PLANHEAT prototype – Mapping Module

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MAPPING H&C DEMAND AND SUPPLY WITH THE MAPPING MODULE

Mapping H&C demand and supply in your city

The Mapping Module is the first module of the integrated PLANHEAT tool. It contains models for mapping and quantifying current and future H&C demand. It also enables to map energy sources potential for low carbon heating and cooling.

What would you like to map?

Demand
- CMM - Current city based heat & cooling mapping
- CMM - Future city based heat & cooling mapping
- DMM - Current and future district based H&C mapping

Supply
- SMM - Potential heat & cooling supply
TWO APPROACHES FOR MAPPING THE DEMAND

<table>
<thead>
<tr>
<th></th>
<th>City Mapping Module - CMM</th>
<th>District Mapping Module - DMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>Exploration of the distribution of different types of H&amp;C demand within the city</td>
<td>Bottom up assessment of H&amp;C demand per building at the district level</td>
</tr>
<tr>
<td>Input data</td>
<td>Final energy consumption data and spatial indicators</td>
<td>Building properties</td>
</tr>
<tr>
<td>Temporal resolution</td>
<td>Annual</td>
<td>Annual and hourly</td>
</tr>
<tr>
<td>Spatial resolution</td>
<td>50m – 1 km</td>
<td>Buildings</td>
</tr>
</tbody>
</table>
THE DEMAND MAPPING MODULE

Parameters mapped:

Demand Residential
- Space heating (high/medium/low)
- Domestic hot water
- Space Cooling

Demand Tertiary
- Space heating (high/medium/low)
- Domestic hot water
- Space Cooling

Space heating

Domestic hot water

Space cooling
CITY DEMAND MAPPING MODULE

Antwerp

- Residential
  - Space heating high temperature
  - Floor area residential high temp
  - Heat island map
- Space heating medium temperature
  - Floor area residential med temp
- Space heating low temperature
  - Floor area residential low temp
- Domestic hot water
- Population density
- Floor area general

Services
- Space heating high temperature
- Floor area tertiary high temp
- Space heating medium temperature
- Floor area tertiary med temp
- Space heating low temperature
- Floor area tertiary low temp
- Domestic hot water
- Employment density tertiary sector
- Space cooling
- Floor area tertiary buildings

PLANHEAT CURRENT DEMAND
Detecting UHI effect with Heating Degree Hours map

CITY DEMAND MAPPING MODULE
CITY DEMAND MAPPING MODULE

Antwerp

- Demand
  - Residential
    - Space heating high temperature
      - Floor area residential high temp
      - Heat island map
    - Space heating medium temperature
      - Floor area residential med temp
    - Space heating low temperature
      - Floor area residential low temp
  - Domestic hot water
    - Population density
  - Services
    - Space heating high temperature
    - Floor area tertiary high temp
    - Space heating medium temperature
    - Floor area tertiary med temp
    - Space heating low temperature
    - Floor area tertiary low temp
    - Domestic hot water
      - Employment density tertiary sector
    - Space cooling
      - Floor area tertiary buildings
DISTRICT DEMAND MAPPING MODULE

Simplified assessment

Complete assessment
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Supply
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Start
PLANHEAT SOURCE MAPPING

List of PLANHEAT sources for low carbon heating and cooling

- Conventional sources:
  - Solar thermal
  - Biomass from agriculture
  - Biomass from forestry
  - Shallow and deep geothermal
- Industrial excess heat
- Unconventional sources:
  - Data centres
  - Supermarkets
  - Refrigerated storage facilities
  - Indoor car parkings
  - Subway networks
  - LNG terminals
  - Sewage
  - Water bodies

Calculation of theoretical-technical supply

- Choice between basic and advanced calculation methods depending on data availability
- Based on European studies and datasets as much as possible
  - Permanent link with PLANHEAT webserver to have the most up-to-date versions of the European data
- Possibility to use local (statistical and geographical) data
- Default values (per country) are suggested, but can always be overruled by the user
## EXAMPLE METHOD 1: BIOMASS FROM FORESTRY

### Map

<table>
<thead>
<tr>
<th>Map</th>
<th>Mapped variable [unit]</th>
<th>Data specification</th>
<th>Default maps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forest cover [ha]</td>
<td>Map indicating the forests, split in Broadleaved Forest, Coniferous Forest, Mixed forest</td>
<td>Corine Land Cover (2018)</td>
</tr>
<tr>
<td>2</td>
<td>Protected area</td>
<td>Natura2000 sites in Europe</td>
<td>Natura2000 areas (2017)</td>
</tr>
<tr>
<td>3</td>
<td>Global ecological zones</td>
<td>Difference between temperate / boreal / subtropical forests</td>
<td>Global ecological zones (2010)</td>
</tr>
</tbody>
</table>

### Data

<table>
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<tr>
<th>Data</th>
<th>Variable [unit]</th>
<th>Data specification</th>
<th>Default values</th>
</tr>
</thead>
</table>
| 1    | Net annual increment (NAI) [m³/ha.year] | Based on GEZ and forest type | Source: IPCC  
GEZ - Temperate forests:  
- Coniferous: 3.0 tonnesDM/ha·yr  
- Broadleaf: 4.0 tonnesDM/ha·yr  
- Mixed: 4.0 tonnesDM/ha·yr |
| 2    | Net calorific value [MWh/tDM] | Density of the different wood species | Source: IPCC  
- Coniferous: 19.2 MWh/tDM  
- Broadleaf: 19.0 MWh/tDM  
- Mixed: 19.1 MWh/tDM |

*Cities can always overwrite default values if they have better quality data available*
EXAMPLE 2: INDUSTRIAL EXCESS HEAT

1. Companies with CO2 emissions reported in the European E-PRTR database
   - Excess heat mapped automatically. Other ETS companies are mapped, user can estimate indication of available excess heat (see step 2).

2. User adds source to the map based on
   - CO2 emissions (if known)
   - Fuel consumption (if known)
   - If above is unknown, footprint area of the industrial buildings
TOWARDS THE PLANNING/SIMULATION MODULE

- Development of the Mapping Module with the support of the 3 PLANHEAT validation cities and other ‘PLANHEAT cities’
- Release of the third and final prototype of the Mapping Module by the end of May 2019
- The Mapping Module can be used on its own for mapping purposes, but it’s also the portal towards the Planning and Simulation Module where demand and supply are combined to create H&C plans for the future.

- **KPI selection and scenario definition**
- **District heating grid route optimizer**
- **Hourly balancing load/supply**

![KPI selection and scenario definition chart]

=> See presentation on the Planning and Simulation Module of PLANHEAT
Thanks for your attention!

For more information on the Mapping Module: follow a (live) training session or check the E-learning platform on the PLANHEAT website at www.planheat.eu

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