

Application of PETRA methodology in Kiev

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Description and objectives

The present project has supported Ukrainian stakeholders, interested in adopting a strategy to assess energy efficiency (EE) of housing stock, to use a contextual version of PETRA (Platform for Energy and Technical Retrofit in Architecture - former EPIQR+).

This methodology, currently in use in Switzerland and other European countries, evaluates EE and the energy potential of building, including the energy performance certificate (EPD) that will become mandatory in Ukraine after the final adoption of the law on 'Energy Efficiency in Buildings'.



Impacts

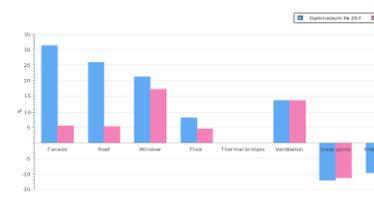
The quantification of the foreseeable short-term impact of the energy refurbishment of the ten school analyzed in this project is as follows:

- Reduction of annual energy consumption of 5.6 GWh (average improvement of 67%);
- Decrease of annual emissions of 1'125 tons CO₂.

The pay-back of energy-saving interventions is on average 4 years, a particularly short period compared to Swiss standards. This is due in particular to the lower cost of construction and to the supply prices of energy similar to Switzerland.



New parameters



Heat balance

Transmission heat losses	Qt	253.5 MJ/m ² a
Ventilation	Qv	102.5 MJ/m ² a
Internal and connected with people heat gains	Qi	72.8 MJ/m ² a
Solar thermal gains	Qs	101.3 MJ/m ² a
Heating thermal demand	Qh	235.0 MJ/m ² a
Heat demand for hot water	Qww	25.0 MJ/m ² a
Heating Energy demand	Eh	235.0 MJ/m ² a
Heating Energy demand (Heat and WW)	Ehww	260.0 MJ/m ² a
Total energy demand	Ehwe	377.6 MJ/m ² a
Energy savings	Ehww	-64%
Energy savings	Ehwe	-54.7%

Building Envelope

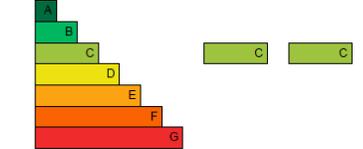
U-value of roof	0.20 W/m ² K	-79.2%
U-value of facade	0.22 W/m ² K	-82.0%
U-value of window	1.82 W/m ² K	-19.5%
U-value of basement floor	0.25 W/m ² K	-42.5%

Energy carrier type

Heating production	Teleriscaldamento	1.00
WW production	Teleriscaldamento	1.00
Outdoor air flow		0.70 m ³ /hm ²

Global efficiency:

Efficiency



Valuation	Value	Limit	Gap
Efficiency of envelope (Qh)	65.3 kWh/m ² a	55.6 kWh/m ² a	17%
Global efficiency (Ehwe)	104.9 kWh/m ² a	72.7 kWh/m ² a	44%
MINERGIE index estimate	43.8 kWh/m ²	55.0 kWh/m ²	-20%
CO ₂ emissions	18.3 Kg/m ²		

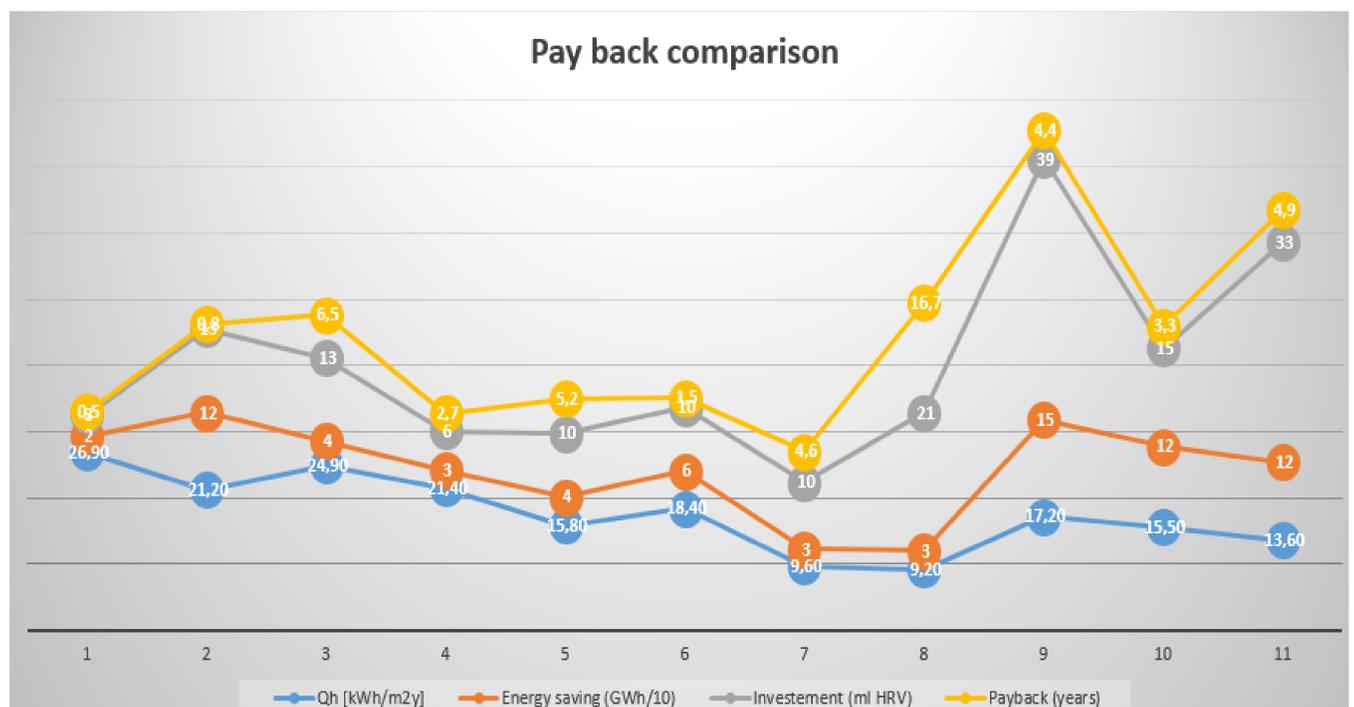
Nota: 1kWh = 3.6MJ

Methodology

The purpose of the project is the transfer of methodology in the field of building renovation, thanks to the Swiss instrument PETRA, which contains the following stages:

- the diagnosis of existing real estate assets, including the collection of relevant data;
- actual heat balance and forecast;
- analysis and forecasting of operational energy;
- economic analysis and forecasting;
- definition and comparison of refurbishment scenarios.

Pay back comparison



Conclusions

The assessment of energy efficiency indicators of buildings analyzed with PETRA will estimate the level of energy savings that could be achieved in Ukraine in the case of generalized energy refurbishment. It will also enable the State to plan co-financing of these projects needed to meet Ukraine's obligations under the Energy Union Accession Agreement, the EU Association Agreement and the Memorandum of Ukraine with the IMF.

Among the possible indirect impacts, we can include the increase in the employment of the population through the development of small businesses in the field of energy efficiency. Considering the size of the interventions to carry out in the near future, the Ukrainian market may be very attractive for both material suppliers and skilled labor.