



H°TMAPS

Materials for Training Workshops on the Hotmaps Tool

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Deliverables 6.4 and 6.6 in course of the Hotmaps project



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The Hotmaps project

The EU-funded project Hotmaps aims at designing a toolbox to support public authorities, energy agencies and urban planners in strategic heating and cooling planning on local, regional and national levels, and in line with EU policies.

In addition to guidelines and handbooks on how to carry out strategic heating and cooling (H&C) planning, Hotmaps will provide the first H&C planning software that is

User-driven: developed in close collaboration with 7 European pilot areas

Open source: the developed tool and all related modules will run without requiring any other commercial tool or software. Use of and access to Source Code is subject to Open Source License.

EU-28 compatible: the tool will be applicable for cities in all 28 EU Member States

The consortium behind

Scientific partners



Pilot areas for developing and testing the tool





Executive Summary

This document presents the Hotmaps training materials and it provides guidelines and examples to assist the performance of further training workshops on the use of the Hotmaps tool, as well as the self-taught training.

This document covers the following expected deliverables in the course of the Hotmaps project:

- 📍 D6.4 Workshop education material for follower cities
- 📍 D6.6 Capacity building material for 2- days and 1/2-1 day arrangements

Please see the introduction for a detailed explanation of which part of the document correspond to each deliverable.

This document provides a list of all the available capacity building and educational materials produced in the course of the Hotmaps project, together with their respective use. Practical aspects of organizing and delivering the trainings are also explained, such as the adopted training structure, the selection of trainers, locations and timing, the promotion activities, the adoption of a registration platform and an e-learning platform.

Due to the COVID-19 global emergency, the on-site training workshops planned from March 2020 onwards had to be converted into online trainings. The trainings were adapted multiple times due both to the COVID-19 outbreak and to the experience and feedback gathered in the first two on-site trainings. This development process is explained by presenting both the original workshop draft and final agendas, as well as the online trainings agendas, together with the on-site training materials and those later used online.

Guidelines for a live presentation of the tool are shown, as that could be the introductory part of any workshop and online training. After that, all the sections of the trainings are explained in details and the training material used is illustrated, including the use of an e-learning platform, the exercises hand-outs and their relative solutions. The feedback collected could provide some valuable insight to future participants and training organizers, on how the trainings were received and how to build on this experience. Therefore, we reported in this document also the feedback collected as presented in Deliverable 6.5-6.7.

Finally, the legacy of the Hotmaps education activities is displayed, explaining how future training organizers can find and use all the materials mentioned in this document and kept available on the Hotmaps wiki.



Table of Contents

1 INTRODUCTION.....	10
Correlation to project deliverables	10
Use of the materials	10
How to structure a short and a long training	11
COVID-19 outbreak and control measures.....	12
2 BEFORE THE TRAINING	13
Training structure	13
Trainers and locations.....	13
e-learning platform	13
Promotion and registration.....	14
Participants	14
Final pre-training email.....	15
3 AGENDA.....	16
3.1 Agendas of the onsite workshop.....	16
New Agenda.....	17
3.2 Agendas of the online training	18
4 GUIDE TO A LIVE DEMONSTRATION OF THE TOOL	21
Map and layers visualization.....	21
Show indicators on NUTS 0	21
Show indicators at another level (NUTS 3).....	22
Select a municipality and investigate RES potentials at LAU2 or hectare level	23
Download of layers.....	24
Upload of layers and own data	24
Show CM – Demand Projection.....	25
Show CM – Decentral Heating Supply.....	25
Show CM – Scale Heat and Cool Density Map	26
Show CM – District Heating supply dispatch	26
Show CM – District Heating potential: user defined thresholds.....	27
Show CM – District Heating potential: economic assessment.....	27
Additional and stand-alone Calculation modules	28
5 TRAINING MATERIAL.....	29



5.1 On-site Training	29
Introductory webinar (2 hours, 2 - 3 weeks before the workshop):.....	29
Welcome and introduction	29
Mapping	30
Toolchain I.....	30
Toolchain II.....	30
Comparison and assessment	30
Feedback collection	30
5.2 Online Training	30
Introductory webinar, one week before the intensive training (1 hour).....	31
Introduction to the use of the tool, exercises 1 - 2	31
Wrap-up of exercises 1 - 2, introduction to exercises 3 and 4.....	32
Wrap-up of exercises 3 - 4, introduction to exercises 5.....	32
Closing and explanation of exercises 5, feedback questionnaire, certificates, and final remarks	33
6 FEEDBACK AND LESSONS LEARNED	34
6.1 On-site training	34
6.1.1 Training in Bolzano	34
6.1.2 Training in Brussels.....	35
6.2 Online training	37
<i>The tool</i>	38
<i>The documentation</i>	40
<i>The online training.....</i>	40
<i>Participants' suggestions</i>	41
<i>The afterlife of the Hotmaps-project.....</i>	42
7 RESOURCES FOR FUTURE TRAINING	43
Before the training	43
Preparatory Webinar	43
Exercises 1-2	43
Exercises 3-4	44
Exercise 5	44
Closing Webinar	44
Feedback	44



List of Figures

Figure 1: The e-learning platform Google Classroom used for the Hotmaps Follower online training.....	14
Figure 2: Colour coding of the following training agendas.....	19
Figure 3: First Online training in English, April 27th - May 12th 2020.....	19
Figure 4: Online training in German, May 4th - 19th 2020.....	19
Figure 5: Second online training in English, stretched over three weeks, June 29th - July 17th 2020	20
Figure 6: Industrial sites and renewable energy potential from municipal solid waste at hectare level.....	21
Figure 7: Gross floor area total map for Austria at NUTS 0 level.....	22
Figure 8: Gross floor area total map for Spain at NUTS 0 level	22
Figure 9: Population, potential for industrial sites excess heat and forests residues at NUTS 3 level.....	23
Figure 10: Potential for industrial sites excess heat, wastewater treatment plants power and forests residues at hectare level.....	24
Figure 11: Calculation Module Demand Projection.....	25
Figure 12: Calculation Module Decentral Heating Supply	26
Figure 13: Scale Heat and Cool Density Map	26
Figure 14: Calculation Module District Heating Supply Dispatch	27
Figure 15: Calculation Module District Heating potential - user-defined thresholds.....	27
Figure 16: Calculation Module District Heating potential input parameters (left) and results (right)	28
Figure 17: Stand-alone CM Scenario Assessment.....	28
Figure 18: A view of the introductory quiz	31
Figure 19: Toolchain used from exercise 1 to progressively build the scenario assessed in exercise 5	32
Figure 20: A view of the Classwork section of the e-learning platform.....	33
<i>Figure 21: What is your impression of the user-friendliness of the Hotmaps toolbox?</i>	36
<i>Figure 22: What is your impression of the user-friendliness of the Hotmaps toolbox?</i>	36



<i>Figure 23: How useful are the different calculation modules provided in the toolbox for your future work?.....</i>	37
<i>Figure 24: Feedback on the user-friendliness of the tool</i>	38
<i>Figure 25: Feedback on the user-friendliness of the mapping functionalities and calculation modules.....</i>	38
<i>Figure 26: Feedback on what could be more user-friendly.....</i>	39
<i>Figure 27: Feedback on the usefulness of the calculation modules.....</i>	39
<i>Figure 28: Feedback on the most liked part, and expected future use of the tool</i>	39
<i>Figure 29: Feedback on the training material.....</i>	40
<i>Figure 30: Feedback on the training quality and pace.....</i>	40
<i>Figure 31: Feedback on the training level and e-learning platform.....</i>	40
<i>Figure 32: Feedback on different training parts</i>	41
<i>Figure 33: Feedback on additional resources</i>	41



Terms and Abbreviations

CDD	Cooling Degree Day
CM	Calculation Module
COVID-19	Coronavirus disease 2019, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)
DH	District Heating
EASME	Executive Agency for Small and Medium-sized Enterprises
EED	EU Energy Efficiency Directive 2012
EEG	Energy Economics Group, of the TU Wien
GWh	Giga Watt hour
H&C	Heating and Cooling
HDD	Heating Degree Day
LAU2	Lower Local Administrative Level (formerly NUTS 5), a geocode standard for referencing the subdivisions of countries for statistical purposes corresponding to municipalities or equivalent units.
MWh	Mega Watt hour
NUTS 0-3	Nomenclature of Territorial Units for Statistics, a geocode standard for referencing the subdivisions of countries for statistical purposes. NUTS 0: countries NUTS 1: groups of regions/states NUTS 2: regions/states/provinces NUTS 3: provinces/counties/prefectures/departments/districts
RES	Renewable Energy Sources
SECAP	Sustainable Energy and Climate Action Plan
TU Wien	Vienna University of Technology (Technische Universität Wien)



1 Introduction

This document is addressed both to future training hosts/organizers and future participants, wanting to understand and use the training material for a self-taught learning. In fact, the present document is intended to:

- 📍 Illustrate how the training on-site workshops and online courses have been conceived, organized and carried out,
- 📍 Help future organisers and trainers to set up themselves training workshops and online courses on the Hotmaps tool,
- 📍 Support anyone interested in learning more on the Hotmaps tool functionalities and potential, to use the training material for a self-paced self-taught training and to acquire the understanding and skills to use the tool.

Correlation to project deliverables

The Hotmaps project Grant Agreement foresees the following deliverables, in relation to the training and capacity building material:

- 📍 D6.4 Workshop education material for follower cities
- 📍 D6.6 Capacity building material for 2- days and 1/2-1 day arrangements

Originally, two different types of on-site trainings were planned: five 2 days workshops for follower cities and one ½-1 day workshop addressing other areas. The idea was to set up a concept for the 2 days workshops, iterate the concept in the implementation of the five workshops and then develop a concept for performing the shortened ½-1 day workshop. For both types of events different deliverables were planned to be developed containing the necessary training materials and guidelines (D6.4 and D6.6).

In the implementation of the project it became clear that for the short version of the training the same material can be used as for the long version of the training. However, not all materials are needed for the short trainings. Furthermore, in the preparation of the training materials and guidelines for further use after the project it became obvious that providing the materials and concepts for both types of arrangements in the same document is easier to be used by potential trainers and trainees. Therefore, this document contains guidelines and materials for implementing both intensive training workshops as well as short workshops introducing to the intensive training.

Use of the materials

The following materials have been developed to assist the Hotmaps workshops and to learn how to use the Hotmaps toolbox.

- 📍 This **Training Guideline** document providing
 - A guideline for workshop hosts / trainers
 - Exercises to be used in the workshops
 - Links to all training materials and additional resources



- 📍 Various [Hotmaps Wiki](#), documenting the functionalities of the toolbox and the calculation modules, including some **video tutorials** showing the use of certain parts of the Hotmaps toolbox.
- 📍 The **Hotmaps Handbooks**:
 - [Handbook 1 – Definition & experiences of strategic heat planning](#)
 - [Handbook 2 – Guidance for a comprehensive assessment of efficient heating and cooling](#) (Guidelines for developing national heating and cooling plans according to Article 14 of the EED)
 - [Appendix report to the Handbook for strategic heat planning: Case descriptions](#)
- 📍 The [Hotmaps brochure](#) highlighting the application of the tool
- 📍 The **Hotmaps heating and cooling strategies** developed in the course of the project for **the pilot areas** with the Hotmaps toolbox. These can illustrate practical uses and the full potential of the toolbox. They will be published on the [Hotmaps Project website](#) as soon as complete.

How to structure a short and a long training

A short training could last half a day in person or two webinars online. In such training the agenda could include:

- 📍 Welcome and introduction
- 📍 Short presentation of the trainers
- 📍 Introduction to strategic heating and cooling planning
- 📍 Presentation of the Hotmaps project
- 📍 Insight into the datasets behind the Hotmaps toolbox
- 📍 Description of the Hotmaps Toolchain
- 📍 Live demonstration of the Hotmaps Toolbox
 - Presentation of an example city that has already used the toolbox
 - Current situation and political targets
 - Available data and comparison with default data (briefly)
 - Scenarios calculated with the Hotmaps toolbox (briefly)
 - Insights in the strategy formulation and outcomes (briefly)
- 📍 Introduction to the training materials so that the participants, if interested, can deepen their understanding of the tool either subscribing a longer training or performing the exercises on their own

A long training could last two full days on-site or 5 webinars and 3 support sessions online. In such training the full agenda of the short training could be extended with 5 practical exercises presented in three steps: 1-2, 3-4 and 5. The exercises would be introduced in the webinars, then the participants would perform them on their own, using the training material and some additional guidance provided in the support sessions. The completed exercises would then be revised together in the next webinar before introducing the following exercises.

A variation of the training could be a modular approach, where participants are divided in groups and each group performs one or two exercises, moving across one part of the toolchain, or where participants can decide which calculation modules to explore and only subscribe for one or more modules.



Another interesting addition could be moving from the calculations performed on the Hotmaps toolbox, to the policy and strategic analysis. This would imply interpreting the data and the results obtained, looking into strategic heating and cooling planning, and evaluating policy options. Such insight would require additional time and result in an even longer training.

The materials used for the online courses and linked to at the end of this document in chapter 7'Resources for future training' can be taken as reference.

COVID-19 outbreak and control measures

The COVID-19 pandemic has caused many events around the world to be cancelled or postponed. Likewise, all the Hotmaps on-site trainings from March 2020 onward, originally planned to take place in-person, was rescheduled and held virtually.

These are the trainings originally planned to be held in person:

- 📍 Bolzano (IT), December 9th – 10th, 2019 > Done
- 📍 Brussels (BE), February 19th – 20th, 2020 > Done
- 📍 Milton Keynes (UK), April 1st – 2nd, 2020 > Cancelled due to Covid-19 pandemic.
- 📍 Frankfurt-am-Main (DE), May 5th – 6th, 2020 > Cancelled due to Covid-19 pandemic.

These are the trainings that have been eventually held virtually as countermeasure:

- 📍 Online training in English, April 27th – May 12th, 2020
- 📍 Online training in German, May 4th – 19th, 2020
- 📍 Online training in English, stretched over three weeks, June 29th – July 17th, 2020

Please see D6.5 and 6.7 for more details on the number and type of participants of each training, together with other details such as affiliation, country, gender, and progress achieved.

The conversion of trainings from on-site to online required several adjustments:

- 📍 Reorganizing the training agenda, from an intense 2-days training, to a two weeks duration, and eventually three weeks.
- 📍 Converting the material from a support to be used in person, with other participants and trainers available for an immediate feedback, to a distance-learning format, where participants could access all useful resources online, submit their assignments, have means to ask questions or signal issues
- 📍 Reorganizing the training team, making sure to have at least a trainer every 15 participants, available for the whole duration of the training
- 📍 Identifying and adopting a webinar platform (Teams), where participants could connect to attend live webinars and support groups
- 📍 Identifying and adopting an e-learning platform (Google Classroom), where participants could access anytime all the training material, receive new assignments, receive guidance, submit their work, and provide feedback



2 Before the training

Training structure

The training has been set up to combine:

- 📍 A presentation of the Hotmaps project.
- 📍 A virtual tour of the Hotmaps toolbox.
- 📍 Practical and written exercises, to be performed by the participants based on spreadsheets and explanatory documents.
- 📍 Support, Discussion and Feedback sessions.

In the online version of the training, all activities originally planned in person, were replaced by a mix of:

- 📍 Live sessions / webinars (introduction at the beginning and wrap up at the end)
- 📍 Videos explaining the data, the Hotmaps toolbox and the exercises
- 📍 Online support sessions with a trainer (optional)

The training material has been structured, so that participants are guided through the Hotmaps toolchain, setting up heating (and cooling) scenarios for a sample city in five steps:

- 📍 Exercise 1: Mapping of heat demand and resource potentials
- 📍 Exercise 2: Calculation of decentral heat supply costs
- 📍 Exercise 3: Calculation of district heating supply costs
- 📍 Exercise 4: Calculation of district heating distribution costs
- 📍 Exercise 5: Setting up of consistent scenarios for the region

Trainers and locations

The trainers were selected based on their familiarity with the tool, their availability to take part to the trainings, and for the training held in German also their language skills.

The locations of the four on-site trainings have been selected because of the detected presence of a substantial number of heating and cooling professionals, interested in learning how to use the Hotmaps toolbox. This was either reported by some of the project partners or more often by the pilot area representatives themselves.

For the online trainings, no location was required, but instead the creation of webinars rooms and links, as well as the adaptation of the training material and the set-up of the e-learning platform.

e-learning platform

The e-learning platform Google Classroom has been chosen, among other alternatives, for its accessibility and user friendliness. In fact, it is a free platform, accessible with any free private Google account, and quite straightforward to use for both trainers and participants. It has a wall dedicated to general communications, a classwork section that can be organized per themes and allows attachments, links, shared documents, and other items such as online forms that we used for a multiple answer test and the feedback questionnaire.



A screenshot of a Google Classroom stream. At the top, there's a navigation bar with 'Hotmaps Follower Online Tra...' (partially cut off), 'Stream' (which is underlined in blue), 'Classwork', and 'People'. On the far right is a user profile picture. Below the navigation is a banner for 'Hotmaps Follower Online Training' with the 'HOTMAPS' logo and a subtitle: 'The open source mapping and planning tool for heating and cooling'. The main content area shows a 'Upcoming' section with the message 'Woohoo, no work due in soon!' and a 'View all' link. To the right, there are three posts from a user named Giulia Conforto: one from 20 Jul posting new certificates of attendance, another from 16 Jul posting wrap-up exercises and conclusions, and a third from 13 Jul addressed to participants. Each post has a three-dot menu icon on the right.

Figure 1: The e-learning platform Google Classroom used for the Hotmaps Follower online training

To give you an idea of how the e-learning environment was organized for the Hotmaps online trainings, we prepared two sample classrooms, one in English and one in German, which can be accessed anytime as participant with the following codes and link:

English access code: **ealdt6b**

German access code: **tzfxr5w**

[Link to Google Classroom](#)

Promotion and registration

We have published every training event, both on-site and online, on the event management and ticketing website “Eventbrite”, allowing for free registration, to be able to size adequately the training offer and collect participants contact details.

Trainings have been promoted through multiple channels (the Hotmaps project website, partner organizations, category associations, LinkedIn, Twitter, etc.). Several participants have been directly invited to join the trainings, while other have spontaneously decided to join, following the promotion activities.

Participants

Targeted participants belonged to the following categories coming mostly from EU and neighbouring countries:

- 📍 Consultancy companies



- 📍 Local or regional energy agencies
- 📍 Local or regional public authorities
- 📍 Research and academia
- 📍 Business
- 📍 NGOs / Associations
- 📍 Other

Please see D6.5 and 6.7 for more details on the proportion between categories concerning the participants attending each training.

Final pre-training email

Before the beginning of each training, the following steps had to be completed:

- 📍 Define and organise timing, trainers, location, room, and catering (on-site)
- 📍 Define and organise timing, trainers, webinar slots, e-learning platform
- 📍 Finalize training material
- 📍 Invite participants, promote trainings, set up registration platform

All registered participants have been contacted by email before the beginning of the training, receiving the final agenda before the training, while the participants to the online training also received some introductory material and details to access the webinar and the e-learning platform. The trainings have been structured to be accessible to anyone without any prior preparation. Nonetheless, please note that due to the technical and very sector-specific nature of the Hotmaps toolbox, all trainings have been addressed to heating and cooling planning professionals. For those participants lacking the theoretical preparation around heating and cooling planning, we recommended to consult the Hotmaps Handbooks beforehand and acquire the adequate theoretical understanding.



3 Agenda

3.1 Agendas of the onsite workshop

The two tables below show the agenda of the training in Brussels, the latest of the two training workshops, which differed only slightly in content from the one in Bolzano.

Day I		
Time	Content	Comment
12:00	Come together and lunch	
13:00-13:30	Welcome and introduction <ul style="list-style-type: none">• Short presentation of the participants• Overview of the workshop agenda• Presentation of test cases / regions:<ul style="list-style-type: none">◦ Each participant performs all analyses for one region◦ Work in the tool should be done individually◦ Group work discussion of open questions and results	
13:30-15:30	Derivation of current heat demand and future potentials of RES and excess heat in the test regions Exercise and group work I (Mapping): <ul style="list-style-type: none">• Derive demand and RES potential data for the selected example regions from the default data set• Create user account and upload individual data for the test regions (heat demand density, RES potentials, etc.)• Mapping of the data and compare default data and individual data• Derive defined indicators and maps for the participants regions• Export / Save the uploaded data	Several Hotmaps trainers on-site to assist participants
	Break	
15:30-17:30	Calculation of scenarios and sensitivities of different parts of the heat demand and supply systems in the test regions Introduction: <ul style="list-style-type: none">• Presentation of Hotmaps toolchain for developing scenarios of heating for regions Exercises and group work II (Toolchain I): <ul style="list-style-type: none">• Development of future heat demand density maps• Analysis of locations potentially feasible for district heating• Calculation of excess heat transport costs	Several Hotmaps trainers on-site to assist participants
17:30-18:00	Feedback from participants on: <ul style="list-style-type: none">• Learnings of the first day on the test regions• General feedback on the tool and the training• Expectations for day II	
19:30	Joint dinner	

Day II		
Time	Content	Comment
09:00-12:00	Exercises and group work III (Toolchain II): <ul style="list-style-type: none">• Calculation of district heating distribution costs	Several Hotmaps



	<ul style="list-style-type: none">• Calculation of decentral supply costs• Calculation of district heating supply costs <p>(Short break at 10:30)</p>	trainers on-site to assist participants
12:00	Lunch	
13:00-15:30	Development of consistent scenarios for the test regions based on the calculations of the different parts of the heat demand and supply systems Exercises and group work IV (Comparison): <ul style="list-style-type: none">• Selection of scenarios for comparison / assessment• Compilation of results from different parts of the toolchain for scenario assessment• Development of conclusions from scenario calculations	Several Hotmaps trainers on-site to assist participants, one trainer per topic at least
	Break	
15:30-16:30	Feedback from participants: <ul style="list-style-type: none">• Presentation of “lessons learned” and conclusions for heating and cooling strategy development• Available and missing functionalities for the planning process	
16:30-17:00	Closing remarks Handover of certificates Presentations of implemented help-desk	

New Agenda

Building on the feedback and experience collected during the first two training workshop, a different approach was used to develop the agenda for the subsequent training planned in Milton Keynes. The main weakness reported at that point was that some participants could have used more time for interpreting results, trying out parameter sensitivities and have group discussions. Hence, the new agenda would divide participants in groups, granting time for and encouraging group discussions on parameters and results. Participants would be able to tweak scenario components individually, having time for their own calculations, yet still creating overall scenarios by merging the group results.

The training in Milton Keynes was cancelled due to COVID-19 outbreak measures, therefore this agenda remained a draft, but it laid the basis for the subsequent online training agendas.

Day I		
Start	Content	Comment
12:00-12:30	Welcome and introduction <ul style="list-style-type: none">• Short presentation of the participants and the respective situation• Overview of the workshop agenda	
12:30-13:30	Presentation of example city (e.g. nearest pilot area) <ul style="list-style-type: none">• Current situation and political targets• Available data and comparison with default data• Scenarios calculated with the Hotmaps tool• Insights in the strategy formulation and outcomes	E.g. a delegate of the nearest Hotmaps pilot area
14:30-17:30	Exercises and group work I (focus mapping – data integration): <ul style="list-style-type: none">• Derive demand and RES potential data for the participants regions from the default data set• Create user account and upload individual data for the participants regions (heat demand density, RES potentials, etc.)• Mapping of data, comparing default and individual data• Derive defined indicators and maps for the participants regions	Several Hotmaps trainers on-site to assist the participants



	<ul style="list-style-type: none">• Export / Save the uploaded data	
17:30- 18:00	Feedback from participants on: <ul style="list-style-type: none">• Data quality of default data for their region• Available and missing functionalities for the mapping process• Expectations for day II	
20:00	Joint dinner	

Day II		
Start	Content	Comment
09:00- 12:00	<p>Exercises and group work II (planning I):</p> <ul style="list-style-type: none">• Short introduction to possible planning topics (Options A – E below)• Split into 2 – 3 groups for selected topics• In each group then<ul style="list-style-type: none">○ Demonstration of main functionalities of the necessary modules○ Performance of predefined exercises by the participants using either own or default data <p>Examples for options:</p> <ul style="list-style-type: none">• Option A: integration of renewables• Option B: excess heat integration• Option C: district heating expansion• Option D: decentralised heating assessment• Option E: renovation strategies	Several Hotmaps trainers on-site to assist the participants, one trainer per topic at least
12:00	Lunch	
13:00- 15:30	<p>Exercises and group work III (planning II):</p> <ul style="list-style-type: none">• Split into 2 – 3 groups for selected topics• In each group then<ul style="list-style-type: none">○ Demonstration of main functionalities of the necessary modules○ Performance of predefined exercises by the participants using either own or default data• Participants select a different group than in the morning (planning I)	Several Hotmaps trainers on-site to assist the participants, one trainer per topic at least
15:30- 16:30	Feedback from participants on: <ul style="list-style-type: none">• Available and missing functionalities for the planning process• Presentation of “lessons learned” and conclusions for heating and cooling strategy development• Filling in an evaluation form for the training	
16:30- 17:00	Closing remarks Handover of certificates	

3.2 Agendas of the online training

Here are reported the final agendas of the three online trainings. After the first two trainings were carried out, additional participants contacted the Hotmaps training team, asking for an additional training, if possible. This was organized on a longer time span, as explicitly requested.



Color coding

Live webinar
Recorded webinar and other material
Deadline
Support Session
Calendar

Figure 2: Colour coding of the following training agendas

Monday 27/04	Friday 01/05	Monday 04/05	Tuesday 05/05	Wednesday 06/05	Thursday 07/05	Monday 11/05	Tuesday 12/05
9:00 - 9:30							
9:30 - 10:00							
10:00 - 10:30							
10:30 - 11:00	Preparatory webinar		Intro Ex. 1-2		Wrap-up Ex. 1-2		
11:00 - 11:30				Support Session	Intro Ex. 3-4	Support Session	
11:30 - 12:00							
Lunch Break							
13:00 - 13:30							
13:30 - 14:00							
14:00 - 14:30							
14:30 - 15:00							
15:00 - 15:30						Wrap-up Ex. 3-4	
15:30 - 16:00						Intro Ex. 5	
16:00 - 16:30							Deadline: Upload (16:00)
							Wrap-up Ex. 5 and Final Remarks

Figure 3: First Online training in English, April 27th - May 12th 2020

Monday 04/05	Friday 08/05	Monday 11/05	Tuesday 12/05	Wednesday 13/05	Thursday 14/05	Monday 18/05	Tuesday 19/05
9:00 - 9:30							
9:30 - 10:00							
10:00 - 10:30							
10:30 - 11:00	Preparatory webinar		Intro Ex. 1-2		Wrap-up Ex. 1-2		
11:00 - 11:30				Support Session	Intro Ex. 3-4	Support Session	
11:30 - 12:00							
Lunch Break							
13:00 - 13:30							
13:30 - 14:00							
14:00 - 14:30							
14:30 - 15:00							
15:00 - 15:30						Wrap-up Ex. 3-4	
15:30 - 16:00						Intro Ex. 5	
16:00 - 16:30							Deadline: Upload (16:00)
							Wrap-up Ex. 5 and Final Remarks

Figure 4: Online training in German, May 4th - 19th 2020



	Monday 29/06	Wednesday 01/07	Thursday 02/07	Monday 06/07	Tuesday 07/07	Thursday 09/07	Monday 13/07	Tuesday 14/07	Thursday 16/07	Friday 17/07
9:00 - 9:30										
9:30 - 10:00										
10:00 - 10:30										
10:30 - 11:00	Preparatory webinar									
11:00 - 11:30										
11:30 - 12:00	Intro videos posted				Support Session		Support Session		Support Session	
Lunch Break										
13:00 - 13:30										
13:30 - 14:00										
14:00 - 14:30										
14:30 - 15:00										
15:00 - 15:30										
15:30 - 16:00										
16:00 - 16:30										
		Test Deadline (16:00)								
										Upload Deadline (16:00)

Figure 5: Second online training in English, stretched over three weeks, June 29th - July 17th 2020



4 Guide to a live demonstration of the tool

A good way to introduce the Hotmaps toolbox is by showing its functionalities directly on the toolbox website. Here we suggest ideas for an introductory live presentation of the toolbox.

Map and layers visualization

The toolbox opens on a map. A good starting point is opening the layers menu from the top bar, and selecting one or more layers of the following from the menu that opens on the left:

- Heat
- Climate
- Industry
- Potentials - Geothermal
- Nuts data

Unclicking each layer after showing it one by one will avoid it to overlap with the next one. You may find it useful to preload the layers before the demo, and to not scroll around, keeping the zoom level and place constant to show how the same map gets populated with different layers.

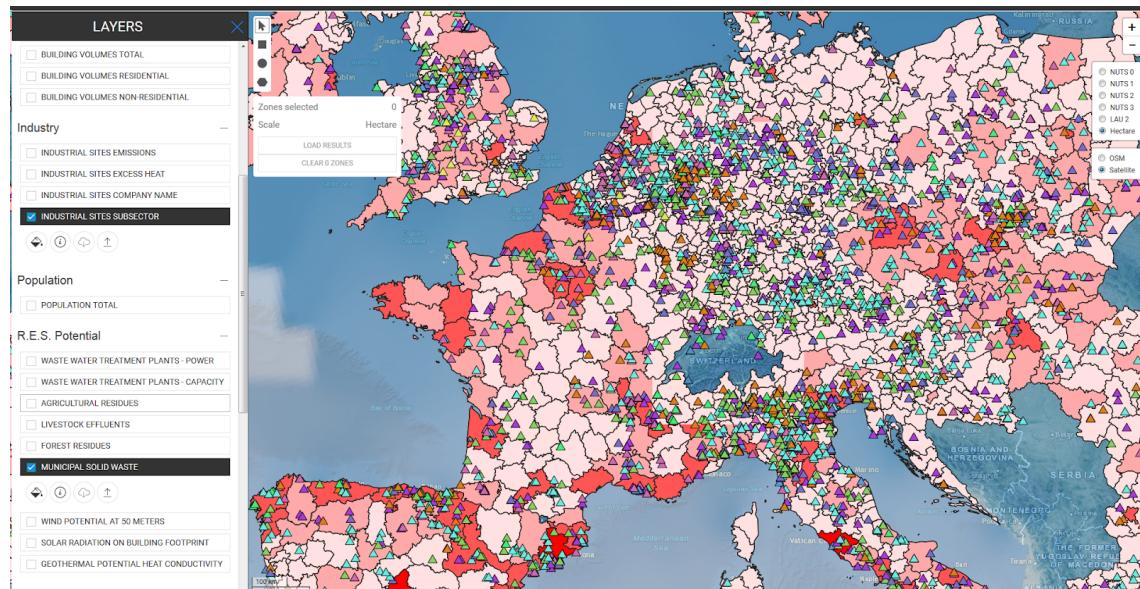


Figure 6: Industrial sites and renewable energy potential from municipal solid waste at hectare level

Show indicators on NUTS 0

As the highest level of granularity of the data is NUTS 0 (country level), we suggest showing one or more of the following indicators at this level:

- Heat demand
- Cooling demand



- 📍 Population
- 📍 Heating degree days (HDD), cooling degree days (CDD)
- 📍 Industry, some potentials

This can be a good occasion to explain how these indicators are intended, and maybe to show a comparison with a second country. The results are shown on the right side.

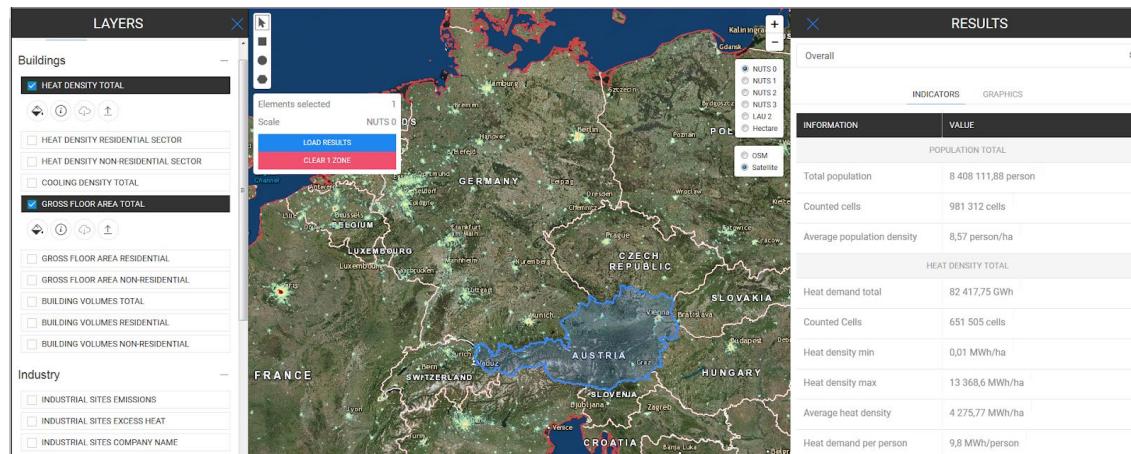


Figure 7: Gross floor area total map for Austria at NUTS 0 level

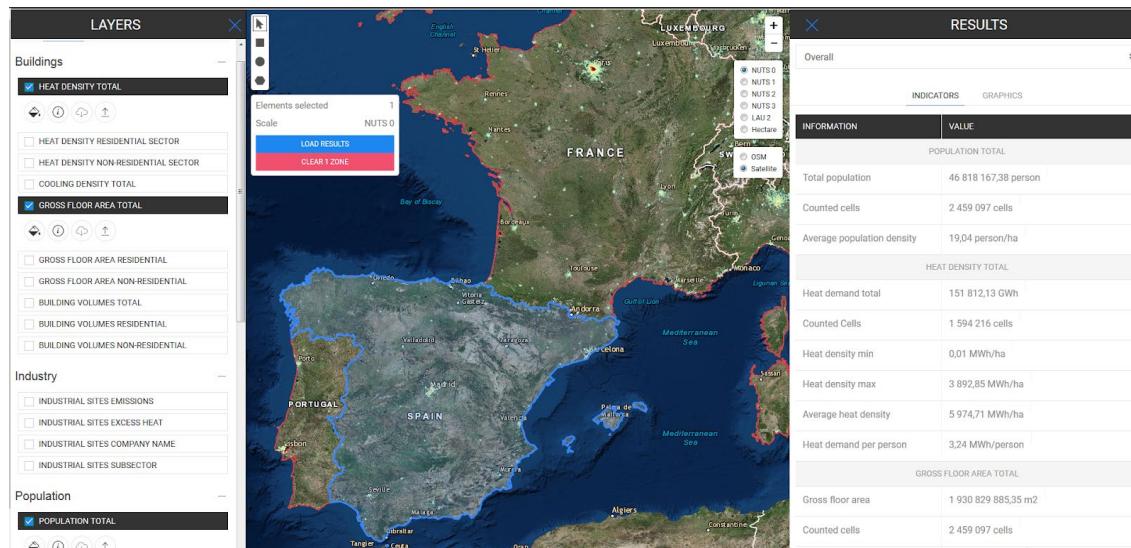


Figure 8: Gross floor area total map for Spain at NUTS 0 level

Show indicators at another level (NUTS 3)

Show one or more of the other levels of granularity (NUTS 1 to 3, LAU 2, or hectare), just to show what are the predefined selections available in the toolbox. Please be aware that the lowest level, LAU2, may take longer to load. This could be a good moment to mention that each indicator has a different minimum level of zoom/selection, and that not all of them are defined at hectare level.

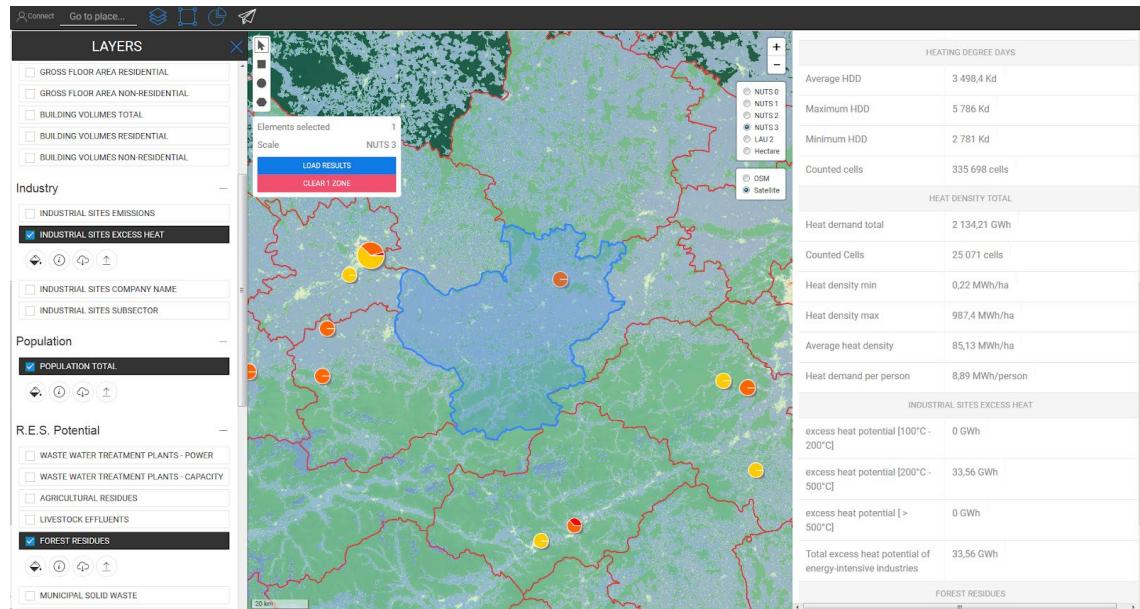


Figure 9: Population, potential for industrial sites excess heat and forests residues at NUTS 3 level

Select a municipality and investigate RES potentials at LAU2 or hectare level

Pick a municipality, possibly knowing that it has some RES or industrial potential in the surroundings. Keep in mind that a custom selection allows for more flexibility than LAU2.

Select few layers to start with, such as heat demand and population, and show the indicators and explain them.

Suggest relevant questions to investigate: what are the potentials? Start with one, e.g. wastewater treatment plant. This indicator is shown in points, so if the area selected does not include one, extend it to another area selection or draw a bigger polygon that covers the plant. Industrial excess heat potential is not always available in the close proximity.

Select another layer, such as forest residues. Draw a new polygon that covers some forest area and check the indicator results. You can stop here or go on with some more indicators. Just be aware that each indicator has its peculiarities, for instance solar usually yields quite large potentials, which are higher than the heat demand. This will entail to explained why that happens.

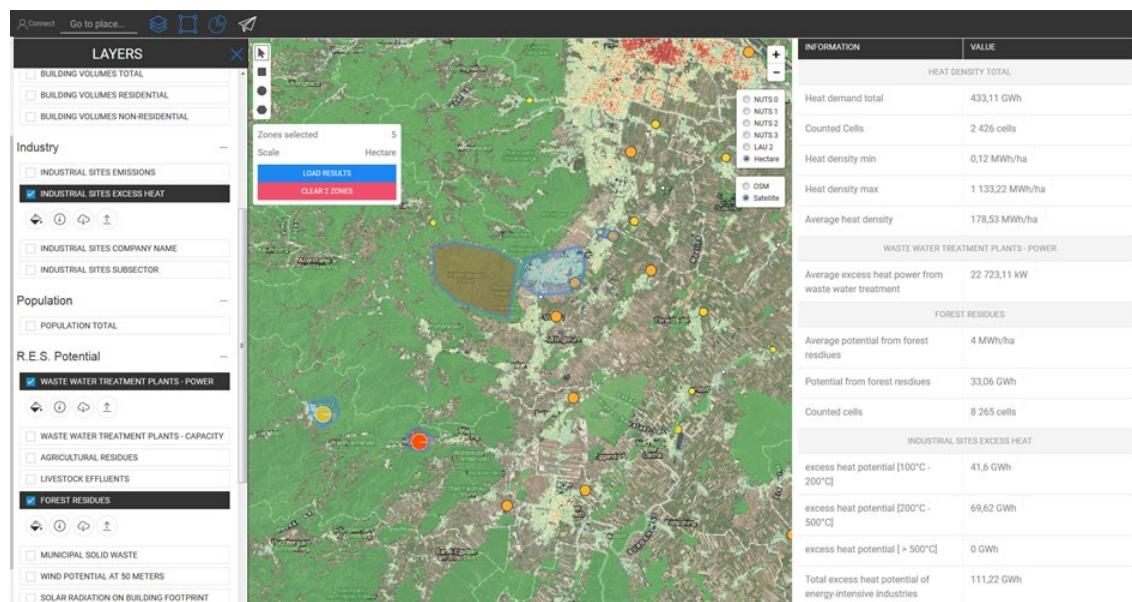


Figure 10: Potential for industrial sites excess heat, wastewater treatment plants power and forests residues at hectare level

Download of layers

You can show the download functionality by downloading the heat density map as a raster file and saving it on your computer. Just show where the ‘Download layer selection’ symbol  is located, in the side menu on the left of the screen, below every layer as can be seen in the previous figures and click it.

Please remind participants to use one of the recommended browsers to complete this step. Issues such as not downloading any file or downloading an empty file have been reported when accessing the toolbox with other browsers. Data is provided with specific granularity levels, and might not be always available at smaller levels. Downloading the full default dataset can illustrate at which granularity level each parameter is available.

Upload of layers and own data

Data can be also uploaded, which is particularly useful when using own data or a raster file previously elaborated. To show this functionality, first, unselect all the layers in the left panel. Show how to register and create a user account. Then, log-in to your Hotmaps user account and then click on the ‘account’ button. Click on ‘Select files’ in the right bottom corner of the account window and proceed to your storage folder to upload your files.

The formats accepted is “.tif” and “.csv”. Look up the file to upload from your computer using the ‘Select file’ button located at the bottom of the account window. Specify the category of data from the drop-down list to the left of the ‘Select file’ button. Make sure to select the right category of data, so if you want to re-upload the raster file that you just downloaded, select ‘Heat density total’.

Finally, click the ‘Upload layer’ button and the uploaded layer will emerge at the top of the left layer panel to be used exactly as one of the embedded default layers.



Again, please remind participants to use one of the recommended browsers (Firefox and Chrome) to complete this step. Issues such as not downloading any file or downloading an empty file have been reported when accessing the toolbox with other browsers.

Show CM – Demand Projection

To continue, you can then show some calculation modules, explain the indicators, and show the graphs and layers. For instance, you could start with the Demand projection, which is used at the beginning of the training material (exercise 2), after the mapping exercise (exercise 1).

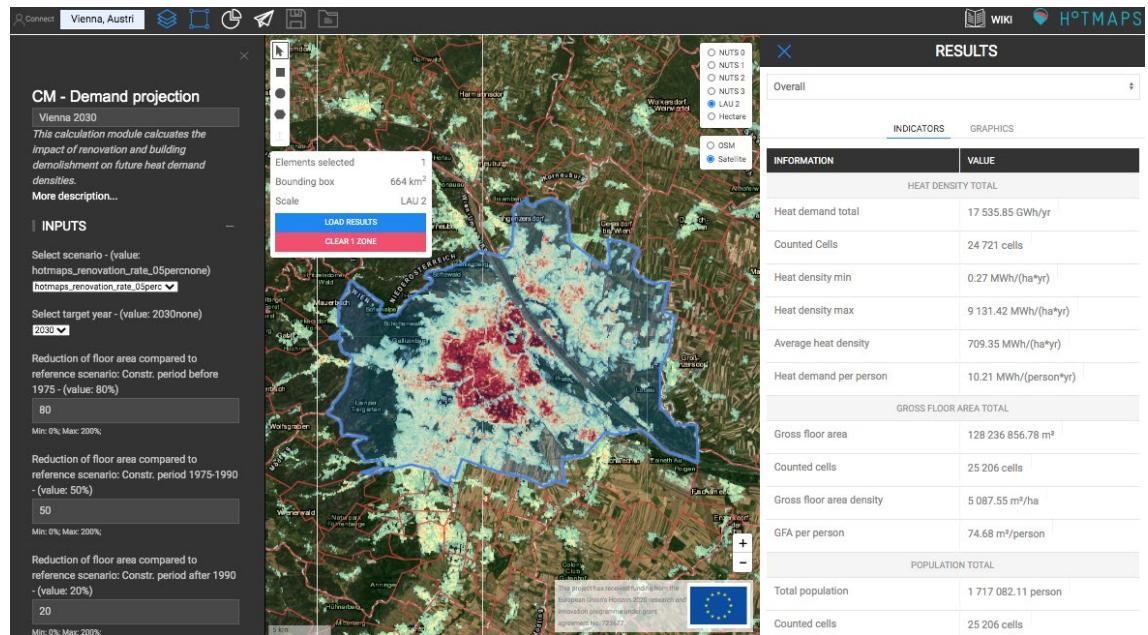


Figure 11: Calculation Module Demand Projection

Show CM – Decentral Heating Supply

Then, you can show the Decentral Heating supply, which is also one of the first calculation modules used in the training material (exercise 2).

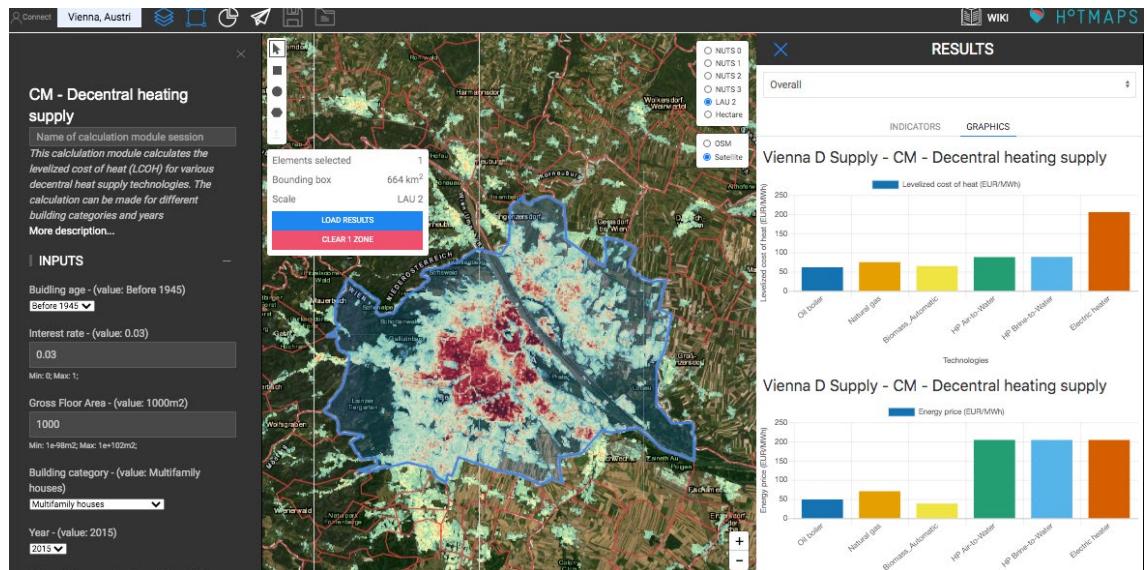


Figure 12: Calculation Module Decentral Heating Supply

Show CM – Scale Heat and Cool Density Map

After that, you can show the Scale Heat and Cool Density Map and explain how it is used in the training material. For instance, you can explain that the heat demand density layers are expressed in terms of final energy, not in terms of useful energy. In order to calculate any layer in terms of useful energy, the user can either scale every single output, multiplying them by the average efficiency factor for heating systems in the selected area, or simply use the calculation module “Scale heat and cool density map”, indicating the average efficiency factor for heating systems in the selected area, and the module will produce the heat demand density map in terms of useful energy. The map can then be downloaded, saved and used for further analysis.

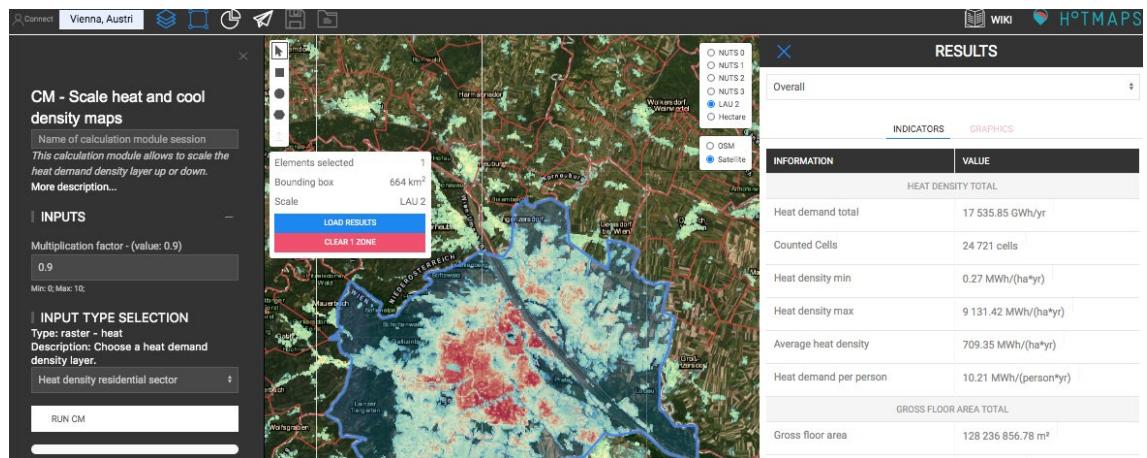


Figure 13: Scale Heat and Cool Density Map

Show CM – District Heating supply dispatch

At this point you could show the District Heating supply dispatch. We recommend choosing the parameters wisely and spend some time to explain the difference between the invest mode



and the dispatch mode. We have noticed during the trainings, that this calculation module is perceived as more challenging, and participants were more confused about it than other calculation modules.

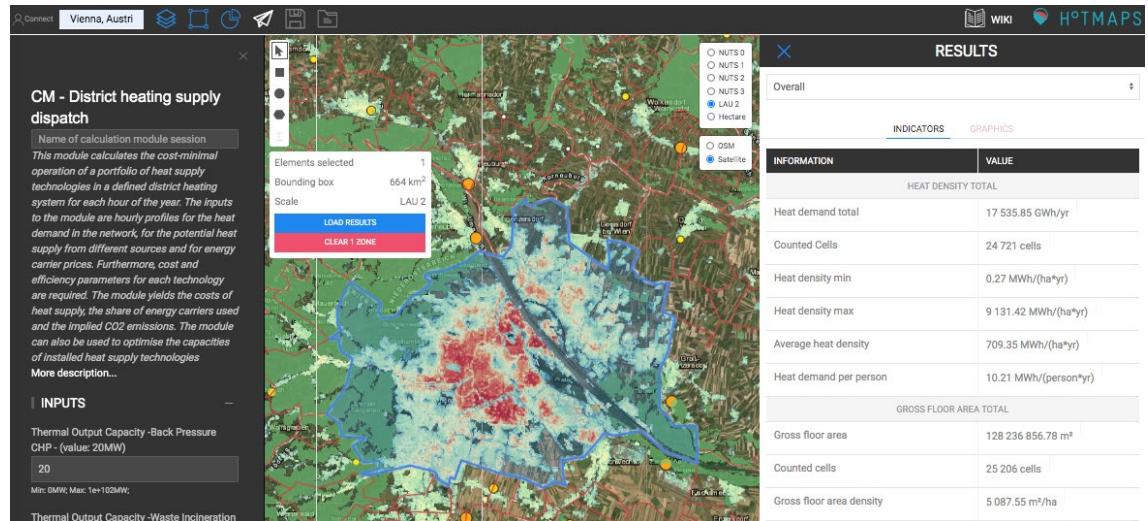


Figure 14: Calculation Module District Heating Supply Dispatch

Show CM – District Heating potential: user defined thresholds

The District Heating potential: user defined thresholds is another module that has proved not so easy to grasp, so you could spend some time to explain its purpose and functioning.

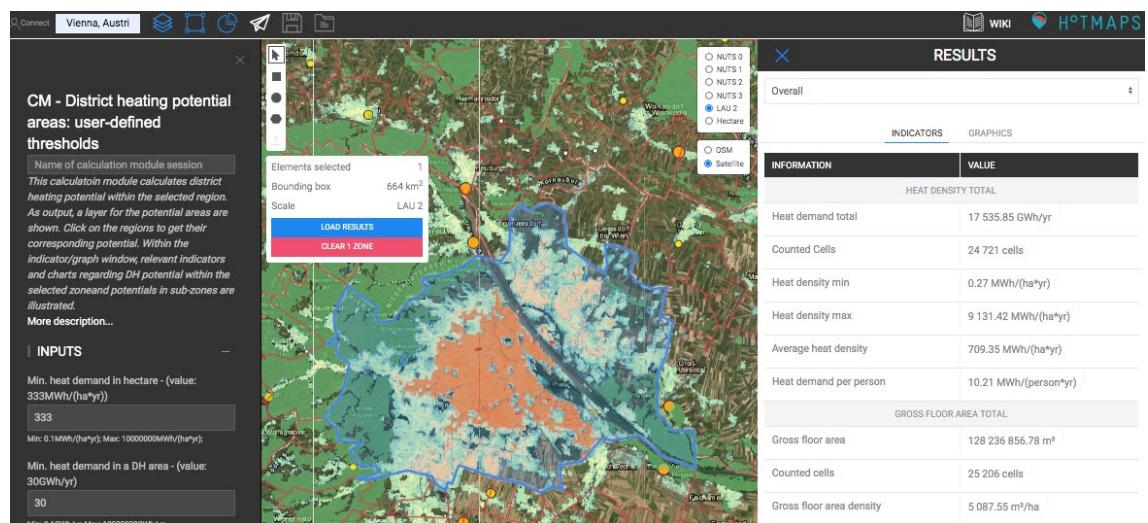


Figure 15: Calculation Module District Heating potential - user-defined thresholds

Show CM – District Heating potential: economic assessment

Then you could move on with the District Heating potential: economic assessment, using the following parameters:

- 📍 Min. heat demand in hectare: 200 MWh/ha
- 📍 Min. heat demand in a DH area: 20 GWh/yr

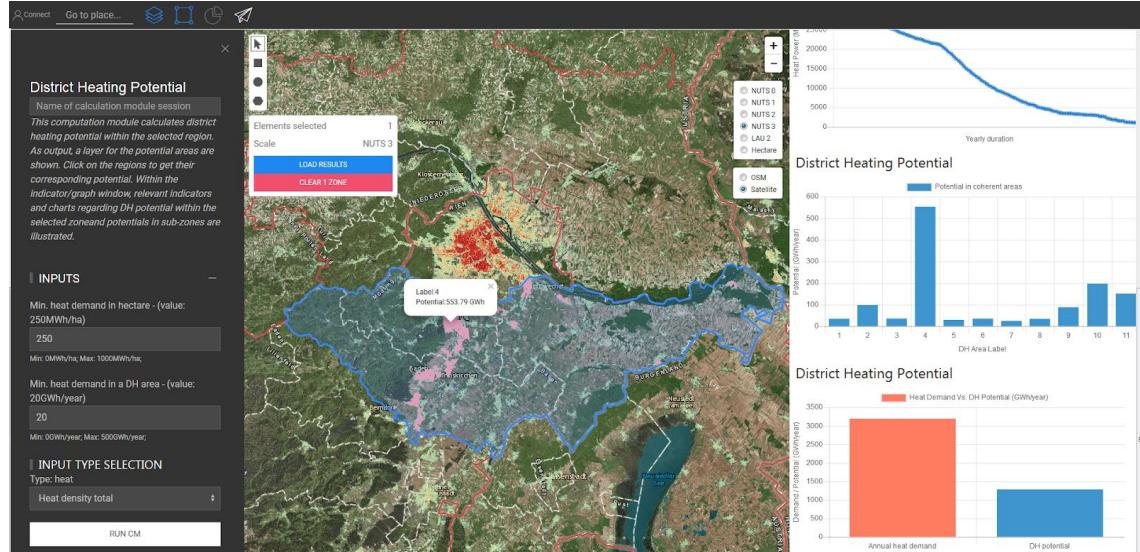


Figure 16: Calculation Module District Heating potential input parameters (left) and results (right)

These settings would typically result in more regions, making it easier to explain the functionality. Keep in mind that the raster file might not be visible when zooming in too much. This could also be a good chance to do a second run with different parameters (in which case, specify a new name for the run in the inputs section of the CM), or other calculation modules.

Additional and stand-alone Calculation modules

You can tailor the number and selection of modules to show during the live demo, based on the audience that you are addressing. One stand-alone module that is used in the training material is the Scenario Assessment (exercise 5), which consists of a spreadsheet (in the file format .xlsx). However, the tool presents several other stand-alone modules among which to choose.

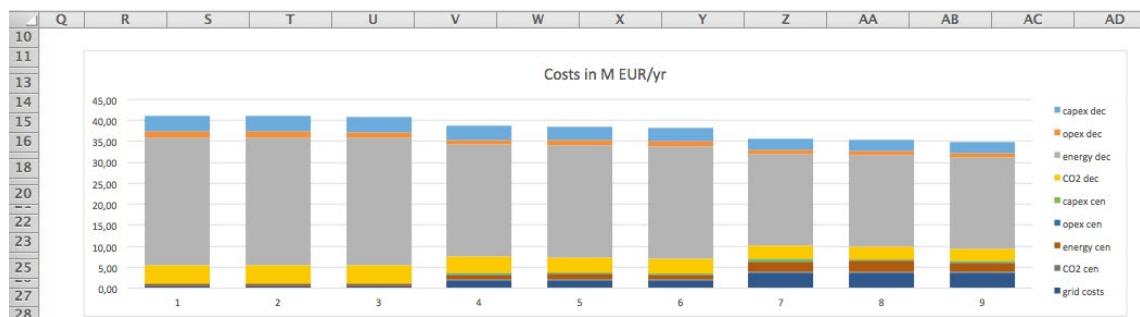


Figure 17: Stand-alone CM Scenario Assessment



5 Training Material

The Hotmaps follower training material was conceived originally for a series of face-to-face trainings. As previously explained, both the material and the training approach had to be adjusted after the measures for containing the COVID-19 pandemic were introduced.

5.1 On-site Training

This section explains what kind of materials were used during the onsite trainings, how they were distributed and in which order.

Introductory webinar (2 hours, 2 - 3 weeks before the workshop):

This webinar served as an introduction to the following days. The participants were introduced to the Hotmaps project and received a short presentation of the toolbox and of the workshop agenda. The webinar touched upon the following topics:

- 📍 Introduction
- 📍 Why strategic heating and cooling planning is important
- 📍 Heating strategy development in the pilot areas of the project
- 📍 Presentation of the workshop programme
- 📍 Very short intro to the toolbox
- 📍 Organisational issues
- 📍 Questions and Answers

To give an overview of what can be done with the tool, a few heating strategies developed in pilot areas were introduced, showing how local conditions can benefit from different and customized approaches. This also allowed for describing which data was taken from the default data sets and which other was provided by the pilot regions and uploaded.

The presentation of the workshop program illustrated both the schedule and the planned activities.

A short live demonstration offered a first introduction to the tool. Then links to the Hotmaps brochure, handbooks and wiki were provided allowing participants to further explore and understand it.

Welcome and introduction

The participants were asked to introduce themselves briefly. Then, the training materials were distributed, and the agenda was shown again. Then, two prepared test cases were shown, on Tournai, Belgium and Tomaszów Mazowiecki, Poland. Each participant was asked to choose one of these two locations and calculate all exercises of the workshop for that location, as in these two days each participant would learn how to use the toolbox, by carrying out a city analysis.



Mapping

The first practical exercise was the mapping. After a short introduction, various basic functions of the toolbox and various analyses were practiced. Various possible analyses in the test region were carried out by choosing different layers and then note the results. A word document contained the instructions to perform the exercises, while the results had to be noted or pasted into a spreadsheet.

Toolchain I

Here the participants developed future heat demand maps, analysed potential areas for district heating and calculated excess heat transport costs from nearby excess heat sources. Again, a word document contained the instructions to perform the exercises, while the results had to be noted or pasted into a spreadsheet. Additionally, when most participants had finished the exercise, a wrap-up of the module was performed for everyone.

Toolchain II

The second day focused on the second part of the toolchain. District heating supply, District heating distribution and Decentral supply costs were calculated with the corresponding modules. The same procedure was used: the presentation of the exercise, a word document with guidelines, a spreadsheet for input parameters and to save results, and a wrap-up of each exercise before starting the next one.

Comparison and assessment

The end of the practical part was the comparison of different scenarios for the whole city. A complete version of the exercise was provided both for participants to compare them with their own and for participants who had not finished all the calculations. Minor differences among participants results were noted and explained.

The spreadsheet for the Scenario Assessment module was introduced, then participants evaluated different scenarios and discussed them with each other and the trainers.

Feedback collection

In the course of the training, official feedback was requested twice from the participants. The first time orally after the first half day, the second time with a written questionnaire at the end of the second day. In addition, during the training, feedback was also received through individual support.

After some closing remarks, the training certificates were distributed to all participants who had completed the full training.

5.2 Online Training

This section explains what kind of materials were used during the online trainings, how they were distributed and in which order.



Introductory webinar, one week before the intensive training (1 hour)

This webinar was meant to welcome the participants, present the trainers, the Hotmaps project, Hotmaps toolbox, the structure and modality of the training, and the e-learning platform. All webinars were provided with Microsoft Teams.

After registering for the training and receiving the welcome email with the links for the webinars, this was the first time that the participants had a chance to get in touch with the trainers.

We informed the participants that all future communications would be delivered through the e-learning platform Google Classroom. During the webinar, the first material was posted on the platform: a short tutorial presenting the Hotmaps toolbox at a glance, two introductory videos, respectively on strategic heating and cooling planning and on the Hotmaps database, and a link to the first multiple answers test, based on the content of the videos. The test was provided through Google Forms, with deadline at the end of the week. Also, the webinar's presentation and recording were posted the same day.

The screenshot shows a Google Form quiz question. The question is "Why is strategic heating and cooling planning needed?" and it is worth "1 point". There are four options, each preceded by a radio button:

- For technical reasons: to reduce buildings and business final energy consumption.
- For political reasons: to meet the 2030 European targets of reducing GHG emissions by 40%, increasing renewables share to at least 32%, and increasing energy efficiency by 32.5%. (These targets were revised upward in 2018 compared to the original -40% GHG, +27% RES and +27% efficiency)
- For regulatory reasons: to comply with the Energy Efficiency Directive that requires to carry out a comprehensive assessment of the potential for high efficiency strategies and decarbonization of the heating and cooling sector.
- All of the above.

Figure 18: A view of the introductory quiz

The link to the Hotmaps handbooks was originally provided only in the welcome email and in the introductory webinar presentation, and then, after some participants reported that they could have used more theory around the heating and cooling planning, it was added to the introductory material.

Introduction to the use of the tool, exercises 1 - 2

This was the first webinar of the intensive training. We assumed that the participants had accessed the material posted so far, completed the test and been familiarized with the tool.

The trainers showed how to do the mapping of heat demand and resource potentials and how to calculate the decentral heat supply costs for the scenario under analysis. In order to ease the process of checking the assignments for errors, all participants were required to perform the same calculations on the same municipality: Tomaszów Mazowiecki, a large town in central Poland.

The material for exercises 1-2 was posted the night before the webinar and it included:

- 📍 A word document, with the instructions to perform the calculations,
- 📍 A spreadsheet, with the parameters to use and the space to paste the results obtained.

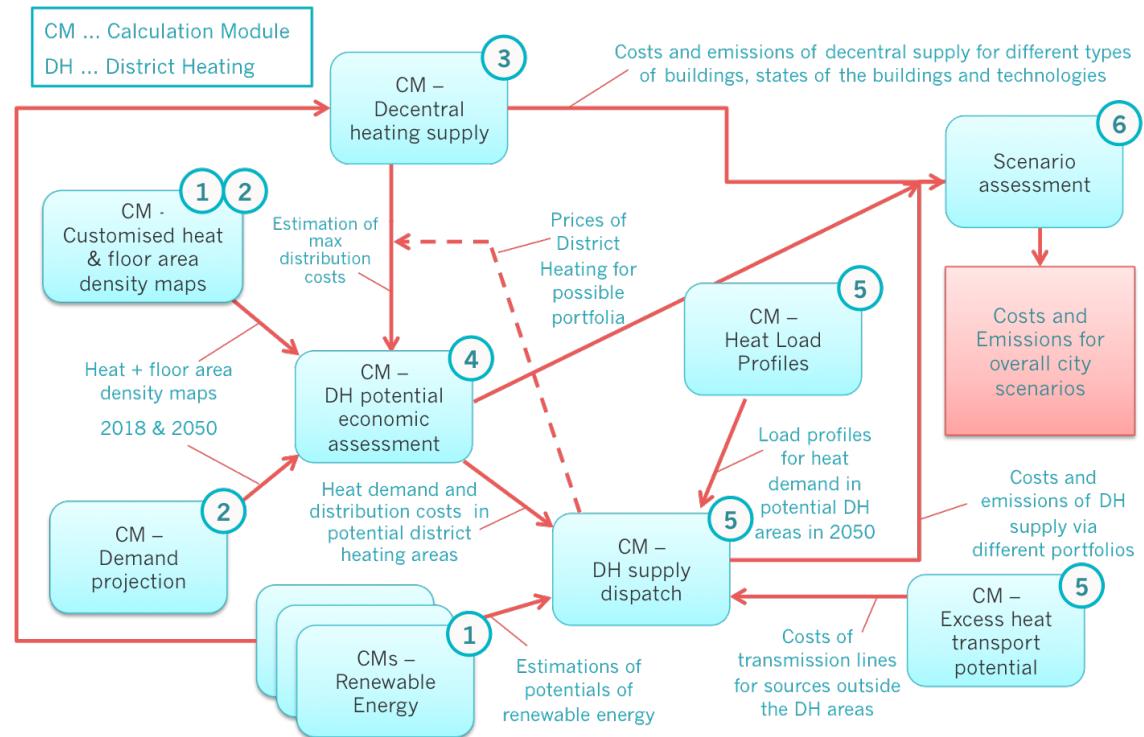


Figure 19: Toolchain used from exercise 1 to progressively build the scenario assessed in exercise 5

This was a good chance to remind participants to accept the email invite to join Google Classroom and to show them again how to use the e-learning platform, and creating a Google account in case they did not have one.

As the first two exercises were distributed, the participants had been divided in groups of max 15-20 people- Each group had been assigned to one trainer, that was available during each support session to answer questions and help participants complete the exercises. The respective link to the Teams room was also distributed to each participant through the e-learning platform.

Wrap-up of exercises 1 - 2, introduction to exercises 3 and 4

The trainers showed how exercises 1-2 were supposed to be completed and moved on showing how to calculate the district heating supply costs and distribution costs for the scenario under analysis.

The material for exercises 3-4 was posted the night before the webinar and it included, as for exercises 1-2, a word document and a spreadsheet to perform the exercise.

This was a good chance to remind participants to make good use of the support sessions.

Wrap-up of exercises 3 - 4, introduction to exercises 5

The trainers showed how exercises 3-4 were supposed to be completed and moved on showing how to set up a consistent scenario for the region and perform the scenario assessment.

The material for exercise 5 was posted the night before the webinar and it included, as for the previous assignments, a word document and a spreadsheet to perform the exercise.



This was a good chance to remind participants of the final deadline for completing all the assignments and uploading them through the e-learning platform, as well as to inform them that in order to receive the certificate of attendance, they should have provided their full name and also submitted the feedback questionnaire.

Closing and explanation of exercises 5, feedback questionnaire, certificates, and final remarks

The trainers showed how exercise 5 was supposed to be complete and then addressed the closing of the training. An overview of the feedback received during the support sessions and through the feedback questionnaires was provided. Additional information was provided regarding the distribution of the certificates of attendance, which were posted on the e-learning platform at the beginning of the following week. The training certificates were provided upon completion of the training, which is to say when all assignments had been submitted. The training did not involve any evaluation of the assignments, but the correct answers of the introductory test and the completed version of exercise 5 were circulated for self-evaluation.

Because some participants asked to be able to complete the training beyond the deadline, the e-learning platform was kept open for some additional weeks in order to allow all the interested participants to complete the training and receive their certificate.

A screenshot of the Classwork section in an e-learning platform. The top navigation bar includes 'Hotmaps Follower Online Training', 'Stream', 'Classwork' (which is highlighted in blue), and 'People'. Below the navigation are links for 'View your work', 'Google Calendar', and 'Class Drive folder'. On the left, there's a sidebar with 'All topics' and links to 'Certificates of atten...', 'Support Group Disc...', 'Intensive Training', and 'Introduction'. The main content area shows three sections: 'Certificates of attendance', 'Support Group Discussion', and 'Intensive Training'.

- Certificates of attendance:** A post titled 'Certificates of attendance' by 'Certificates of attendance' (profile icon) with a due date of 'Posted 20 Jul'.
- Support Group Discussion:** Two posts: 'Magda Support Group Discussion' by 'Magda' (profile icon) with '30' responses and 'No due date'; and 'Marcus Support Group Discussion' by 'Marcus' (profile icon) with '4' responses and 'No due date'.
- Intensive Training:** Two posts: 'Wrap-up exercise 5 and Conclusion (16th Ju...' by 'Certificates of attendance' (profile icon) with '30' responses and 'Posted 16 Jul'; and 'Exercise 5 and Feedback Questionnaire' by 'Certificates of attendance' (profile icon) with '3' responses and 'Due 17 Jul, 16:00'.

Figure 20: A view of the Classwork section of the e-learning platform



6 Feedback and lessons learned

Considering the research nature of the Hotmaps project, collecting feedback was particularly useful for the training team as well as for the rest of the project consortium. The feedback collected was presented in Deliverable 6.5-6.7, and is here reported for practical reasons, so that future participants and training organizers will find all useful resources gathered in this document.

6.1 On-site training

6.1.1 Training in Bolzano

The first Hotmaps training workshop was held in Bolzano on December 9th/10th, 2019. There were 21 participants registered, however only 11 took part to the event. The overall feedback on the event was very positive. Below a summary of most relevant feedback is reported.

The Training Workshop

- 📍 It could be useful to have longer workshops (perhaps 2 full days) and after each exercise, to reflect upon the results, relating them to the exercise's goals.
- 📍 It would also be interesting to learn how to upload own bottom-up data into the tool to replace the default data.
- 📍 The first day might benefit from less scenario calculations (2 or 3 each is enough to grasp the process), and more result-discussions. Very tired at the end of day I.
- 📍 Reflection about results and parameters along the way would be beneficial.
- 📍 It is a complex tool and 1.5 days are not enough to learn and understand how to use it without a good experience with GIS and Excel.
- 📍 Discussion of results/scenarios could possibly be moved to a follow-up webinar.
- 📍 Exercises or basic testing of the tool should be sent out/asked from the participants beforehand to make them familiar with basic functionalities.
- 📍 Good to start day II with a recap of day I and “where we’re at” in the toolchain.

The Dataset and Tool

Functionalities

- 📍 Generally good
- 📍 The default database is a good feature, especially being offered open source.
- 📍 The online tool is easy to use and easy to grasp in a couple of hours. However, it seems that now it has to be coupled with an extensive use of excel sheets in order to count and evaluate scenarios, as well as for other calculations. I think it would be great if these would be implemented in the online tool as well.

Default data

- 📍 The availability of default data was generally good
- 📍 The quality of default data was generally good



- 📍 Documentation/Wiki can always be improved. It will always be a matter of learning by doing. It has not been so easy to use the documentation in such a short training course.

Calculation modules

- 📍 Which calculation module did you find especially useful? (sorted by occurrences)
 - CM District Heating – Economic Assessment
 - CM Demand projection
 - CM Decentral Heating Supply
- 📍 Which calculation module did you find less useful? Excess Heat Transport Potential
- 📍 It would be interesting to have the possibility of modelling the heat demand according to climate change scenarios and perhaps extreme events such as heat waves.

Overall

- 📍 I would like to congratulate the authors for the Hotmaps tool. It is a very comprehensive and thorough tool, which allows for detailed energy planning, in an open-source platform.
- 📍 It has been a very useful and interesting workshop. I will probably use this tool to get some results for my PhD.
- 📍 This training was very interesting, also allowed a comparison with other countries very useful for a first assessment of decisions and interventions to be made on the local territory, for energy choices, also in economic forecasting and energy goals
- 📍 THANK YOU! It was a great experience. I think that you are onto something very promising and exciting. We need to put the extreme amount of data that is available today to real use via easy-to-use but highly sophisticated tools like yours.
- 📍 Once I start to work with the tool, I will be able to give more detailed feedback on the functioning of the tool.
- 📍 I see applicability for my project. In my case, it will be very important to implement scenarios in an adequate way (so that it could consider demographic changes, densification of certain areas, sprawling, etc.).
- 📍 The Training: was very good, I found it super that there were plenty of people from the Hotmaps crew, who could help us without any waiting time.
- 📍 It is useful for my work with the cities. It is good to be able to have a tool to see the changes on DH sector for EU cities
- 📍 Workshops may be done for different target groups (academic researchers, consultants, agencies, local authorities/planners) and hence address different features in differing depth, based on the target group.

6.1.2 Training in Brussels

The second training was held in Brussels on February 19th/20th, 2020. In total we received feedback from 12 participants. Since the last training we adopted the feedback questionnaire and were therefore able to have some graphs for different questions which are shown below.

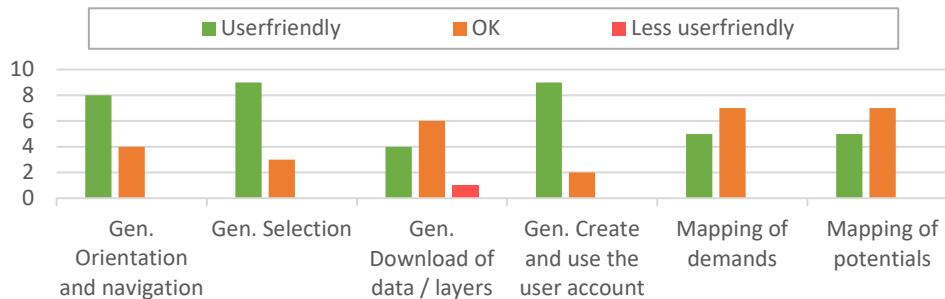


Figure 21: What is your impression of the user-friendliness of the Hotmaps toolbox?

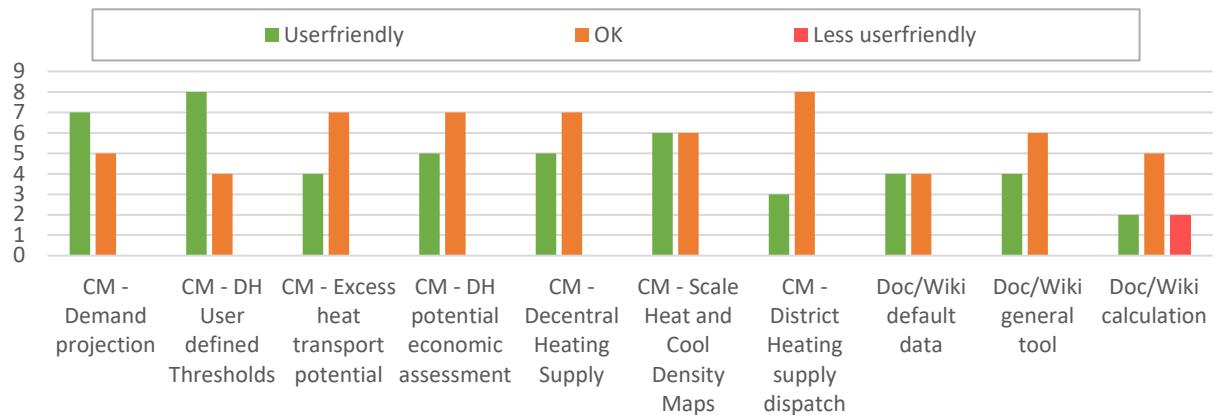


Figure 22: What is your impression of the user-friendliness of the Hotmaps toolbox?

Additional feedback:

- 📍 The support documents of the training course were very good.
- 📍 More and better documentation is required to understand the models behind the calculation modules. Otherwise it is not possible to understand what is being calculated and what the meaning is of the numbers in the output.

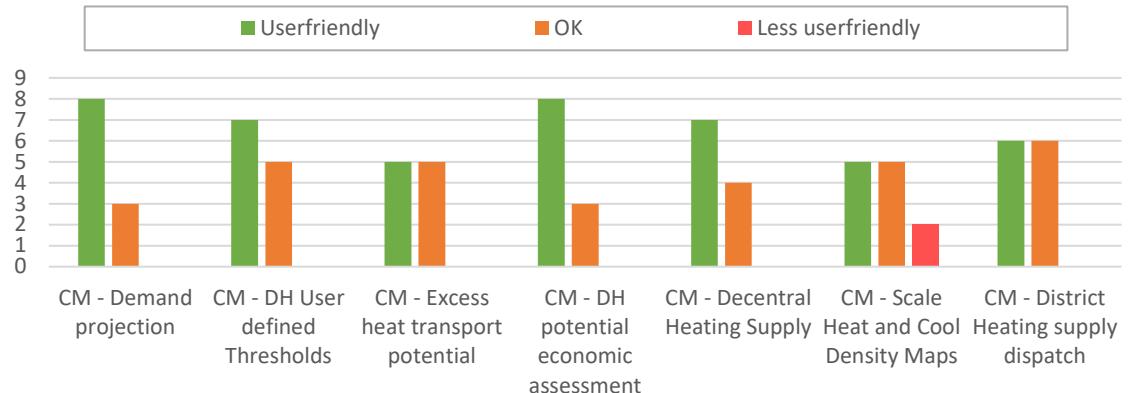


Figure 23: How useful are the different calculation modules provided in the toolbox for your future work?

Additional feedback:

- 📍 The interface could be further improved, especially the layers generated by the calculation module.
- 📍 Better documentation required to understand what is exactly happening and on which models this is based.

How are you planning to use the Hotmaps database and toolbox in your future work?

- 📍 Heat demand density data is useful, and I will be using it as a start for my DH network design.
- 📍 For future projects, there are possibilities for extending energy efficiency projects to urban scale, hence district heating / cooling calculations could be an asset.
- 📍 The tool can be used for a quick energy assessment of an area but not for a detailed analysis.

How often are you planning to use the Hotmaps database and toolbox in your future work?

- 📍 I will probably use it several times a month in the next few weeks to practice more, and I will see afterwards.
- 📍 Once a month maybe
- 📍 Can't offer relevant answer due to uncertainty of future curse of workflow in the company and professional life.

6.2 Online training

A first round of feedback was collected in the support sessions and in the comments posted on the e-learning platform. This concerned mainly the accessibility of the Hotmaps toolbox, usability of the functionalities, and the bugs encountered. This was extremely useful to fix the reported bugs, but it also led to adapting the training material for subsequent trainings. Several notes have been added where relevant in order to explain those concepts that had been proved difficult to understand.



A second round of feedback was collected at the end of the online training through the feedback questionnaire that was filled out by 79 participants, of which we report below the main findings. You can see both the feedback questionnaire used for the [English](#) and for the [German](#) trainings on the Hotmaps Wiki page [Training Material](#) (Giulia Conforto, 2020).

The tool

What is your impression of the user-friendliness of the general functionalities of the Hotmaps toolbox?

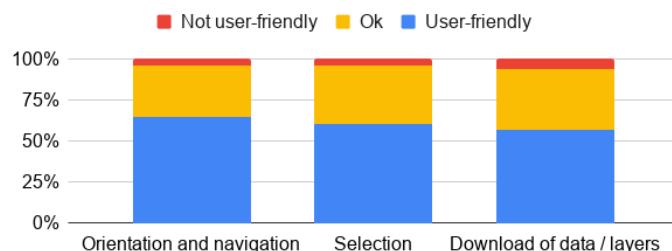


Figure 24: Feedback on the user-friendliness of the too

What is your impression of the user-friendliness of the mapping functionalities and the calculation modules (CM) of the Hotmaps toolbox?

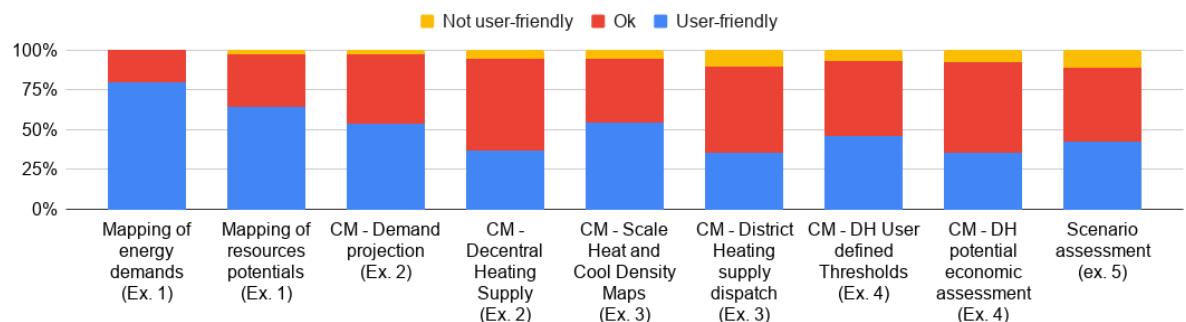


Figure 25: Feedback on the user-friendliness of the mapping functionalities and calculation modules



What needs to be more user-friendly?

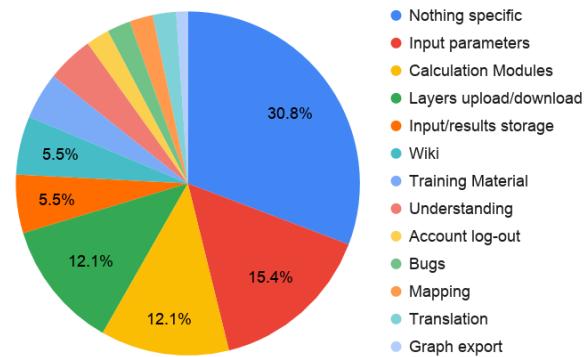


Figure 26: Feedback on what could be more user-friendly

How useful are the different calculation modules provided in the toolbox for your future work?

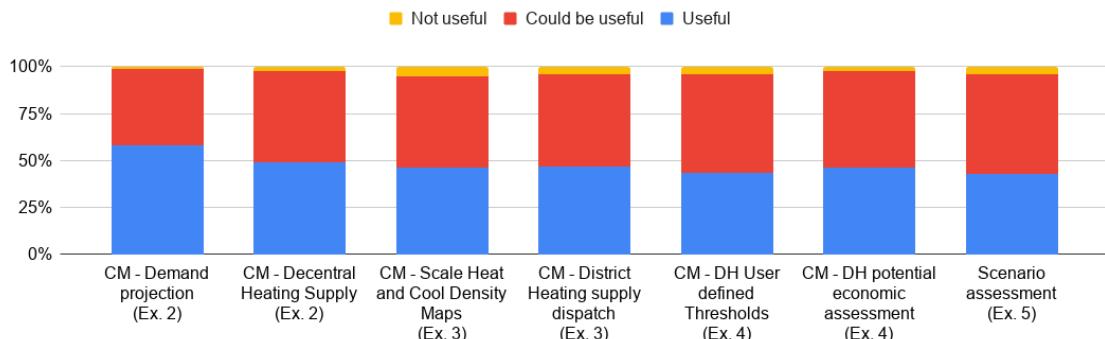
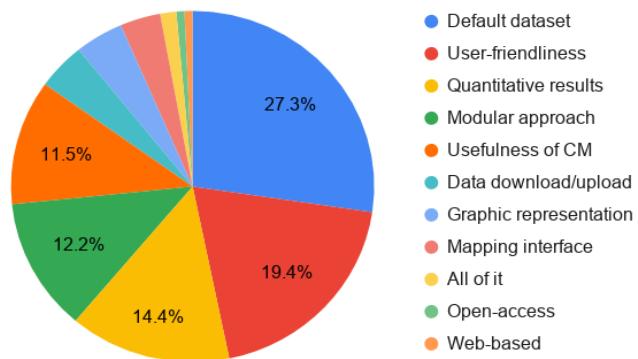
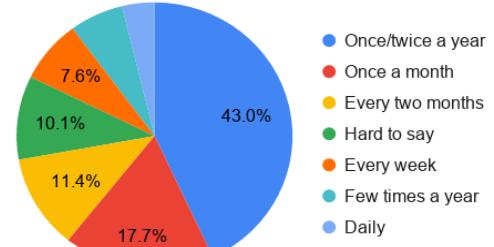


Figure 27: Feedback on the usefulness of the calculation modules

What do you like the most in the toolbox?



How often do you think you will use the Hotmaps database and toolbox in your future work?



For which activities will you use the Hotmaps database and toolbox?

SECAP, Heat planning, and DHC project analysis

Figure 28: Feedback on the most liked part, and expected future use of the tool



The documentation

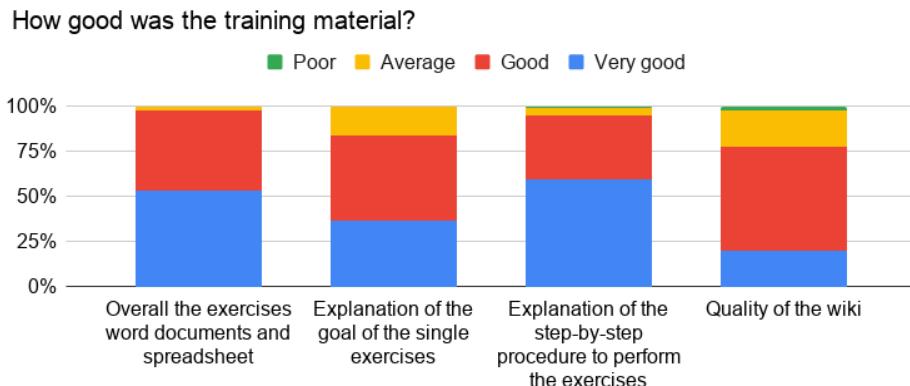


Figure 29: Feedback on the training material

How would you rate the training overall? How was the pace of the training?

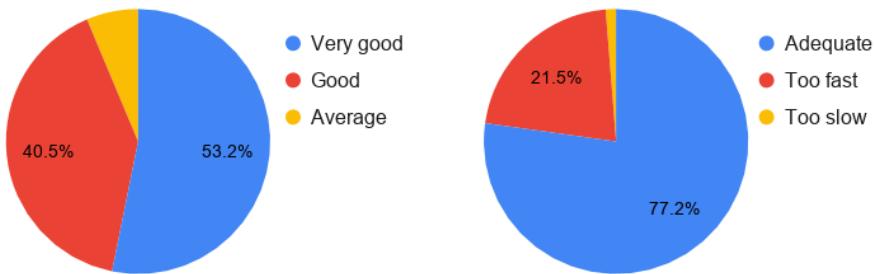
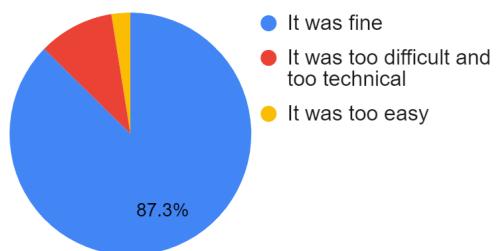


Figure 30: Feedback on the training quality and pace

The online training

What do you think about the level of training?



How user-friendly did you find the Google Classroom platform?

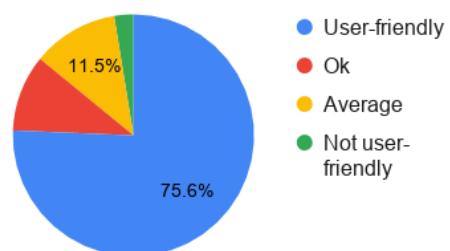


Figure 31: Feedback on the training level and e-learning platform



How useful did you find the training resources?

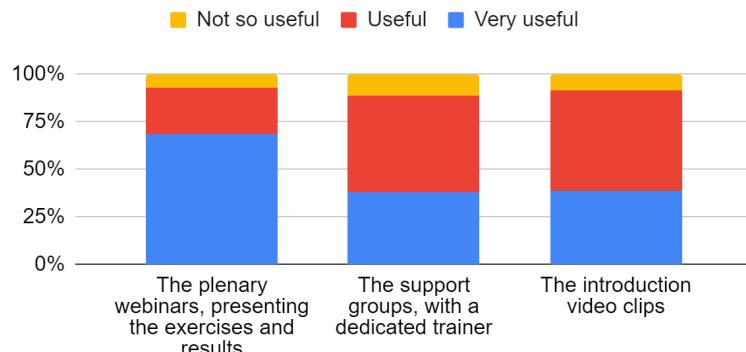


Figure 32: Feedback on different training parts

How often did you use the additional resources?

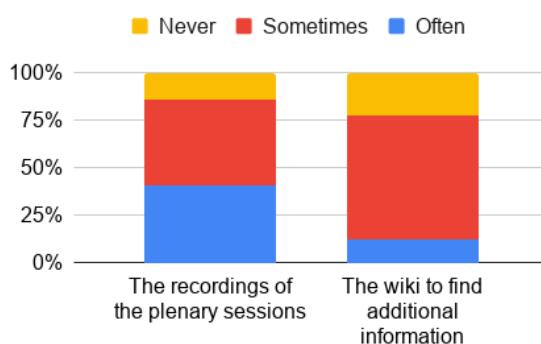


Figure 33: Feedback on additional resources

Participants' suggestions

Level of the training – As previously mentioned, the Hotmaps training was conceived for heating and cooling planning professionals. Accordingly, several participants had already acquired notions of heating and cooling planning theory and could follow the training without additional preparation. Some participants would have even enjoyed more details, additional modules, such as on District cooling and the relation to electricity and transport, as well as more structured and challenging exercises. In particular, some participants asked for better explanation on the definition of terms, the input and output parameters, and the purpose of each exercise, in order to achieve a deeper understanding of the toolbox. However, some other participants, were not familiar with the subject, and decided to join the training anyway, but struggled with understanding the theory behind the Hotmaps toolbox and could have had benefit from some preliminary study of the heating and cooling planning procedures and calculations.

Duration of the training – At the end of both the first two online trainings, a number of participants regretted not finding enough time to complete the training at the level of detail



they would have liked, and suggested in case of future trainings, to stretch the same amount of information over a longer time span. Consequently, the third training was spread over three weeks, but this did not produce a higher level of completion.

Other suggestions have been listed below:

- 📍 Develop more on the overall aim of Hotmaps toolbox and its potential use on top on the mere instructions to use the tool. Focus more on the interpretation, main message and limitations of the output of the calculation modules and the exercises. Clearly divide the training material between the practice of heating and cooling planning and the Hotmaps software application.
- 📍 More team discussions, to share ideas and experiences on H&C modelling.
- 📍 Separate trainings for separate functions.
- 📍 Support sessions in different times of the day.
- 📍 Solve all the known bugs to be able to have next trainings on a stable version.
- 📍 Keep webinars and recordings short and concise, maybe splitting them in more parts.

The afterlife of the Hotmaps-project

Do you use similar tools in your daily work?

- 📍 65% No, no specific H&C planning tool (but some use general energy assessment tools)
- 📍 Others: mainly GIS Tools (ArcGIS, Grass, QGIS, MapInfo, SAGA), BHKW-Plan, Buildup, Dymola, Ecoregion, Energieatlas Baden-Württemberg, Energy plus, HeatRoadMap Europe, Klimaschutzplaner, LEAP (Long Range Energy Alternatives Planning), Matlab, Modelica, Peta, PHPP, Polysun, PostgreSQL + PostGIS, PVSys, Retscreen, Scatter Cities, SEAI BER, Thermos, TOP Energy, Transys, as well as own spreadsheets/systems.

How much do you pay them per year?

- 📍 60% Free
- 📍 40% Up to 1500€/year per license, or up to 5000€.

Would you be willing to pay for a training like this?

- 📍 30% No
- 📍 30% Yes, up to 1000€
- 📍 30% Depending on features/conditions: if adapted to knowledge of participants, more in depth, better preparatory training, if the final version is actually stable, if provided in other languages too

Would you pay to use this tool in the future?

- 📍 45% No
- 📍 50% Yes, if further developed, bugs fixed, some desired features and human support provided. (but only 44% for additional features, 30% for additional storage, 16% for faster calculations)



7 Resources for future training

Hotmaps is an open source database and toolbox, aiming at supporting the adoption of heating and cooling systems in Europe. Hence, it is in the interest of the project to train as many followers as possible. Since the project is approaching its conclusion, a training material section has been set up in the Hotmaps Wiki. This section will remain available after the end of the project to all those users interested in either doing a self-taught and self-paced training or in organising future Hotmaps trainings. In fact, all the material has been developed with a train-the-trainer approach.

The [Training Material](#) page of the Wiki provides all supporting materials at their later version used for the online training and it is structured as follows:

Before the training

- 📍 Email sent to participants before the first webinar [English](#) / [German](#)
- 📍 Tutorial: How to use Hotmaps [English](#) (This tutorial can be seen in any language, by using the youtube automatic translation options)

Handbooks:

- 📍 [Summary of the Hotmaps Handbooks for strategic heat planning](#)
- 📍 [Handbook 1 – Definition & experiences of strategic heat planning](#)
- 📍 [Handbook 2 – Guidance for a comprehensive assessment of efficient heating and cooling](#)
- 📍 [Appendix report to the Handbook for strategic heat planning: Case descriptions](#)

Preparatory Webinar

- 📍 Preparatory webinar: introduction to the Hotmaps project, toolbox, database, and online training [English](#) / [German](#)
- 📍 Presentation used for the webinar [English](#) / [German](#)
- 📍 [Sample Google Classroom](#) English access code: **ealdt6b** / German access code: **tzfxr5w**
- 📍 [Tutorial: How to use Hotmaps](#) (This tutorial is played by default in English, but can be seen in any language, by using the youtube automatic translation options)
- 📍 Introductory video: "How can the toolbox support energy planning?" [English](#)
- 📍 Introductory video: "The EU wide database" [English](#)
- 📍 Test: introduction videos [English](#) / [German](#)

Exercises 1-2

- 📍 Webinar: introduction to exercises 1-2 [English](#) / [German](#)
- 📍 Presentation used for the webinar [English](#)
- 📍 Exercises 1-2 word [English](#) / [German](#)
- 📍 Exercises 1-2 excel [English](#) / [German](#)
- 📍 How to open a CSV [English](#) / [German](#)



Exercises 3-4

- 📍 Webinar: Wrap-up of exercises 1-2, introduction to exercises 3-4 [English](#) / [German](#)
- 📍 Exercises 3-4 word [English](#) / [German](#)
- 📍 Exercises 3-4 excel [English](#) / [German](#)

Exercise 5

- 📍 Webinar: Wrap-up of exercises 3-4, introduction to exercise 5 [English](#) / [German](#)
- 📍 Exercise 5 word [English](#) / [German](#)
- 📍 Exercise 5 excel [English](#) / [German](#)

Closing Webinar

- 📍 Webinar: Wrap-up of exercise 5, feedback questionnaire, certificates and final remarks [English](#) / [German](#)
- 📍 Exercise 5 complete [English](#)
- 📍 Exercise 1-2 complete [German](#)
- 📍 Exercise 3-4 complete [German](#)
- 📍 Feedback questionnaire [English](#) / [German](#)
- 📍 Template for certificates: please contact conforto@e-think.ac.at
- 📍 Presentation used for the webinar [English](#)

Feedback

- 📍 Feedback questionnaire (on-site) [English](#)
- 📍 Feedback questionnaire (online) [English](#) / [German](#)