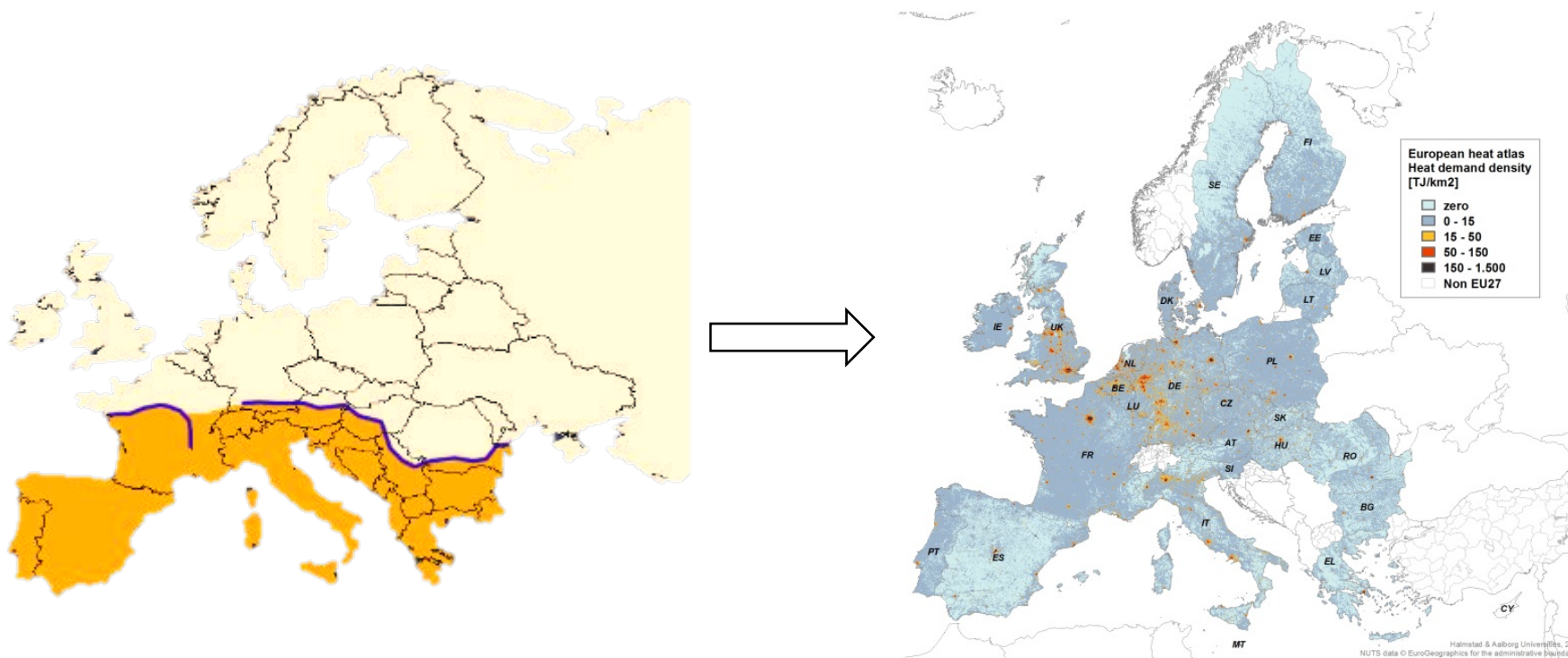


Heating demand and supply analysis – Development of an energy atlas

Tomislav Novosel, Asst. Prof. Tomislav Pukšec, Prof. Neven Duić

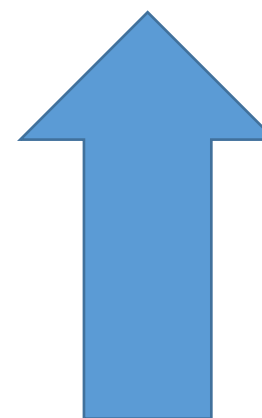
Faculty of Mechanical Engineering and Naval Architecture, Department of Energy,
Power Engineering and Environment, University of Zagreb

Why GIS mapping?



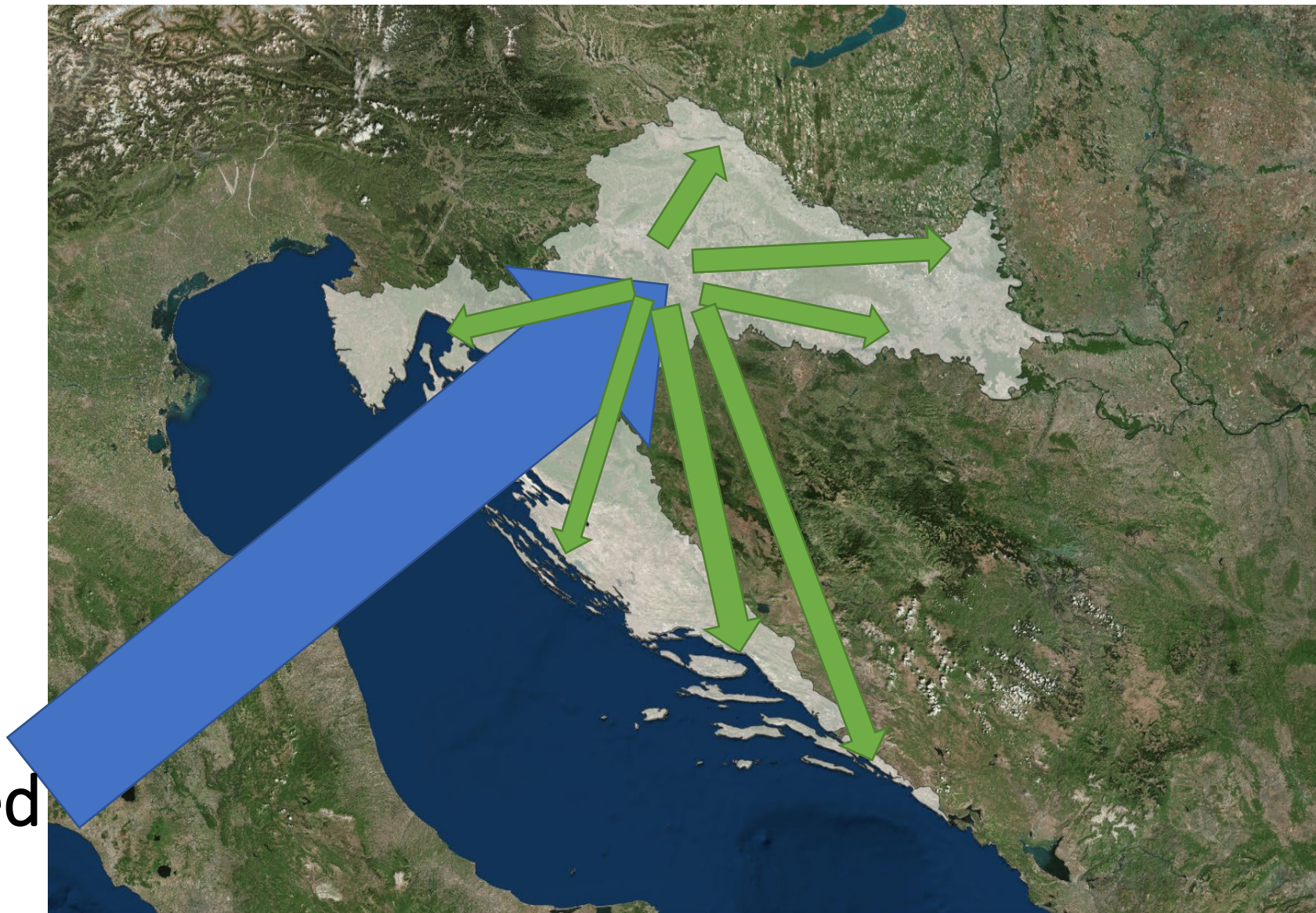
Two approaches

Top down



Bottom up

Aggregated
data



2.6 Energetska svojstva i karakteristike zgrada

2.6.1 U – koeficijenti građevinskih dijelova i elemenata

Energetska svojstva i karakteristike zgrada kao i njihovu energetsku potrošnju u velikoj mjeri određuje razdoblje izgradnje. Iako se razina potrošnje energije za grijanje u zgradama može pratiti i kroz druge parametre¹⁷ (npr. klimatski (temperaturni) uvjeti lokacije i podneblja, faktor oblika zgrade, i dr.), razdoblje izgradnje je podatak koji puno govori o karakteristikama izgradnje i primjenjenim tipovima konstrukcija, kao i (ne)primijenjenim propisima o toplinskoj zaštiti relevantnima za određeno razdoblje izgradnje¹⁸.

U analizi energetskih svojstva i karakteristika građevinskih dijelova i elemenata bitan je podatak o namjeni zgrade i specifičnostima energetske potrošnje, odnosno režimu korištenja zgrade prema namjeni¹⁹. U daljnjem se razmatranju neće promatrati kategorija zgrada prema namjeni već će se dati karakterističan opis građevinskih dijelova karakteristične zgrade i njenih elemenata tipičan za određeno razdoblje izgradnje. U tablici 2.9 je procijenjena godišnja potrebna toplinska energija za grijanje i godišnja potrošnja finalne energije za grijanje, hlađenje, potrošnju toplu vodu i rasvjetu po m² za primorsku i kontinentalnu Hrvatsku a prema kategorijama nacionalnog fonda zgrada Republike Hrvatske prema namjeni definiranim u poglavlju 2.1.

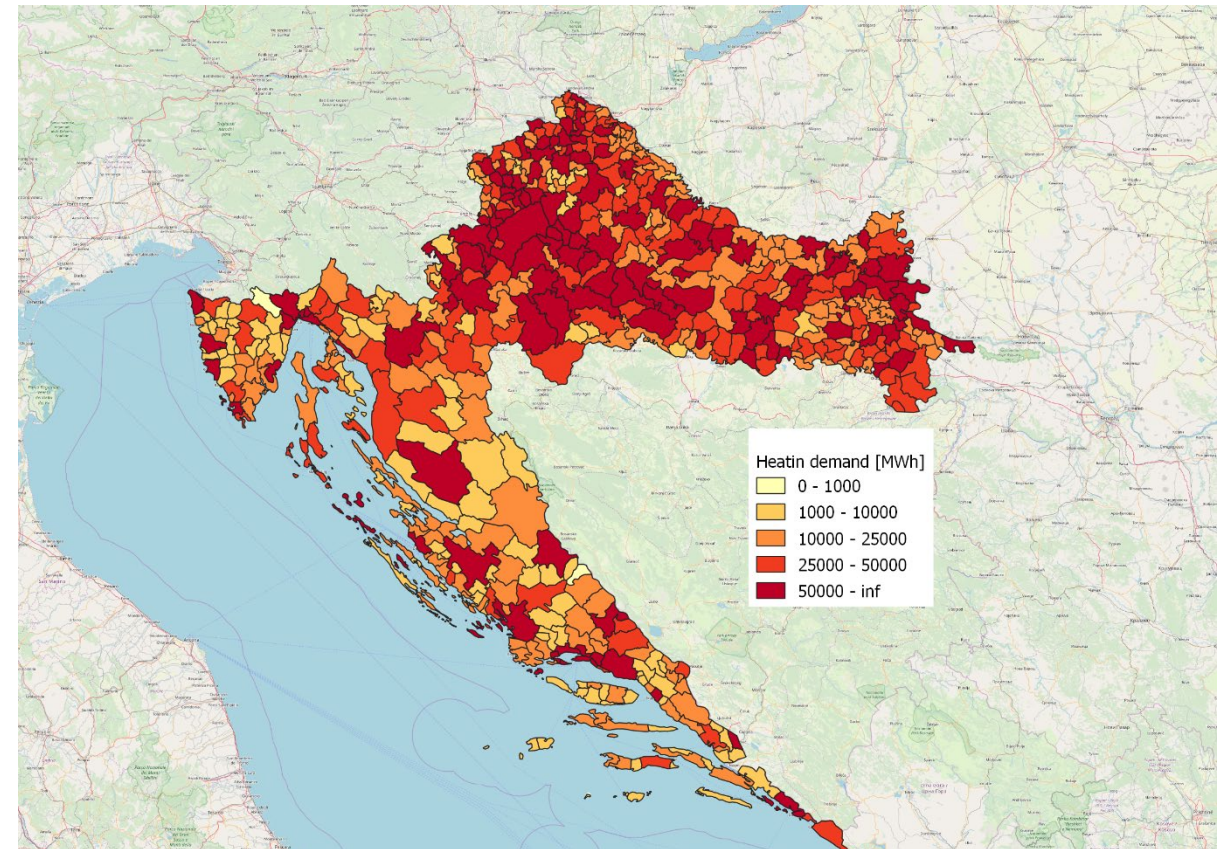
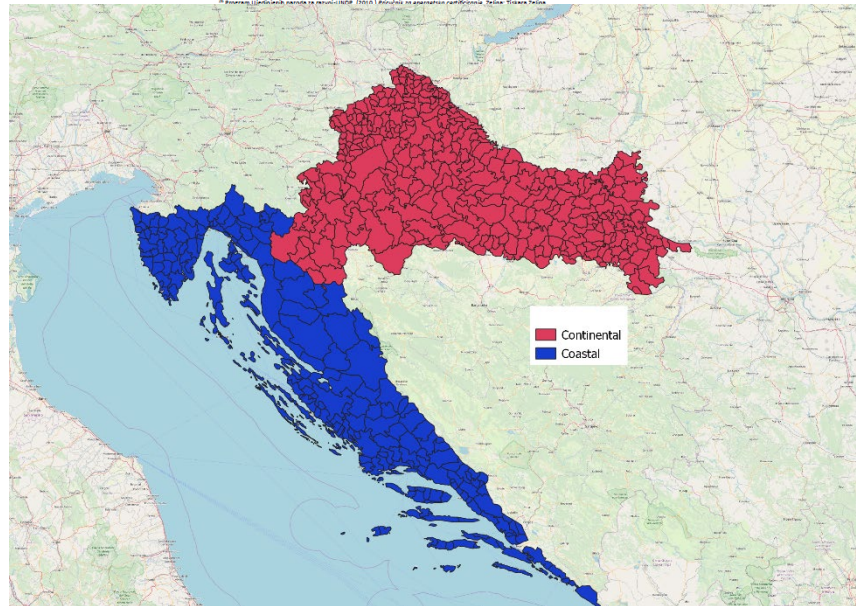
Tablica 2.9 Godišnja potrebna toplinska finalna energija za grijanje i godišnja potrošnja finalne energije za kontinentalnu i primorsku Hrvatsku (KWh/m²a)²⁰

| Namjena zgrade | Godišnja potrebna toplinska energija za grijanje (KWh/m ² a) | | | | | | | | | | | | | | |
|---|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------------------|-----------|-----------|-----------|-----------|
| | Kontinentalna Hrvatska | | | | | | | | | | Primorska Hrvatska | | | | |
| | do 1945 | 1945-1970 | 1970-1985 | 1985-1990 | 1990-2000 | 2000-2010 | 2010-2015 | 1945-1970 | 1970-1985 | 1985-1990 | 1990-2000 | 2000-2010 | 2010-2015 | 2015-2020 | 2020-2025 |
| Vilaštembene zgrade | 270 | 200 | 190 | 180 | 150 | 90 | 70 | 122 | 90 | 86 | 81 | 68 | 41 | 33 | |
| Ostale javne zgrade | 300 | 300 | 300 | 300 | 240 | 140 | 110 | 141 | 100 | 100 | 100 | 100 | 68 | 50 | |
| Restoranske zgrade javne namjene | 180 | 247 | 273 | 300 | 120 | 100 | 82 | 95 | 125 | 135 | 87 | 79 | 65 | 32 | |
| Restoranske zgrade komercijalne namjene | 229 | 298 | 326 | 324 | 150 | 120 | 75 | 115 | 150 | 165 | 105 | 95 | 78 | 38 | |
| Namjena zgrade | Godišnja potrošnja finalne energije za grijanje, hlađenje, pripremu potrošne tople vode i rasvjetu (KWh/m ² a) | | | | | | | | | | | | | | |
| | Kontinentalna Hrvatska | | | | | | | | | | Primorska Hrvatska | | | | |
| | do 1945 | 1945-1970 | 1970-1985 | 1985-1990 | 1990-2000 | 2000-2010 | 2010-2015 | 1945-1970 | 1970-1985 | 1985-1990 | 1990-2000 | 2000-2010 | 2010-2015 | 2015-2020 | 2020-2025 |
| Vilaštembene zgrade | 477 | 354 | 336 | 318 | 265 | 159 | 124 | 216 | 159 | 152 | 140 | 120 | 72 | 57 | |
| Ostale javne zgrade | 510 | 566 | 537 | 509 | 424 | 255 | 198 | 249 | 265 | 253 | 239 | 200 | 120 | 94 | |
| Restoranske zgrade javne namjene | 237 | 367 | 473 | 374 | 332 | 283 | 148 | 119 | 224 | 336 | 281 | 385 | 305 | 139 | |
| Restoranske zgrade komercijalne namjene | 386 | 445 | 570 | 451 | 400 | 340 | 178 | 143 | 270 | 404 | 339 | 404 | 308 | 167 | |

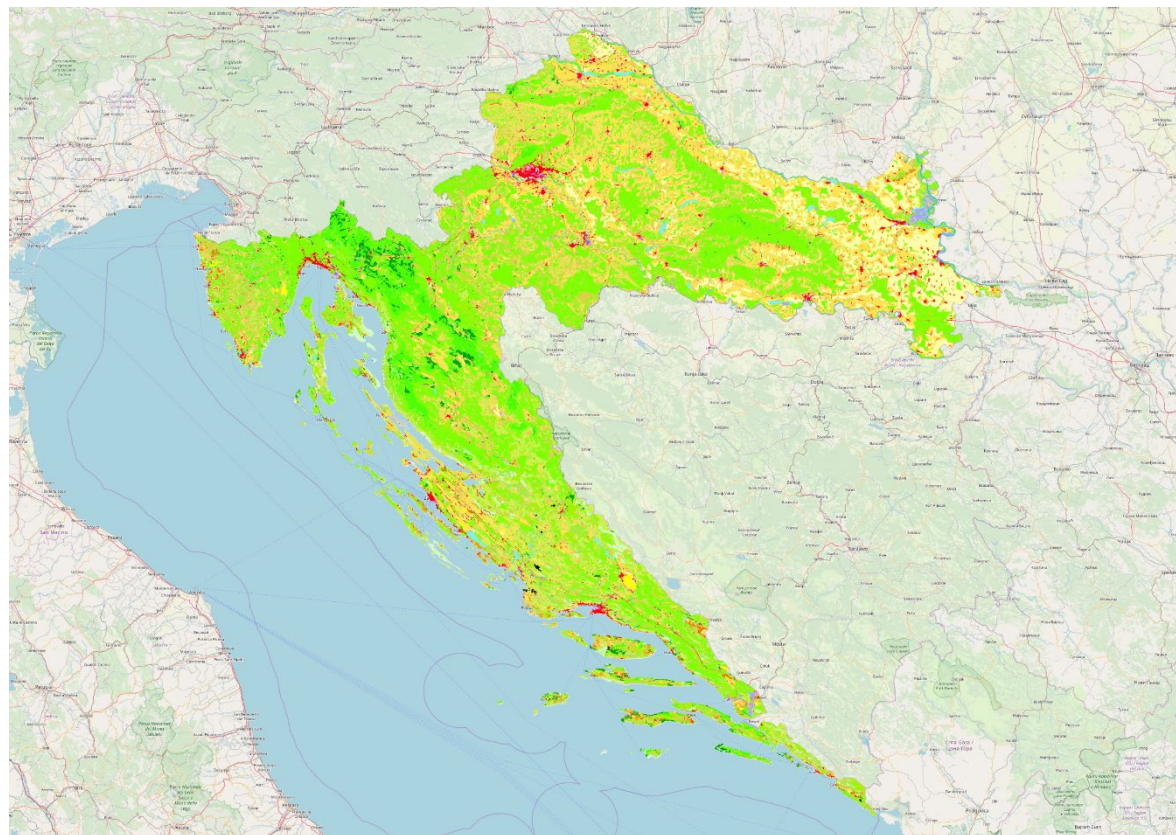
¹⁷ Ministarstvo građevinarstva i prostornog uređenja, (2013.) Izvori Program energetskog obnove višestambenih zgrada za razdoblje od 2014. do 2020. godine (ovdje), Dostupno na: <http://www.mgpa.hr/hrvatski/izvori-program-energetskog-obnove-vi-sestambenih-zgrada-za-razdoblje-od-2014-2020-godine>

¹⁸ Izvori: (1) Statistički zavod RH, (2) priručnik 2013. godine.

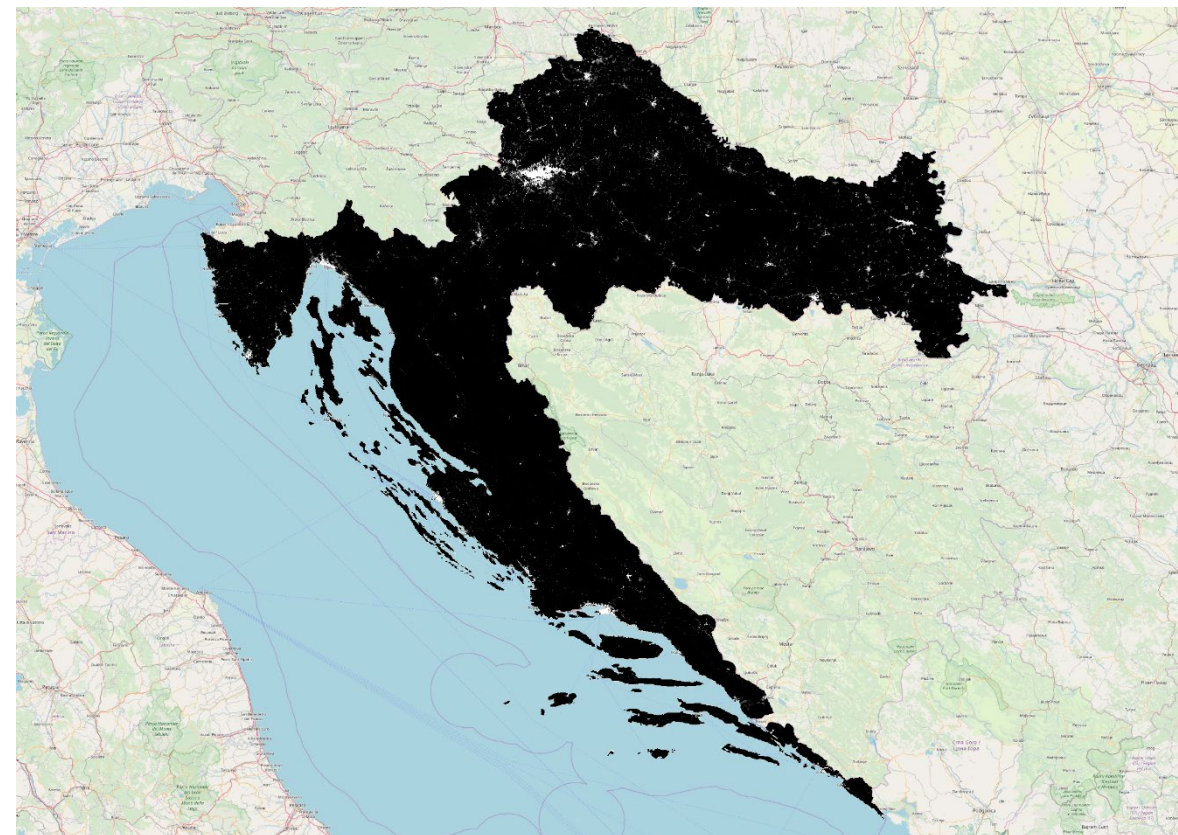
¹⁹ Izvori: (1) Statistički zavod RH, (2) priručnik 2013. godine.

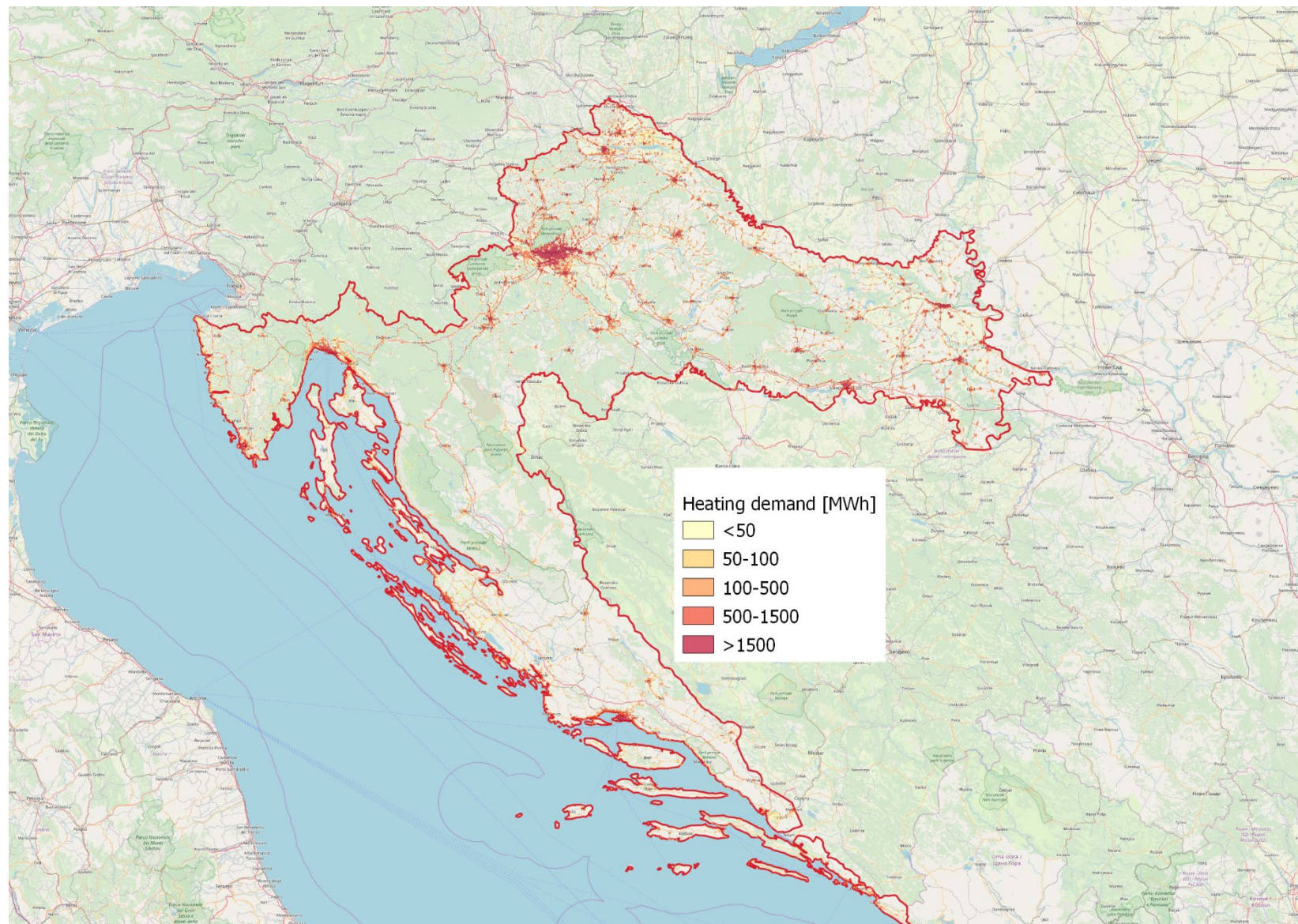


Land use



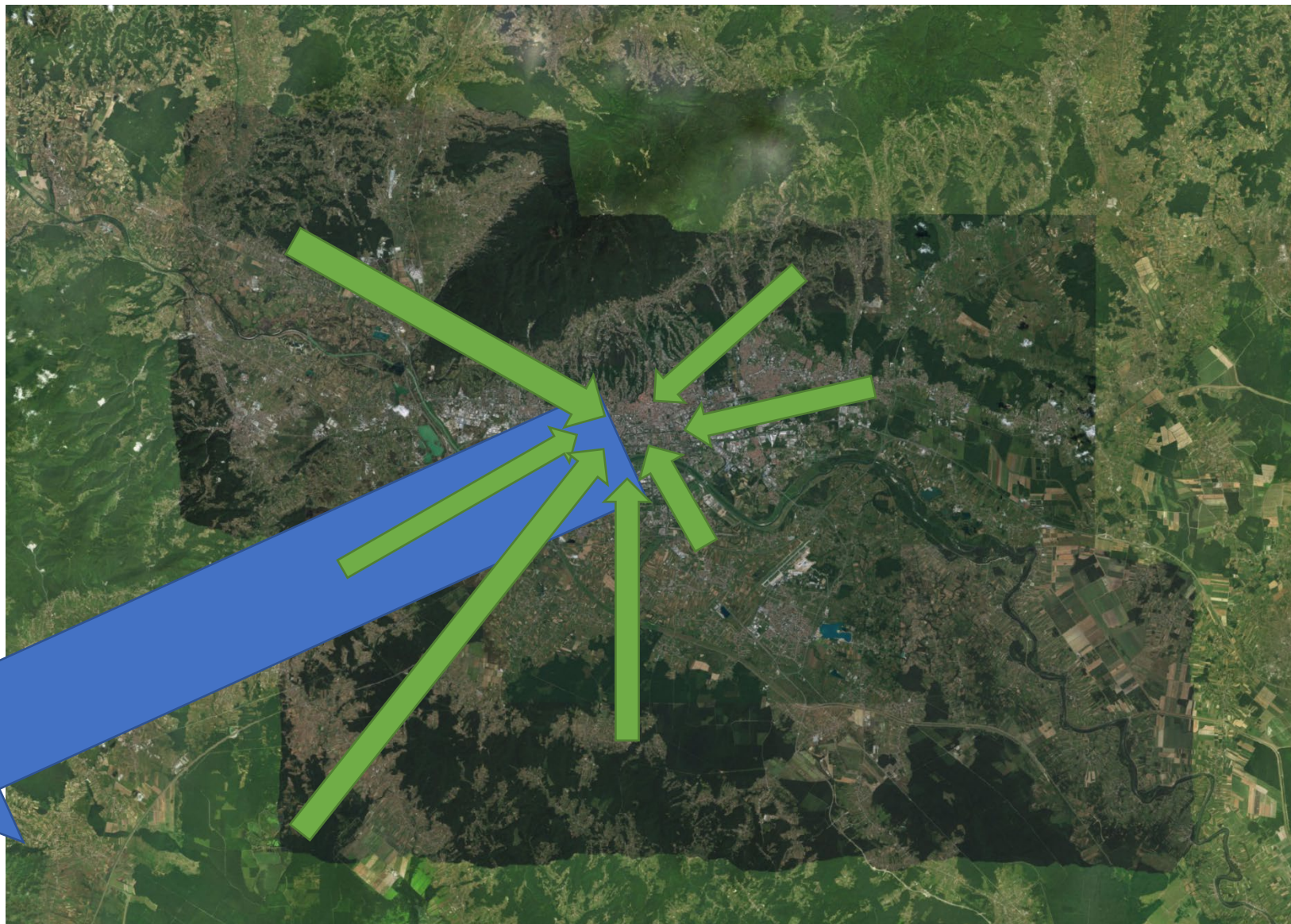
Population density

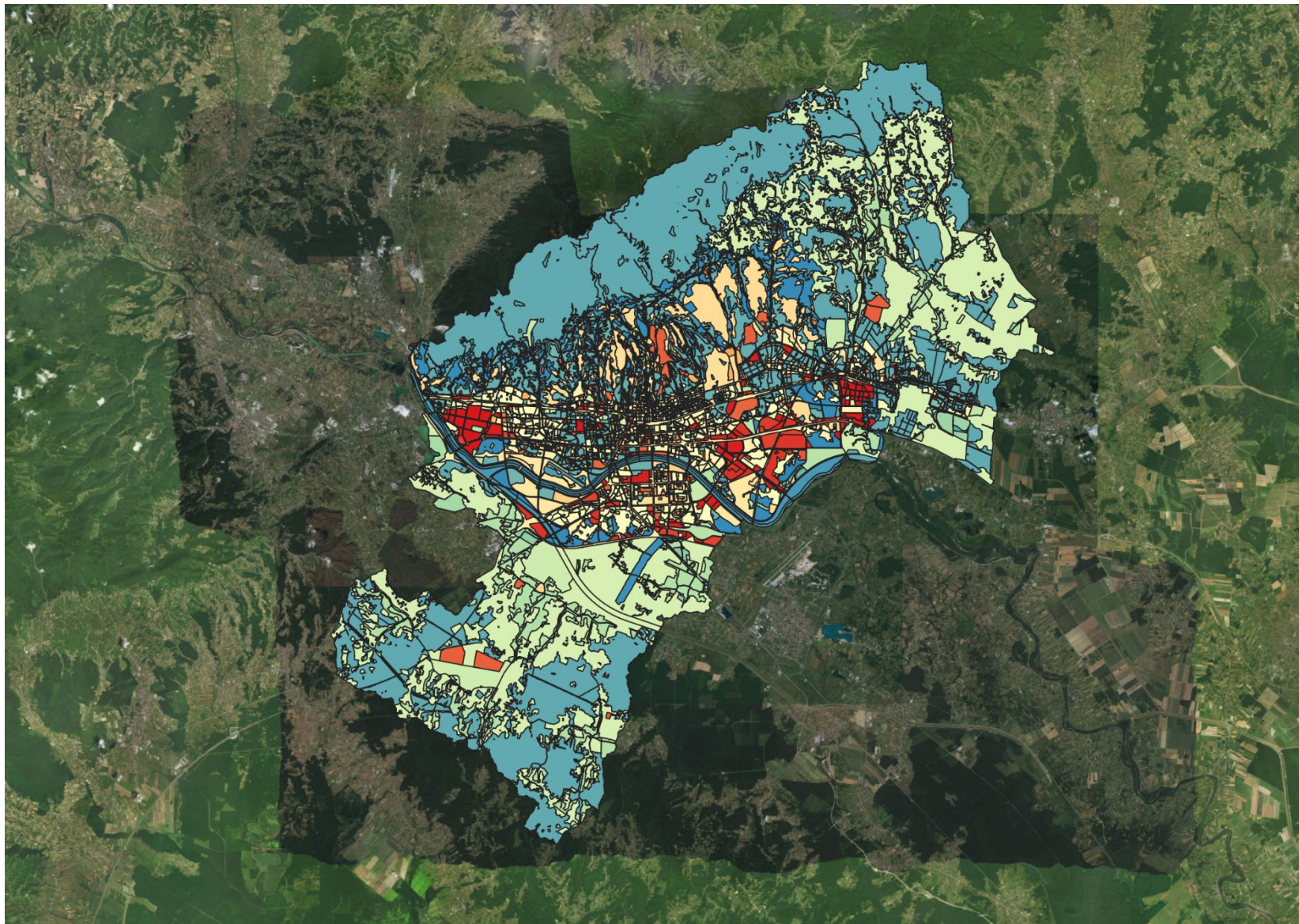




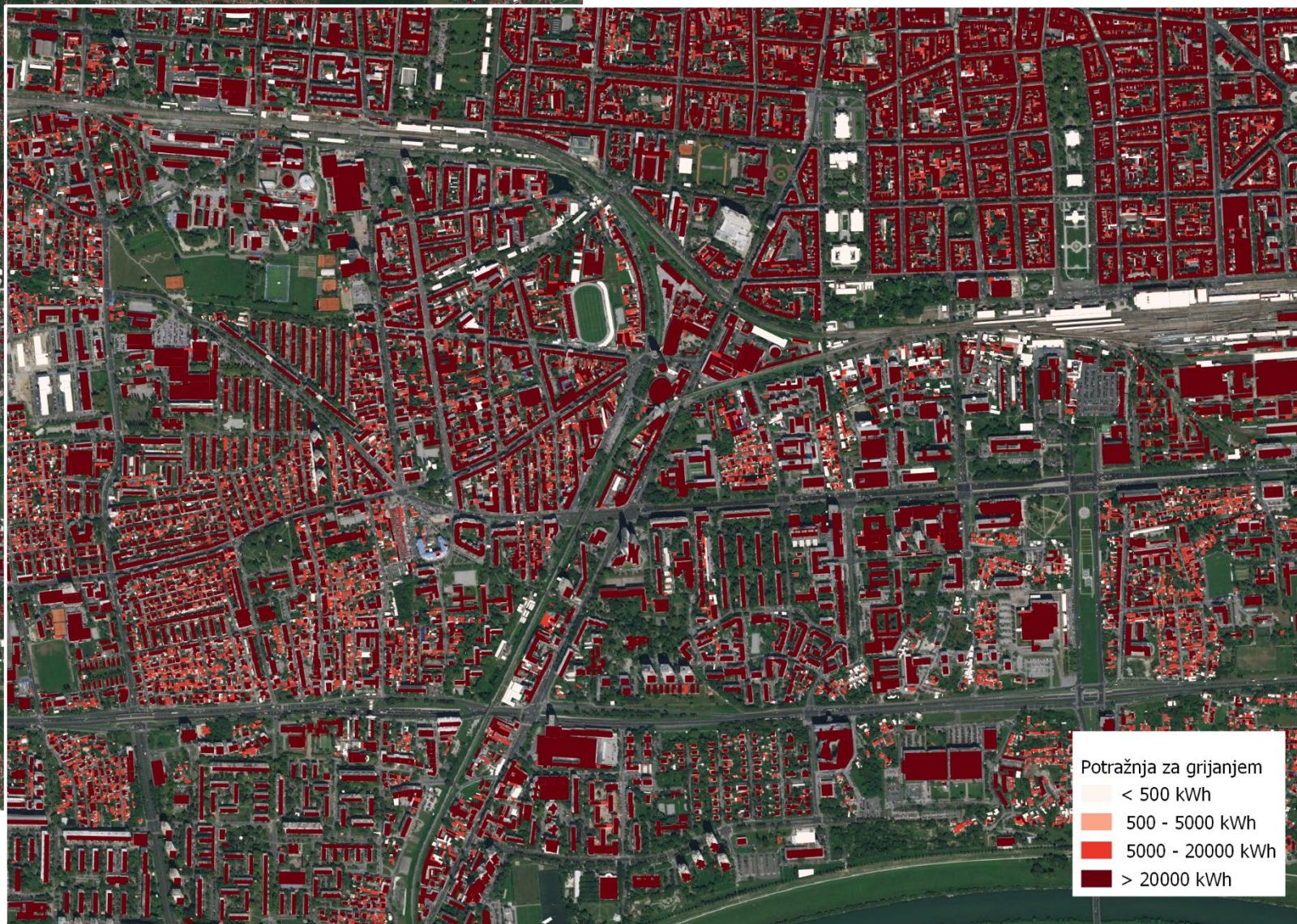
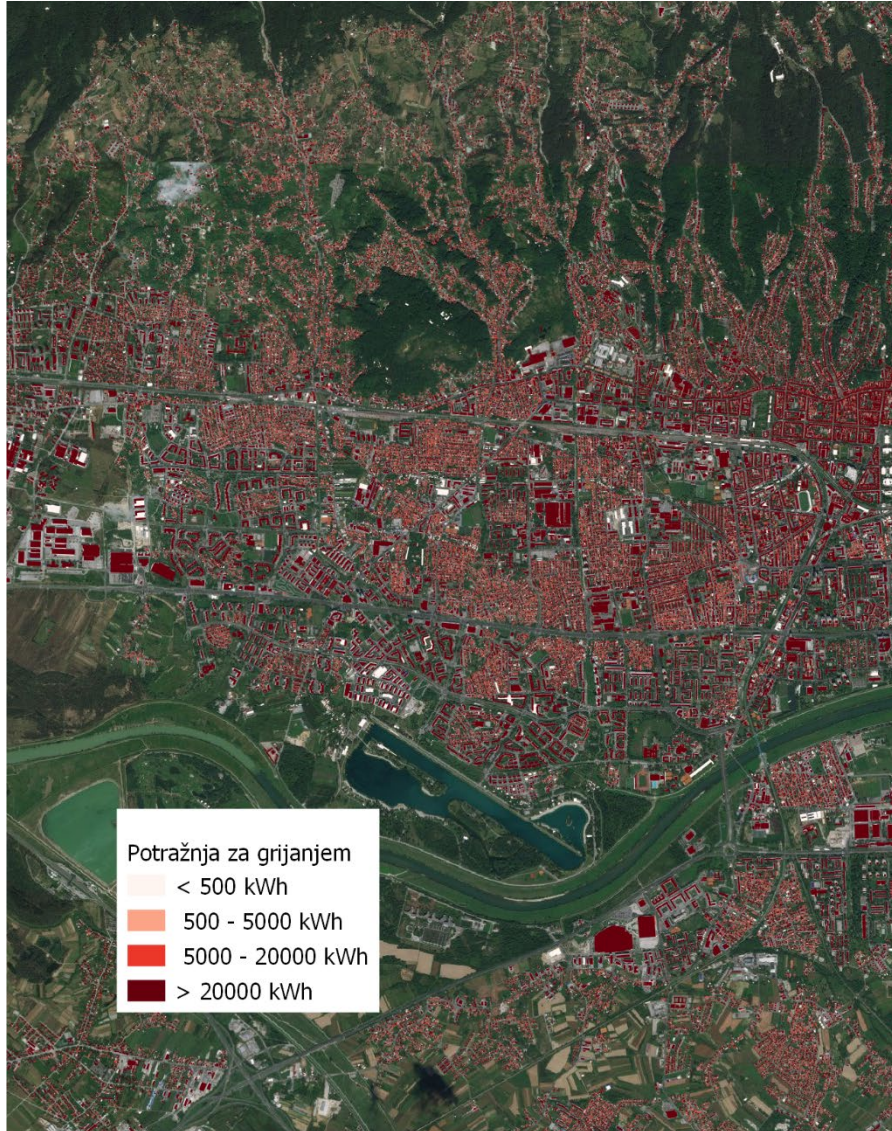


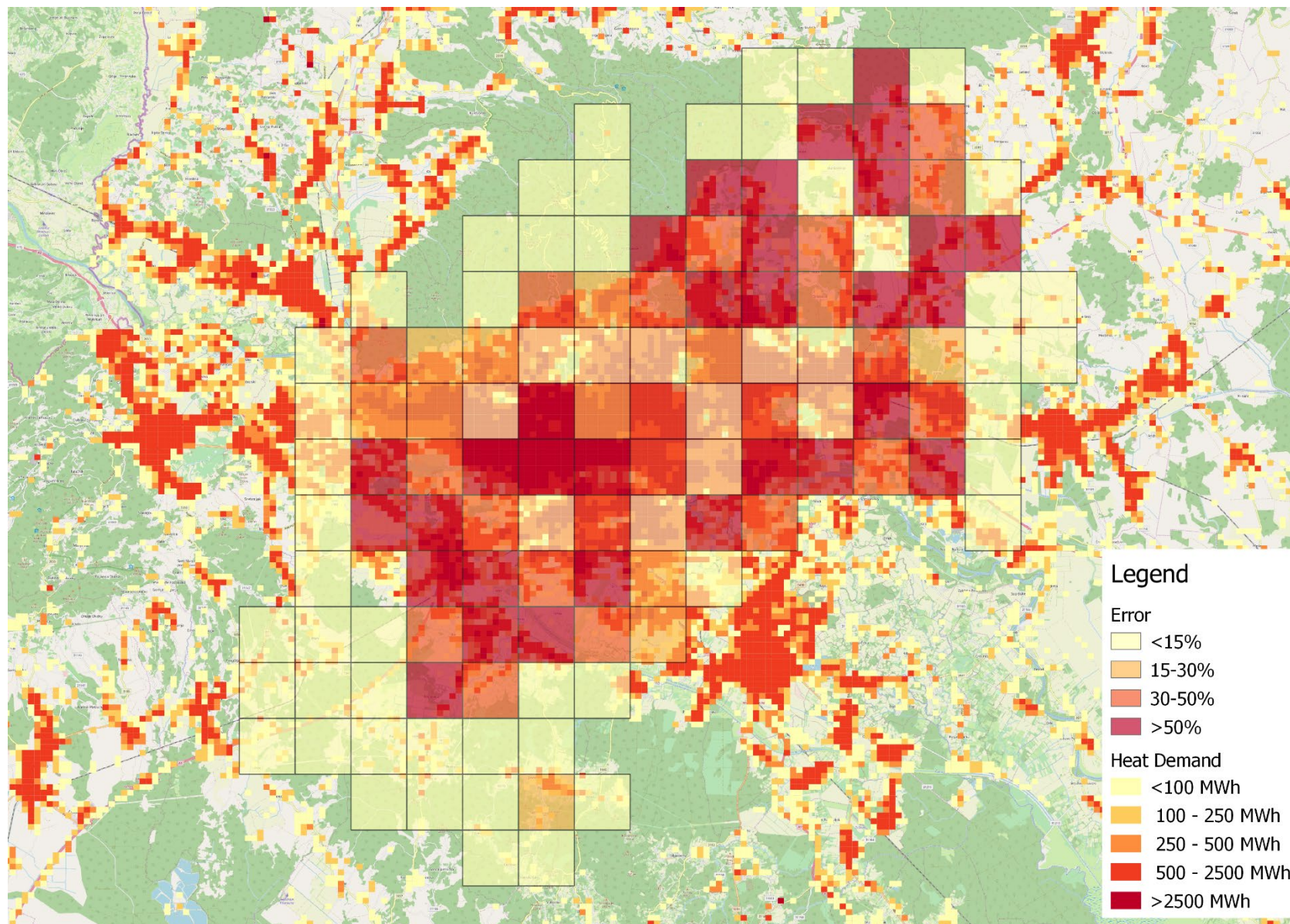
Aggregated
data

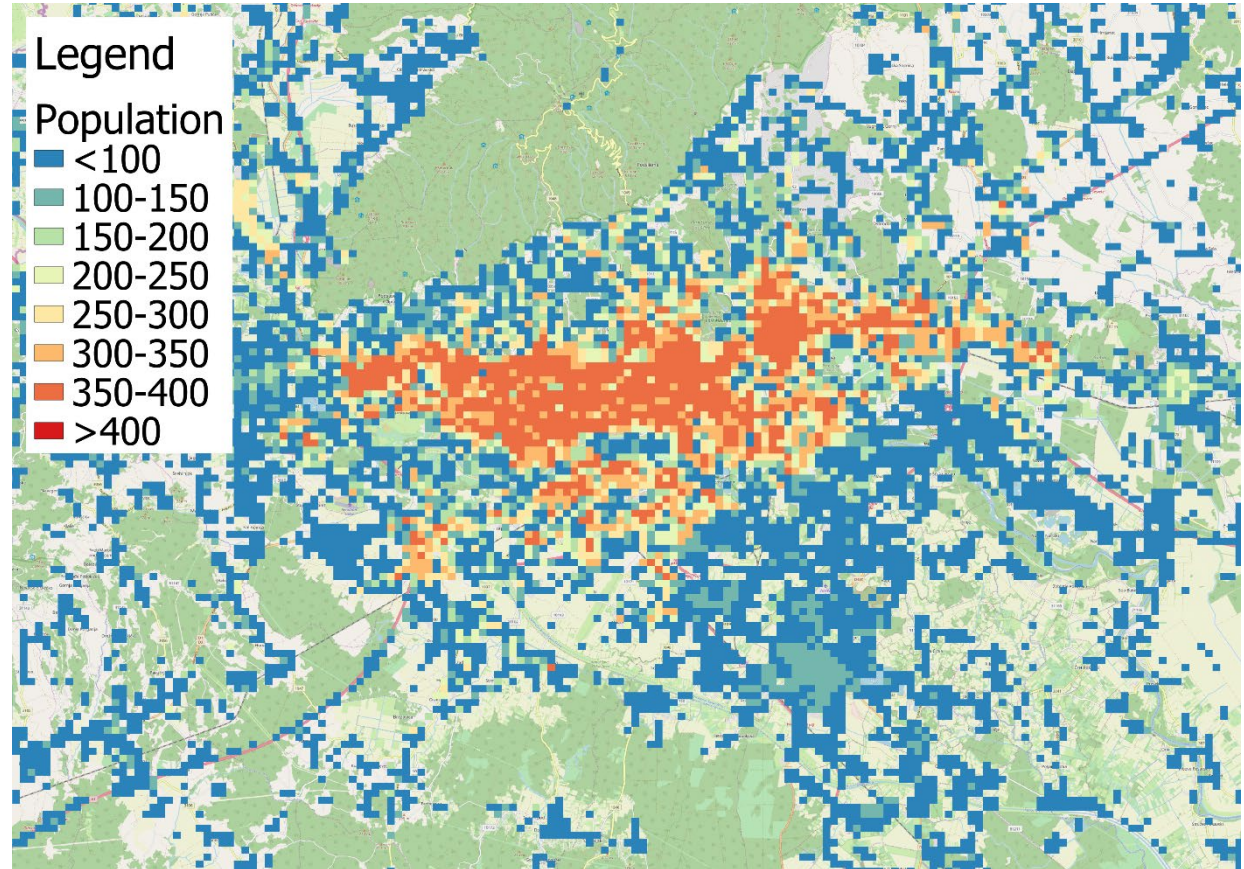
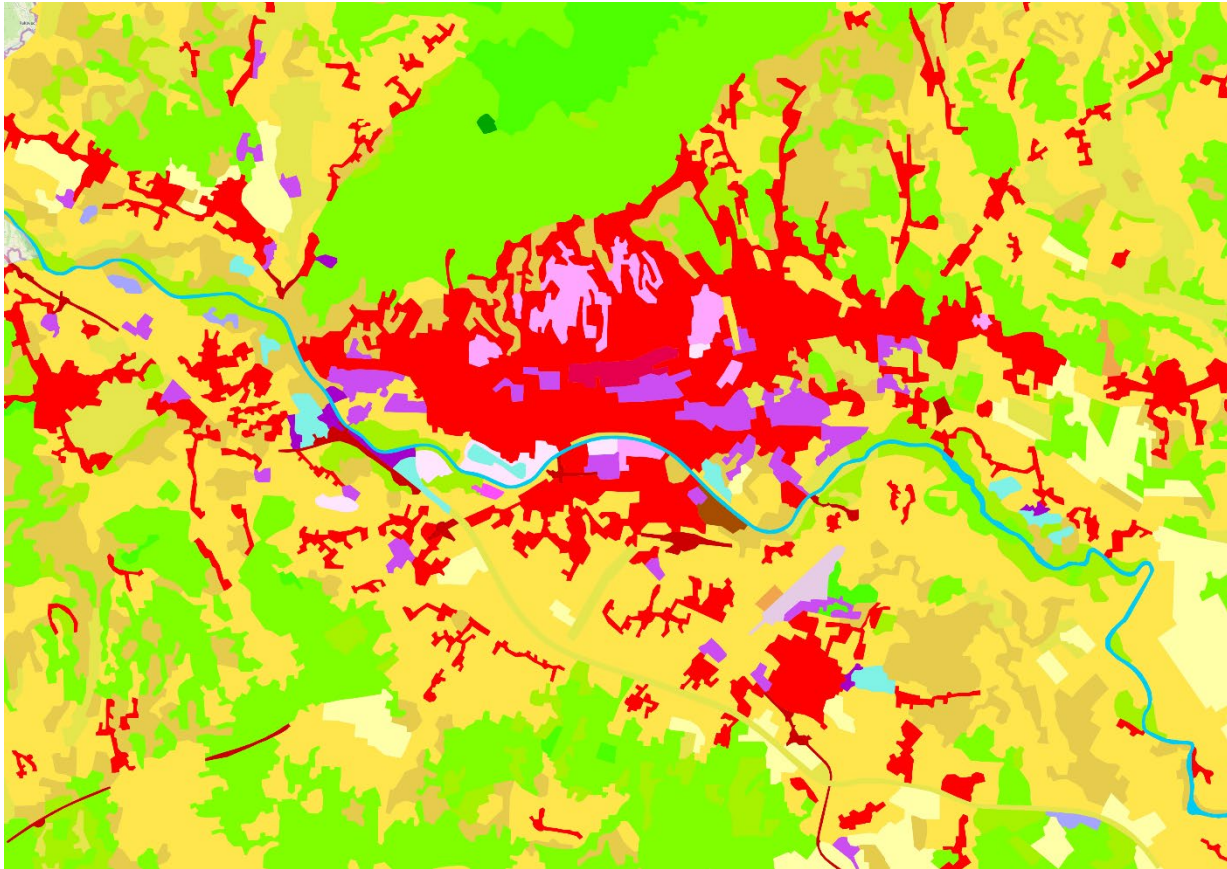


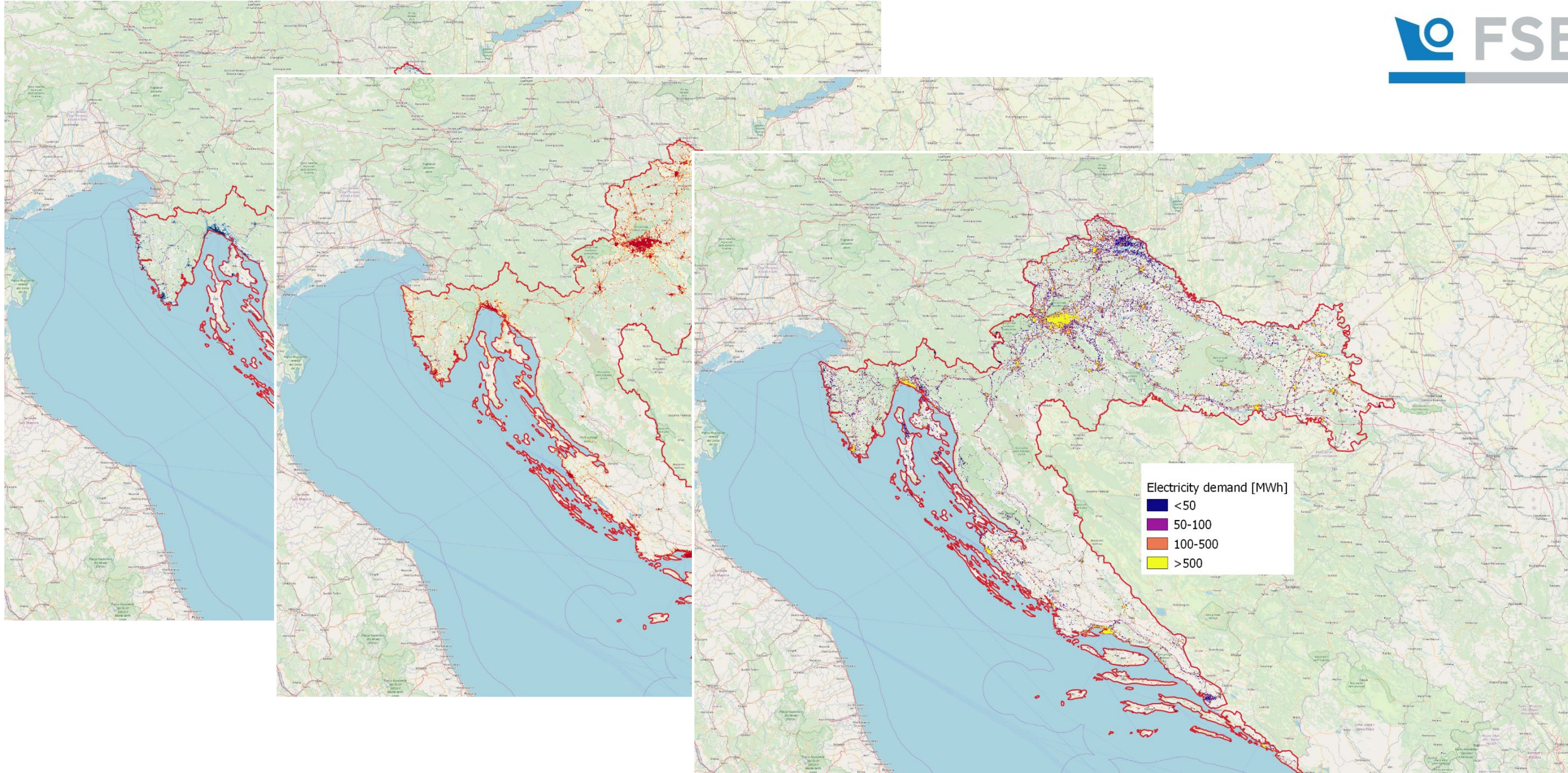


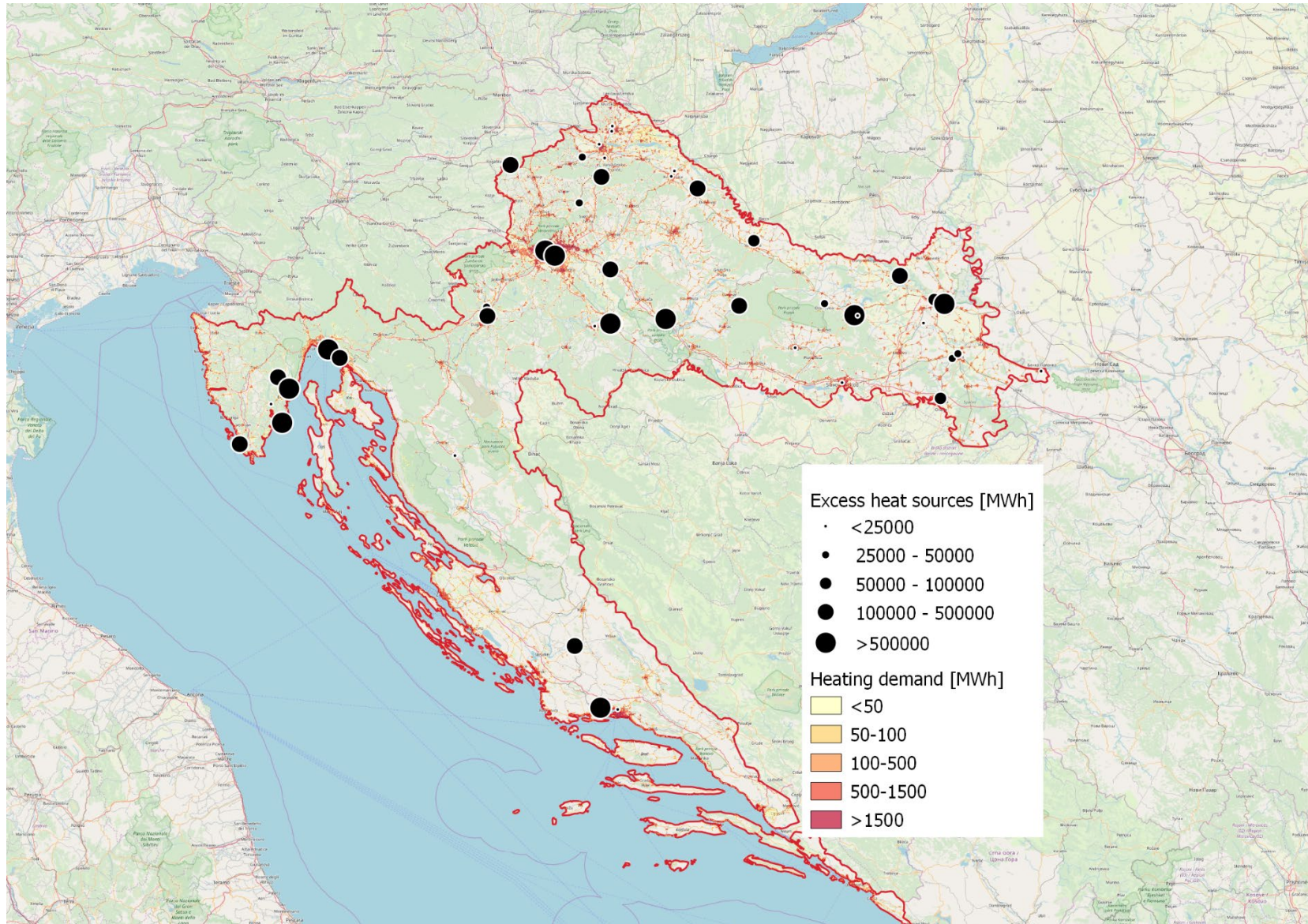


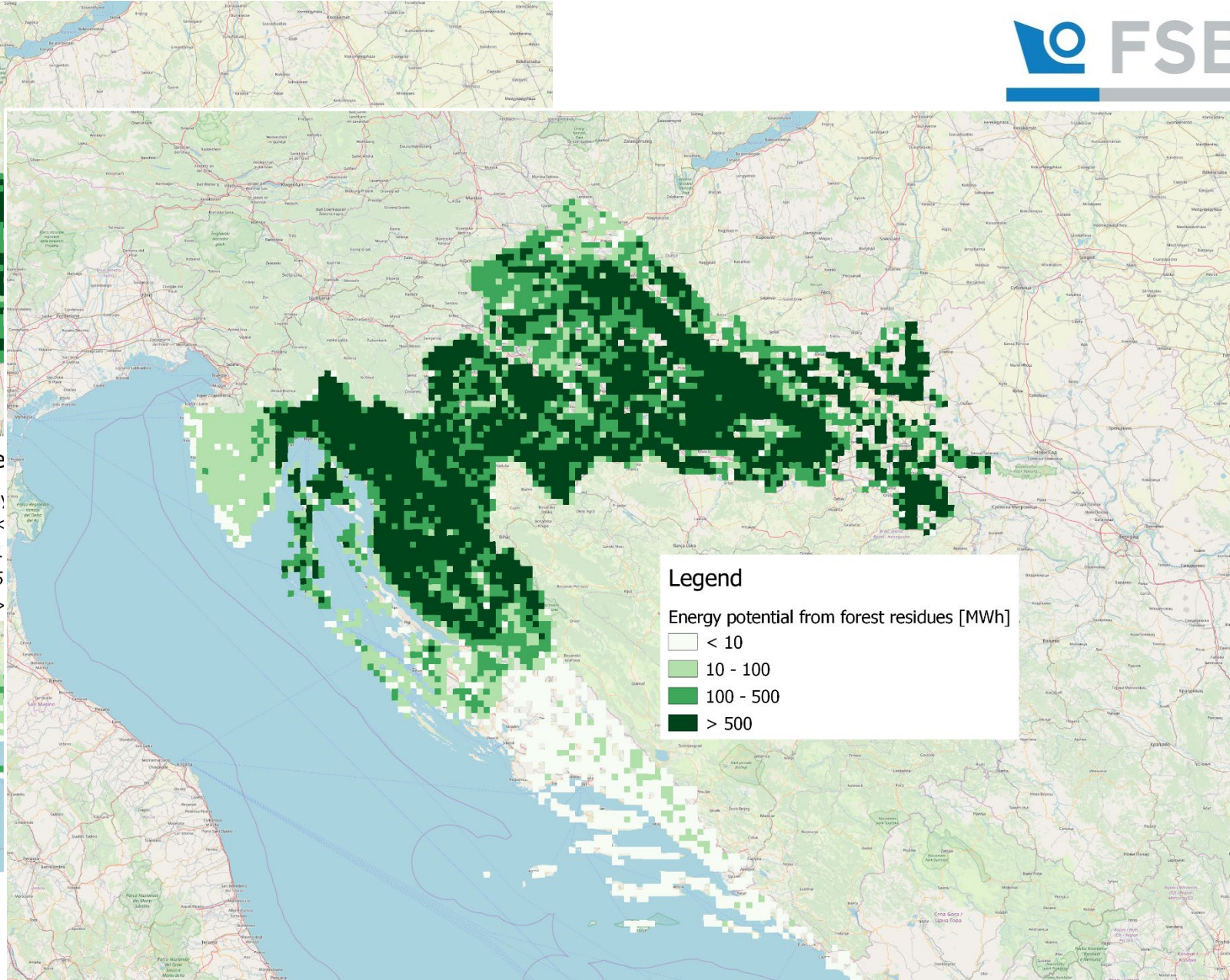
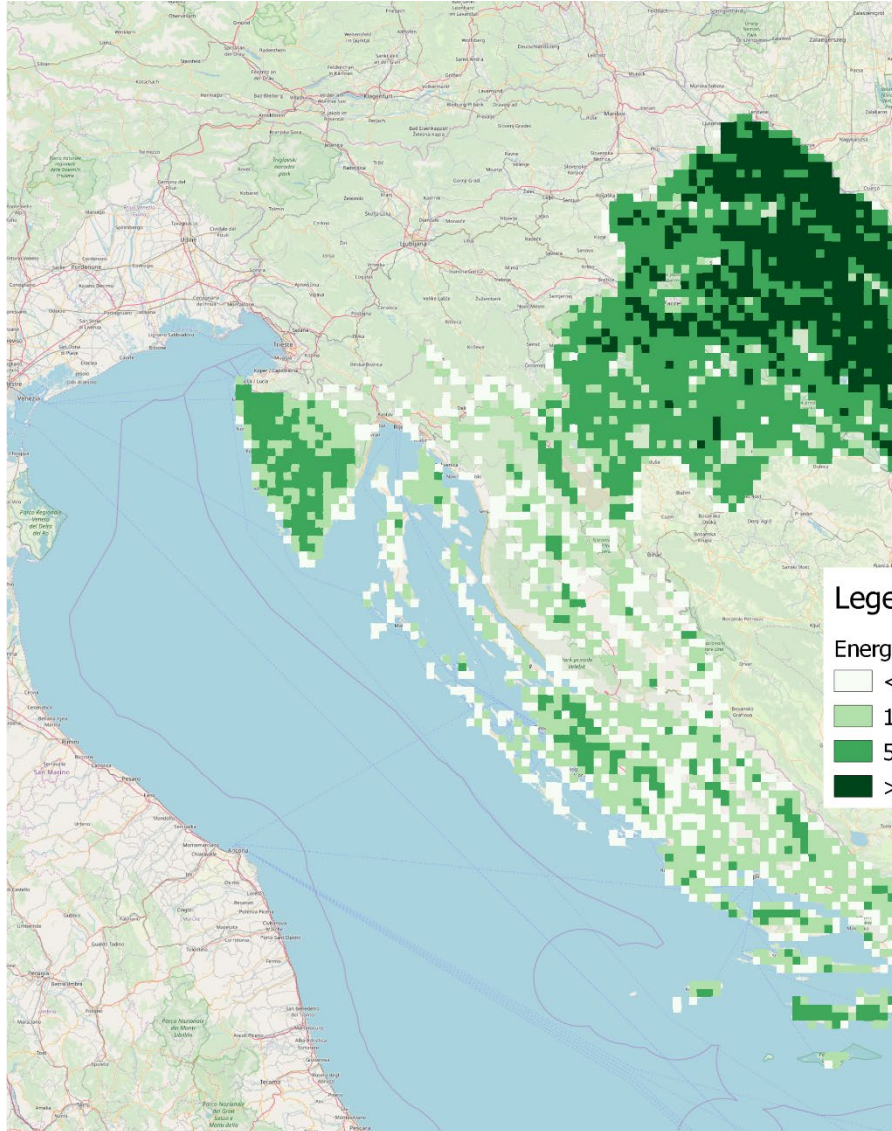




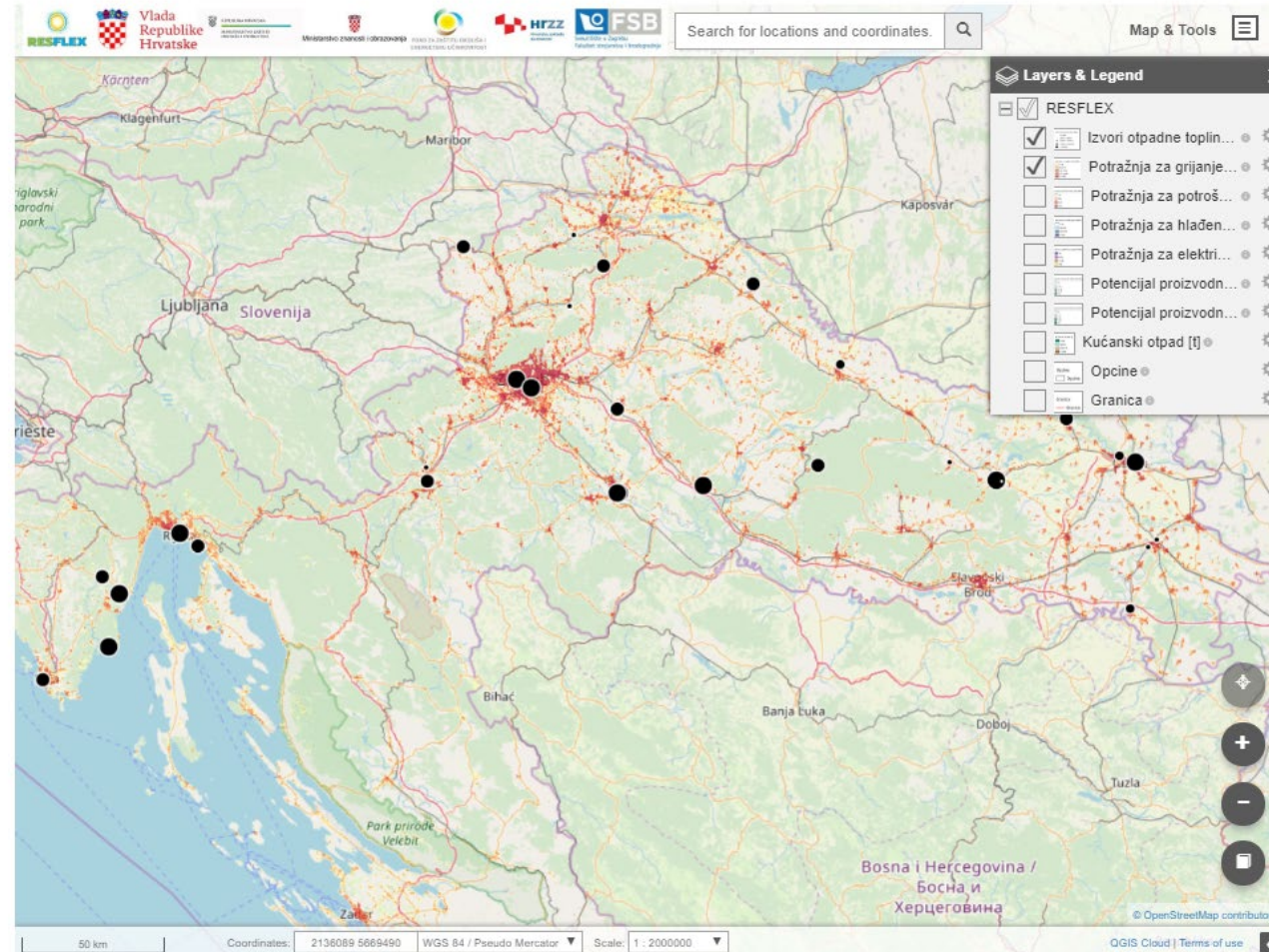








GIS karta



The energy atlas is available online at:
het.hr/

Thank you for your attention!

tomislav.novosel@fsb.hr

Financial support from the RESFLEX project funded by the Programme of the Government of Republic of Croatia, Croatian Environmental Protection and Energy Efficiency Fund with the support of the Croatian Science Foundation for encouraging research and development activities in the area of Climate Change for the period from 2015 to 2016 is gratefully acknowledged

The support provided by the Office for Spatial Planning of the City of Zagreb, City Bureau for Surveying and Cadastral Affairs and the City Office for the Strategic Planning and Development of the City of Zagreb is gratefully acknowledged