.



picture 4 - *Civil Acts Registration Office*, postcard from 1910

The Russian building dates back to early 19<sup>th</sup> century, whereas the building in Ukraine dates from late 19<sup>th</sup> century. Yet they both have bonds with the history of the two cities and they are a matter of national pride. At present, both buildings are being used for activities that are different from those which had been originally conceived and they do not always grant historical dignity. The building in Vladimir, for instance, is now hosting a nightclub, a youth club and a fur-coats outlet. The building in Cherkassy is being used for wedding feasts while it hosts the registration office and youth clubs. Yet such a situation has led to a positive outcome: both buildings haven't been abandoned, hence preventing further damage for building materials and systems. Moreover, the two test cases envisaged alternative solutions with a social and public use for the buildings.

The Noble Assembly Building in Vladimir (see picture 5), for instance, might host a cultural city and a tourist centre, underlining that preserving the urban historical heritage is crucial from both a social and cultural point of view and from an economic one.



picture 5 – Possible use for the building in Vladimir. On the ground floor (on the left) the building might host a tourist office and some cultural activities. The first floor (on the right) might host some artistic activities (schools, painting, music and craftsmanship classes) and an auditorium for the exhibitions to display the outcomes of the activities carried out within the building.

The different amount of time required by the new activities have led to redesign the energy systems of the building accordingly, within the SPINE project, taking into account the differences in terms of time, space and use of the building in an innovative way, as against with similar cases in both cities, during the restoration of such beautiful buildings.

This has been possible because the buildings were linked to a District Heating network (a fairly common feature within both cities). Moreover, a careful consideration has led to the belief that radically changing the heating system might have risen restoration costs alongside with maintenance costs.

In fact, energy consumption in historical buildings is mainly due to their own volume, even when energy saving devices are installed, including attic and walls coating, the use of double glass doors and windows, installation of heat meters and check valves and reduced heat production. Our case studies reveal that the main rooms are always more than 3.50 m. high, leading to an average eight of more than 4 m. In real life, such conditions generally lead to a twofold action aimed at reducing energy and economic costs alongside with pollution:

- Use of radiant heating systems;
- Use of drop ceilings to reduce the indoor environment that needs heating.

Yet both solutions do not fit in well when dealing with historical and valuable buildings because very often the floor is still in good conditions irrespective of its age, because real actions cannot be taken as the floor is safeguarded by state, regional or municipal legislations or because breaking the floor to install the radiant system could endanger its structure and increase the overall costs. The use of quality drop ceilings (whenever paintings, frescos and plasters are not present) could then jeopardize the architectural volume/surface and open/close space ratio, hence deleting the perspective that usually characterizes historical and valuable buildings.

Hence the solution – innovative in this kind of context – that architects, plant engineers, owners and users have come up with, after a long consultation.

The solution increases heating performances in the wintertime and cooling performances in the summertime; it is simple, yet revolutionary, within the geographical and cultural context of test cases when it comes to historical buildings restoration and energy saving and efficiency.

The upgrading envisages the installation of new pipes, joints and valves, the installation of heat meters and thermostatic radiator valves on each radiator and the installation of traditional heaters (selected according to their aesthetic integration and for their efficiency) alongside with fan coils (wisely located behind the traditional grates that can be found in every building in Russia and in Ukraine).



pictures 6, 7, 8. Indoor view of the building in Cherkassy, Ukraine, and view of radiator covers hiding traditional radiators. The picture in the middle illustrates the wall hosting the heaters of the building in Vladimir, and a wooden grate from a similar building in Vladimir (see picture on the right).

Bearing in mind the very low temperatures that winter fall can bring, this system would enable traditional heaters to provide the right amount of heat during the night and when the building is not being used, preventing walls and internal structures from freezing and avoiding serious structural damages. On the other hand, when the building is being used the heating system would be called upon to provide an indoor temperature of about 22° and the fan coil could then heat the environment much more quickly. The same principle applies to the summertime. Therefore, should humidity and heat reach high levels, the fan coils would then provide fast cooling. In both cases, starting from an average temperature of about 17°-18°C, the energy demand to provide a comfortable environment would not exceed 2°-3°C, whereas during the summertime, considering the high ceilings and the cold tending to stay in the lower part of the room, fan coils could be set to start only above 24°-25°C with humidity rates between 40 and 60%.

The upgrading project enables energy savings of about 22% for the building in Vladimir and of about 20% for the building in Cherkassy and it would provide this outcome just by enhancing the heating and cooling systems, without taking into consideration any further actions upon the structure of the building (such actions would be hard to undertake in any way, given the kind of building and the legislation that protects it).

Moreover, the above-mentioned solution would improve and foster the use of District Heating, the most cost-effective system from the economic, energetic and environmental point of view, and it would also lead to:

- Upgrade the existing District Heating networks, a highly efficient system for energy production and distribution that for this reason is now being considered once again a “smart” solution;
- Respect the historical buildings with regards to their original materials and criteria (based upon a large thermal mass) during the upgrading of heating and cooling systems;
- Curb and balance energy consumption;
- Provide better indoor comfort;
- Provide users of the building with the opportunity to choose the temperature they prefer, hence leading to immediate comfort;
- Energy costs that match the actual amount of energy used;
- Upgrade cooling/heating systems.

This is one of the first practical outcomes of the SPINE project and the close cooperation between technical, economic and social bodies that setup one of the most significant community programs for technological and cultural exchange in the Energy Saving, Energy Efficiency and Historical Building Restoration sectors. We hope that the cities of Vladimir and Cherkassy will continue to benefit from this program as they have done since its setup. Moreover, this experience turned out to be very useful for Italian architects and urban planners too, providing us all with food for thought with regards to a point that has been discussed by

specialists for a long time and that has been often raised in our conversations during the trips to get to the buildings. What would happen if Italy (but also in many other western countries) relied more on the common sense and on professionals, experts and historians' knowledge and techniques instead of abiding the regulations that have proved to be inadequate to cope with the complexity of the urban setting and that have followed any decision from the differing political administrations, witness the development of our cities since 1942?