A European Heat Density Map

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The Hotmaps Project

Heating and Cooling: Open Source Tool for Mapping and Planning of Energy Systems

The goal of Hotmaps is to develop an open source heating and cooling mapping and to provide default data for EU28 at national and local level. These data and tool allow public authorities and stakeholders to identify, analyse, model and map resources and solutions to supply energy needs within their territory of responsibility in a resource and cost efficient way. Those results will help authorities to develop heating and cooling strategies on local, regional and national scale which are in line with RES and CO₂-Emission targets on national and EU level.

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Closing existing data gaps: heating and cooling dataset available for the EU-28

The dataset lays the foundation for the Hotmaps tool. The developed data set covers all EU-28 countries (plus Norway, Switzerland and Iceland) and estimates based on a top-down approach the energy needs for heating, cooling and domestic hot water preparation, as well as underlying key indicators such as population, value added, heated gross floor area, heated building volume, share of buildings per construction periods or heating and cooling degree days on a 100x100 m level.

Key input data

The datasets builds on statistical data of the national buildings stock such as number buildings, floor area, as well as technical data such as u-values and specific energy needs (also provided at Gitlab). Furthermore, the resulting calculated final energy demand is calibrated to the national energy balances. For the distribution on the local level, calculated spatial data, such as population and value added a long with spatial data extracted from satellite images such as building footprint, land sealing rates or Corine land cover data and building data from the openstreetmap database are used.

Building footprint on 10x10m level Daily temperatures 2000-2014

The approach Methodology report: NUTS 3 - Level NUTS 0 – Level **Distribution of NUTS 0 data to NUTS 3 level:** Based on the results of the project: Territories and low-carbon **Statistical Data:** economy [Espon Locate, 2017] using • Population • Building stock characteristics **Statistical data:** • Number of buildings • Population • Number of dwellings • Building stock characteristics • Net floor area of dwellings • Number of buildings and dwellings per building type • Energy consumption per energy carrier • Net floor area of dwellings, share per construction period • Value added per sectors **Calculate data / data from literature: Calculate data:** • Useful energy demand (energy needs) • Heating degree days Hectare (100x100m) Level **Distribution of NUTS 3 data to Hectare level:** Average energy needs per gross floor **Population** • Population on 1km² and 250x250 level, area indicator population per LAU2 (LAU1) region Ratio of hectare grid cell value to NUTS 3 • Corine land use data (hectare level)

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Application within the Hotmaps toolbox

Besides accessing the developed data set directly (provided at Gitlab) using GIStools such as QGIS, the analyses can also be performed using the Hotmaps Toolbox, which is currently under development.





Referenced literature and key input data

C. Schremmer et al., "Territories and low-carbon economy (ESPON Locate), Annex to the Final Report (Scientific Report)," ÖIR GmbH, Vienna, Jul. 2017.

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- Joint Research Center, "Estimation of the Gross Domestical Product 2006 in the 119 000 LAU2 of the ESPON Area." ESPON, 2011.
- Haylock, M.R., van den Besselaar, E. J. M., van der Schrier, G., and Klein Tank, A. M. G., "A European daily high resolution observational gridded data set of sea level pressure," J. Geophys. Res., vol. 116, 2011.

Conclusion

Even though the developed data set builds on available, generic data on the local building stock rather than on actual measurements, it can be used as a valuable starting point for regions, for which such data are not available or accessible.

Eurostat, "Gross value added at basic prices by NUTS 3 regions [nama_10r_3gva]." Eurostat, 2016. Gallego F.J., "A population density grid of the European Union." Population and Environment. 31:460-473, 2012. EC, JRC, Columbia University, "GHS population grid, derived from GPW4, multitemporal (1975, 1990, 2000, 2015)." European Commission, Joint Research Centre (JRC), 2015.

European Environment Agency (EEA), "Corine Land Cover (CLC) 2012, Version 18.5.1." European Environment Agency.

OpenstreetMap. 2018.

Pezzutto et al., "Report on Open Data Set for the EU28", D2.3 Report of the Hotmaps Project, http://www.hotmaps-project.eu/wp-content/uploads/2018/05/D2.3-Hotmaps FINAL-VERSION forupload.pdf

Access the dataset at (Geotif format): https://gitlab.com/hotmaps

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Learn more about the Hotmaps dataset and planning tool: www.hotmaps-project.eu



