FH MÜNSTER
University of Applied Sciences

EGU FB Energie · Gebäude · Umwelt
Energy · Building Services · Environmental Engineering

Potential and design of district heating networks using Geographic Information Systems (GIS)

or

Fighting Climate Change with GIS-technology

Jigeeshu Joshi & Hinnerk Willenbrink
Research Associates

Stegerwaldstraße 39
D-48565 Steinfurt

fon +49 (0)2551.962548
fax +49 (0)2551.962717

joshi@fh-muenster.de, willenbrink@fh-muenster.de
www.fh-muenster.de/egu, www.wiefm.eu

About us

Hochschulen

Fachhochschule Münster University of Applied Sciences

SAXION Hogeschool Enschede

Projektpartner

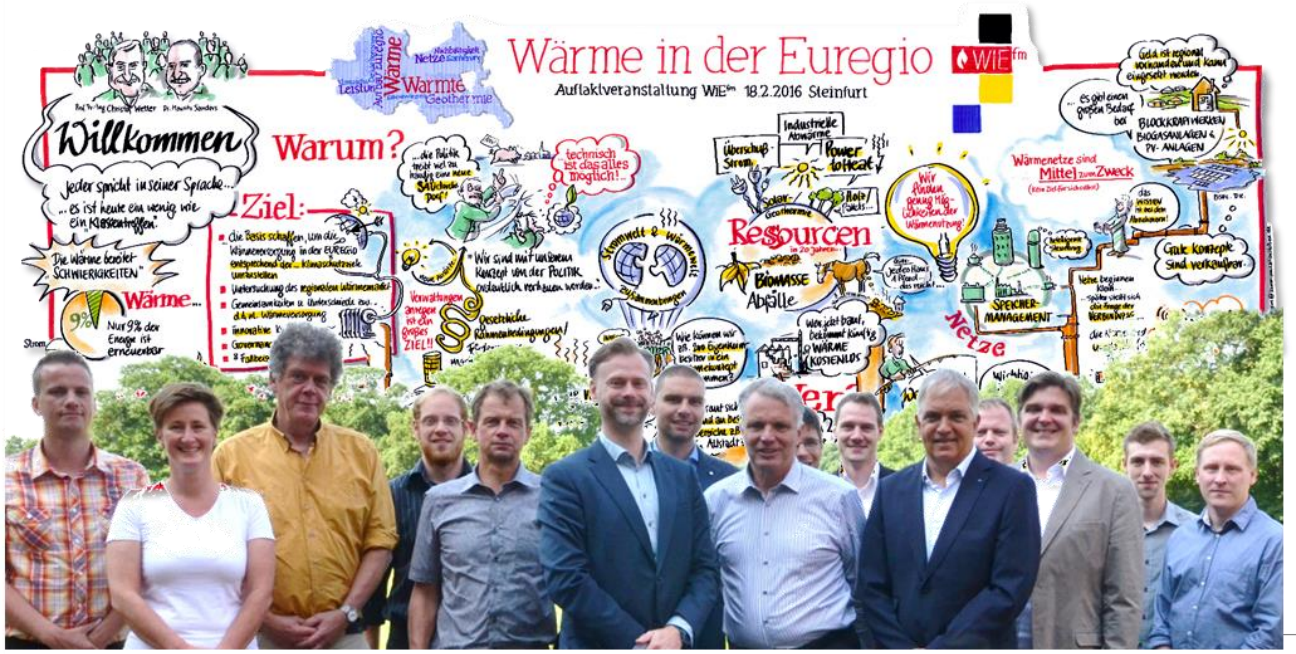
WFG FÜR DEN KREIS BORKEN MBH

wfc WIRTSCHAFTSFÖRDERUNG KREIS COESFELD GMBH

AWG

WES Wirtschaftsförderungs- und Entwicklungsgesellschaft Steinfurt mbH

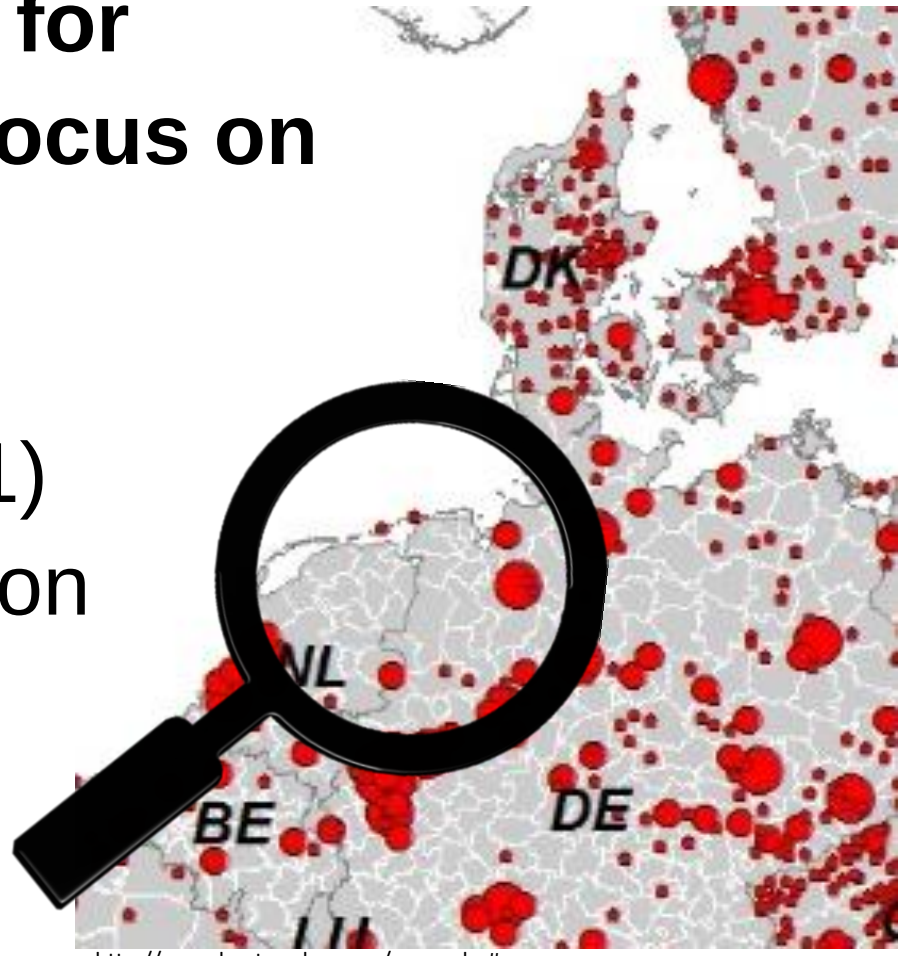
kiEMT werken aan energie- en milieutechnologie



A need for more energy planning

There was no freely accessible basis for integrated energy planning with the focus on heat (at least in our region)

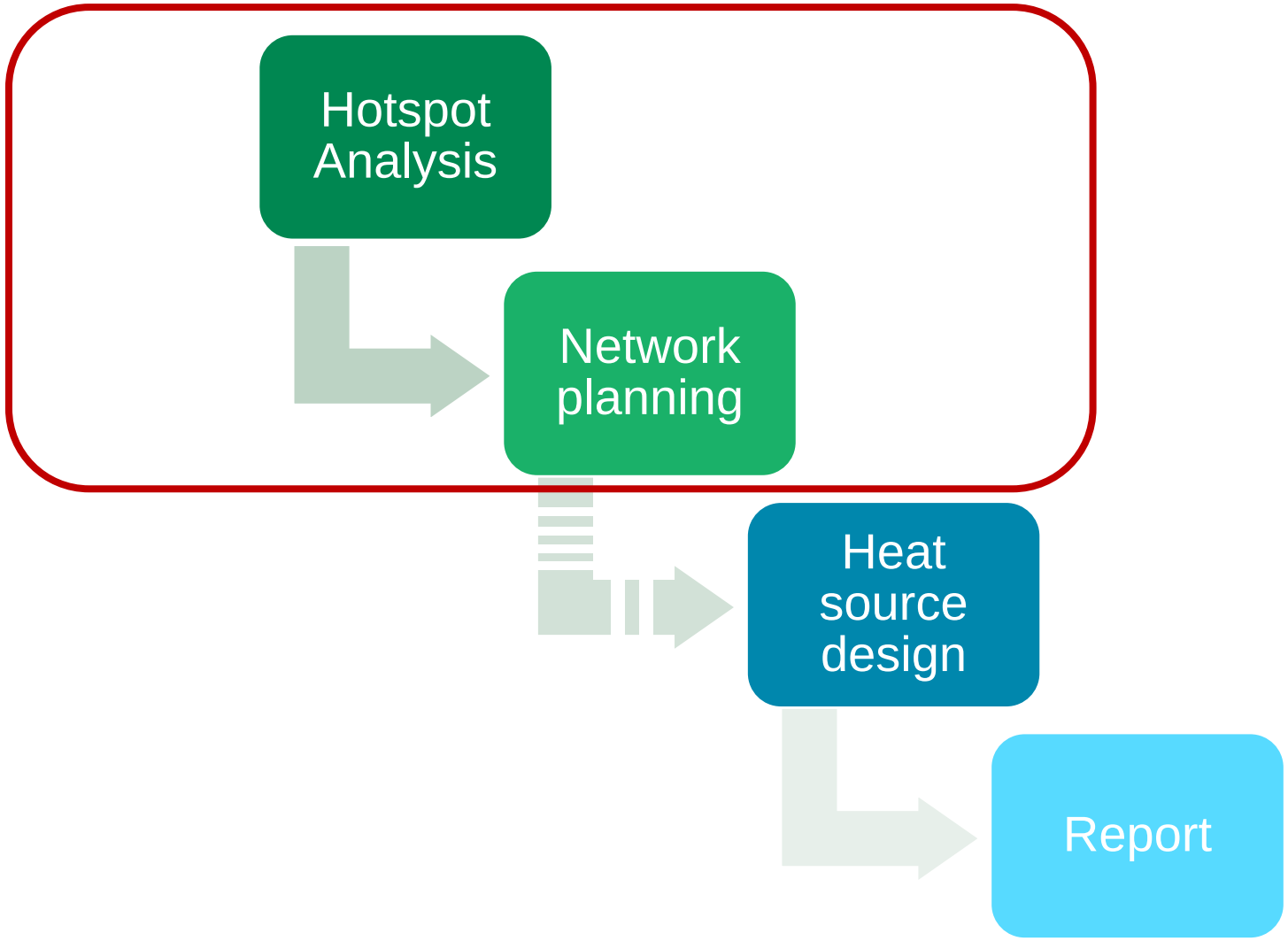
- No open geodata (until 2017/01/01)
- No open energy demand information
- No spatial context



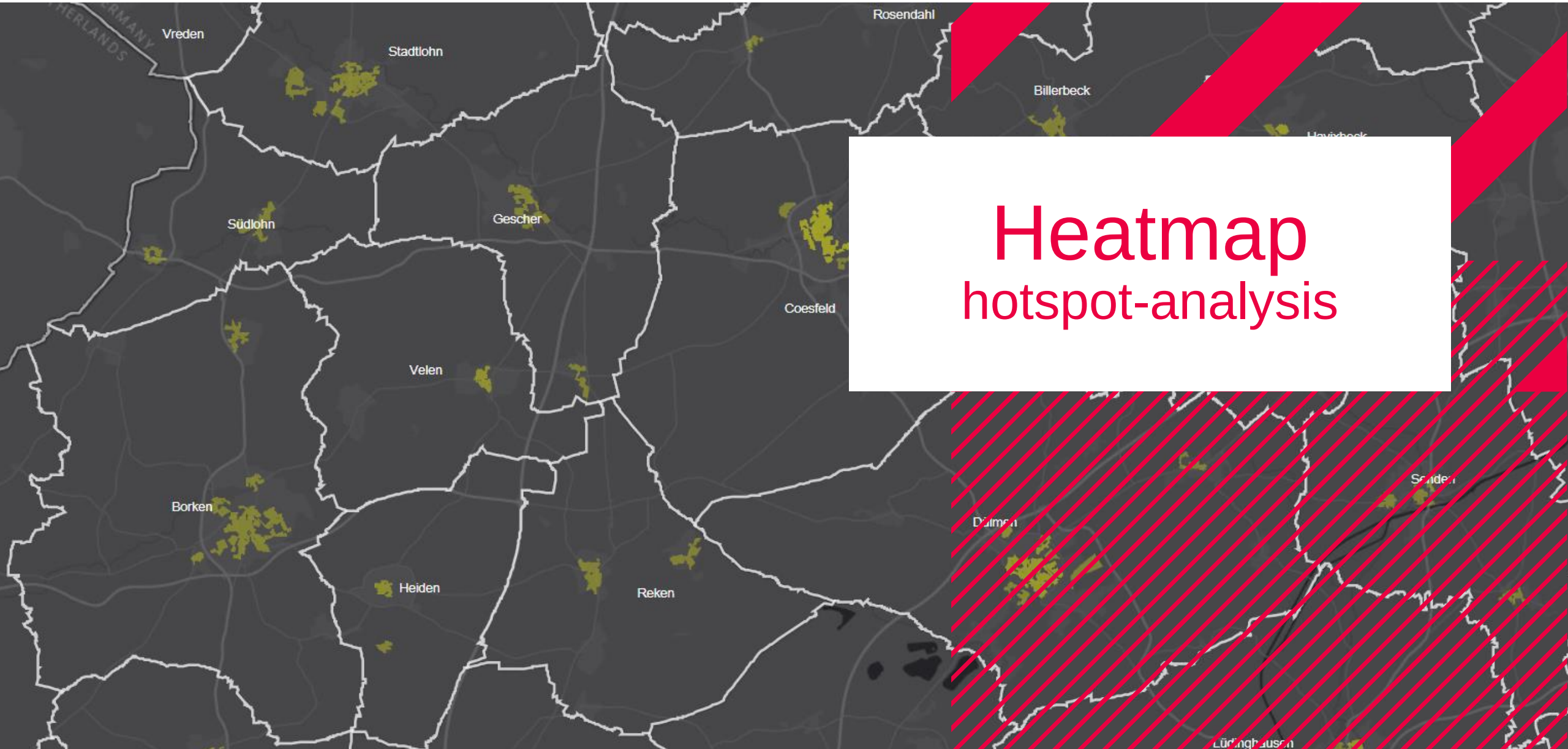
http://www.heatroadmap.eu/maps.php#

Approaching the problem

FH MÜNSTER
University of Applied Sciences



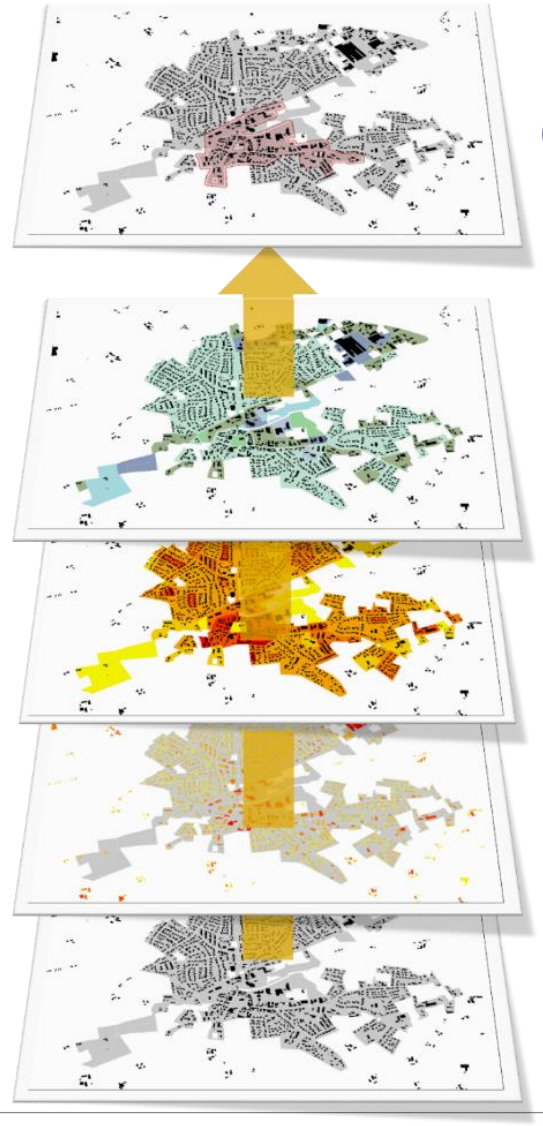
FH MÜNSTER
University of Applied Sciences



Heatmap
hotspot-analysis

HotSpot - Analysis

FH MÜNSTER
University of Applied Sciences



5 Hotspot:
- Results

4 City block:
- Landuse

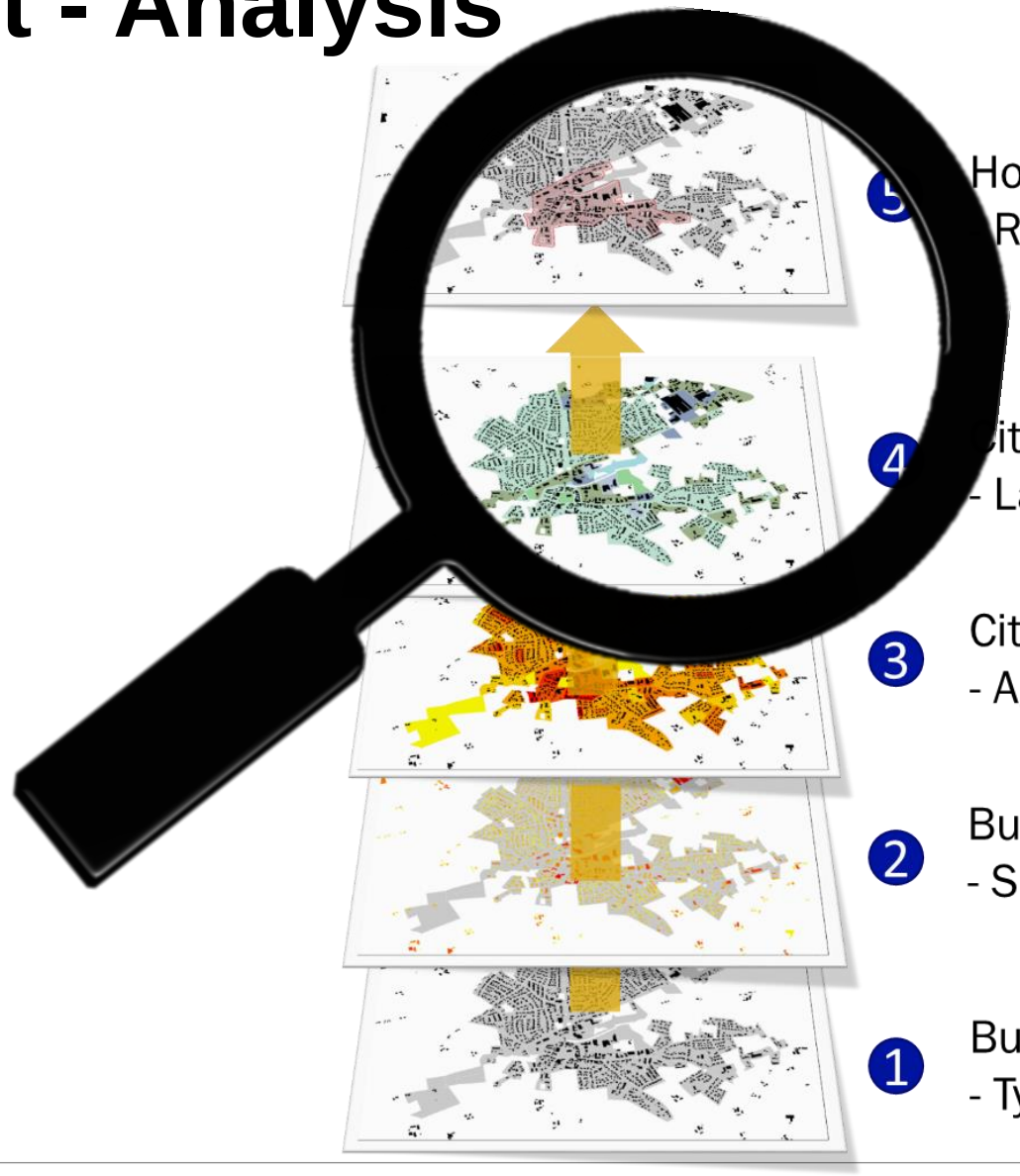
3 City block:
- Aggregated heat demand

2 Buildings:
- Specific heat demand

1 Buildings:
- Type, area, age

HotSpot - Analysis

FH MÜNSTER
University of Applied Sciences



5 Hotspot:
- Results

4 City block:
- Landuse

3 City block:
- Aggregated heat demand

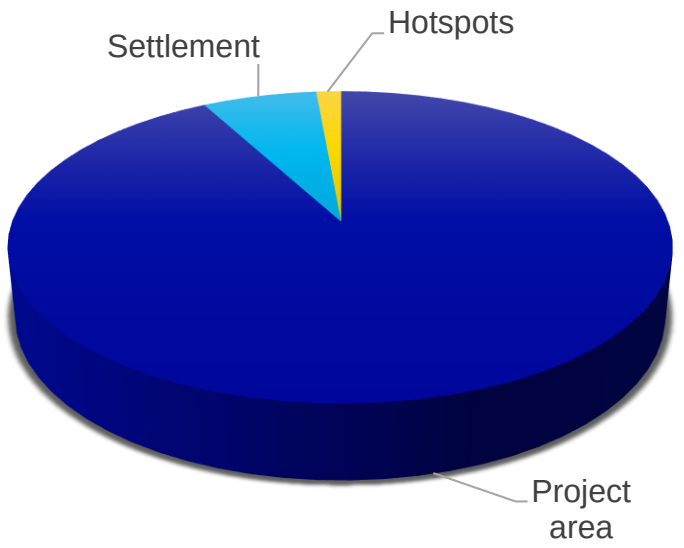
2 Buildings:
- Specific heat demand

1 Buildings:
- Type, area, age

FH MÜNSTER
University of Applied Sciences

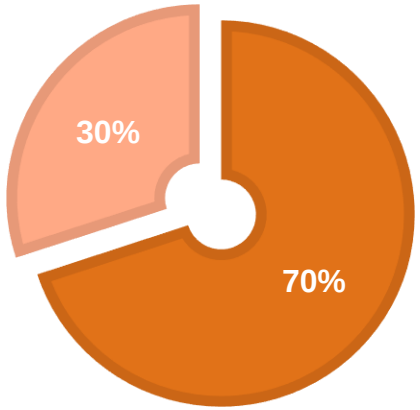
Facts & Figures

HotSpot Analysis



- 10 % of the project area is settlement area

- 1 % of the project area is covered by hotspots

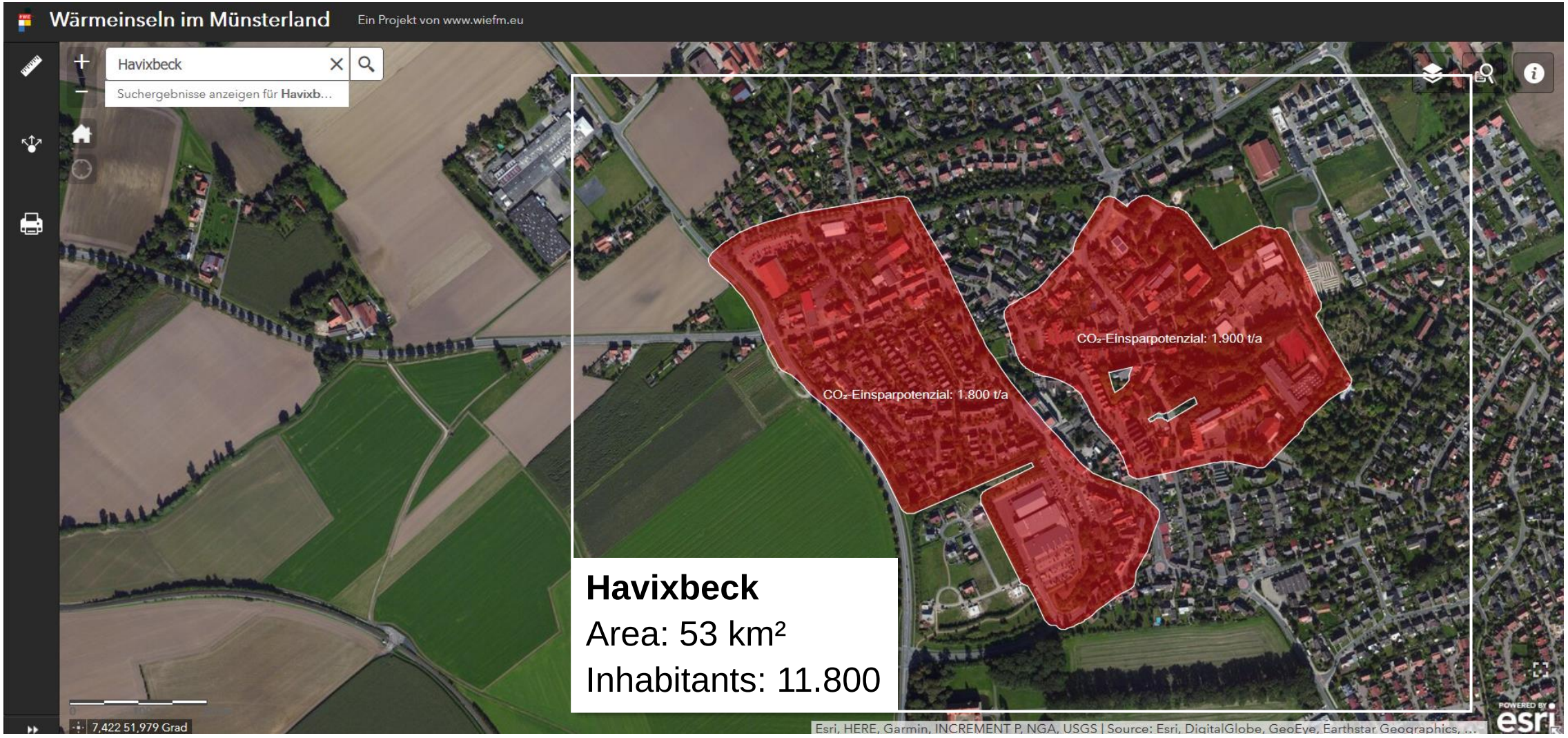


- 30 % of the total heat demand (heating and warm water) within the hotspots

FH MÜNSTER
University of Applied Sciences

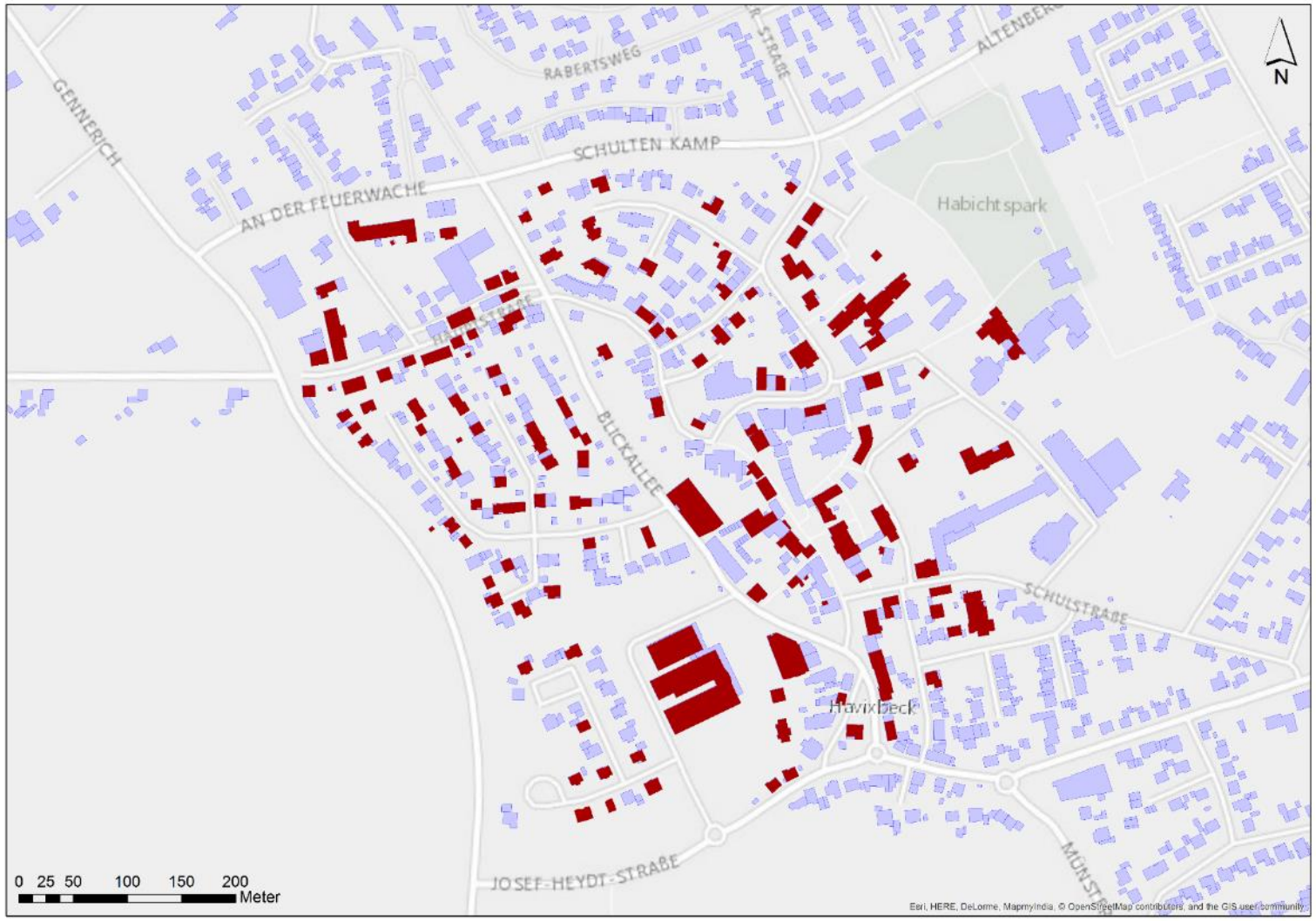
Network Planning

Example

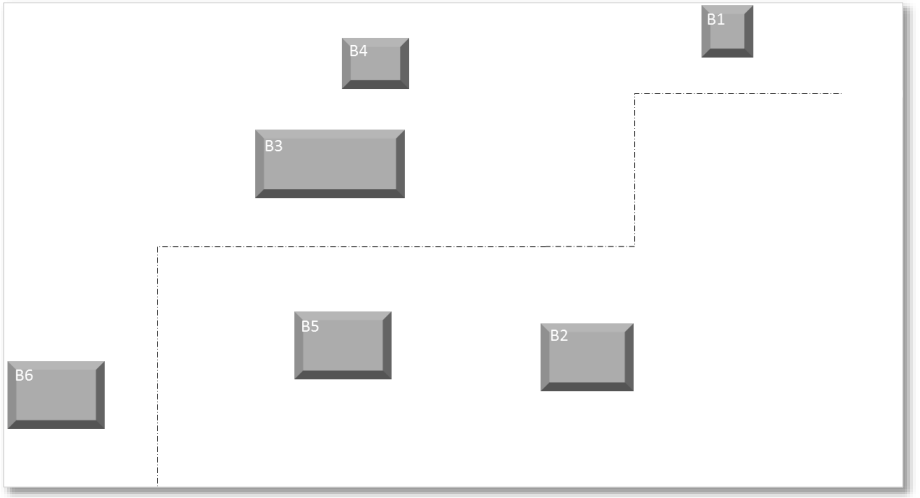

Wärmeinseln im Münsterland
Ein Projekt von www.wiefm.eu
Havixbeck
Suchergebnisse anzeigen für Havixb...
CO₂-Einsparpotenzial: 1.800 t/a
CO₂-Einsparpotenzial: 1.900 t/a
Havixbeck
Area: 53 km²
Inhabitants: 11.800
7,422 51,979 Grad
Esri, HERE, Garmin, INCREMENT P, NGA, USGS | Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, ...
esri

Example - Selecting Buildings

FH MÜNSTER
University of Applied Sciences

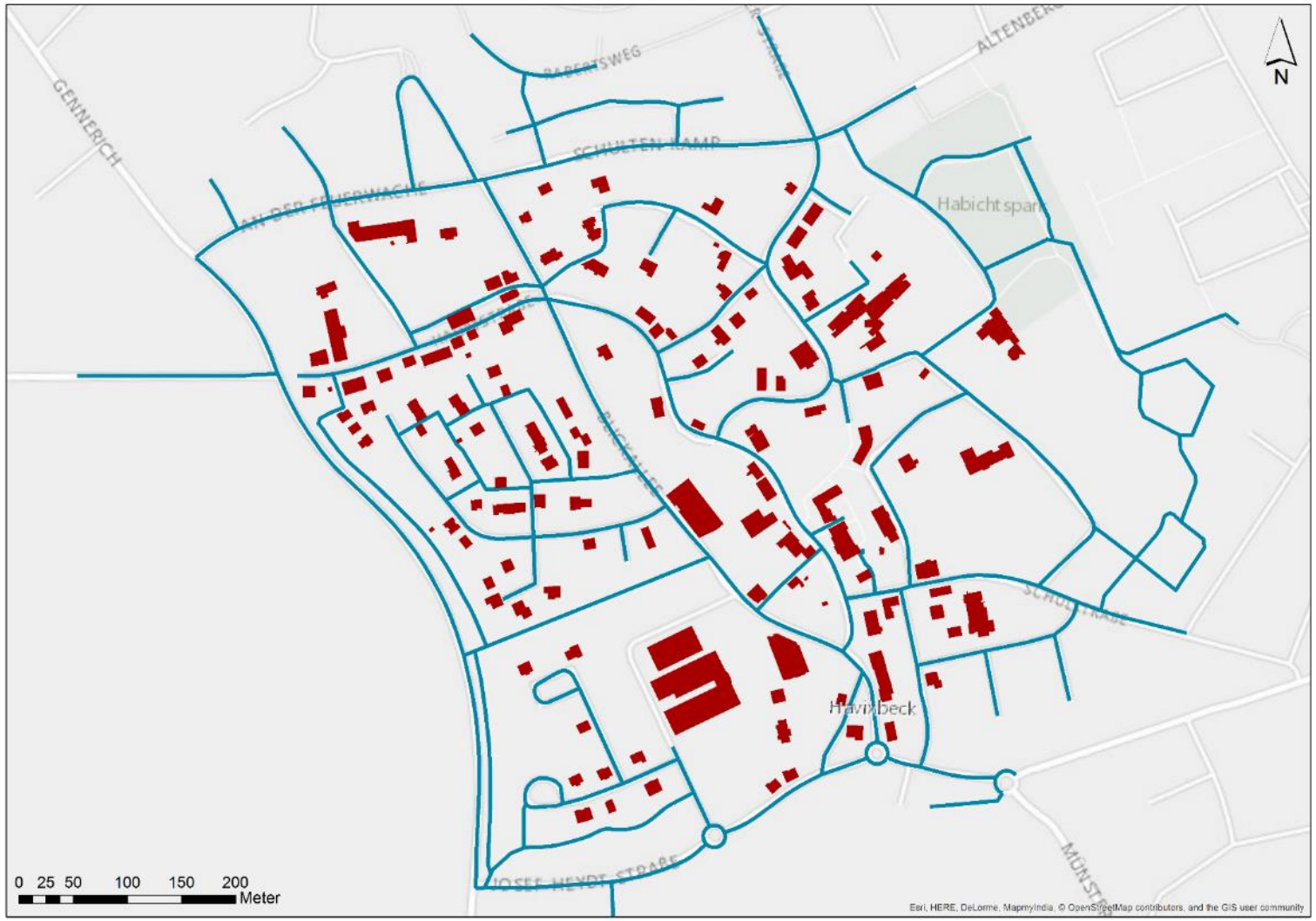


Schematic representation

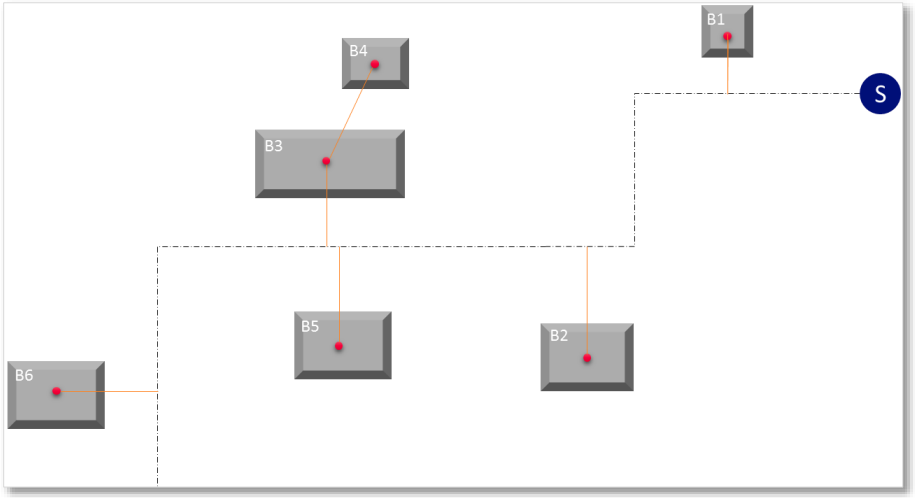


Example – Preparing (Road) Network

FH MÜNSTER
University of Applied Sciences

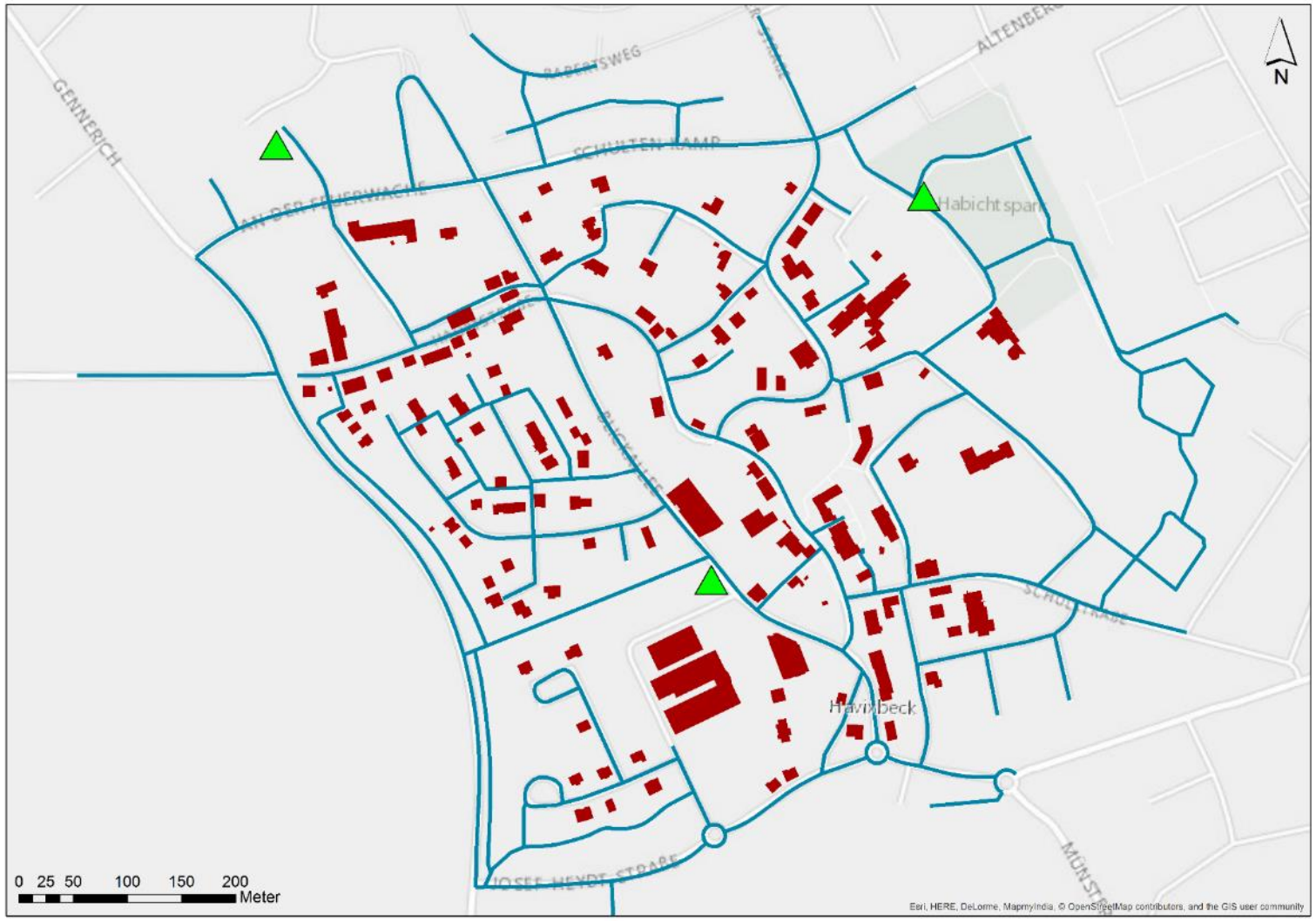


Schematic representation

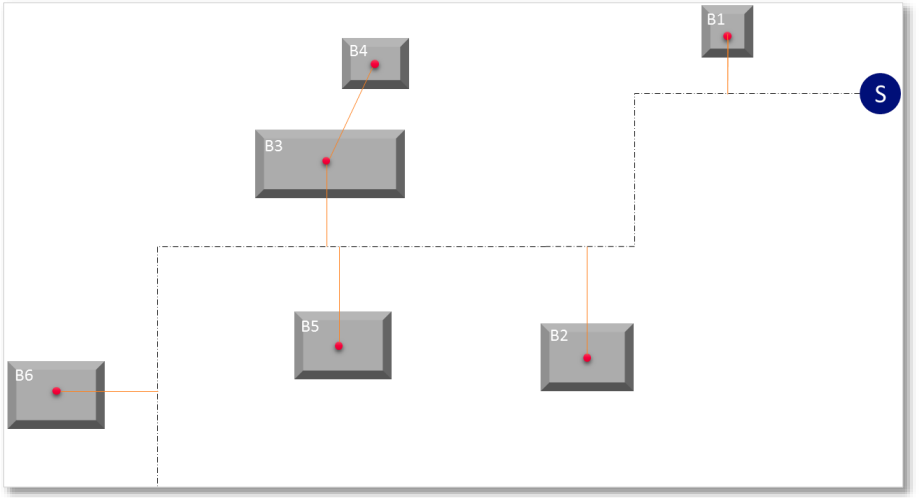


Example – Locating of Heat Source

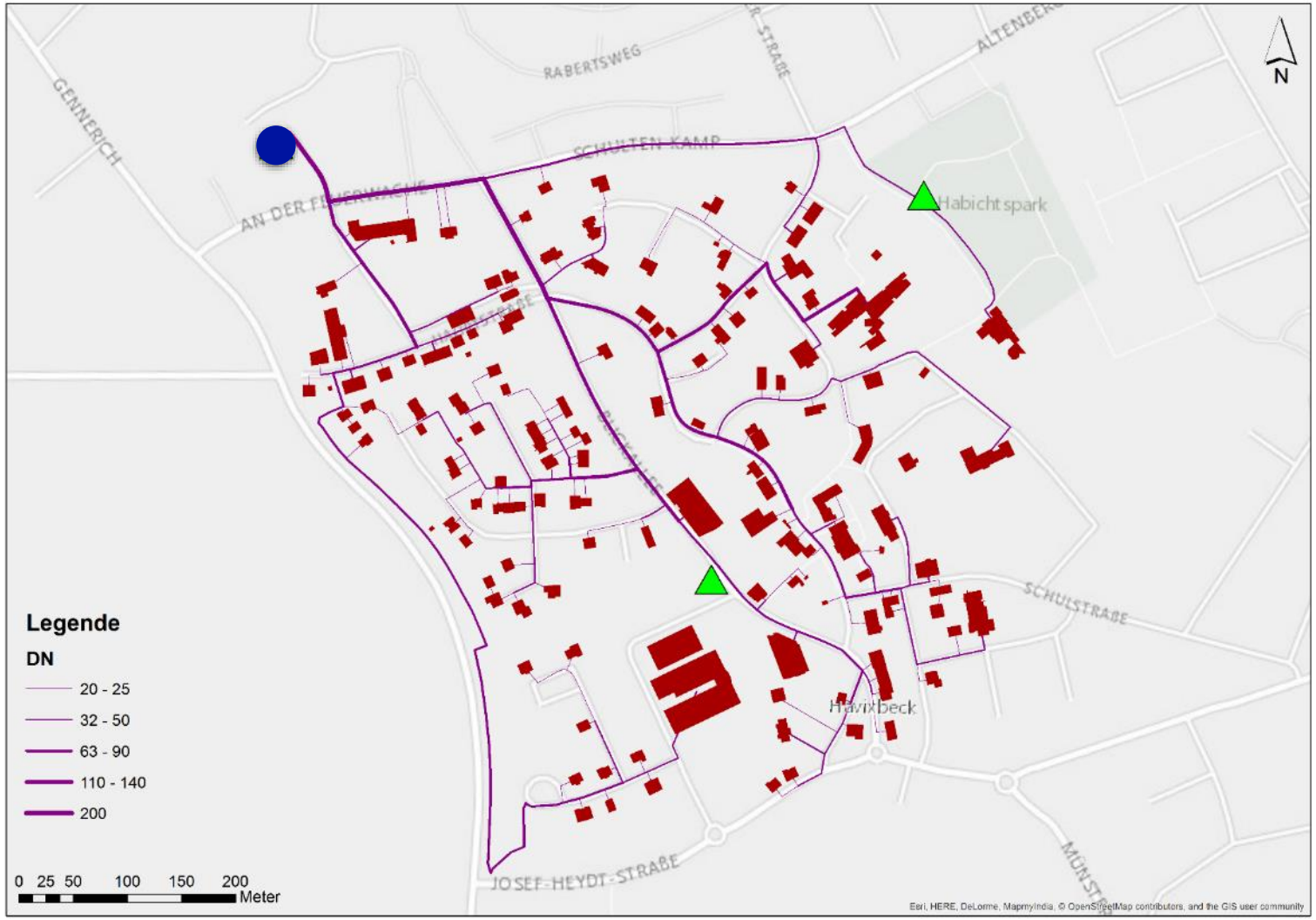
FH MÜNSTER
University of Applied Sciences



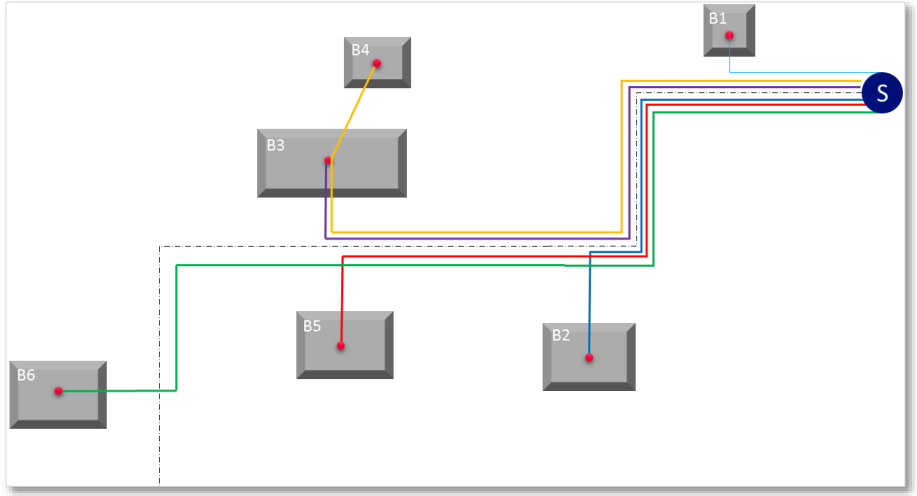
Schematic representation



Example – Network Analysis



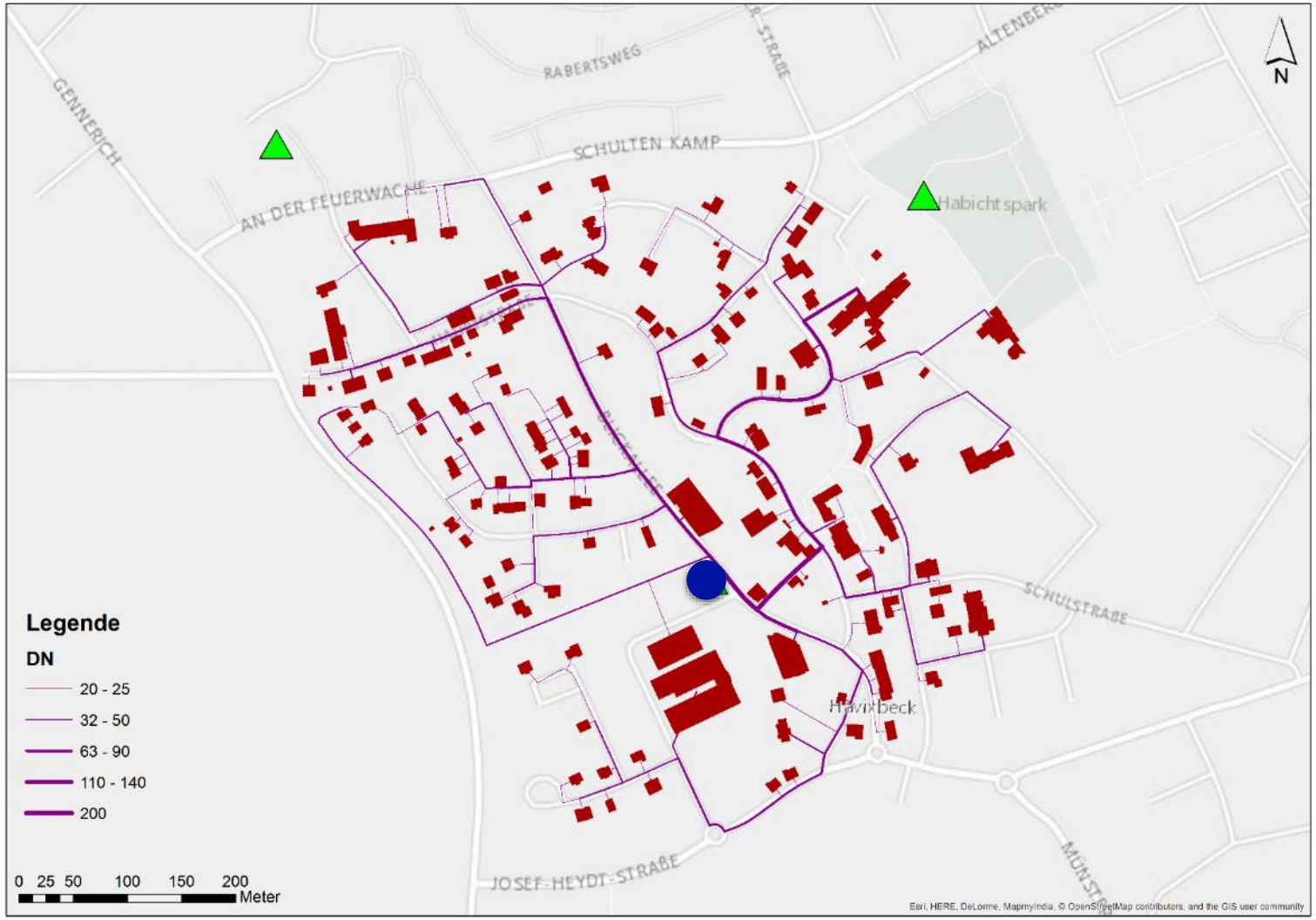
Schematic representation



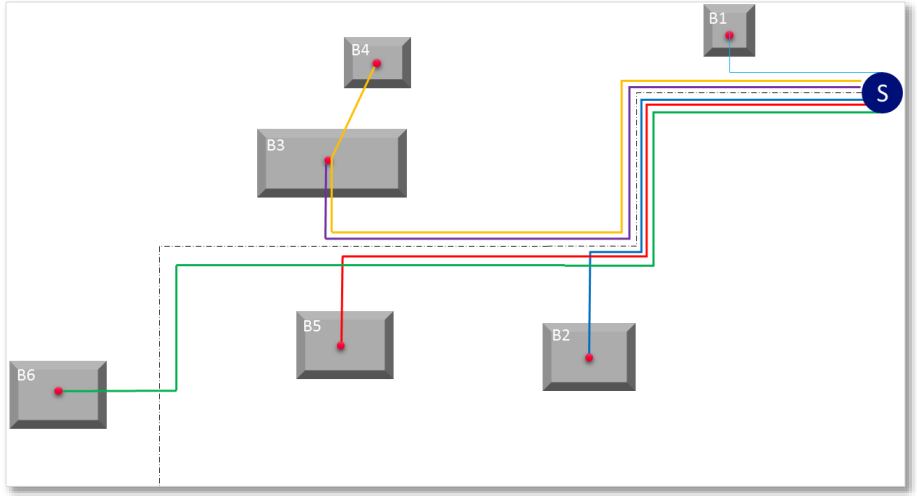
Supply Temperature: 80° C

Return Temperature: 60° C

Example



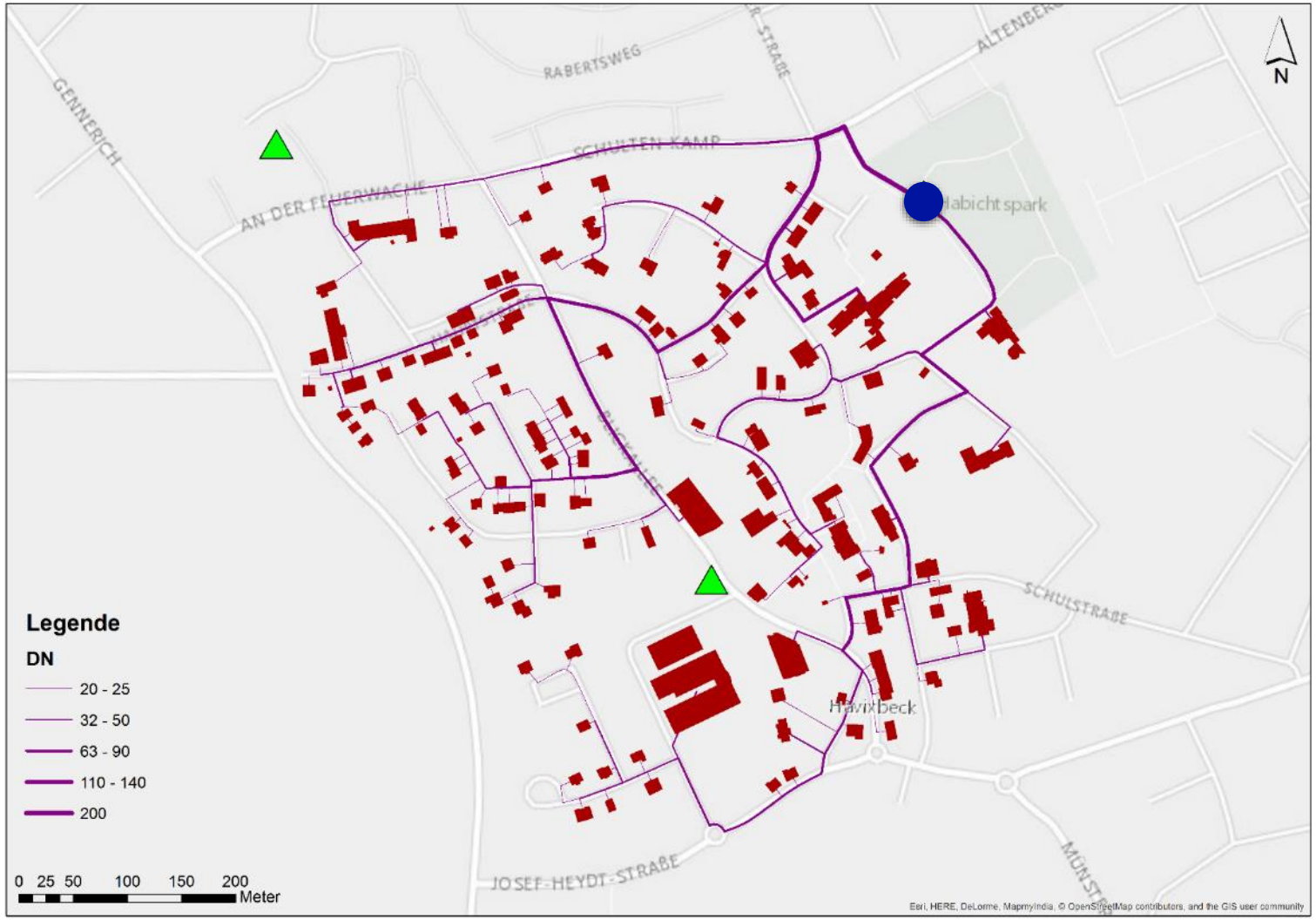
Schematic representation



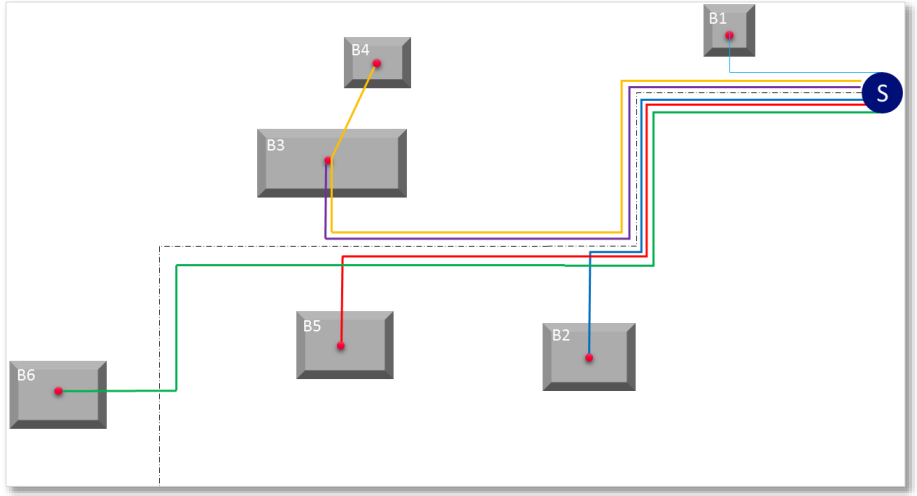
Supply Temperature: 80° C

Return Temperature: 60° C

Example



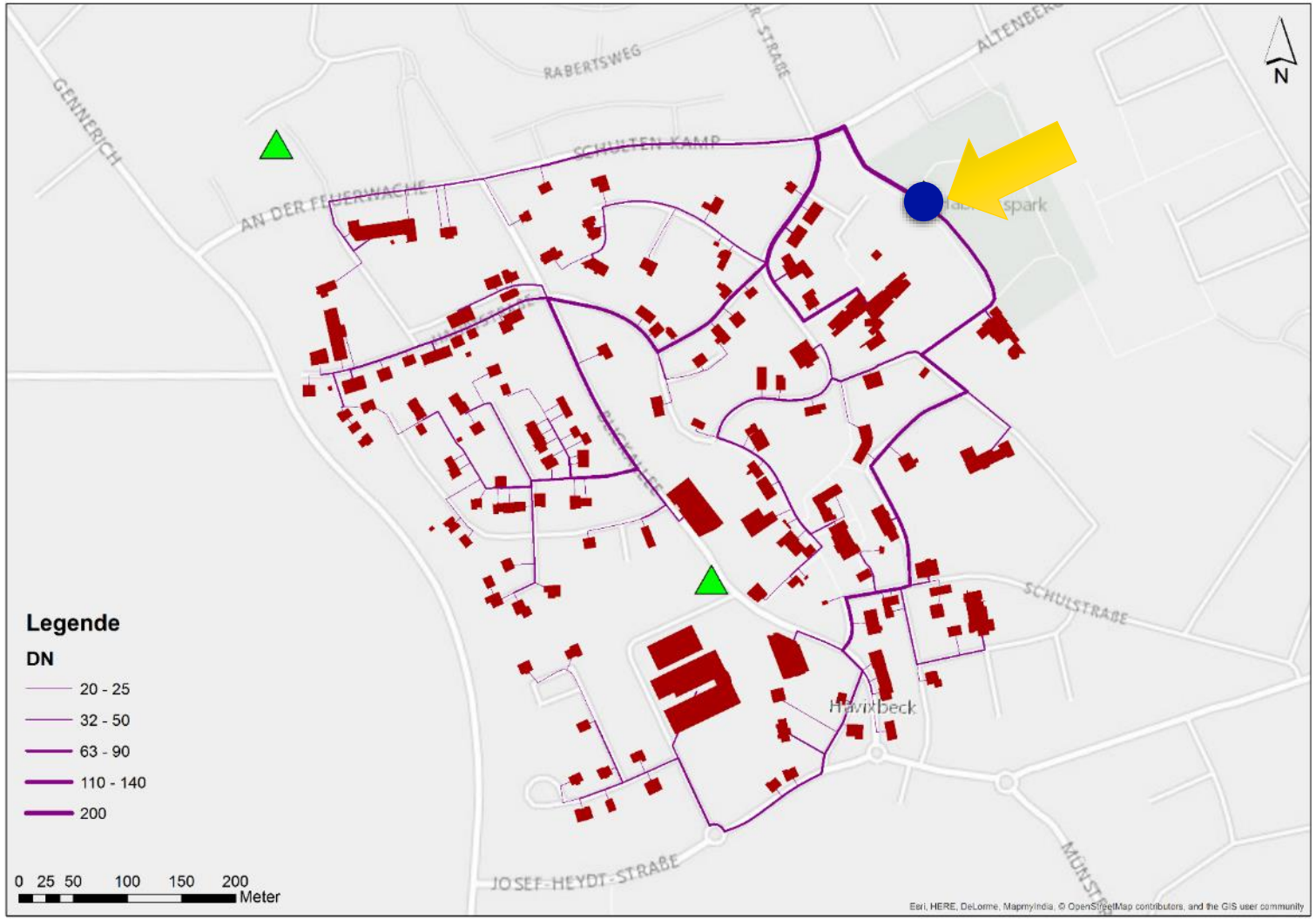
Schematic representation



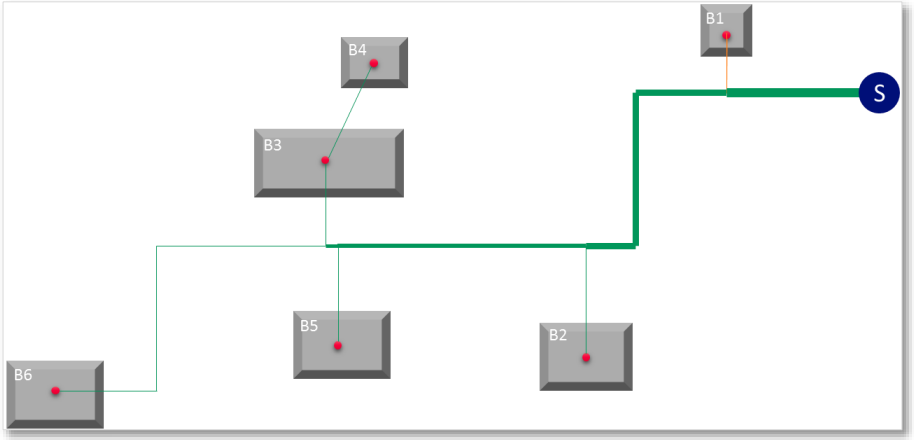
Supply Temperature: 80° C

Return Temperature: 60° C

Example – Network Design



Schematic representation

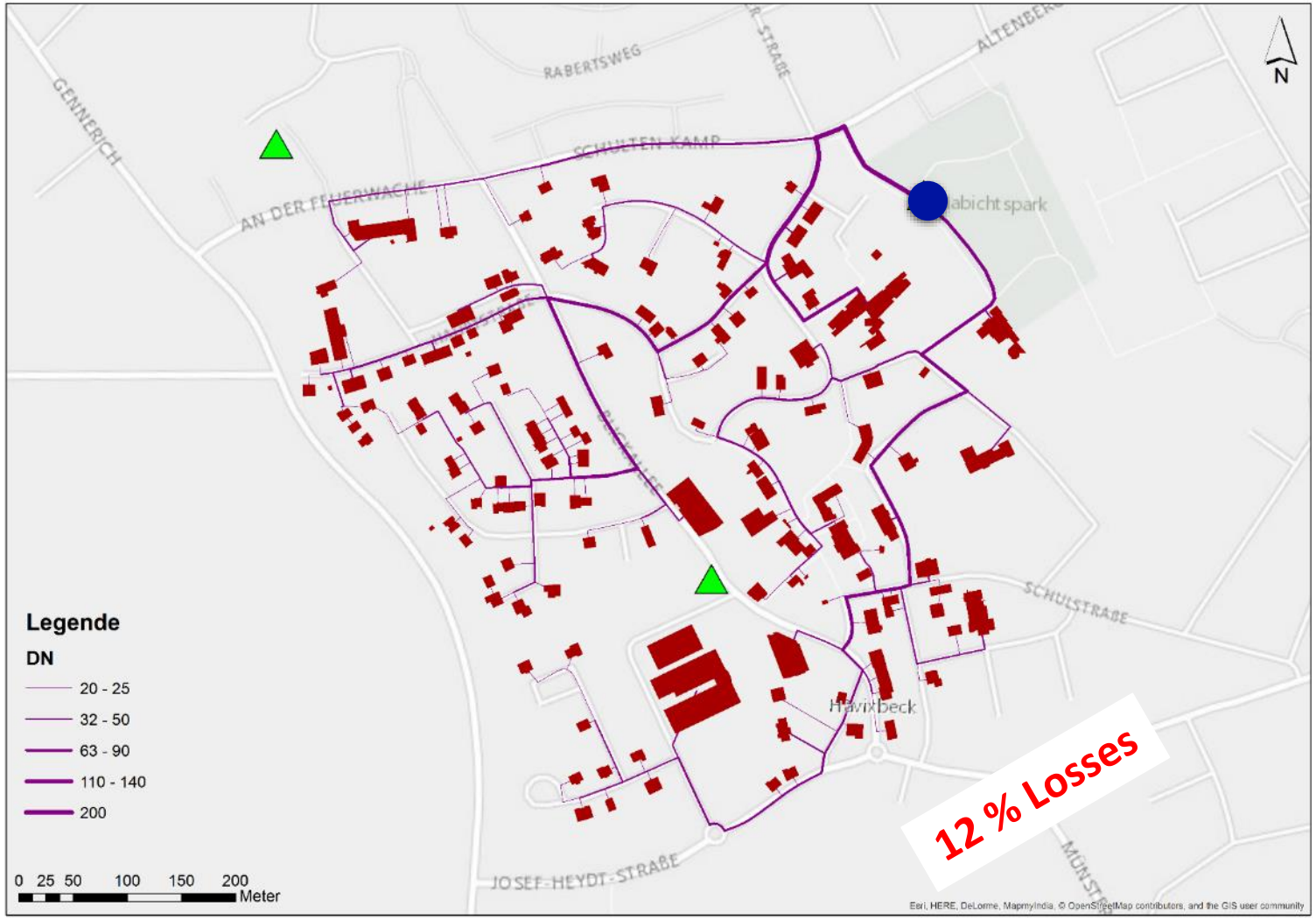


Supply Temperature: 80° C

Return Temperature: 60° C

Example – Network Figures

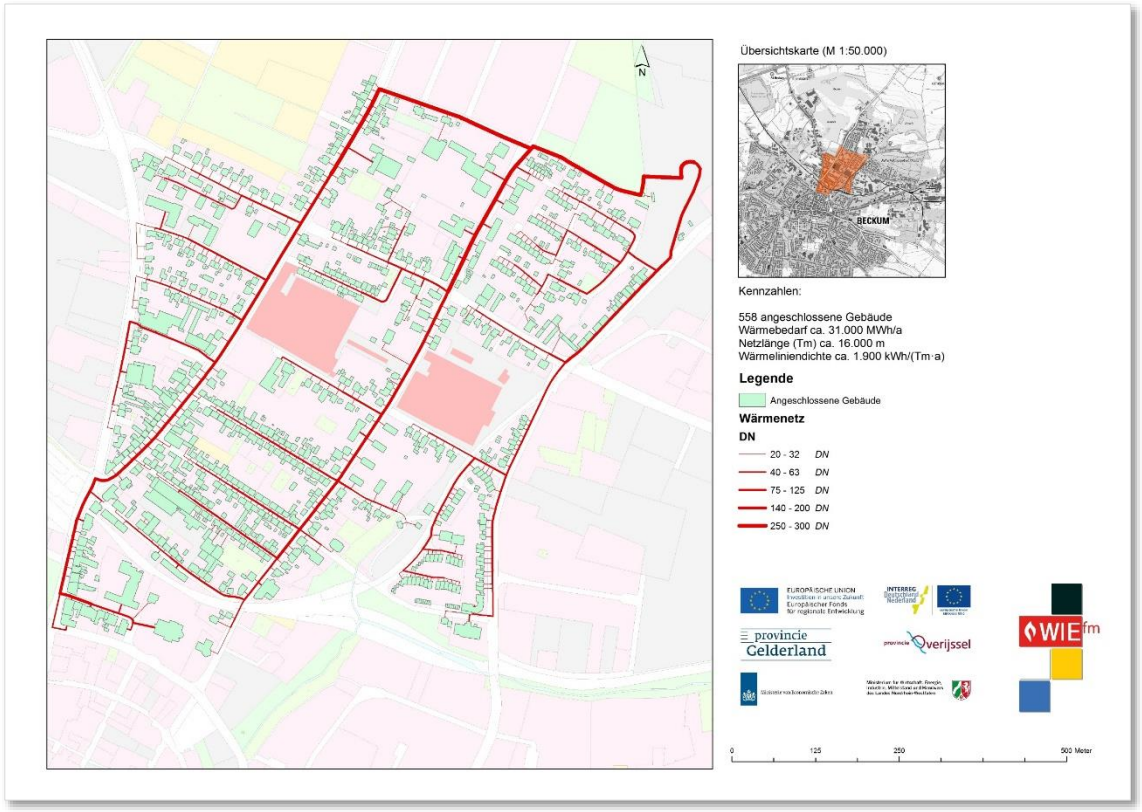
FH MÜNSTER
University of Applied Sciences

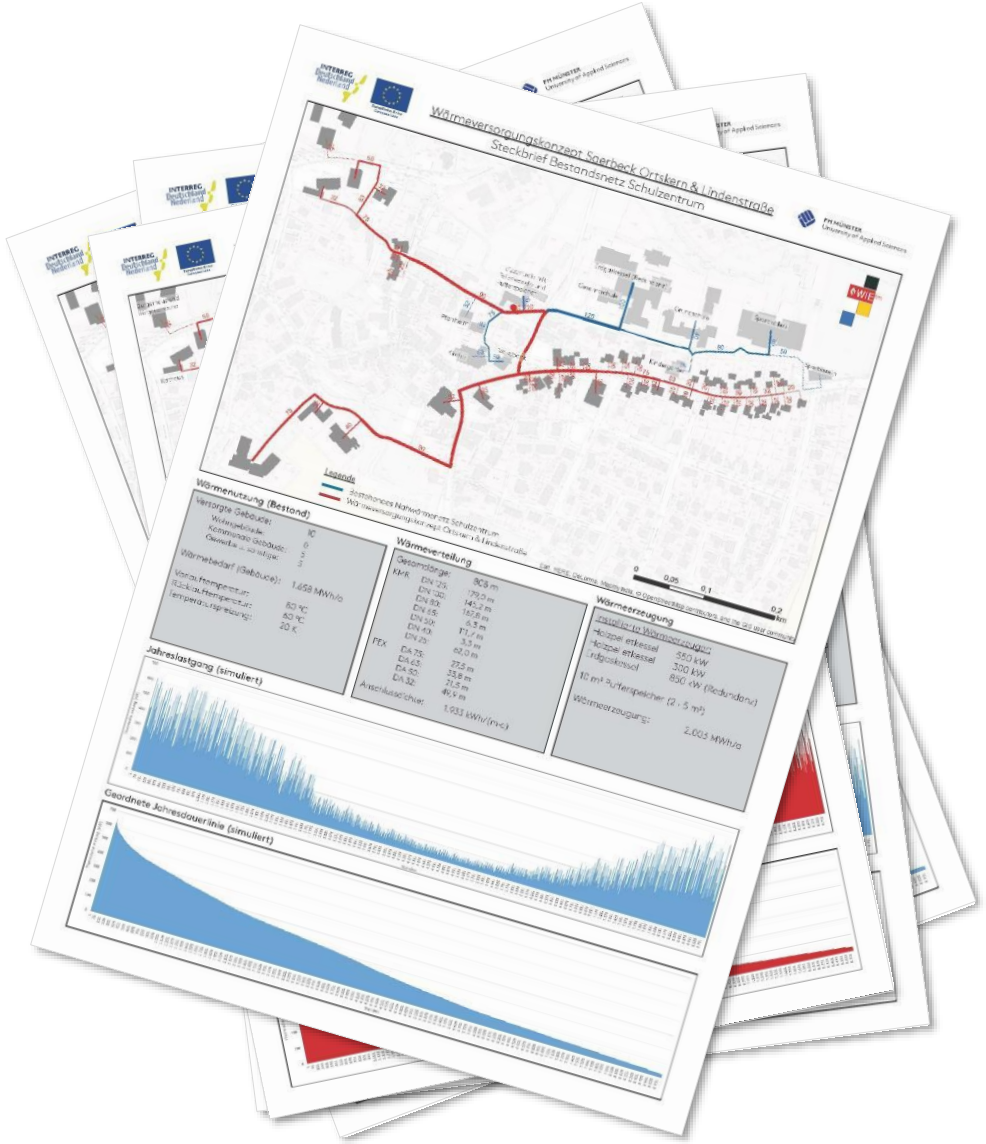


Load-profile	Heat demand [kWh/a]	Count [n]
EFH & MFH	3,457,752	107
GH	209,201	3
GKO	1,862,659	12
GMK	1,518,330	37
Sum	7,047,942	-
Losses	830,651	-
Total	**7,878,593**	**159**

5.2 km Primary lines
2.6 km Secondary lines
7.8 km Pipe system total
1,015 kWh/m·a
2.25 Mio € Investment
229 € / m

Example - Project Report





Conclusion

Conclusion

Subheadline

- ✓ **We showed that energy planning is possible with open GIS data and how**
- ✓ **Our tools enable quick and easy implementation of DH**
- ✓ **Our results are published and presented in form of web maps (wiefm.eu)**

FH MÜNSTER
University of Applied Sciences

Please contact us:

M.Sc. Jigeeshu Joshi
Dipl.-Geogr. Hinnerk Willenbrink

FH Münster - University of Applied Sciences

Fachbereich Energy · Building Services · Environmental Engineering

Stegerwaldstraße 39
D-48565 Steinfurt
Tel : +49 (0) 2551 9-62548
Fax : +49 (0) 2551 9-62717
Mail: willenbrink@fh-muenster.de
Web: www.fh-muenster.de/egu
Web: www.wiefm.eu

EUROPÄISCHE UNION
Investition in unsere Zukunft
Europäischer Fonds
für regionale Entwicklung

INTERREG Deutschland Nederland

Europäische Union
Europese Unie

provincie Gelderland

provincie Overijssel

Ministerie van Economische Zaken

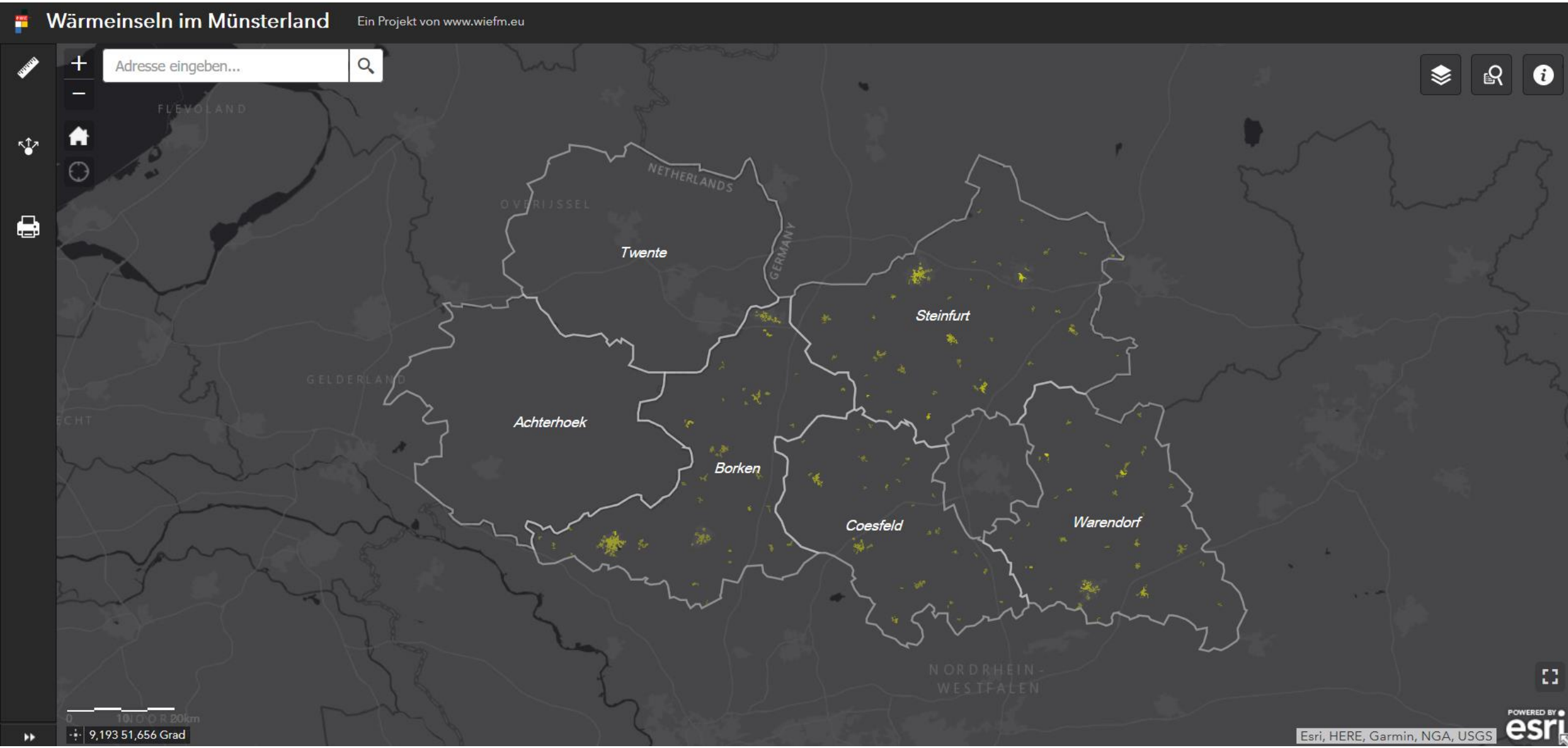
Ministerium für Wirtschaft, Energie, Industrie, Mittelstand und Handwerk des Landes Nordrhein-Westfalen

Forschungsteam

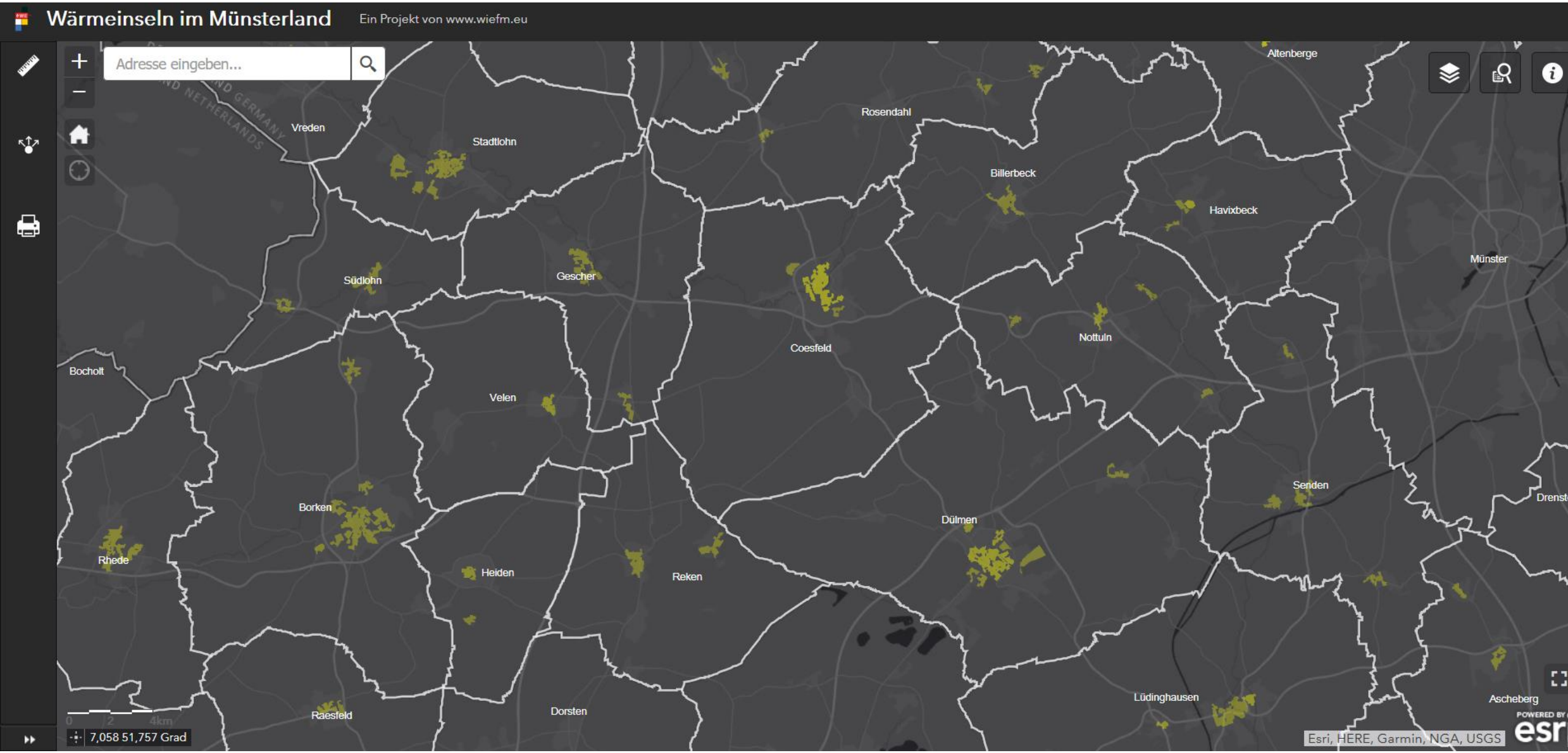
Prof. Dr.-Ing. Christof Wetter

Stegerwaldstraße 39 fon +49 (0)2551.962548 joshi@fh-muenster.de, willenbrink@fh-muenster.de
D-48565 Steinfurt fax +49 (0)2551.962717 www.fh-muenster.de/egu, www.wiefm.eu

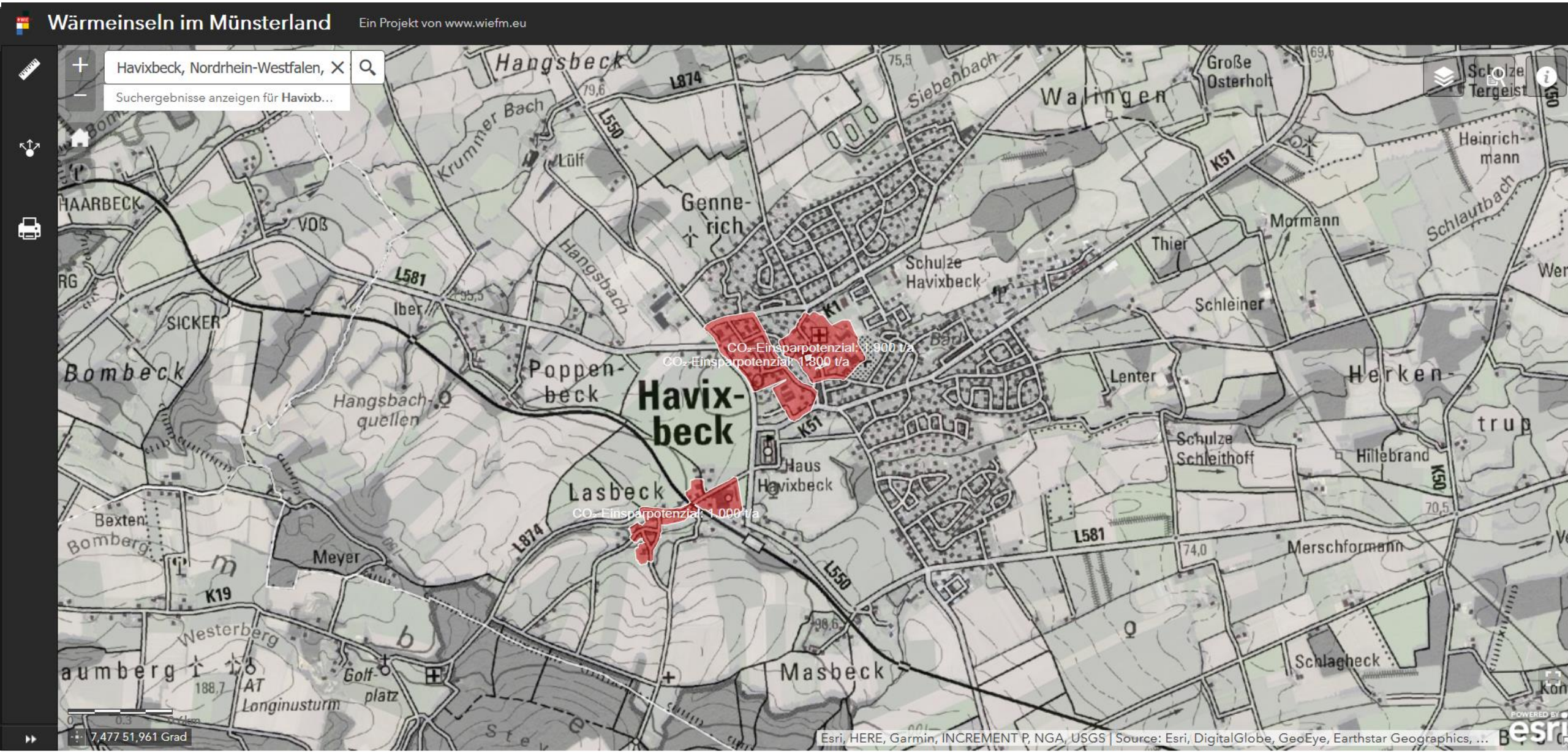
Wärmehotspots im Münsterland



Wärmehotspots im Münsterland



Wärmehotspots im Münsterland



Wärmehotspots im Münsterland