THERMOS

Baseline Replication Assessment Report – Pilot Cities

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Lead Deliverable Authors:

Ignacio Prieto - Creara

Paolo Michele Sonvilla - Creara

Marta Chillida Munguet - Ayuntamiento de Granollers

James Wilson - Islington Council

Marta Kęsik - URZĄD M.ST. WARSZAWY

Valdis Rieksts-Riekstins - Zemgale Regional Energy Agency

Thomas Wenzel – Deutsche Energie-Agentur GMBH

João Dinis – Municipio de Cascais

Simon Wyke – Greater London Authority

Maria-Elena Seeman, Nicolaie Moldovan – Alba Iulia Municipality

Reviewers:

Ignacio Prieto - Creara

Paolo M. Sonvilla - Creara

Michele Zuin - ICLEI

Annette Lamley - CSE

Contents

1 Introduction

The Baseline Replication Assessment Report aims to map-out and assess the national and local framework conditions for a successful adoption of the THERMOS model.

This document constitutes the final issue of the Baseline Replication Assessment Report and focuses on the four Pilot Cities of the THERMOS project: Granollers, Islington, Jelgava and Warsaw, and the 4 Replication Cities: Alba Iulia, Berlin, Cascais and the Greater London Authority.

Throughout this document the most relevant characteristics and features that should be considered for the adoption of the THERMOS tool are analysed. The analysis covers the following elements in each of the four Pilot Cities studied:

- **Heating and Cooling in the local context**: this section contains an analysis of the local energy system (energy mix, key performance indicators on power and thermal supply and demand), the key energy policy and legislation, the adoption of Renewable Energy Sources (RES) in the city and the existing energy objectives and plans, among others;
- **Stakeholder Identification and Engagement**: the main local and national stakeholders that should be engaged for a successful adoption of the tools developed throughout THERMOS are listed in this section, together with the roles that they can hold towards the THERMOS model replication and the strategies to be followed for their engagement;
- **Towards THERMOS Uptake**: in this section the principal barriers that could prevent the adoption of the THERMOS tool and the solutions to overcome them are examined;
- **THERMOS Case Study**: finally, the document focuses the analysis on a single opportunity in a city district or quarter where the THERMOS tool will initially be applied.

This report is therefore meant to establish a baseline and serve both as a guide and a set of practical examples on the information that should be gathered and the stakeholders that should be engaged for a successful replication and adoption of the THERMOS tool.

2 Alba Iulia

2.1 Introduction

The city of Alba Iulia has 63,536 inhabitants, according to the 2011 census. Situated in the Centre Region of Romania, Transylvania, the city has a total surface of 1,274 ha. In Alba Iulia the economy is based on tourism, due to the presence of the largest citadel in Romania and the second one in Europe after the citadel in Luxembourg. However, there is a diverse economic structure, with an attractive business environment for foreign investors. Thus, the city also relies on other important industries such as the porcelain industry, the largest in Romania.

Alba Iulia, also known as 'The Other Capital', bears a heavy name in the history of Romania due to important historic events which have left their mark on the city. Alba Iulia is a city of national importance and was nominated in 2012 as a European Destination of Excellence by the EDEN programme administered by the European Commission.

Alba Iulia Municipality is a local public authority which provides a democratic local government of the city of Alba Iulia. Some of the main objectives of the municipality are: to ensure the provision of public services for the inhabitants of Alba Iulia Municipality in a sustainable manner respecting the equality of chances, to promote social and economic development, to promote a safe and healthy environment, to encourage the involvement of citizens and of non-governmental organisations in the matters of local government and to make sure the citizens of Alba Iulia Municipality benefit from a healthy living environment and from good living conditions.

The Development Strategy of Alba Iulia underlines the importance of reaching a sustainable development of the local economy and improving the quality of citizens' life. The strategy puts forward three important approaches for Alba Iulia: 'Alba Iulia of the residents' - improving quality of life; 'Alba Iulia of the tourists' - cultural tourism development and advertisement of the town's brand and 'Alba Iulia of the investors' - promoting businesses. During the last years, Alba Iulia Municipality is paying more attention to the situation of public, private and residential buildings in the city, how efficient they are in terms of energy waste and how to encourage a more responsible attitude of stakeholders about environmental challenges. In this respect, the Municipality of Alba Iulia has managed to thermally rehabilitate 3 residential blocks with a total of 264 apartments, using European funding under the Regional Operational Program.

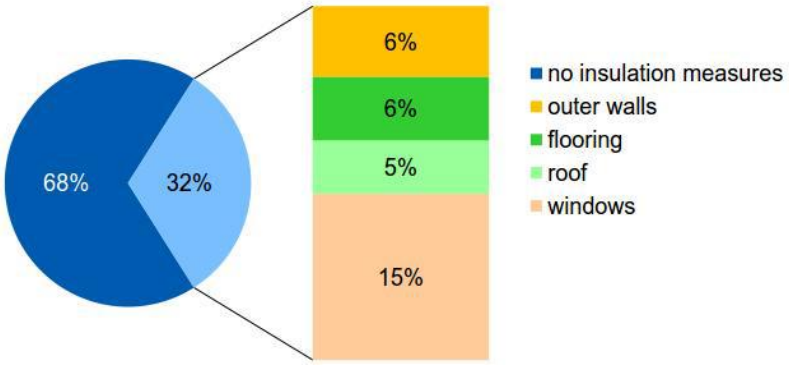
2.2 Heating and Cooling in the Local Context

2.2.1 Local energy system

2.2.1.1 Introduction

The residential energy consumption in Romania is much higher than the average energy consumption in EU countries. This can be explained by the pronounced energy waste from buildings: for instance, a 2-bedroom apartment in Romania consumes 2 times more heat than a 4-room apartment in Germany. This is explained by the fact that for a long time, residential buildings were built with a low thermal protection degree using low-quality insulating materials, as shown in the figure below:

Figure 1: Building insulation status in Romania

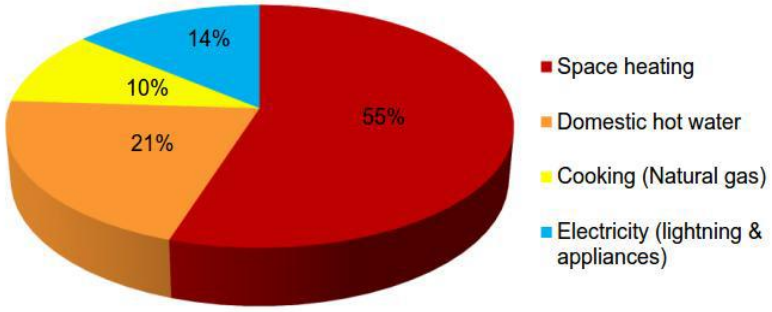


Source: National Institute of Statistics

In Romania about 35-40% of total residential buildings (about 3,000,000 apartments) correspond to apartments in blocks of flats. Almost all of them were meant to be connected to district heating systems, although now less than half of them are still connected to DH

networks. The following figure shows the distribution of the energy consumption of a typical apartment:

Figure 2: Distribution of energy consumption of a typical apartment (block of flats built between 1950 - 1990)



Source: National Institute of Statistics

According to the 2011 census, the average useful area of dwellings (excluding common areas in multi-family buildings) is about 48 m^2/dwelling in municipalities and cities, being 47 m^2/dwelling the national average. According to available data for blocks of flats, the useful heated area per apartment including common areas ranges between 45 and 65 m^2/apartment with an average value of 55 m^2/apartment.

The analysis of the energy consumption from the SEAP – Covenant of Mayors, performed in 2008, shows that, at Alba Iulia Municipality level, the highest energy consumption is registered in the residential segment and in the tertiary sector (both together account for 75% of the total consumption). The table below shows the main findings of the analysis, from which the following facts stand out:

-the private and commercial transport sector account for 22% of the total energy consumption
-natural gas is the main source of energy, 63% of it being used for heating the living spaces
-electricity consumption represents 12% of the total energy consumption and is foreseen to increase especially in the tertiary sector, for producing air conditioning.

Results of the energy consumption analysis in 2008 (SEAP- Covenant of Mayors)	
Activity domain	**Consumption in Alba Iulia 2008 (MWh)**
Buildings, equipments/ municipal installations	17,038
Buildings, equipments/ tertiary installations	219,719
Residential Buildings	363,939
Municipal Public Lighting	2,761
Municipal own transport	332
Public transport	6,679
Private and commercial transport	163,833

Total	**774,301**

CO_2 emissions on domains	
Activity domain	**CO_2 Emissions [t]/ equivalent CO_2[t]**
Buildings, equipments/ municipal installations	4,292
Buildings, equipments/ tertiary installations	61,560
Residential Buildings	97,685
Municipal Public Lighting	1,935
Municipal own transport	85
Public transport	1,783
Private and commercial transport	42,348
Total emissions	**209,689**

2.2.1.2 Thermal energy supply and demand

Key performance indicator	
Number and type of energy generation units	1,714 photovoltaic panels
Solar thermal energy generation (kW generation)	257 kW
Heat pump energy generation (MWh/ year)	No local data available
Biomass energy generation (MWh/ year)	No local data available
Waste heat potential (MWh/ year)	No local data available
Buildings' energy consumption in the residential sector (MWh/ year)	365,939
Buildings' energy consumption in the tertiary sector (MWh/ year)	219,719
Municipal Buildings energy consumption (MWh/ year)	17,038

2.2.2 Key Heating and Cooling policy and legislation

Law 372/2005 regarding the energetic performance of building, amended with law 159/2013, OUG 13/2016 and other orders in 2010, 2012, 2016, regulates the heating and cooling networks.

Additional to these regulations there are calculation and implementation methodologies for buildings, from the Ministry of Regional Development.

In addition, there is relevant legislation on energy efficiency. The main pieces of legislation on this topic are listed below:

- Law no. 121/2014 on energy efficiency - Transposes Directive 2012/27 / EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125 / EC and 2010/30 / EU and repealing them of Directives 2004/8 / EC and 2006/32 / EC.
- GD no. 122/2015 approving the National Energy Efficiency Action Plan (2014-2020).
- In accordance with the provisions of Law no. 121/2014 on energy efficiency within the Authority National Energy Regulation, the Department for Efficiency has been set up Energy Agency (DEE), through the ANRE President Order no. 95/2014, published in OJ No.737 / 2014.

2.2.3 Heating and Cooling within urban development and renovation programmes

2.2.3.1 Heating and Cooling Objectives

From 1993 the activity of producing and distributing heat through centralized systems in Alba Iulia was managed by a company which in 1999 became Dalkia Romania Branch Alba Iulia. The company had as its objectives the management of production, transport and distribution of thermal energy for domestic hot water and heating, with heat generated in the block heating stations. In 1993 the company managed a total of 31 district heating plants and a network of district heat systems, providing heat networks spanning 24.35 kilometers and serving 16,635 apartments in Alba Iulia and its surroundings.

However, fuel prices went up gradually and owners decided to disconnect buildings from networks. In 2011, 29 district heating plants were closed. In 2012, the last two functional district heating plant became non-functional. Nowadays, more than 18,500 apartments have a central heating system and 10% of these are estimated to be equipped with air conditioning systems.

Therefore, Alba Iulia is facing some key challenges in the development of heating and cooling systems and district networks:

- Improving thermal insulation of the envelope for residential buildings from Alba Iulia City (external walls, windows, doors, upper floor, floor above the basement), roofs and covers and, if applicable, including measures on structural strengthen of buildings;
- Improving indoor comfort of thermal rehabilitated flats;

- Reducing energy consumption by at least 30% after thermal rehabilitation of the residential buildings (housing blocks);
- Reducing the maintenance costs for heating and hot tap water;
- Reducing pollutants emissions generated by the production, transport and consumption of thermal energy.

In addition, the City Hall of Alba Iulia Municipality has signed the Covenant of Mayors and the new Covenant of Mayors for Climate and Energy, voluntarily committing to increasing energy efficiency and the use of renewable energy sources in their territories. By their commitment, Covenant signatories aim to meet and exceed the European Union 30% CO_2 reduction objective by 2030. Moreover, Alba Iulia Municipality has developed the Sustainable Energy Action Plan (SEAP), which is aimed at reducing the environmental impact of urban activities, increasing the quality of public utility services and the economic competitiveness in order to transform the city into a "green city".

Pursuant to the provisions of this Strategy and as a signatory city of the Covenant of Mayors, Alba Iulia Municipality has already materialized several investment projects aimed at improving the environmental conditions of the city. Thus, Alba Iulia has installed PV panels producing renewable energy in 4 public institutions (the Technical College 'Dorin Pavel', the Nursing Home for the Elderly, the Day Centre for the Elderly and the Programmes Department of the City Hall) through the 'Ensuring the energy sustainability of 4 public institutions of Alba Iulia Municipality' project. The 1,714 photovoltaic panels installed, with a cumulative installed capacity of 257 kW, are now impacting the electricity and gas bills, saving 80,000 euros a year. This project was co-financed by the European Union and the Romanian Government.

2.2.3.2 Energy Efficiency Opportunities

Alba Iulia Municipality will try to access European funding for thermal-insulation of residential blocks. Private investment is also needed from people living in the residential block. Through the association of residents, citizens will contribute to co-finance the projects.

Energy efficiency is a priority for Alba Iulia Municipality and this is reflected in different strategic instruments of Alba Iulia Municipality:

Original language	English	Link
Overall city strategic documents		
Strategia de dezvoltare a Municipiului Alba Iulia – Strategia Integrată de Dezvoltare Urbană (SIDU)	The Integrated Urban Development Plan 2014-2023 of the Municipality of Alba Iulia	http://www.apulum.ro/ro/pdf7/SIDU_-_versiune_consolidata_august_2017.pdf

Alba Iulia – Prioritizarea Proiectelor pentru perioada 2014-2020	Alba Iulia Project Prioritization for 2014-2020	http://www.apulum.ro/images/uploads/fisiere/Alba_Iulia_Project_Prioritization_for_2014-2020.pdf https://www.youtube.com/watch?v=CkPgstbjcxc
Raportul Băncii Mondiale cu privire la capacitatea instituțională a Municipiului Alba Iulia pentru planificarea dezvoltării urbane și atragerea de resurse de finanțare pentru politici și proiecte urbane	Report released by the World Bank concerning the institutional capacity of Alba Iulia Municipality for planning urban development and attracting financing resources for urban policies and projects	http://www.apulum.ro/images/uploads/fisiere/Alba_Iulia_MRA_EN.pdf
Studiul de caz privind Consolidarea capacității de planificare spațială, precondiție pentru dezvoltare urbană sustenabilă, planificarea spațială, Alba Iulia, realizat de către experții Băncii Mondiale în anul 2013	Case Study on Strengthening Spatial Planning Capacity, Prerequisite for Sustainable Urban Development, Spatial Planning, Alba Iulia, conducted by World Bank experts in 2013	https://www.dropbox.com/sh/78egyhprzfxpmvv/AAAmyPVEVlFRm9TAldp-UQjra?dl=0
Studiul Smart Cities elaborat de către Siemens	Smart Cities Research elaborated by Siemens	-
Planul de Acțiune pentru Energie Durabilă (PAED) al municipiului Alba Iulia	Sustainable Energy Action Plan of Alba Iulia Municipality (SEAP)	-

2.2.3.3 Renewable Energy Adoption and Potential

From 2010 Alba Iulia Municipality is implementing the 'Ensuring the energy sustainability of 4 public institutions of Alba Iulia Municipality' project, which focus on the Technical College 'Dorin Pavel', the 'Community Center for Elderly', the 'Daylight Center for Elderly' and the 'Programs Direction of the City Hall'. Throughout the project, 1,714 photovoltaic panels have

been installed for a cumulative installed capacity of 257 kW. The project is being co-financed by the European Union and the Romanian Government.

2.2.3.4 Transport and infrastructure

The city has one of the most modern urban public transportation in Romania (in 2013, the Public Transport Society of Alba Iulia won the IRU Bus Excellence Award for best bus operator in Europe), 85% of schools and kindergartens are thermally insulated, over 17 hectares of urban green areas have been landscaped in the last two years and more than 15 kilometres of bicycle routes have been, 90% of the city is connected to the sewage system and a new wastewater treatment station is currently under construction. Another initiative conducted by Alba Iulia Municipality is the modernization of the public lighting on several streets of the city.

Alba Iulia Municipality adopted its Sustainable Urban Mobility Plan in November 2016, focusing its future mobility on smart multi-modal transportation at the level of the core city and the Functional Urban Area (FUA), changing the current shift from conventional and motorized transportation to alternative and non-pollutive transport means.

Alba Iulia is located in the centre of Transylvania. Road access is via the A1 motorway (350 km from Bucharest). Alba Iulia is crossed by one of the main Romanian railways (Bucharest-Arad) connecting Alba Iulia directly with Budapest. Alba Iulia is located at the intersection of two highways under construction, which will be completed in the next two years, namely Pan-European Corridor 4 Bucharest-Nadlac and the Sebeş-Turda highway linking A1 and A3 (Bucharest-Bors or Transylvania Highway), ensuring the connection of Alba Iulia with the other regions of the country, as well as with the corridor and the road transport networks that connects with Europe through Hungary.

The local public transportation is organized at conurbation level within the FUA. The FUA is composed by one urban administrative unit - Alba Iulia Municipality (which is the core city of the FUA) and other seven rural administrative units. Alba Iulia Municipality is also the lead partner for the AIDA LT Association, representing an intercommunity Association for transport development. In this way the geographic boundary delimitation of AIDA LT and FUA represent the same area.

The main advantage of AIDA – LT is that they are delegated to provide integrated public transportation services within a well-defined area, having a single information service provider, a unique charging system and a single transportation schedule, according to EC Regulation no. 1370/2007 of the European Parliament and of the Council from 23rd of October 2007 concerning the public transportation services by means of road and rail.

In Alba Iulia, from September 26, 2015, the Alba Carolina Fortress can be visited from a state-of-the-art electric minibus that gives tourists a complete experience in the historic city of Alba Iulia. Minibus-guided tours are a way of transportation for tourists highly use in cities such as London, Paris or Rome. The decision of the municipality to introduce this electric vehicle for the first time in Alba Iulia comes as a first solution for visiting less accessible tourist attractions in *Cetate*.

Additional to these means of transportation, Alba Iulia Municipality tested an electric public bus with an autonomy of 250 km for several days in 2015. The SOR EBN 10.5 circulated on the

most crowded bus routes in Alba Iulia (lines 103 and 104) and is was tested for several days to see how it functions in city traffic conditions. During the test, passengers travelled free of charge since one of the purposes of this experiment was the determination of the autonomy of the bus loaded with passengers and under normal operating conditions.

Moreover, within the Alba Iulia Smart City 2018 pilot project, the municipal fleet of Alba Iulia Municipality has received an electric vehicle, as donation from Kaufland Romania.

2.2.4 Financing Opportunities and Instruments

The City Hall of Alba Iulia has received significant financial support from the European Union in the last few years and has implemented European projects with a total value of more than 150 mil Euros, although they were not focused on energy-related matters.

The European Regional Development Fund (ERDF) and other grants constitute a possible finance source for DH networks. Alba Iulia will apply for grant within the Regional Operational Program for the thermal insulation of more than 70 blocks of flats, as presented in the following sections within this document. The required documentation is under preparation. However, the Alba Iulia Smart City Pilot project 2018 could also be a resource.

Alba Iulia Smart City 2018 is a pilot project which aims to integrate smart city solutions in Alba Iulia starting with the occasion of celebrating 100 years of the unification of Romania. The pilot project is implemented by the Municipality of Alba Iulia in partnership with the Ministry of Communications and Information Society. This project is unique in Romania since it is the first smart project developed between the national government, a local public authority and private companies and because all the smart city solutions proposed by companies are or will be implemented on the costs of the private companies involved and will ensure the interoperability with other smart city solution providers in the future.

The pilot project is focused on implementing smart, innovative and compatible solutions at local level, developed by the private sector, in a wide range of areas such as: smart lighting system, smart parking, smart mobility, smart citizens, e-governance, smart administration, 5G networks, smart energy consumption, smart businesses, applications using beacons for tourism promotion, free WIFI access in all touristic public spaces, smart education projects, LORA technology, or innovation labs, among others. Alba Iulia Municipality intends to establish independent partnership agreements with the representatives of the private sector who want to be involved within the project, so that all smart solutions are well integrated and compatible one with another.

So far, the Municipality has established an official partnership agreement with Orange, a large company who proposed an open and interoperable platform that can be extended and adapted to the changing needs of citizens and municipalities and recently with Microsoft but is in direct communication also with other companies.

The project will greatly benefit the inhabitants of Alba Iulia Municipality, together with the business investors and the tourists visiting the city. The project Alba Iulia Smart City benefits from the technical support and interest of over 60 companies, some of which are world renowned companies. In addition, advanced discussions are being conducted with companies such as like IBM, CISCO, ZTE, Xerox, Phillips, Telekom, Vodafone, FastOrder, 14 IT companies within the CLUJ IT CLUSTER, and others.

The Ministry of Communications and Information Society has elaborated the *Guide of the Smart City Concept in Romania*, a compendium of solutions and technology based smart ITC applied at local and regional level, which can transform local communities into smart cities, having access to quality products and services, modern health systems and education and transparent public administration for local citizens, The guide can be downloaded at the following link: https://www.comunicatii.gov.ro/?p=8532

The solutions are meant to be entirely financed and supported by the companies involved with the occasion of celebrating 100 years of Unification of Romania which was signed in Alba Iulia.

None of the project is financed through EU programs such as Horizon 2020 but of course all parties involved in the partnership are looking for funding opportunities to support as well other innovative solutions that could contribute to Alba Iulia Smart City Project 2018. For the moment, this project is not benefiting from any governmental, local or European Funding.

2.3 Stakeholder Identification and Engagement

2.3.1 Local stakeholders

The local stakeholders are representing several institutions/organizations from Alba Iulia in charge of the urban development of the city, representatives of the municipality, of the local

agencies or energy providers but also private stakeholders in charge of providing public services to citizens, such as:

2.3.1.1 Alba Iulia Municipality - City Manager`s Office

The Municipality has been working on attracting EU funds, grants and other external funding for the sustainable development of the city.

2.3.1.2 Alba Iulia Municipality - Investment Department

The Investment Department of the Alba Iulia Municipality coordinates all the investments of AIM financed through EU funds and local budget.

2.3.1.3 Local Agency for Energy Alba

The Alba Iulia Municipality is working close with the Local Agency for Energy Alba for different events, but also for collecting and processing data in energy field. They are active in European Funded projects, in organizing events dedicated to energy efficiency, active in helping cities to adopt the Sustainable Energy and Climate Action Plan for the covenant of mayors.

2.3.1.4 Public Transportation System – STP

STP is the most modern transportation company in Romania and is based in Alba Iulia.

2.3.1.5 E.ON Energy Romania

E.ON Energy Romania is a gas and energy provider at national level.

2.3.1.6 ENEROM INSTAL SRL

ENEROM INSTAL SRL is a private company for energy.

2.3.1.7 SC Electrica Distribution SA

SC Electrica Distribution SA is the main energy provider at Alba Iulia level.

2.3.1.8 Flash Lighting

Flash Lighting is a private company in charge of the public lighting at AIM level.

2.3.1.9 VEGACOMP Consulting

VEGACOMP Consulting is a company focused on the junction between Telecommunications and Energy as Telecom needs Energy and Energy services need communications services

2.3.1.10 '1 Decembrie 1918' University Alba Iulia

'1 Decembrie 1918' is a national university with more than 5,000 students/year with which Alba Iulia Municipality has a 10 years collaboration.

2.3.1.11 Residents Associations

The Residents Associations is composed by administrators helping residents to organize better their home utilities and services.

2.3.1.12 I`VELO

I`VELO is company for bike sharing at national level, managing a bike sharing point in Alba Iulia Municipality.

2.3.1.13 Creative Quarter Carolina – CCC

CCC is a group of creatives and artists, joining an association for contributing to the development of creative industries at AIM level, as well as of the culture and digital future of the city.

2.3.1.14 Alba Iulia Municipality - Alba Iulia 2018 Smart City Team

The Alba Iulia 2018 Smart City Team is working close to private companies in order to develop smart city solutions at local level.

2.3.2 National stakeholders

The main national stakeholders that could help adopting the THERMOS tool are:

2.3.2.1 National Regulatory Authority for Energy

2.3.2.2 Ministry of Energy

2.3.2.3 Ministry of Regional Development

2.3.3 Existing stakeholder participation processes

Each year, the Local Agency for Energy Alba is organizing in partnership with local authorities the Fair Renewable energy sources.

Other activities where the municipality is participating for raising awareness include the Mobility week (which consists on different events organized with NGOs) and a traffic snake game in collaboration with schools.

2.3.4 THERMOS Local Liaison Group

Name of organization	**Type of stakeholder** *(primary target audience)*	**Main topical engagement**
E.ON ENERGY ROMANIA	Industry and investors in thermal energy	Energy Distribution
SC Electrica Distribution SA	Business	Energy Distribution
Flash Lightning	Business	Energy Services
Residents Associations	Associations and NGOs	Integration
Public Transportation System - STP	Public and/or private utility	Mobility/Transport

I`VELO	Associations and NGOs	Mobility/Transport
ENEROM INSTAL SRL	Industry and investors in thermal energy	Urban Planning
Alba Iulia Municipality - City Manager`s Office	Political decision-makers	Stakeholder engagement
Alba Iulia Municipality - Investment Department	Public administration	Stakeholder engagement
Local Agency for Energy Alba Iulia	Energy Agencies	Stakeholder engagement
'1 Decembrie 1918' University Alba Iulia	Science and research institutions	Stakeholder engagement
VEGACOMP Consulting	Business	Stakeholder engagement
Creative Quarter Carolina - CCC	Associations and NGOs	Stakeholder engagement
Alba Iulia Municipality - Alba Iulia 2018 Smart City Team	Public administration	Other (please specify): Intelligent Solutions

2.3.4.1 Stakeholder roles towards THERMOS model replication

Working as a local support group the stakeholders will have the role of identifying the elements from the THERMOS pilot cities which could be replicable at Alba Iulia Municipality level and, when possible, to test the transferability.

2.3.5 Stakeholder Engagement Strategies

Working in groups and continue information updating of the ongoing activities of the THERMOS project. Continue monitoring and evaluation of the participation and the involvement of the stakeholders will be ensured.

2.4 Towards THERMOS Uptake

2.4.1 Barriers

The main barriers to the development of district heating networks are:

- There is no district heating plant, which implies that the individual ownership of apartment heating and cooling system is not under the control of the municipality.
- The owners are affected by the high costs of apartment heating systems modernization and development

2.4.2 Proposed solutions

In order to overcome the barriers identified, it would be necessary to first achieve:

- Thermal insulation of residential blocks
- Awareness raising
- Mapping the current situation
- Involving different stakeholders

These are solutions which are also included in the Development Strategy of Alba Iulia Municipality.

2.4.3 THERMOS exploitation opportunities

The THERMOS tool could serve as an auxiliary tool for authorities for setting priorities but also for increasing the efficiency of stakeholders' involvement.

2.5 THERMOS Case Study

Alba Iulia Municipality will focus on the rehabilitation of the 74 residential blocks of flats. The thermal rehabilitation measures are to be analysed:

- External walls insulation
- Replacing the existing windows and entrance doors with thermal-glazed windows and thermal-glazed doors
- Roof insulation
- Floor (over the basement insulation)

2.5.1 Objectives

As mentioned before, the objective of this case study is the rehabilitation of 74 residential blocks of flats.

It is expected that the thermal rehabilitation of 30 of the 74 residential buildings results in the natural gas consumption for heating decreasing from 9,777 MWh/year to 5,563 MWh/year after the thermal rehabilitation, for a total energy saving of about 43%.

The natural gas consumption in the other 44 residential buildings is expected to decline from 25,309 MWh/year to 15,075 MWh/year after thermally rehabilitating the building, which means an energy saving of about 40%.

2.5.2 Key stakeholders

- Apartments owners
- Residents Associations
- Local Agency for Energy Alba
- Employees of the municipality

2.5.3 KPI indicators table

Key performance indicator	
Number and type of energy generation units	No local data available
Solar thermal energy generation (MWh/ year)	No local data available
Heat pump energy generation (MWh/ year)	No local data available
Biomass energy generation (MWh/ year)	No local data available
Waste heat potential (MWh/ year)	No local data available
Buildings' energy consumption in the residential sector (MWh/ year) for the 74 blocks	35,086

2.5.4 Financing status/ opportunities

The project could be funded from ERDF funding, the Alba Iulia Smart City project or other external funding:

ERDF funding is a dedicated operational program for 2014-2020 for rehabilitating the residents owned buildings but also for public buildings, in order to enhance the energy efficiency and the quality of living for the residents.

Alba Iulia Smart City project is an initiative which could contribute in attracting other resources in terms of smart solutions for buildings (residential, tertiary, public)

In addition, other funding could be available in the coming years, different funds, grants but as well, if regulated in the near future, the PPPs or financial instruments such as municipal bonds.

2.5.5 Exploitation of the opportunity

2.5.5.1 Barriers

The main gaps/ barriers within local framework of the energy system that may prevent the uptake of the opportunity are:

- General market barriers for heating and cooling
- General market barriers for building-scale heating and cooling solutions like HPs, solar thermal, biomass, etc
- General market barriers for collective heating and cooling solutions like DHC and gas grids
- Specific market barriers for heating/cooling savings in buildings
- Specific market barriers for heating/cooling savings in industry

These barriers can affect the project in the following ways:

- Scepticism of owners for the co-financing of the project
- Lack of incentives for owners in order to stimulate them to invest in new systems for heating and cooling their apartments
- Competitive applications for ERDF funding does not guarantee the funding

2.5.5.2 Proposed solutions

- Good communication between the municipality and the residents associations and the owners and with other stakeholders
- Local working groups to overcome barriers
- Experienced project managers and implementation team.