Heat & Cold in practice case study collection

ICLEI Europe

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Content

Introduction

Heating and cooling (H&C) accounts for about half of Europe's total energy needs with 75% still dependent on fossil fuels. Thus, rapid and significant change is needed to reach the EU 2050 goals and action must be taken at local level involving a variety of stakeholders.

On top of emissions reduction, H&C planning focuses on other challenges of European cities like energy, poverty, energy efficiency, dependency on fossil fuels and stability. However, cities often lack the resources or tools to bring this planning forward.

The aim of the Act!onHeat project is to accelerate the use of strategic heating and cooling planning in cities and regions throughout Europe. The project identified the success factors of strong and efficient existing heating and cooling plans and developed a workflow for strategic H&C planning based on existing open-source tools, Hotmaps and THERMOS.

Introduction

The present set of case studies aims to showcase some of the supported projects in Act!onHeat's Support Facility, which engaged local governments and supported several municipalities to:

- ➔ Start, continue, or improve upon their strategic heating and cooling planning
- ➔ Develop pre-feasibility studies for individual heating and cooling projects

This document is directed to local and regional governments, city planners, energy agencies, utilities and other organisations involved in local H&C planning. The goal is to inspire other municipalities and organisations to advance on their H&C journey and follow similar steps to the ones showed in these case studies.

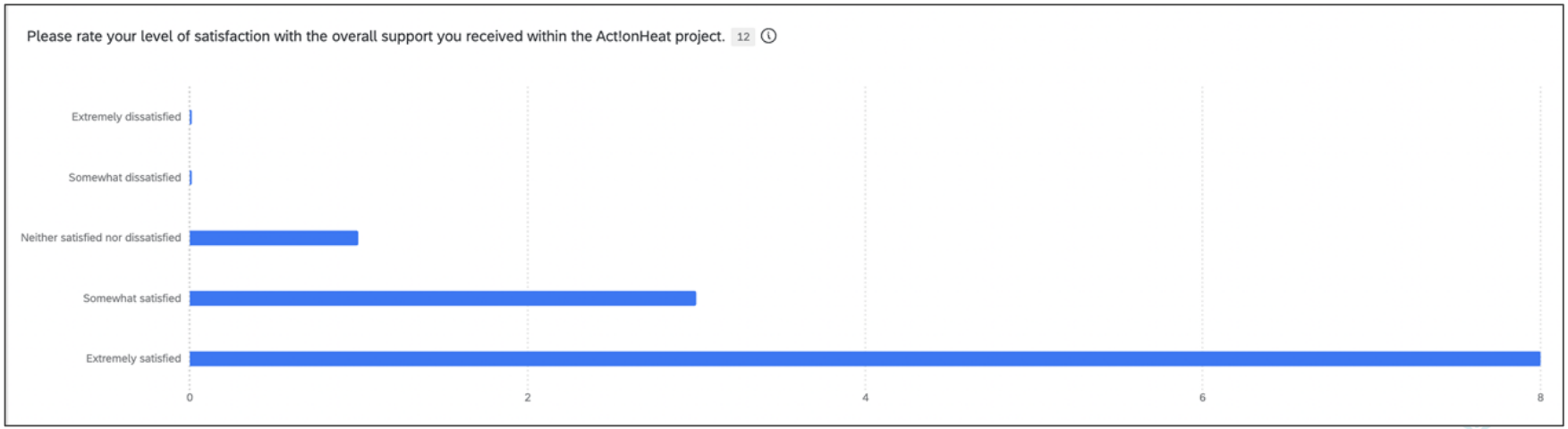
Support Facility results

The Act!onHeat Support Facility helped accelerate H&C planning in dozens of European cities and regions, with the support of experts and the use of digital tools Hotmaps and THERMOS.

The following slides show some Support Facility results, regarding satisfaction and activities that were carried out.

Support Facility results

According to an online survey developed by Act!onHeat partners, most of the surveyed organisations (11/12) which participated in the Support Facility are either very satisfied or satisfied with the programme.



Support Facility results: Financial Studies

In addition to the support already mentioned, some of the pre-feasibility project case studies could receive additional financial support from the partners. The support focused on the development of techno-economic pre-feasibility studies for localised heating or cooling projects, with the potential to include a subsequent assessment of financial and governance options for selected applicants.

- ➔ 6 Financial Studies conducted, and 2 more on the pipeline
- ➔ The focus was on construction/expansion of heating networks
- ➔ The project supported local governments, academic institutions and energy companies from municipalities across the European Union, the United Kingdom, and the Western Balkans

Act!onHeat Workflow

The Act!onHeat project developed a suggested workflow for strategic heating and cooling (H&C) planning. No two systems are the same, and individual actors can approach it in different ways.

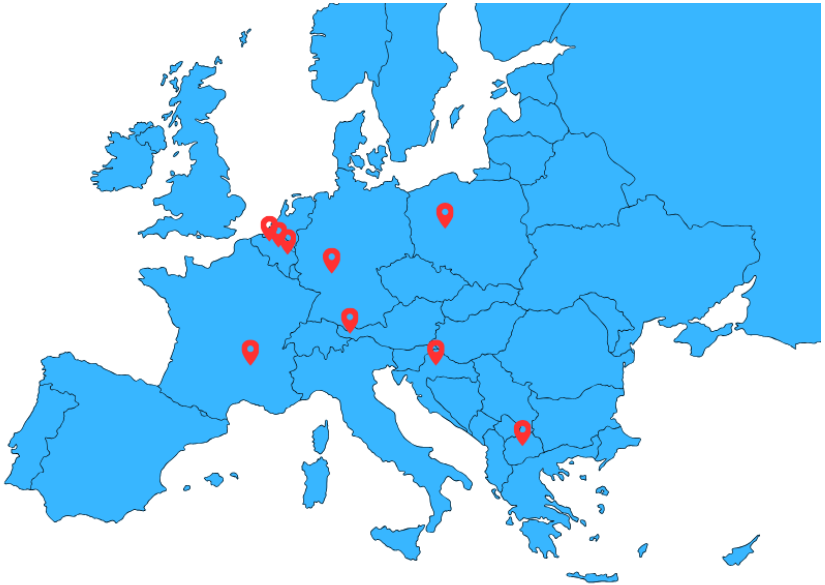
This workflow is the basis for Act!onHeat's Support Facility, which led to the development of the case studies described below, and as such, each case is link to a specific step(s) of the workflow.

Inspiring Case Studies

The selection criteria for the 9 featured cases included the success of the studies and projects, the diversity of topics and geographical distribution. This is a summary of the selected case studies:

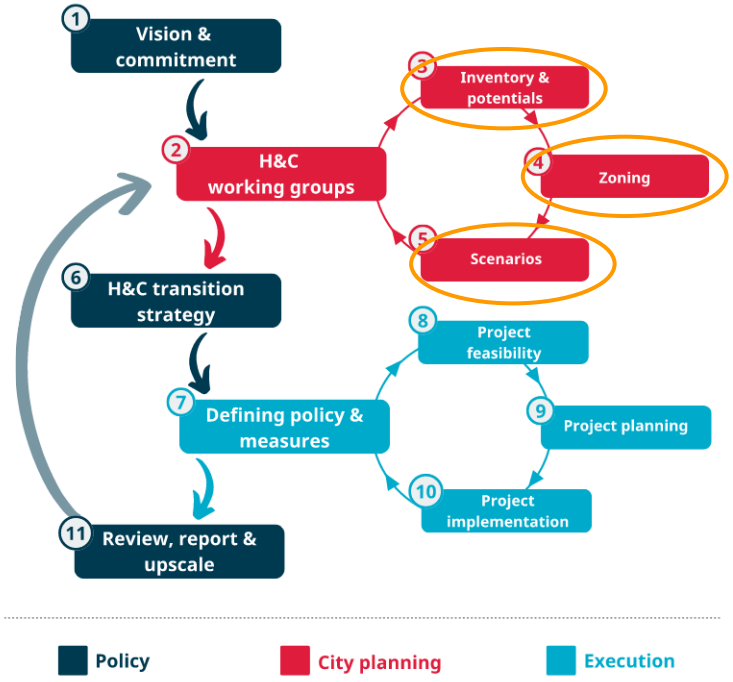
Module 1: strategic H&C planning		*Module 2: project feasibility studies*	
LEA H.	Developed materials for assisting municipalities	**Zelzate**	Extend the existing heat network
VEKA	Guidance for heat plans following the EED	**Vorarlberg**	Heat network in new housing development
SOL	Efficient deep renovation strategy	**Poznan**	Expansion and decarbonisation of heat network
MANU	Nationwide heat demand density map	**St-Niklaas**	New heat network and supply analysis
REGEA	Heat demand analysis with low data availability		

Inspiring Case Studies - geographical distribution



LEA Hessen

- Energy agency in Hessen (Germany)
- Heat planning is mandatory in the region
- They are the first point of contact for 400+ municipalities on H&C planning
- They support local bodies in developing H&C plans



LEA Hessen - Case developed with Act!onHeat

The goal of the case study was to train members of LEA Hessen and prepare materials to support the assistance provided to municipalities on H&C planning.

3 comprehensive workshops were attended by numerous Hessian municipalities where experts from the Act!onHeat consortium gave keynote speeches.

Act!onHeat prepared targeted training webinars for members of LEA Hessen. The topics were the following:

- "Data for municipal heating and cooling planning“
- "Developing a data inventory for heat planning“
- "Using the Hotmaps database and toolbox for strategic heating and cooling planning“

Experts from Act!onHeat provided advice for a quick advisory service for district heating. This included the development of a best-practice slide deck for renewable energy sources in district heating networks.

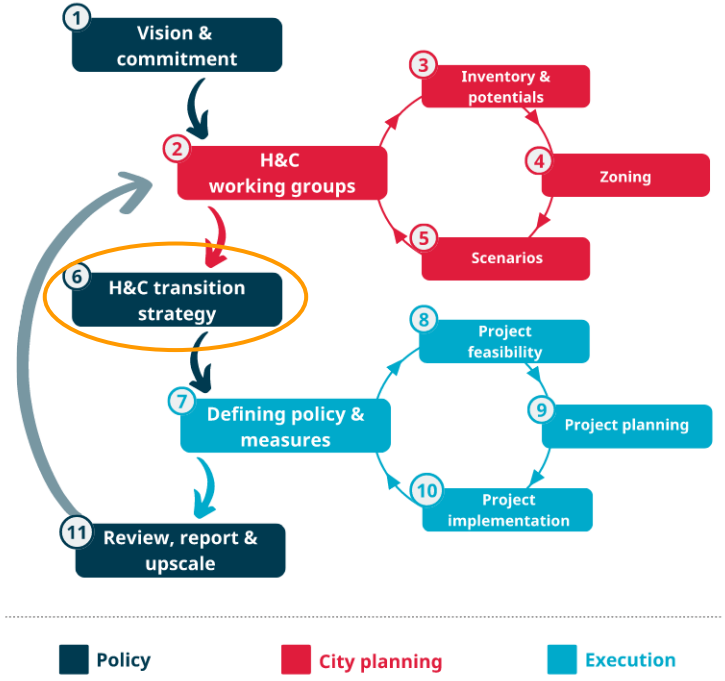
LEA Hessen - Outcomes

- The developed materials and learnings will help LEA Hessen in assisting municipalities in Hessen to create their H&C plans.
- This case study links to the energy transition, stepping away from polluting energy sources.
- The developed best-practice slide deck for RES in district heating networks can also be useful for other energy agencies or stakeholders developing similar projects.

Flemish Energy and Climate Agency (VEKA)

Vlaanderen
verbeelding werkt

- Independent environment agency of the Flemish government
- They implement a sustainable energy policy
- They support 300+ local bodies in developing their H&C plans



VEKA - Case developed with Act!onHeat

The objective of the case study was to provide guidance on the development of heat plans complying with the rules as set out in the Energy Efficiency Directive (EED) 2023 and develop a respective model heat plan. These were the main findings of the analysis:

- ➔ A large number of the heat plans (almost all) don’t meet (at least some of) the EED requirements.
- ➔ Municipalities need a guided document that outlines all requirements and steps for meeting its compliance.
- ➔ There is a need to define a body, legally responsible for the assessment of the H&C plans.

The team developed a checklist and a draft template and guidelines for preparing the potential public body being responsible for assessing compliance with the EED of the developed plans in Flanders.

VEKA - Outcomes

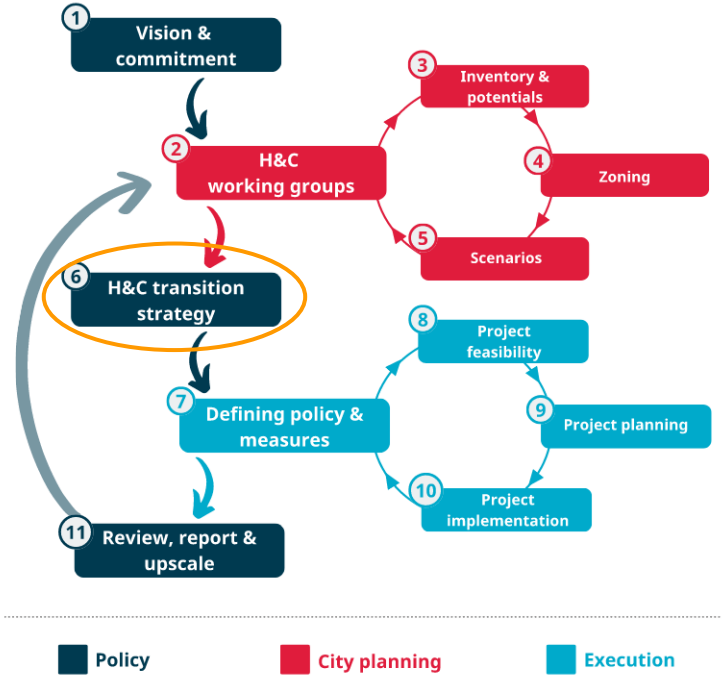
- The developed materials and learnings will help VEKA in assisting municipalities in Flanders to create H&C plans in line with the EED requirements, whether by adapting existing H&C plans or developing new ones.

- The checklist and the template/guideline for EED 2023 compliant H&C plans are useful for all EU-27 municipalities.

Le Syndicat de l'Ouest Lyonnais (SOL)

Syndicat de l'Ouest Lyonnais

- It encompasses 4 inter-communities including 41 municipalities
- SOL is the public body with the legal power to develop local planning documents
- Inter-communities are obliged to implement their decarbonization plans



SOL - Case developed with Act!onHeat

The objective of the case study was to support the development of an efficient deep renovation strategy for the residential and tertiary sectors, on the scale of the 4 inter-communities (possibly extending it to the municipality level). These were the main results:

- ➔ A model for lowest-cost-renovation roadmaps was developed for inter-communities to meet their SECAP targets.
- ➔ Inputs from local bodies were critical for the development of the model (e.g. a region-specific renovation practice is more relevant than a general European standard).
- ➔ The limited technical expertise in the local level had stagnated the achievement of the SECAP targets.

The results of the analyzed inter-communities will be communicated to the responsible local authority for their consideration in the development of renovation policies and the definition of renovation packages.

SOL - Outcomes

- The methodology will be implemented on the individual municipality level, where needed, by the local inter-municipal authorities to develop a municipality-specific roadmap.

- The methodology developed for SOL to identify the lowest cost building renovation measure can be applied to other EU-27 municipalities. It is in line with the EU renovation wave and fighting energy poverty in Europe.

- The case study developed a data requirement list in the form of a document listing all the data needed for a building stock assessment in all EU locations. They also developed an Excel tool that provides the lowest-cost-renovation roadmap to achieving SECAP targets for any municipality.

Macedonian Academy of Sciences and Arts (MANU)

- North Macedonia is divided into 80 municipalities
- MANU is an independent institution that assists the planning of national policies regarding sciences and arts
- They support municipalities with their energy plans, and more recently, in developing heating and cooling plans

MANU - Case developed with Act!onHeat

The objective of the case study was to prepare a nationwide heat demand density map and to identify potential district heating areas. The tools Hotmaps and QGIS were used for this matter.

The preparation of the heat demand and gross floor area density maps were done following two streams:

- ➔ Top-Down approach: generating a nationwide heat demand density map with 1 ha resolution. The process is not data-intensive, leading to potential inaccuracies.
- ➔ Bottom-up approach: deals with more data with higher granularity and precision. This data is available primarily in 3 municipalities. The goal of these maps is to identify strengths and weaknesses of the top-down approach.

Lack of budget and data are the main barriers to H&C planning in North Macedonia. Thus the preparation of the heat demand and gross floor area density maps is an important step to feed municipalities and motivate them to start with the H&C planning.

MANU - Outcomes

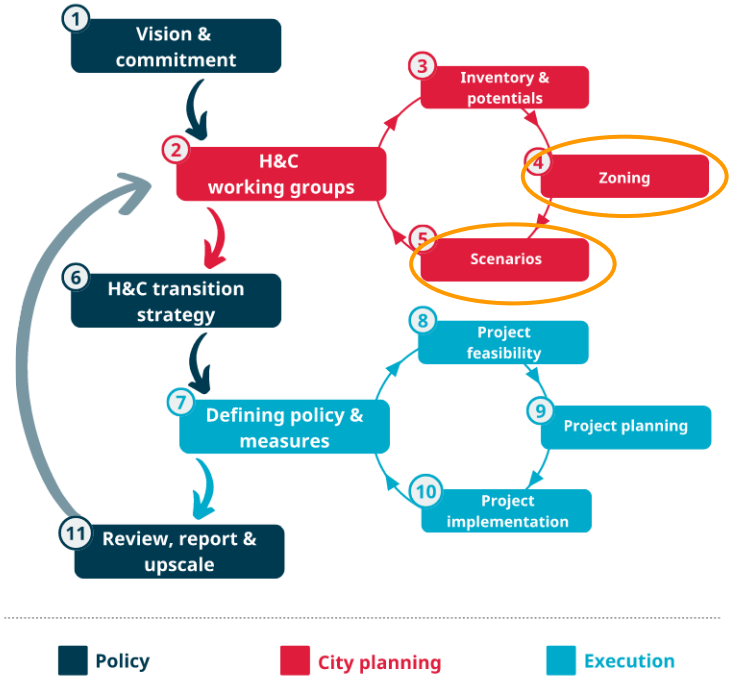
- Once the data is published, initial steps for heat planning can be kept minimal, and therefore, it should be affordable for municipalities.

- There was a follow-up workshop after publishing the dataset to help North-Macedonian municipalities understand the data and use the Hotmaps toolbox for their heat planning.

- Thanks to the generic approach taken, mainly based on open-source datasets available Europe-wide and used in the preparation of the top-down approach, similar steps can be taken by other countries in the region like Bosnia, Albania, Kosovo, and Serbia.

REGEA

- REGEA is a Croatian regional energy agency and knowledge center
- They provide innovative solutions in the energy and environmental sector
- REGEA is developing heating decarbonisation plans for several Croatian cities



REGEA - Case developed with Act!onHeat

The objective of the case study was to use the potential of multipliers for using the available modules and datasets in the Hotmaps tool in regions with low data availability. REGEA was already familiar with Hotmaps.

So far, the main focus is laid on the default data sets of Hotmaps:

- ➔ Heat demand density
- ➔ Gross floor area density

As well as two calculation modules from Hotmaps:

- ➔ District heating potential: Economic assessment
- ➔ Heat demand projection

These data and tool allow public authorities with limited resources to analyse and model solutions to heating energy needs in a resource- and cost-efficient way.

REGEA - Outcomes

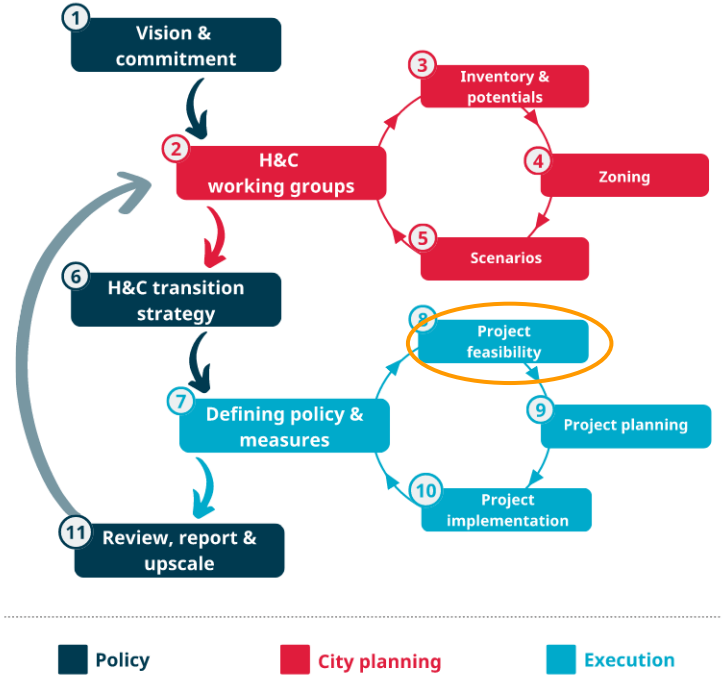
- The approach of using Hotmaps with low data availability will be applied to several municipalities in Croatia. This is done in the scope of an EU LIFE project.

- The standard data, tool and solutions developed in the study can contribute to the replicability of the process in further municipalities and regions in Europe. It can help cities start their H&C planning, as obliged by the EED.

- Consulting companies are seen as a good multiplier for this purpose, as they can find similar cases and apply the same methodology which requires reduced effort, increasing profitability and application.

Zelzate

- Zelzate is a Town in East Flanders (Belgium) of about 13,000 inhabitants
- They have sources of a large amount of residual heat nearby
- They already identified a potential economically viable heat network



Zelzate - Case developed with Act!onHeat

The objective of the case study was to support a pre-feasibility study looking at extending the existing heat network proposals involving ArcelorMittal steelworks and Sint-Jan Baptist Psychiatric Centre.

The network will include Zelzate Centre and potentially the neighboring municipality Sas van Gent, also considering a 2nd potential heat source from the Cargill starch production plant.

Act!onHeat partners modelled five scenarios using the THERMOS tool to find the most optimal networks. This helped answer specific heat network related questions for the local government.

Experts from the Act!onheat consortium met regularly with various stakeholders to gather the required data on building heat demands, drilling costs, and heat supply costs to input the model.

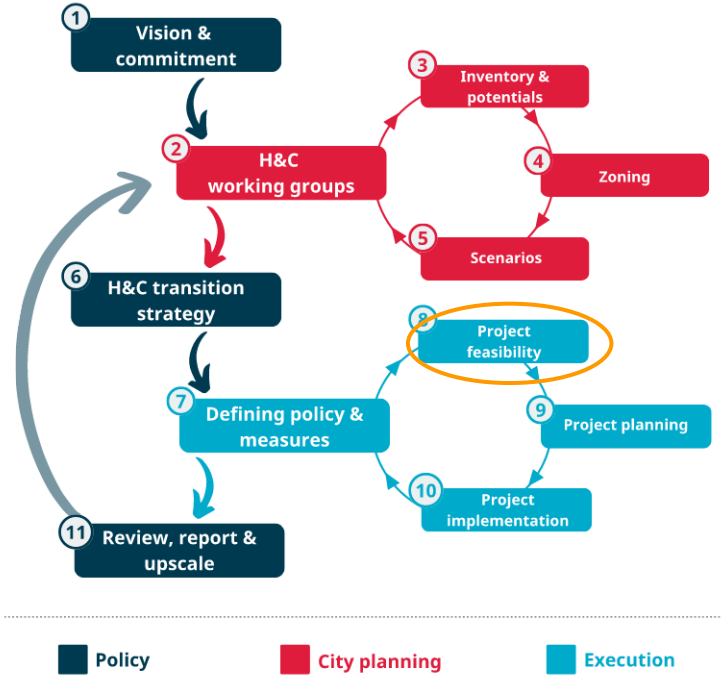
Zelzate - Outcomes

- The output of the collaboration was a pre-feasibility study of the district heating network for the local government, including the available residual heat sources.
- Zelzate shared the findings with the multiple stakeholders involved, which will lead to the next steps.
- This case can be replicated in areas with residual heat sources available, where a heat network can be modelled using THERMOS.

Energieinstitut Vorarlberg

Energieinstitut Vorarlberg

- Energieinstitut Vorarlberg is the energy agency of the Vorarlberg region in Austria
- They provide solutions for decision-makers in the field of energy
- Bludenz, a municipality in the region, has a new social housing development



Energieinstitut Vorarlberg - Case developed with Act!onHeat

The objective of the case was to support a study looking into the feasibility of establishing a heat network in a social housing development in the town of Bludenz.

Six scenarios were modelled using THERMOS, resulting in optimised heating networks, including a supply model optimisation. Heat supply of this social housing estate via a district heat network seems feasible, even with a deep level of building retrofit.

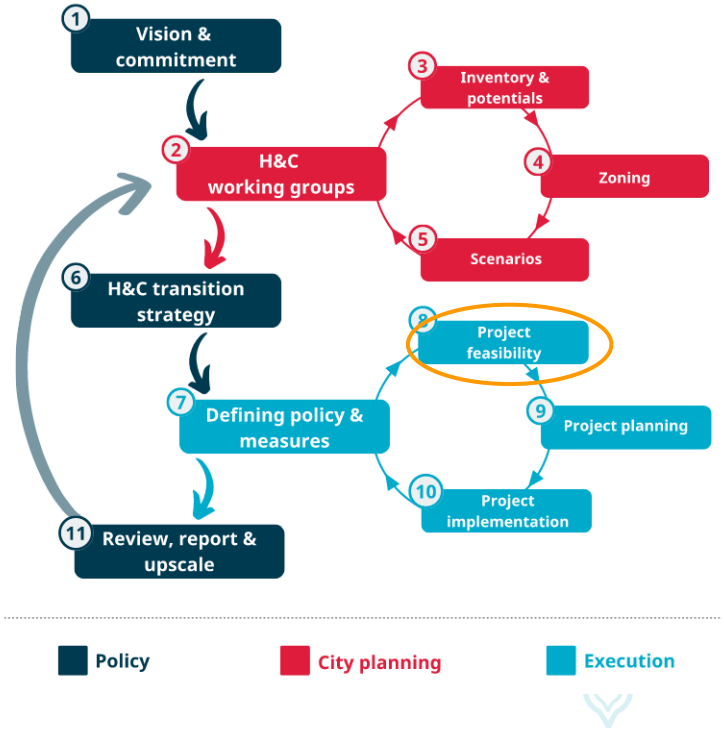
The participant was already an experienced THERMOS user, so the support received by Act!onHeat experts mostly consisted of giving further explanations of some of THERMOS' more advanced features.

Energieinstitut Vorarlberg - Outcomes

- The study outputs were written up into a report and results were shared with the owner of the area (social housing provider).
- The modelling will continue based on updated information (heat demand, pipe cost changes due to digging already taking place in the area).
- As replication efforts, the energy agency will attempt other similar studies in the Vorarlberg region of Austria.

Poznań

- Poznań is a municipality is Poland of about half a million inhabitants
- There is already an extensive heat network in Poznań, operated by Veolia
- They plan to expand and decarbonise the heat network



Poznań - Case developed with Act!onHeat

The objective of the case was to model the expansion and decarbonisation of the already existing heat network in Poznań, using the THERMOS tool.

While the study is still ongoing, these are the steps being taken:

- ➔ Act!onHeat experts already created a map in THERMOS with the estimated heating demands of buildings.
- ➔ Once more information comes on the potential heat supply sources, the model can be defined.
- ➔ The model will be run once decided the desired scenarios (e.g. which buildings to connect to the network).

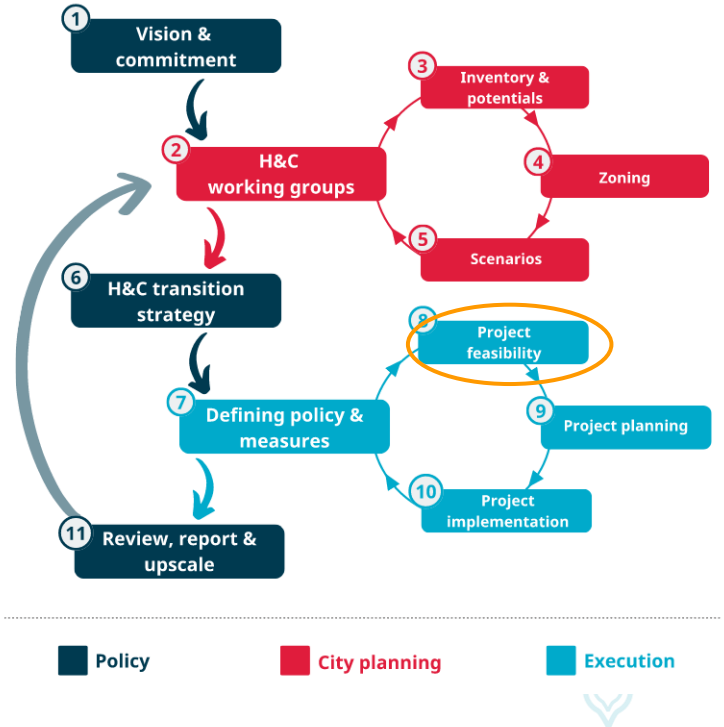
The required data is being provided by Veolia, the district heating system manager.

Poznań - Outcomes

- The study output will be the modelling of the district heating network expansion in Poznań, using greener energy sources.
- The project is expected to have a large impact due to the scope and scale of the network, but the final parametres are still to be determined.
- Act!onHeat experts will additionally do a financial study for the project.

Sint-Niklaas

- Sint-Niklaas is a 80,000 inhabitant Belgian city located in the province of East Flanders
- The municipality works together with VITO, VITO, a technological research organisation, for the development of a heat network



Sint-Niklaas - Case developed with Act!onHeat

The objective of the case was to support a pre-feasibility study looking at starting a heat network in Sint Niklaas. Two scenarios were modelled using THERMOS, incorporating the following energy supply options:

- ➔ The excess heat from a wastewater treatment plant
- ➔ A future solar thermal site with heat storage

The data to input the model was either provided by the municipality, like the building heat demand estimates, or obtained from THERMOS default values.

Act!onHeat experts trained workers from the municipality and VITO on the THERMOS tool, and developed the model.

Sint-Niklaas - Outcomes

- The study output was the creation of two scenarios for the development of a heat network in Sint Niklaas
- Both scenarios with the different heat supplies were shown to be financially feasible
- The province will support further feasibility studies on other districts in order to create a heat district policy paper

Summary & Outlook

The set of case studies presented show how 9 European cities or regions, with the support of Act!onHeat experts, successfully advanced on their H&C planning and took a step forward in the decarbonisation of their thermal systems. The use of the digital tools Hotmaps and THERMOS has been key to accelerating the analysis of the areas or the design of heat networks, requiring minimal resources and increasing efficiency.

The next step for the 9 case studies will be to further refine, approve, and advance their heating and cooling plans or projects. The work done during Act!onHeat's lifetime establishes a good foundation and provides new tools for effective H&C management. These efforts can serve as an inspiration for other European cities to adopt similar approaches, thereby improving their thermal energy systems and contributing to the continent's ambitious climate neutrality goals.

act!on heat

Find further materials in the Act!onHeat resource centre

A repository of papers, reports and recordings from training sessions developed during the Act!onHeat project lifetime

www.actionheat.eu

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