

1.1.15 Energy efficient refurbishment of the former factory building IU V Vrhnika into a Cultural centre (SI)

Vrhnika is a Slovenian municipality situated near capital city Ljubljana, at the border between the Ljubljana marshes and the rocky Karst. It has a population of 16.417 people and stretches on an area of 115 km². The municipality started to work on sustainable energy policies systematically in 2008, when the Local energy concept was adopted. In 2010 Vrhnika was **awarded as the most energy efficient middle sized municipality in Slovenia**.

Vrhnika joined the Covenant of Mayors in May 2012 to demonstrate its commitment towards reaching EU climate & energy targets and to improve local energy and environmental conditions. The SEAP is in the phase of harmonisation and preparation. To fulfil the commitments and goals, municipality of Vrhnika provided appropriate actions and measures aiming at increasing EE and RE use. One of them is **energy efficient refurbishment of the former factory building IU V Vrhnika into a Cultural centre** (Figure 16), which will improve quality of life in municipality of Vrhnika, lower GHG emission and costs and will have significant socio-economic effects.



Figure 4 Former factory building IU V Vrhnika

Technical aspects

The current state of a derelict building envelope IU Vrhnika is inadequate in terms of both functionality and energy efficiency. Its energy rehabilitation will have an impact on:

- reduction of the energy demands of the building - energy for heating,
- improving the living comfort with the replacement of deteriorated building furniture and radiators, restoration of the building envelope,
- reduction of the greenhouse gas emission and thus on negative effects on the environment.

The results of energy efficient renovation will have significant impact on new market opportunities of now abandoned building IU Vrhnika. The renovation will directly open new

jobs and generate revenue and increase the number of visitors. They will get new opportunities for additional education and cultural activities. The added value of the restored building will also be evident through the already known benefits of educated and culturally conscious population: reduction of unemployment, improving the situation on the labor market, etc. In the rehabilitated building, the following activities are provided:

- Library Cankar Vrhnika
- Primary School Ivan Cankar,
- Institute of Culture, Sports and Tourism Vrhnika.

The energy refurbishment of the former factory building IUUV Vrhnika into a Cultural centre project has holistic approach and treats the entire building. Each stage of the renovation of the building is divided into five sections, which can be carried out simultaneously or sequentially depending on the financial capability of the investor, i.e.:

- Energy restoration of the building is treated in the **first stage** and includes the rehabilitation of the entire building envelope (roof, facade walls, floors to the ground, carpentry) and carry out the main elements of the systems. In the first stage, in addition to energy rehabilitation process, the entire second floor, which will be renovated into eight classrooms and supporting areas for the school. On the ground floor rehabilitation covers Hall 1 (300 m²), dual-purpose room shelters/ changing rooms at the Hall 1, lobby and vertical communication within the facility.
- The **second stage** covers arrangement of the library on the first floor and all of the services in the mezzanine. Library also belongs to a pro rata share of the total installations and devices.
- The **third stage** includes arrangement of the Hall 2 (170 m²).
- The **fourth stage** includes refurbishment of the Hall 3 (300 m²) and associated changing rooms with toilets. Layout of the hall is arranged to preserve the space open and flexible as much as possible.
- The **fifth stage** includes arrangement of the restaurant with associated services (warehouse, office, toilets for staff). Bathrooms for guests are shared with those for the Hall 3. If the fifth stage of implemented will be performed before the fourth, the toilets will be arranged in this stage.

Complete refurbishment of the former factory building IUUV Vrhnika in all five stages **will reduce energy use in the building by 446 MWh per year.**

Environmental aspects

During the refurbishment, the project will have certain minimum negative impacts on the environment (Table 26, Figure 17). In the long term, the investment will have a very positive

impact on the environment - reducing the burden on the environment, energy efficiency of the building, and reduction of the electricity use (Table 26, Figure 17).

Table 25 Itemised short-and long-term environmental impacts

Environmental elements and expected impacts		
Environmental elements	Expected impacts	
	Between refurbishment	Between occupancy
Soil and water	Soil contamination due to emissions of construction machinery and use of construction materials will be minimal.	Lower water and energy consumption.
Air	The increase in exhaust emissions due to the use of machinery during construction will be minimal. Dust will be present because of trucks.	Due to lower gas consumption and thereby lower energy consumption air will be improved due to the reduction of emissions.
Noise	Noise from construction machinery and transportation. The works will be carried out in time and in a manner that will be least disruptive to the environment.	No negative impacts are foreseen. The location is remote and also during major events noise pollution is not distracting.
Waste, construction waste	The formation of small quantities of hazardous waste.	Separate waste collection is envisaged.
Energy for heating and cooling	During the construction there will be no impact.	The facility will feature new thermal insulation of the external envelope, which will follow the expert guidelines for energy consumption reduction.

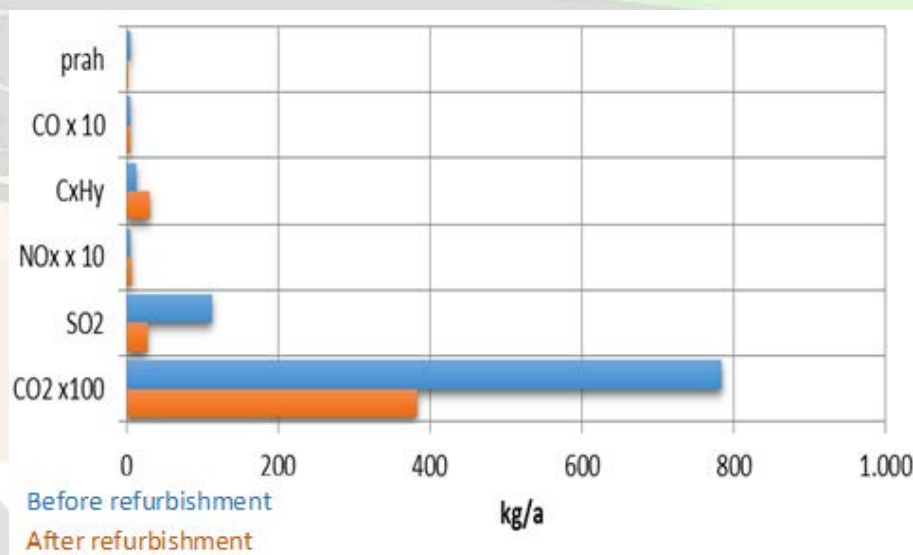


Figure 5 Emissions of individual components (in kg per year) before (blue) and after (orange) comprehensive refurbishment of the building

Financial aspects

The investment will be financed with a **78.23% share of the grant of the European cohesion policy and 21.77% of the own funds** of the municipality Vrhnika (Table 28).

Table 26 Dynamics of funding at current prices in EUR including VAT

Source	2013	2014	Total	Share
National budget				
MZIP-PP 962210	706.399,85	28.117,59	734.517,44	66,49%
PIIP-PP 962410	124.658,80	4.961,75	129.620,55	11,73%
Municipality of Vrhnika	231.280,84	9.205,59	240.486,43	21,77%
Total public funds	1.062.339,49	42.284,93	1.104.624,42	100,00%

The amount of the grant is expected to be provided by non-returnable financial incentive of the Ministry of Infrastructure and Spatial Planning i.e. EU cohesion policy. Funds will be drawn down in accordance with the tender conditions. Loans are not provided as sources of funding.

Cash flow (Tables 29 and 30) for the project represents inflows and outflows arising as a result of the investment. Sources of funding are not considered among the inflows. The residual value of the project is equal to zero. Net inflows in the first year (investing year) are negative and in subsequent years positive.

Table 27 Cash flow for the project in thousand EUR

Cash flow	2013	2014	2015	2016	2017	2018
Inflows	0	0	0	0	0	0
Residual value	0	0	0	0	0	0
Outflows	885	22	-23	-23	-23	-23
Investment without VAT	885	34	0	0	0	0
Costs excluding depreciation and tax	0	-12	-23	-23	-23	-23
Net inflows	-885	-22	23	23	23	23
Cash flow	2019	2020	2021	2022	2023	2024
Inflows	0	0	0	0	0	0
Residual value	0	0	0	0	0	0
Outflows	-23	-23	-23	-23	-23	-23
Investment without VAT	0	0	0	0	0	0
Costs excluding depreciation and tax	-23	-23	-23	-23	-23	-23
Net inflows	23	23	23	23	23	23
Cash flow	2025	2026	2027	2028	2029	2030 in dalje
Inflows	0	0	0	0	0	0
Residual value	0	0	0	0	0	0
Outflows	-23	-23	-23	-23	-23	-23
Investment without VAT	0	0	0	0	0	0
Costs excluding depreciation and tax	-23	-23	-23	-23	-23	-23
Net inflows	23	23	23	23	23	23

IRR cash flow is negative (the default period of 25 years). The investment in 25 years does not return, considering the discounted value of net inflows. Net present value at 7% discount rate is negative, the relative net present value is negative. At required discount rate of 7% the investment does not give positive financial results.

Table 28 Indicators of the project in relation to cash flow (index f)

Payback period - the discounted net inflows	preko 25 let
NPVf for the period of 25 years	-611.262 EUR

Relative NPVf for the period of 25 years	-66,79%
IRRf for the period of 25 years (discount rate of 7 %)	-3,35%

Socio-economic aspects

The economic analysis estimates the contribution of the project to the economic development of society. The project is made on behalf of the entire society and not just in terms of infrastructure owner/operator. The economic analysis of the building refurbishment may take into account the assessment of the added value of the project on the quality of life among social benefits. Added value can also impact on healthy lifestyles i.e. human health. The investment will create added value through a positive impact on the economy. The economic analysis considers following impacts:

- tax adjustments
- corrections for externalities
- adjustments due to indirect effects
- from market to account prices
- discounting

Possible additional economic benefits that are defined in the methodology of cost-benefit analysis (CBA) in the field of education, would be:

- increase the welfare of users of the facility,
- costs for society if in the project invested funds would not be used for the best alternative,
- externalities, for example. increase in revenue due to additional activities (shops, restaurant etc.).

Economic internal rate of return is positive (the default period of 25 years). The investment therefore gives a positive socio-economic performance as measured by the IRRe.

Table 29 Economic flow for the project in thousand EUR

Economic flow	2013	2014	2015	2016	2017	2018
The inflow of cash flow	0	0	0	0	0	0
Energy saves	0	12	23	23	23	23
Indirect effects	0	28	28	28	28	28
Outflows	708	30	3	3	3	3
The investment cost without VAT x 0.8	708	27	0	0	0	0
Costs of indirect effects - 10%	0	3	3	3	3	3
Net inflows	-708	9	48	48	48	48
Economic flow	2019	2020	2021	2022	2023	2024
The inflow of cash flow	0	0	0	0	0	0
Energy saves	23	23	23	23	23	23
Indirect effects	28	28	28	28	28	28
Outflows	3	3	3	3	3	3
The investment cost without VAT x 0.8	0	0	0	0	0	0
Costs of indirect effects - 10%	3	3	3	3	3	3

Net inflows	48	48	48	48	48	48
Economic flow	2025	2026	2027	2028	2029	2030 in dalje
The inflow of cash flow	0	0	0	0	0	0
Energy saves	23	23	23	23	23	23
Indirect effects	28	28	28	28	28	28
Outflows	3	3	3	3	3	3
The investment cost without VAT x 0.8	0	0	0	0	0	0
Costs of indirect effects - 10%	3	3	3	3	3	3
Net inflows	48	48	48	48	48	48
IRRe for the period of 25 years (discount rate of 7 %)	4,07 %					

The sensitivity analysis (Table 32) showed the effect of changes in investment and energy prices on the success of the project taking into account the 7 % discount rate.

Table 30 Sensitivity analysis of the project

Sensitivity analysis	Change	Change of NPV
Investment increase	5%	-6,52%
Savings increase	5%	1,98%
Investment decrease	-5%	7,50%
Savings decrease	-5%	-1,90%

It is evident that the project is more sensitive to a change in the costs of the investment

Table 31 Likelihood analysis of the project

Likelihood analysis	Change	Likelihood
Investment	increase	Yes/No
Fuel prices	increase	Yes

Considering the market situation and anticipations, it is more likely that energy prices will increase (Table 33), which will have a positive impact on the performance of investments. The investor can not affect the change in fuel prices, but it can impact on the amount of the investment as he selects the most favourable bidder on the public call, taking into account the relationship between price and quality. In addition, the investor can require fixed prices, which in turn positively influences the results of the investment.

Organisational aspects

The investment will be executed in 2013 and 2014. In 2012, project and investment documentation have been designed, in February 2013, public tender was published, in April the contractor was selected, and in May the contract was signed (Table 34).

Table 32 Time schedule of the investment

Activity	2012	2013	2014
Preparation of documentation			
Energy audit	done		

DIIP	done		
IP	done		
Preparation of detailed design documentation	done		
Public tender			
Tender		February	
Contractor selection		April	
Signing contract		May	
Beginning of the operation		June	
Completion of the operation			September

Following project organizational chart has been identified:

- Responsible person for the investment is Mayor of Municipality of Vrhnika;
- Responsible manager for acquisition of investment documentation (DIIP, PDI and IP) is the Deputy Mayor of the Municipality of Vrhnika;
- The municipality is responsible for the project and investment documentation;
- Contractor for the execution of the investment shall be selected through a public contract for the implementation of the total investment in accordance with the Public Procurement Act. In the same way, a contractor building control shall be selected;
- With the selected contractor, Municipality of Vrhnika sign a contract for the total completion of the investment (on key);
- Responsible for the project implementation coordination is the deputy mayor of the Municipality of Vrhnika;
- Investor arranges an adequate expert supervision of construction and proper quality control;

Upon completion of the works, the contractor gives finished object, together with handover record and in accordance with the applicable regulatory requirements to the owner and building manager - the Municipality of Vrhnika.

All costs incurred by the regular maintenance and operation shall be borne by the Municipality of Vrhnika. After the organization of individual programs in each floor of the building, transfer of management is scheduled to Library Cankar Vrhnika (mezzanine and first floor), elementary school Ivan Cankar (second floor) and the Department for Culture, Sport and Tourism Vrhnika (for the management of sports facilities in the ground floor).

Vrhnika (Slovenia) signed a twinning agreement with Cullar Vega, Spain in July 2013 and is supported in the development of its SEAP and the implementation of sustainable energy actions in the framework of the CoM.

Table 35 below summarises the results of the technical, financial, socio-economic and organisational analysis of the action entitled "Energy efficient refurbishment of the former factory building IUV Vrhnika into a Cultural centre".

Table 33 Summary of the findings of the assessment study of the action “Energy efficient refurbishment of the former factory building IUV Vrhnika into a Cultural centre”

Technical/ Environmental assessment	Title	Energy efficient refurbishment of the former factory building IUV Vrhnika into a Cultural centre
	Baseline scenario data (kWh, tCO ₂ , €)	SEAP not approved yet
	Technology employed	Insulation, EE windows, heat recuperation, EE boiler, thermostatic valves, energy monitoring
	Technology providers	Various
	Technical specifications	-
	Energy savings	446.000 kWh/a
	Primary energy savings	491.000 kWh/a
	CO ₂ savings	40 tCO ₂ /a
Financial assessment	Financing scheme	Municipality funds (21,77 %) Cohesion funds (78,33 %)
	Project cost	1.104.624,42 €
	Annual maintenance costs	0 (building refurbishment)
	Annual project revenues	23.000 € (savings)
	Discount rate	7 %
	IRR (%)	-3,35 %
	NPV (€)	-611.262 €
	payback period (years)	>25 years
Socio- economic assessment	Annual socio-economic costs	3.000 €
	Annual socio-economic benefits	51.000€
	IRR (25 years)	4,07 %
	NPV	-
Organisational assessment	Time-schedule	1/6/2013-1/10/2014 (on-going)