

DELIVERABLE T1.3.3

**D.T1.3.3 – Estimation of heating losses from
thermal data / PA4**

03/2020





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A.T1.3 Estimation of PV potential and heating losses

Issued by: Partner Nr. 06

Date: March 2020

Circulation RE – Restricted to BOOSTEE-CE Partners

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1. Introduction and aims

The deliverable T1.3.3 belongs to the activities related to estimation of PV potential and heating losses (A.T1.3). In particular for each Pilot Action, a report has been created reporting some information gathered from onsite thermal acquisitions or data owned by local energy agencies. The overall idea is to report the heating loss situation in the pilot buildings and, if possible, the improvement after the investment activities. According to Application Form, the quantification of D.T1.3.3 is 7 but we created 8 documents corresponding to the 8 locations of the Pilot Actions (one cross-border). The various deliverables reports information and graphical results of thermal analyses in all PAs with (public or internal) and without investments. In this latter case, despite the lack of investment, thermal and energetic analyses were performed in any case to provide useful material to the local municipalities and inform them of possible energy efficiency actions they could undertake to improve the energy performance of buildings.

In the following section the activities related to PA4 in Tolna, Hungary (TDCA) are reported.

2. Thermal acquisitions in the BOOSTEE-CE pilot action #4

In the following tables, we report the acquired thermal data with some metadata and comments, to facilitate comprehension and understanding of the situation in some public buildings located in Tolna (Hungary).

Acquisition date	09.05.2019
Time and ext. temperature	4:10, 10 deg
Distance from building [m]	20
Applied thermography camera system	Manufacturer: Testo Type: 882 IR resolution: 640x480
Pictures of the equipment	
Type of building	Town hall
Owner	Municipality of Tolna
Description of the composition of the outer wall	clay blocks, 65 cm; cement plaster, 1 cm The building is under local protection
Description of the roof or ceiling to the exposed roof	wood layer, 2,5 cm; closed air layer, 2 cm; wood layer, 2,5 cm;

	filling, 10 cm; HDPE vapor barrier film, 0,08 cm, rockwool, 20 cm
Coefficient of heat passing through the outer walls [W/m ² K]	1,2 W/m ² K
Coefficient of heat passing through windows (openings) [W/m ² K]	1,35 W/m ² K 6,4-7 W/m ² K (old doors on the front)
Coefficient of heat passing through the ceiling [W/m ² K]:	0.18 W/m ² K
Coefficient of heat passing through floors [W/m ² K]	1.2 W/m ² K
Coefficient of heat passing through walls to unheated spaces [W/m ² K]	1,2 W/m ² K
Transmission coefficient of heat loss per unit of surface area of heated buildings, HT' [W/m ² K]	0.333 W/m ³ K (calculated heat loss factor)
Annual thermal energy needed for heating [kWh]	260 580,9 kWh
General remarks on the outer envelope and building state	The building is under local protection, the last renovation took place in 1906. The calculation is based on 7/2006. TNM Decree was prepared as of 29.09.2019.
	
	

	<p>The old doors are inadequate, there are inner doors to mitigate the issue as the facade cannot be changed due the local protection.</p> <p>Roof insulation was done using 20 cm rockwool which provides sufficient insulation. The facade is not insulated and consists of 65 a cm thick clay brick layer, which provides for moderate insulation.</p>
	<p>There are no specific numbers for the footing which seems to provide for a worse insulation than the outer walls.</p>

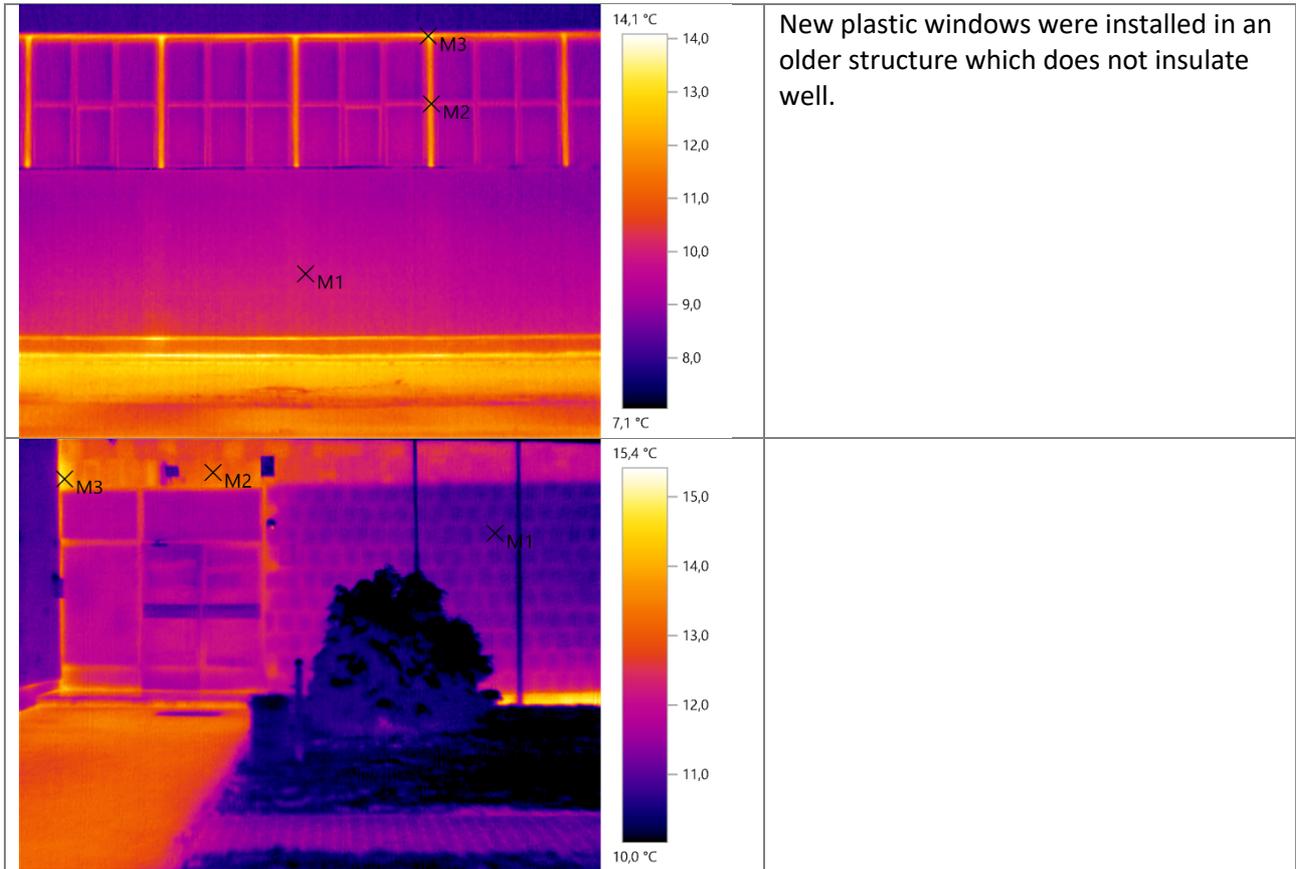
Type of building	Lovarda Cultural Centre
Owner	Municipality of Tolna
Description of the composition of the outer wall	clay blocks, 45 or 60 cm; polystyrene foam, 3 cm; cement plaster, 1,5 cm The building is under local protection
Description of the roof or ceiling to the exposed roof	Austrotherm AT-N100, 5cm; Austrotherm AT-N100, 5cm; HDPE vapor barrier film, 0,08 cm; wood layer, 2,5 cm;
Coefficient of heat passing through the outer walls [W/m ² K]	0,64-0,57 W/m ² K (45 cm or 60 cm wall)
Coefficient of heat passing through windows (openings) [W/m ² K]	1,4 W/m ² K
Coefficient of heat passing through the ceiling [W/m ² K]:	0.33 W/m ² K
Coefficient of heat passing through floors [W/m ² K]	0.62 W/m ² K
Coefficient of heat passing through walls to unheated spaces [W/m ² K]	0,64-0,57 W/m ² K
Transmission coefficient of heat loss per unit of surface area of heated buildings, HT' [W/m ² K]	0.146 W/m ³ K (calculated heat loss factor)
Annual thermal energy needed for heating [kWh]	233 911 kWh
General remarks on the outer envelope and building state	Construction time of the building: 1870

	<p>The building is under local protection, the last renovation took place in 2006. The calculation is based on 7/2006. TNM Decree was prepared as of 29.09.2019.</p>
	
	
	<p>No thermal images were acquired for this building.</p>

Type of building	Sports Hall
Owner	Municipality of Tolna
Description of the composition of the outer wall	<p>cement plaster, 1,5 cm; Porotherm 30, 30 cm; cement plaster, 1,5 cm;</p> <p>cement plaster, 1,5 cm; Porotherm 30, 30 cm; cement plaster, 1,5 cm; Austrotherm AT-H80, 5 cm; cement plaster, 1,5 cm</p>
Description of the roof or ceiling to the exposed roof	<p>Steel trapezoidal plate without seal, 0,07 cm; PE layer, 0,02 cm; Sloping AT-N100, 10cm;</p>

	Villox O-V 4 S/K, 0,4 cm
Coefficient of heat passing through the outer walls [W/m ² K]	0.93-0,47 W/m ² K (with or without insulation)
Coefficient of heat passing through windows (openings) [W/m ² K]	3,5 W/m ² K (old wood windows) 1,51 W/m ² K (plastic windows)
Coefficient of heat passing through the ceiling [W/m ² K]:	0.42 W/m ² K
Coefficient of heat passing through floors [W/m ² K]	1.45 W/m ² K
Coefficient of heat passing through walls to unheated spaces [W/m ² K]	0.93-0,47 W/m ² K
Transmission coefficient of heat loss per unit of surface area of heated buildings, HT' [W/m ² K]	0.157 W/m ² K (calculated heat loss factor)
Annual thermal energy needed for heating [kWh]	233 911,1 kWh
General remarks on the outer envelope and building state	Construction time of the building: 1987 The last renovation took place in 2013. <i>The calculation is based on 7/2006. TNM Decree was prepared as of 29.09.2019.</i>





Thermal images were acquired only in 05.2019 due to the fact that no additional refurbishments were made after 2013 on the three buildings and there were no changes in the buildings' operation as PA4 is only implemented in 04-05.2020.