

MEASUREMENT & VERIFICATION

Thermal refurbishment of buildings

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EU4Energy



**Covenant of Mayors
for Climate & Energy**

**Demonstration Projects
Eastern Partnership**



1 General

1. All projects are obliged to prepare and submit monitoring and verification data
2. The monitoring and verification data shall be prepared for each subproject (building).

2 Calculation of savings

The savings of each subproject have to be calculated by comparing the energy consumption before and after the project implementation. BUT the situation before is often not comparable with the situation after the project (ventilation rate, heating comfort, etc.) → establishment of a “**baseline**” is needed to have comparable conditions before and after the project implementation. The baseline usually represents the calculated (theoretical) energy consumption before the project implementation considering the same service level as after the project implementation (i.e. same ventilation rate, same indoor temperatures, same heated floor area, etc.).

It is recommended to prepare the following table after finalization of the technical design of the project.

Parameter	Unit	Baseline	After implementation	Savings
Heat consumption per year	MWh/a			
Heat energy costs per year				
Electricity consumption per year	MWh/a			
Electricity costs per year				
CO2 emission per year ¹	tCO2/a			

Please attach the basic calculation steps in a separate document.

3 Ongoing monitoring after completion of the subproject (actual measurements)

The PT has to ensure that the following meters/measurement equipment are installed and data will be recorded.

- 1 electronic heat meter incl. internal data storage
- 1 electronic electricity meter incl. internal data storage
- At least 2 thermometer/hygrometer (installed in one playroom and in one sleeping room)

¹ Emission factor natural gas: 0.2 tCO2/kWh; Emission factor electricity: xx tCO2/kWh

It is recommended to continuously measure and record

the following values after the project implementation for the entire kindergarten.

The monitoring data shall be submitted to the ST after completion of the project on a monthly basis.

Value	Measurement device	Measurement interval	Unit
Total electricity consumption	Electricity meter	weekly	kWh
Total heat consumption	Electronic heat meter	weekly	kWh
Temperature of flow/return	Electronic heat meter	Average per week	°C
Indoor temperature/humidity in selected rooms	Thermometer/hygrometer	manual, weekly	°C, %
Additional parameters to monitor:			
Number of hosted children/students	-	monthly	-
Heated floor area (outside measurements)	-	monthly	m ²
Calculated energy performance criteria:			
Electricity consumption per child/student		monthly	Kwh/child
Heat consumption per child/Student		monthly	kWh/child
Heat consumption per heated floor area (outside measurements)		monthly	kWh/m ²
Electricity consumption per heated floor area (outside measurements)		monthly	kWh/m ²