

GIS-based Mapping Tool for Urban Energy Demand

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Johannes Dorfner
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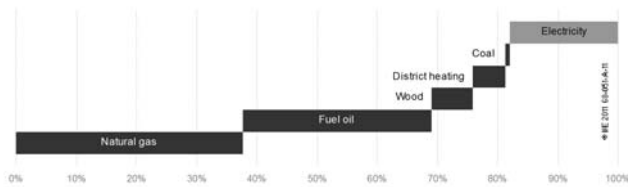


1. Motivation
2. Method
3. Result
4. Conclusion

Motivation – Introduction

- Public focus concerning *energy efficiency* and *renewable energy sources* is on electricity
- More than 80 % of domestic energy consumption is for heat
→ Energy efficiency measures must include heat demand

Energy consumption of private households in Germany (2002) by energy carrier



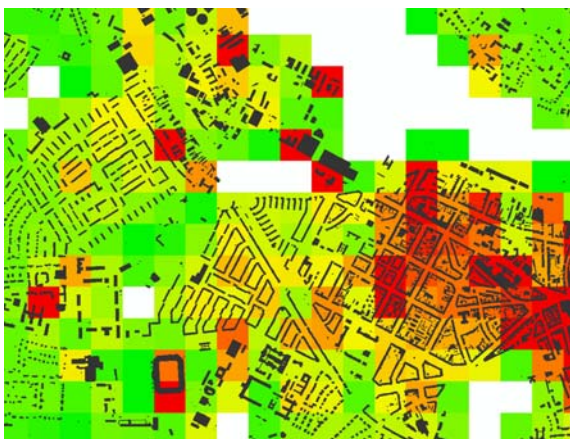
Motivation – Complexity

- Many heating technologies are available
 - Central heat generation/distribution or local generation?
 - Integrate local renewable energy sources?
- Spatial distribution of heat demand as decision variable

Strengths and weaknesses of established heating technologies

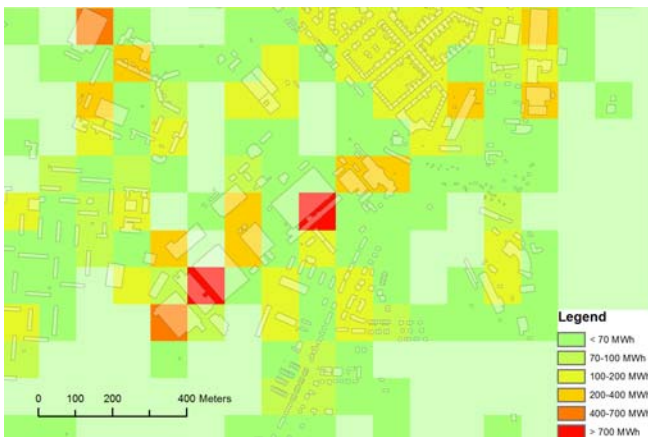
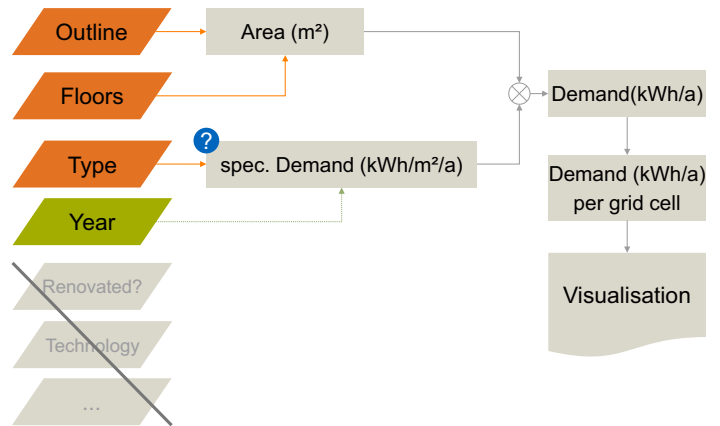
Technology	Strengths	Weaknesses
Gas boiler	+ Low investment	- CO ₂ emissions
Oil burner	+ Low investment	- Needs tank space - High CO ₂ emissions
Solid fuel burner	+ Renewable fuel	- Needs storage space
Heat pump	+ Flexible	- CO ₂ emissions (elec.)
Cogeneration unit	+ High total efficiency	- High investment
District heating	+ Can be very efficient	- Very high investment

Motivation – Example



Method – Building database (1)





- Quick graphical summary of heat energy demand
- Develop a feeling for scales
- Planning for renovation programs
- Find priority areas for district heating networks



- GIS heatmap tool (toolbox for ArcGIS 10 by ESRI) estimates heat demand on spatial grid
- Result is a colour-coded heatmap for quick identification of areas with high/low heat demand
- Heatmap and other tools are available on the UP-RES project homepage under <http://tiny.cc/up-res>.



Dipl.-Ing.
Johannes Dorfner
Lehrstuhl für Energiewirtschaft und Anwendungstechnik



Technische Universität München
Fakultät für Elektrotechnik und Informationstechnik
Arcisstraße 21
80333 München
T +49 89 289-28312
F +49 89 289-28313
johannes.dorfner@tum.de