



**The use of Hotmaps for strategic heat planning**

TU Wien, e-think  
Date: 17.11.2022



This project has received funding from the EU's Horizon 2020 programme under grant agreement no 101033706.

[www.actionheat.eu](http://www.actionheat.eu)



## Webinar 3: The use of Hotmaps for strategic heat planning

ActIonHeat SF1

Time: 1 h 19 min

- Serial 1:
  - Webinar 3
    - Strategical Heating & Cooling planning
    - Group support for municipalities and stakeholders
- Presented by:
  - e-think / Austria
  - TU-Wien / Austria

## Agenda

### Welcome

- I. Strategic heat planning in the vision of Act!onHeat**  
Short recap of previous webinars and the ramp-up call
- II. The Hotmaps Platform**  
Overview of the project (development, platform, dataset, wiki)
- III. Live demonstration of the Hotmaps Toolbox**  
Presentation of the functionalities (features, layers, calculation modules, account)
- IV. Individual exercise**
- V. Further training material**



### Part 1

- Recapitulation of Webinars 1-2

### Part 2

- Preview to Hotmaps.

### Part 3

- Live introduction to the Hotmaps tool

### Part 4

- Interactive use of Hotmaps with participants

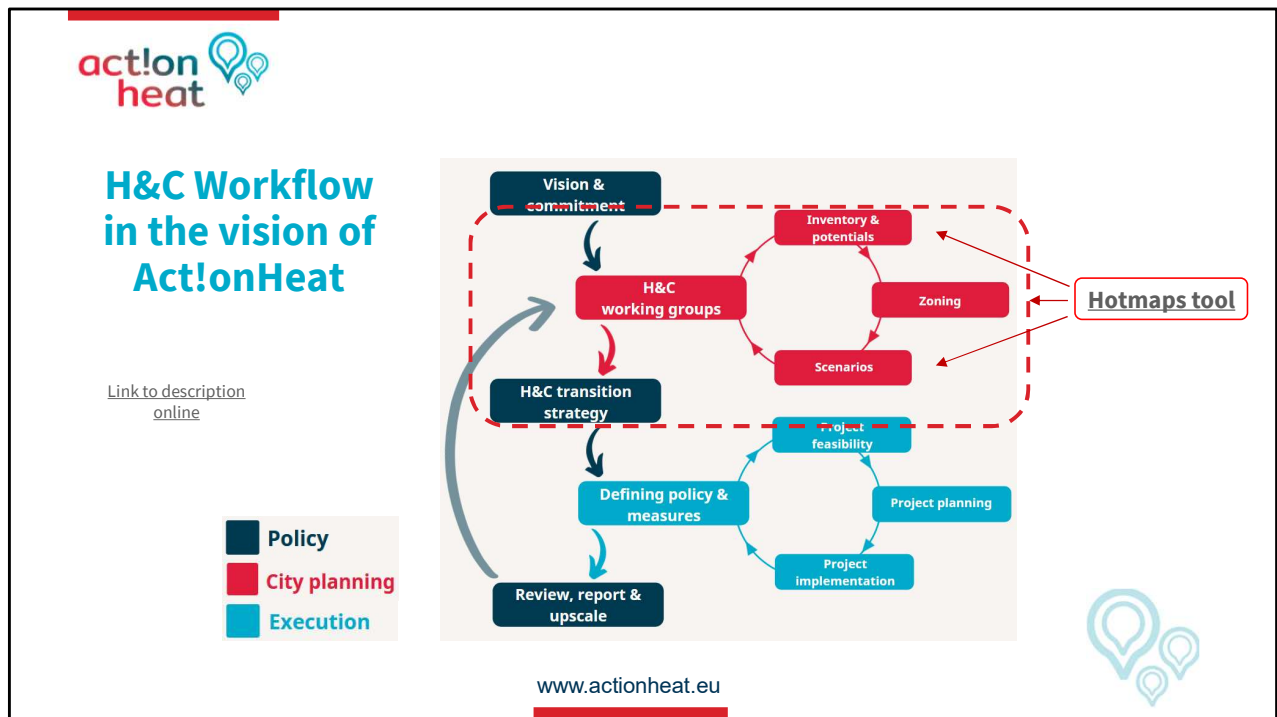
### Part 5

- Extra information for own learning process

## PART I

# Strategic heat planning in the vision of Act!onHeat





## Act!onHeat Workflow

- Focus on City planning

### Policy

- Necessary to know EU targets to achieve them (*Visualization of needs*).

### City planning

- Hotmaps can help to prioritize the zoning and requirements (*Overwie situation*).

### Execution

- Group participation in project implementation steps (*Division of activities*).

## PART II

# The Hotmaps Platform



## Background

- Climate change
- Low CO<sub>2</sub> economy and energy system is necessary
- Heating and cooling is highly relevant
- Heating and cooling needs long term planning
- Aim of Hotmaps: assist long term planning in heating and cooling

[www.actionheat.eu](http://www.actionheat.eu)



## What we can do against the **climate change** crises

- **CO<sub>2</sub> reduction:**  
For example, using less fossil fuels for Heating and Cooling.

How can we do that?

- **Changening H&C systems**  
Which requires a transitory plant for old to new alternatives.

How started?

- Hotmaps assist **long-term planning**  
A tool for H&C visualization for municipalities or stakeholders.



## Hotmaps – What for?

*Hotmaps develops, demonstrates and disseminates **a toolbox to support public authorities, energy agencies and planners in strategic heating and cooling planning** at local, regional and national levels, and in line with EU policies.*

[www.actionheat.eu](http://www.actionheat.eu)



### Hotmaps objective

The tool will be used for Act!onheat project as a part of support facility 1 to help authorities or stakeholders quickly estimate the heat and cooling regional demand.



## Hotmaps – The 3 pillars

- ***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 and adaptable:*** the tool is applicable for cities in all 28 EU Member States by default and users can upload their own data

[www.actionheat.eu](http://www.actionheat.eu)



### Hotmaps fundamental development

User-driven:

- Collaboration of different countries in developing.

Open source:

- Free for use and continue developing.

EU-28:

- Whit EU reliable database for 28 countries.



## Technology Readiness Levels

**Achieved during the Hotmaps project duration**

**TRL 7** – System prototype demonstration in operational environment

**Follow-up project started under the ERA-Net MCall20 to get there (OpenGIS4ET)**

**TRL 8** – System complete and qualified

**TRL 9** – Actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)



### Technology Readiness Level (TRL)

- Indicator of how ready is a software for the market

Hotmas has a readiness level of 7

- Feedback on the tool are in implemented process for level 8, which will be complete in 2024
- The final intention is to achieve a Technological Readness level of 9

## Status of the database and toolbox

- Database:
  - For many data necessary for heating and cooling analysis default data are in the database; however, not all data contained, and data not necessarily correct
  - Follow-up project providing further data → H2020 EnerMaps – finished in July 2022
- Toolbox:
  - Numerous automated and manual tests have been performed on stability and usability for all release versions
  - In this release it's the first time that all CMs relevant for the toolchain are included
  - Still we cannot be sure that no errors occur
- Wiki:
  - Comprehensive with tutorials and training materials
  - Handbooks, strategic energy planning reports available



### Hotmaps database status

#### Data:

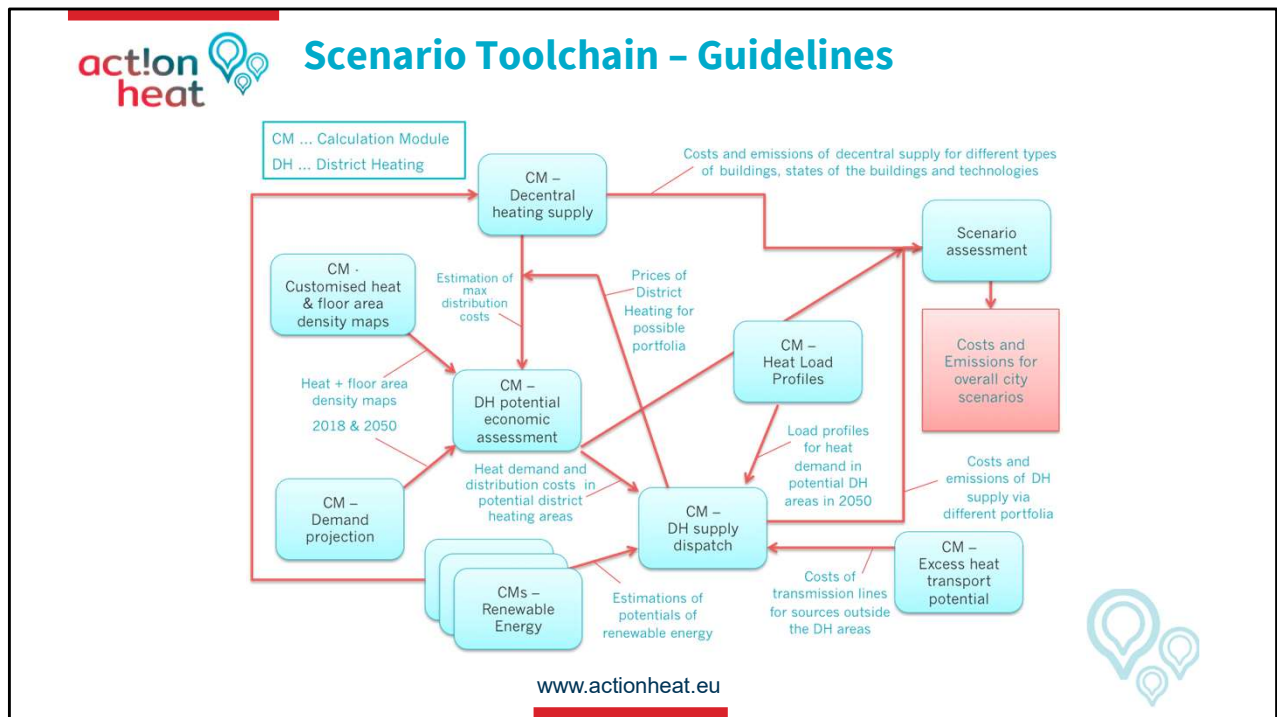
Statistical data change with time and are not 100% accurate. But if required, it is also possible to check the developed calculation methodology in the Wiki link.

#### Toolbox:

It is possible to find errors in the platform when using it; if that happens, press control F5 to reload.

#### Wiki:

It is possible to find extra explanation information for the tool and its use, but it must also be completed.



### Hotmaps Calculation Modules CM

- CM could be used independently:  
The illustration shows how different calculation modules can be used to analyze different aspects of the heating and cooling system and research questions. Furthermore, it also shows how the calculation modules can be used as a chain of tools to derive scenarios for heating and cooling in certain areas.
- CM are combined to generate another model:  
The main idea is to combine CM in different ways to create another CM more complex combination. Nevertheless, all of them are a combination of different statistical data.

## PART III

# Live demonstration of the Hotmaps Toolbox

[www.hotmaps.eu](http://www.hotmaps.eu)

[www.actionheat.eu](http://www.actionheat.eu)

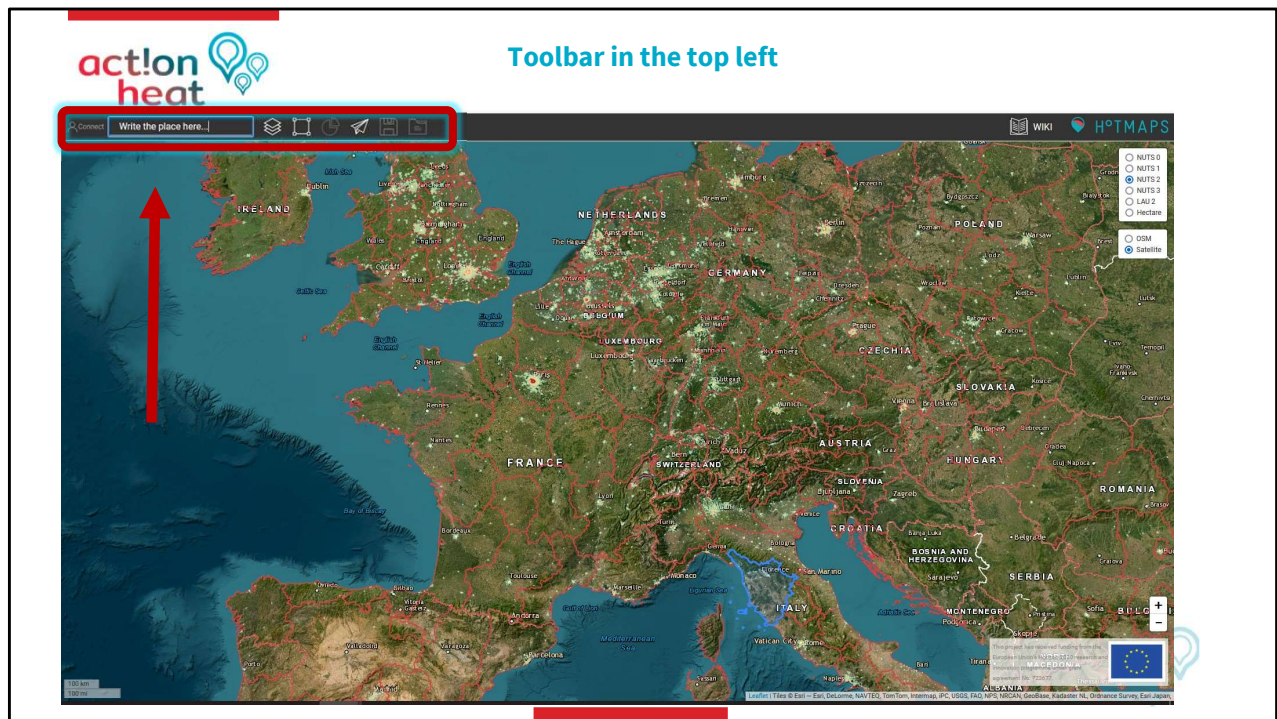


This part of the Webinar was shown online going to: [www.hotmaps.eu](http://www.hotmaps.eu)

### Note:

The next slides are not part of the original presentation. Those were added with the intention to continue explaining this part of the Webinar because the tool was shown online. During the next part of this document, the platform will be described step-by-step, showing images tokened from the internet to follow the demonstration for this part of the Webinar explanation.





### Pictographic icons or windows in the top left

First icon: Connect

- Allow you: To register on the platform to use specific functions.

Second window: localization

- Allows you to go to a specific region. Taping the name of the place.

Third icon: Layers

- Allows you to activate visualization of different H&C Parameters.

Fourth icon: Selection

- Allow you to select a specific region on the map to work with.

Fifth icon: Results

- Allows you to close and open the result window.

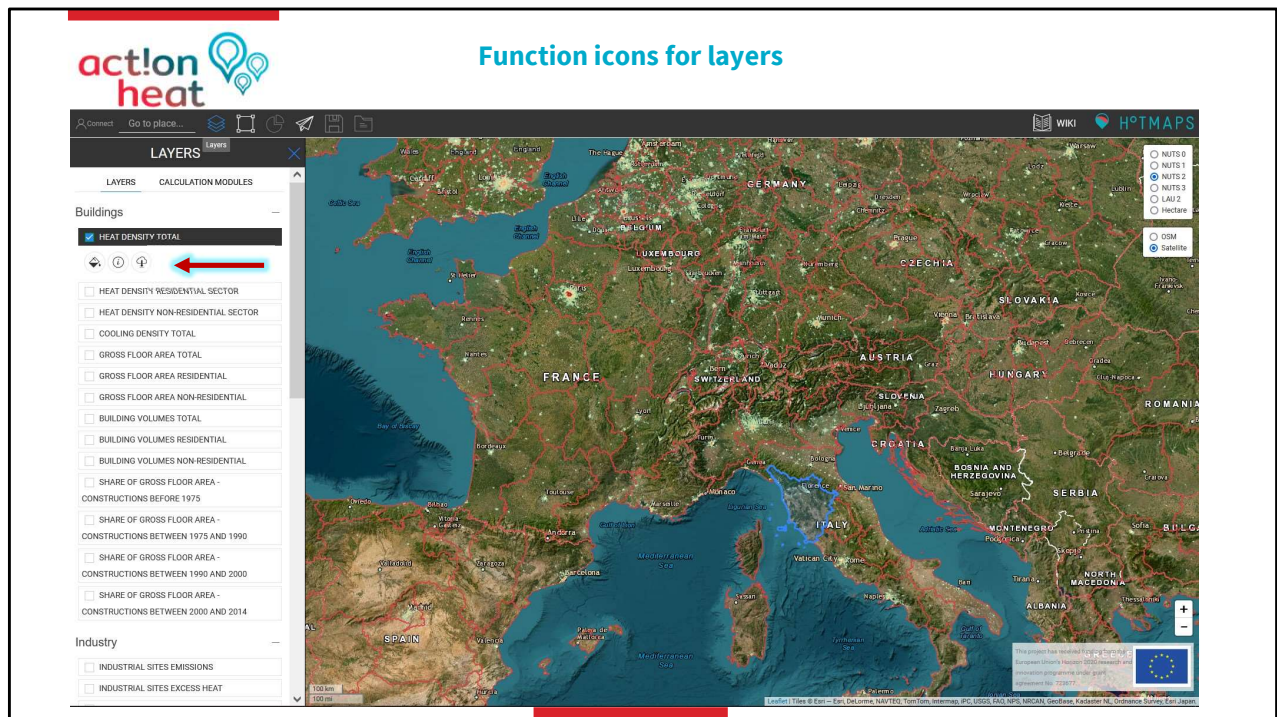
Sixth icon: Feedback

- Allows you to write a comment to the developers for issues.

Seventh and eighth icons: Save and Folder

- Allows you to save your calculations and find them in a specific folder.

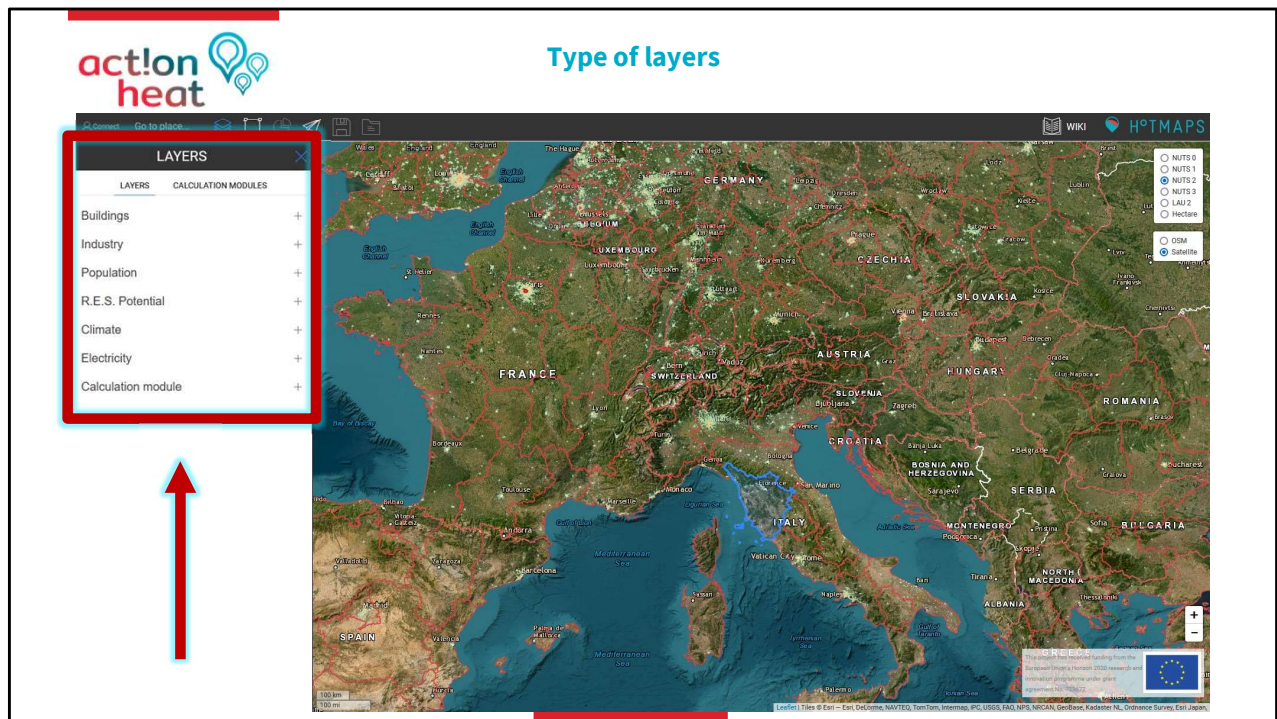




## Layers functions and description

Go to the layer and click on it.

- Allows you to activate the layer function and the next iconic possibilities:
- Icon one: Symbology  
Allows you to know the parametrical color description on the layer
- Icon tow: Information  
Allows you to address you to extra information about the layer
- Icon tree: Download  
Allows you to download default data set



### Different kinds of layers and its visualization

**Buildings.** Is a Raster Layer RL that indicates building volume or a construction area and the heat cooling demand for residential and not residential areas.

**Industry.** Is a Vector Layer VL that shows you specific information about industries like excess heat and carbon emissions

**Population.** VL that shows you the total population in a selected area,

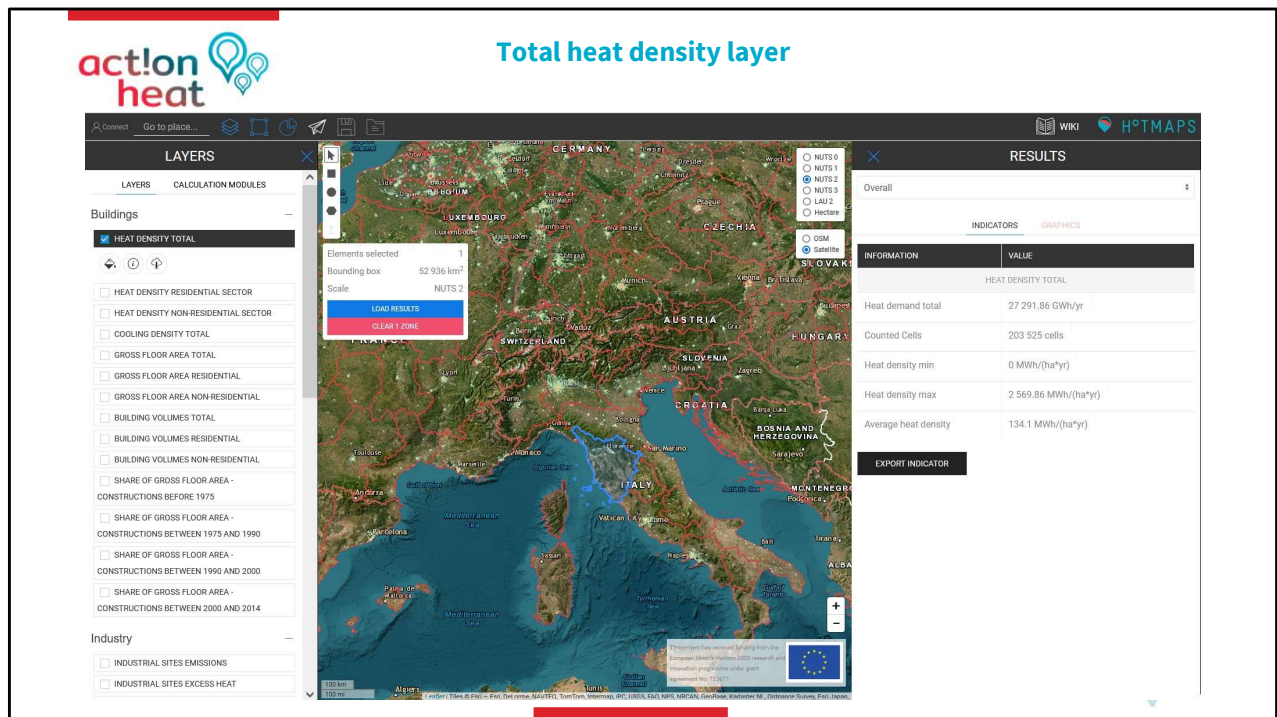
**Renewable Energy Sources R.E.S Potential.** RL that shows you energy potentials like solar radiation, wind, or Forest residues.

**Climates.** RL that shows you temperature percentage like cooling or heating days, wind speed, or solar radiation.

**Electricity.** VL shows you the electricity CO<sub>2</sub> emission in a country average

**Calculation Modes.** RL and VL layers that are combined to give more specific information. This layer will only open if you select an area and load results.





To visualize layer results, it is necessary to select a specific area.

Example:

1.- Selection: Specific area on the map.

Visualization: That area will appear in another color, like blue.

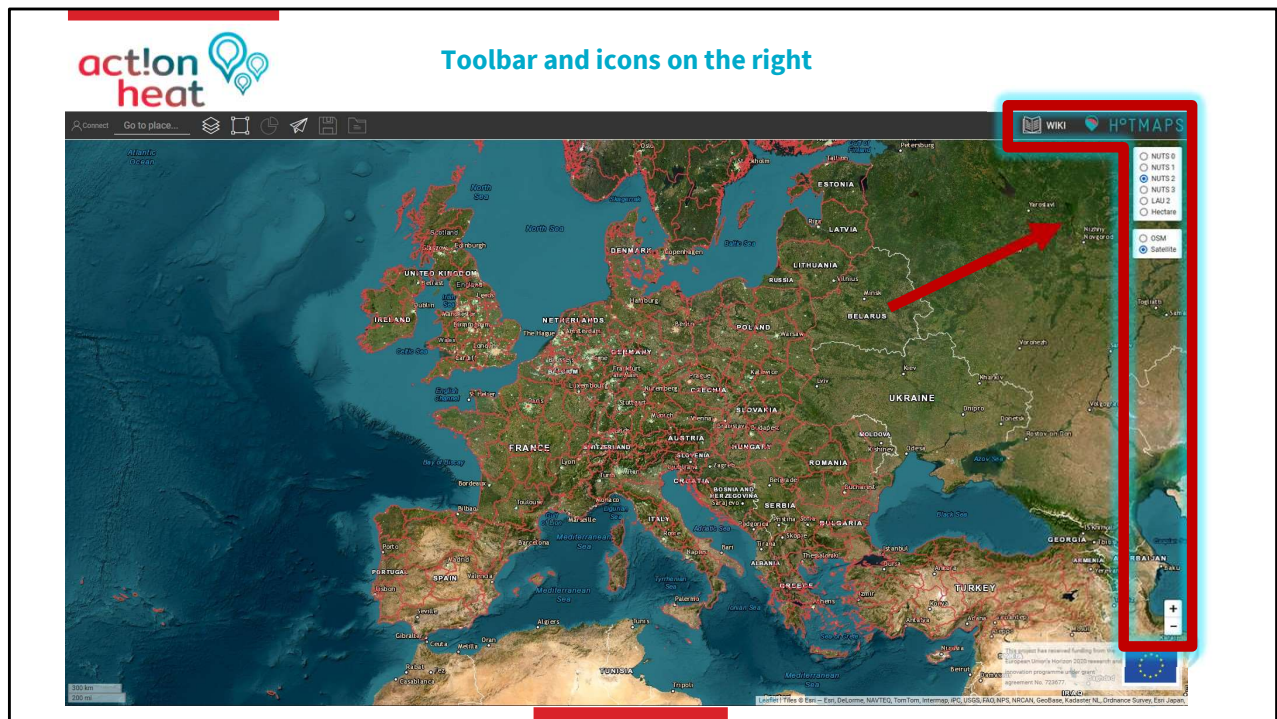
2.- Selection: Specific layer, for example; HEAT DEMAND TOTAL

Visualization: A box right to the layer will appear with information about the selected zone with the number of elements selected. Bounding box. Scale. and the possibility of Loading results or Clear the zone.

3.- Selection: The box color blue, and LOAD RESULTS

Visualization: A RESULT box at the right of the window appears and will show you the results of the selected layer according to that area; for the HEAT DEMAND TOTAL layer, you will observe the Heat demand total. Counted cells. Heat density min and max., and Average heat density.

Note: The CALCULATION MODULES will be open only following the steps already mentioned; select a specific area, and load the results for some layer.



## Pictographic icons or windows on the right side

On the top

First icon top: Wiki

- Allows you to open a Hotmaps general explanation.

Second icon top: HOTMAPS

- Allows you to open the project development homepage.

On the side

First window side: NUTS and Hectare

- Allows you to change the territorial unit division on the map.

Second icon bottom side: Zoom

- Allows you to zoom in or out on the map window.

**action heat**

## Hotmaps Wiki

The Hotmaps Wiki hosts the documentation, guidance and manual of the Hotmaps toolbox. It consists of the following main parts:

1. Data sets,
2. General toolbox functionalities,
3. Calculation modules,
4. How to apply the Hotmaps toolbox?
5. Developers.

These sections are accessible in all Wiki pages in the sidebar.

The **Data sets** section provides information about Hotmaps data set repositories as well as methodologies for gathering these data sets.

The **General tool functionalities and structure** section guides the user through the interface of the toolbox. The section covers all general aspects of the toolbox, which are related to the user experience, e.g. navigating through different parts of the toolbox, layer selection, retrieving indicators, data upload and export functionalities etc.

The **Calculation Modules** section provides an in-depth explanation of concepts and methodologies behind the calculation modules. Besides the explanation of the methodology, the provided examples and test runs for each calculation module help the user to obtain an understanding of input parameters and output results. Some calculation modules are integrated into the toolbox, while others are stand-alone.

The section **"How to apply the Hotmaps toolbox"** is one of the most important sections of this wiki. It helps Hotmaps users to perform heating and cooling planning with the Hotmaps toolbox and includes guidelines on using Hotmaps at the local and national levels, as well as training materials. This section illustrates how different calculation module can be used to analyze different aspects of the heating and cooling system and different research questions. Furthermore, it shows, how the calculation modules can also be used as a chain of tools to derive scenarios for heating and cooling of certain areas. This toolchain is depicted schematically below:

**Scenario Toolchain Hotmaps**

```

    graph TD
      CM1[CM - Customized heat and gross floor area density maps] --> CM2[CM - Scale heat and cool density maps]
      CM2 --> CM3[CM - Demand projection]
      CM3 --> CM4[CM - Heat load profiles]
      CM4 --> CM5[CM - District heating potential areas user-defined thresholds]
      CM5 --> CM6[CM - District heating potential: economic assessment]
      CM6 --> CM7[CM - District heating supply dispatch]
      CM7 --> CM8[CM - Decentral heating supply]
      CM8 --> CM9[CM - Solar thermal and PV potential]
      CM9 --> CM10[CM - Shallow geothermal potential]
      CM10 --> CM11[CM - Heat source potential]
      CM11 --> CM12[CM - Biomass potential]
      CM12 --> CM13[CM - Wind potential]
      CM13 --> CM14[CM - River heat transport potential]
      CM14 --> CM15[CM - Scenario assessment]
      CM15 --> CM16[CM - Add industry plant]
      CM16 --> CM17[CM - Vehicle stock at NUTS 2 level]
      CM17 --> CM18[CM - Scenario assessment]
      CM18 --> CM19[CM - Scenario assessment]
      CM19 --> CM20[CM - Scenario assessment]
  
```

## Wiki link in Hotmaps

### Calculation modules (CM)

- CM - Customized heat and gross floor area density maps
- CM - Scale heat and cool density maps
- CM - Demand projection
- CM - Heat load profiles
- CM - District heating potential areas user-defined thresholds
- CM - District heating potential: economic assessment
- CM - District heating supply dispatch
- CM - Decentral heating supply
- CM - Solar thermal and PV potential
- CM - Shallow geothermal potential
- CM - Heat source potential
- CM - Biomass potential
- CM - Wind potential
- CM - River heat transport potential
- CM - Scenario assessment
- CM - Add industry plant
- CM - Vehicle stock at NUTS 2 level

### How to apply Hotmaps toolbox

- Guideline: Hotmaps toolbox on local level
- Guideline: Hotmaps toolbox on national level
- Concept for using Hotmaps for district cooling
- [Training material](#)

### For Developers

- Developers section
- Guidelines for defining indicators
- Guidelines for writing a Hotmaps Wiki page

### 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

What the Hotmaps Wiki contains:

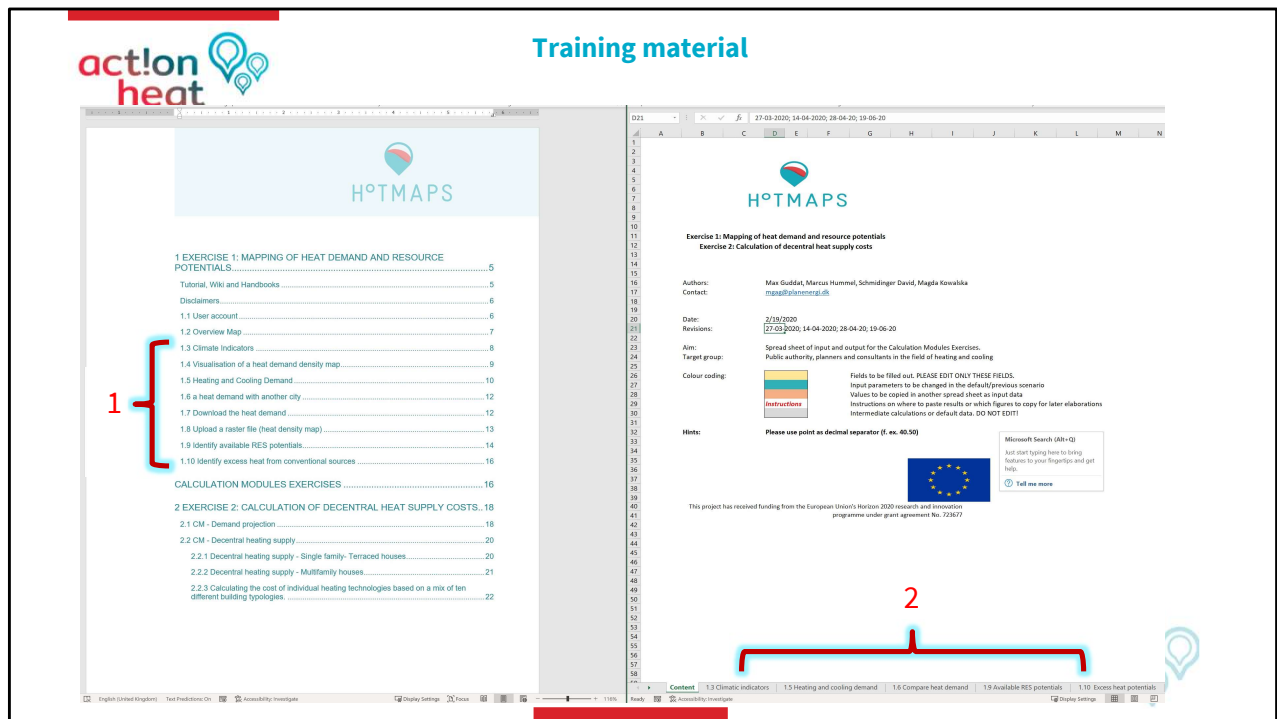
1. Data sets
2. General toolbox functionalities
3. Calculation modules
4. How to apply the Hotmaps toolbox?
5. Developers

Wiki explains how the data are generated in Hotmaps and how the tool could be used through the next elements:

- Introduction: Explain each of the elements from the tool
- Functionalities: Explain general toolbar information
- Methods: Explain how the functions and modules are calculated.
- Guidelines: How to use Hotmaps
- Training material: Exercises to improve your knowledge**
- Developers: How to improve the tool

For the webinar:

First, click on **Training material** and then scroll down to **Exercises 1-2** and download the Word and the Excel format.



**Training material:** Download and open **Word and Excel exercise documents.**

The Hotmaps explanation list of the exercises with the number 1 on the Word document is used to understand how to fill out the Excel sheet marked with the number 2.

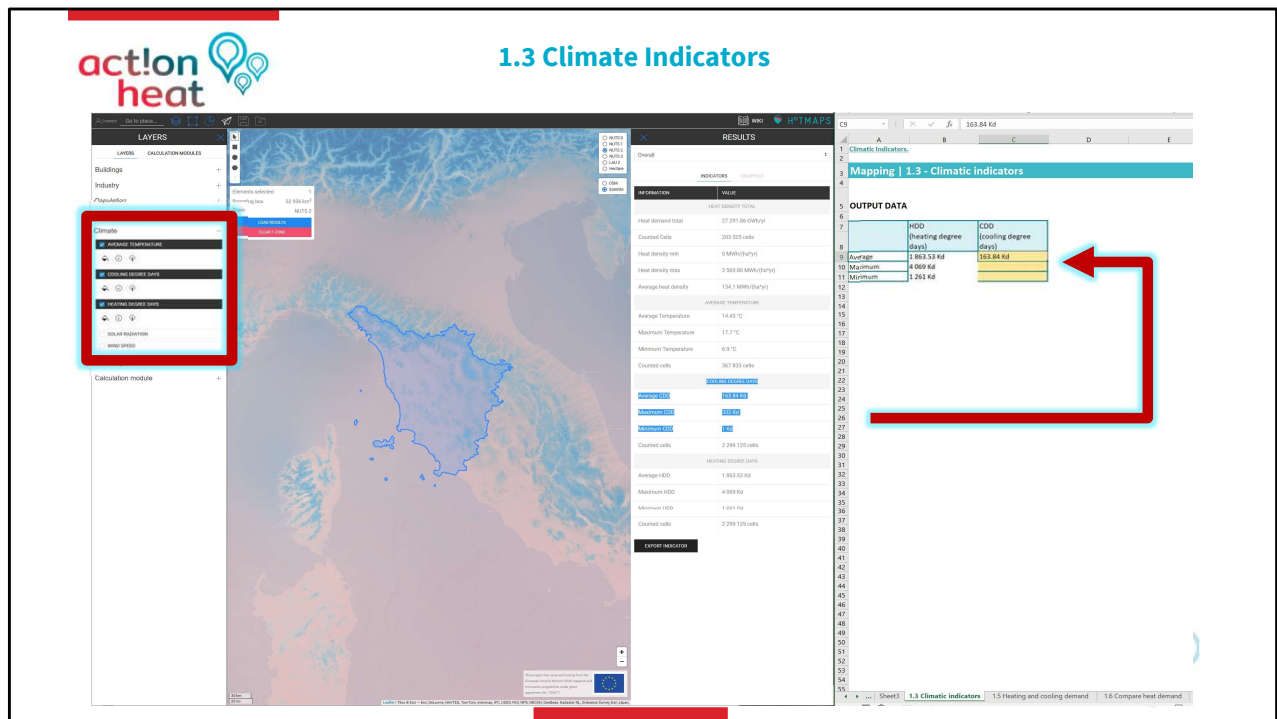
### Word 1

- 1.3 Climate Indicators
- 1.5 Heating and Cooling Demand
- 1.6 a heat demand whit another city
- 1.9 Identify available RES potentials
- 1.10 Identify EH from Conv. Sources
- 2.1 Demand projection
- 2.2.1 Decentral heating supply-Single fam.
- 2.2.2 Decentral heating supply-Multifam.
- 2.2.3 Calculating heating tec. on ten dif. building typologies

### Excel 2

- 1.3 Climatic Indicators
- 1.5 Heating and Cooling demand
- 1.6 Compara heat demand
- 1.9 Available RES potentials
- 1.10 Excess Heat (EH) potentials
- 2.1 Demand projection
- 2.2.1 Decentral heating supply
- 2.2.2 Decentral heating supply
- 2.2.3 Decentral heating supply

Note: The data to fill the Excel table will be found on the Hotmaps plataform; follow the instructions.



The Excel data can be found on the Hotmaps platform:

Word 1

**1.3 Climate Indicators**

1.5 Heating and Cooling Demand

1.6 ....

Excel 2

**1.3 Climatic Indicators**

1.5 Heating and Cooling demand

1.6 ....

For example, for **Climate Indicators**:

1.- Go to Hotmaps layers and choose **Climate**

2.- Select an area of interest and click on it.

3.- Select the climate indicators that you are looking for from Excel:

**Average temperature**

**Cooling degree days**

**Heating degree days**

4.- **LOAD RESULTS** from an interest area with specific parameters according to the interest municipality area for H&C planning.

5.- Fill out the results from Hotmaps in your Excel sheet to complete the exercise.

## PART IV

# Individual exercise





## Individual exercise

1. Open the toolbox in your browser (firefox or chrome preferred) -> [www.hotmaps.eu](http://www.hotmaps.eu)
2. Enter the name of the region you are interested in in the search field
3. Select the level of detail (NUTS 0 - NUTS3, LAU2, Hectar)
4. Activate the layer „HEAT DENSITY RESIDENTIAL“ and „GROSS FLOOR AREA RESIDENTIAL“
5. Select the region of interest in your desired level of detail by clicking on the shape
6. Click on the button “LOAD RESULTS” to receive the results-> write down the results
7. Click on the tab “CALCULATION MODULES”
8. Select the CM “CM - District heating potential areas: user-defined thresholds”
9. Define a threshold for min. heat demand in hectare
10. Click “RUN CM” to receive the potential share of district heating from total demand in selected zone



For the participants:

The participant needs to follow the instruction, open the Hotmaps tool, and complete the exercise. The intention is that they start to familiarise themselves with the tool.

The decision to perform the calculation should remain flexible and tailored to each specific case.

Users were provided with a 10-minute window to transition between discussion and tool testing.



## Further training material

- Extensive training materials in the [hotmaps wiki](#) (training videos, guidelines, exercises, etc.)
- Experts from the Act!onHeat - consortium offer live training sessions for local authorities, energie planners, stakeholders, etc.

[www.actionheat.eu](http://www.actionheat.eu)



Wiki:is the starting point for strategic Heating and Cooling planning.

Act!on heat offers as a part of its support package the possibility to make an appointment and receive workshops making an appointment.





Thank you.



TU Wien, e-think  
Date: 17.11.2022



This project has received funding from the EU's Horizon 2020 programme under grant agreement no 101033706.



[www.actionheat.eu](http://www.actionheat.eu)

