

# INVESTMENT FACT SHEET

## I.3 - Paraffin based latent storages in connection with geothermal district heating system

Version 2

<b>Project index number and acronym</b>	CE 1344- Store4HUC
<b>Responsible partner (PP name and number)</b>	Municipality of Lendava - PP02
<b>Linked to pilot action (number and title)</b>	I3.1 Installations needed for connection to distribution network and innovative energy storage in Lendava
<b>Project website</b>	<a href="https://www.interreg-central.eu/Content.Node/Store4HUC.html">https://www.interreg-central.eu/Content.Node/Store4HUC.html</a>
<b>Delivery date</b>	09.2021

**Description and technical characteristics of the investment**

The main aim of the pilot project was the replacement of the existing Oil-Fired Boiler in Lendava Library (public building) with a renewable energy source. The building was connected to the existing geothermal district heating network to increase the share of renewable in the public sector.

In more detailed and based on the prepared documents the pilot investment includes in the first part the purchase of 2x 65m of pre-insulated pipes (suitable for temp. up to 95°C, STANDARD or PLUS insulation, CALPLEX - DUO H, DN40+40, 50+50/182) and the connection of the public building to the existing geothermal district heating system with all connecting materials. The second part of the investment includes the purchase and the installation of 2 PCM latent storage tanks (2x 1.000l; 130kg) filled with paraffin based - phase change material (2.160 pieces of  $\varnothing 42 \times 310$ mm sticks; 50°C) with all necessary electrical and mechanical parts for energy transmission and measurement. With the additional installation of an energy management tool, we were able to monitor all features that proves the effectiveness of the pilot installations.

The monitoring was carried out from April 2021 until November 2021. The aim of our monitoring and testing phase was to prove (or disprove) the mentioned positive characteristics with numbers. The results show that with the implemented investment we managed:

- to reduce the energy consumption of the pilot system from 84.350,9 kWh to 69.930,0 kWh (electrical energy consumption not considered, as electrical energy is only used as auxiliary energy for circulating pumps, for instance, and amounts to only a very small proportion of the total energy consumption);
- to reduce the yearly CO<sub>2</sub> emissions of the pilot system from 23,53 t CO<sub>2</sub> to 0 t CO<sub>2</sub>;
- to increase the security of energy supply of the system (number of hours without interruptions/discomforts on yearly basis) from 99% to 100% (During the monitoring phase no interruptions/discomforts or under-temperatures of the network have been recorded);
- to reduce the average yearly peak power delivered from external energy sources from 22,25 kW to 21,6 kW;

An innovative solution of energy storing system has been installed in the basement of Lendava Library to increase the level of energy efficiency in public buildings (related to the higher efficiency of the heating system). The advantage of paraffin used storages compared to regular water storages: requires less space, which is very important in case of Lendava Library. Thermal energy storage technologies and geothermal district heating systems have the potential to play a significant role in the transition towards 100% renewable energy systems through increasing system flexibility and overall efficiency and thus reduce CO<sub>2</sub> emissions and increase domestic energy security and additionally reduce the costs of heating.

The added value of transnational cooperation is the joint review of the pilot activity. The peer review partner (PP5) advised on pilot development and implementation. The technical partner (PP9) assisted in the implementation of monitoring and preparation of tools that will calculate the optimization of pilot performance. Thus, we successfully carried out a pilot activity through joint cooperation.

The pilot in Lendava is highly sustainable and fully transferable to other territories with similar conditions. The investment in a pilot energy storage system in Lendava is now the first in the region, national and in wider transnational level. The storage, which have been installed in the cultural and historic protected building of public

library in Lendava, is now representing a decentralized system of thermal energy advancement in the system with paraffin - latent storages. Municipality of Lendava is one of two Slovenian municipalities that has geothermal district heating, in parallel, the municipality also works on energy efficiency, where there are restrictions on cultural and historical protected structures. Pilot paraffin-based latent storages in connection with geothermal district heating system in Lendava is an innovative investment also at wider transnational level and can be transferred not only to territories/regions with geothermal potential, but also in connection with some other renewable energy sources (e.g. biomass/solar district heating system) and the developed autarky rate tool can in this case additionally serve as an indicator for the economic and reasonable utilisation / operation / design of storages.

### Investment costs (EUR) including a break-down of main cost items

Costs categories	Costs
1 New pipeline (construction and assembly work)	20.930,86
2 District heating substation with storage system	31.969,50
3 Peripheral regulation equipment	5.680,00
4 Electrical installations	11.624,50
5 Construction costs for boiler room preparation	1.762,00
6 Planning (technical documentation for machine installations)	2.700,00
7 Additional works (miscellaneous)	1.296,00
<b>Total excl. VAT</b>	<b>75.962,86</b>
VAT (22%)	16.711,83
<b>Total incl. VAT</b>	<b>92.674,69</b>

### Investment location

NUTS 3	Address (Street, house number, postal code, city, country)	GPS coordinates
NUTS 1 - Slovenia NUTS 3 - Pomurje region Lau 2 - Municipality of Lendava	Glavna ulica 12, 9220 Lendava, Slovenia	46.56332, 16.45350

### Duration and process of investment implementation

Start date	End date
02.2020	11.2021

### Major milestones of investment implementation

The major milestones of the investment specification have been:

- × The start of the tender procedure for the project planning (February 2020)
- × The phase of investment planning - preparation of project documentation lasting from March to June 2020
- × The tender procedure for works - public procurement process, started in beginning of July 2020 and ended in mid-August 2020
- × Construction works I - Connection of the building to the existing geothermal district network (last two weeks in January 2021)
- × Construction works II - Installation of the PCM storage tank and all electrical and mechanical components for energy transmission and measurement (first two weeks in February 2021)
- × The testing and monitoring phase of the intervention, lasting from mid-April 2021 to mid-November 2021 (just during the heating season)

### Ownership and durability of the investment (e.g. maintenance, financing)

The pilot installation is located in the building (Lendava Library) owned by the city/Project Partner. City will retain the ownership and will also be responsible for operation and maintenance. Ensuring the consequent use and care for the investment is a standard competence of the city and shall not represent a risk. The pilot investment is already entered in the register of fixed assets with a visible inventory number of the investment.

**References to related pilot action (output fact sheet) and relevant deliverables (e.g. pilot action report, studies) and web-links.**

**If applicable, additional documentation, pictures or images to be provided as annex**

The main deliverables related to the Lendava pilot action are:

- × D.T1.2.4- Feasibility study for implementing energy storages in Lendava (SI) (available [here](#))
- × D.T1.2.5- Assessment of the constraints for establishment of energy storages and action plan for further steps (available [here](#))
- × D.T2.1.5- Investment specification of the integration of an energy storage in HUC for Lendava (SI) (available [here](#))
- × D.T2.2.8- Mid-term report of the HUC pilot action in Lendava (SI) (available [here](#))
- × D.T2.2.9- Final report of the HUC pilot action in Lendava (SI)
- × D.T2.3.3- Transnational evaluation report on pilot actions (ongoing)
- × D.T2.3.4- Transnational strategy for the implementation and capitalization of energy storages in HUCs (ongoing)
- × D.T3.2.4- Validation report and establishment of the autarky rate tool & the checklist (available [here](#))

The main deliverables are available here in the “[Publications](#)” section and on the project [YT channel](#).







