HSLU Lucerne University of Applied Sciences and Arts

Why is reliable energy data so important for research?

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THERMAL ENERGY STORAGE

Engineering and Architecture
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FH Zentralschweiz

Image source: www.craiyon.com

Why is reliable data so important?

Image source: https://en.m.wikipedia.org/wiki/File:2011.11.15_building_software.png

The SWEET projects - “SWiss Energy research for the Energy Transition”

The purpose of the SWEET program funded by SFOE is to accelerate innovations that are key to implementing Switzerland’s Energy Strategy 2050 and achieving the country’s climate goals.

Currently 8 projects running:

Decarb CH

Decarbonisation of heating and cooling

PATHFNDR

Flexibility and sector coupling

EDGE

Integration of dezentralised renewable energy

SURE

Reconcile sustainabiilty and resilience

LANTERN

New energy-related lifestyles

SWICE

Energy-saving potentials and enhanced living standards

CoSi

Interactions society and energy system

Refuel

Sustainable fuels and platform chemicals

What is considered? (strongly simplified)

Potentials

Energy provision

Energy system

Demand

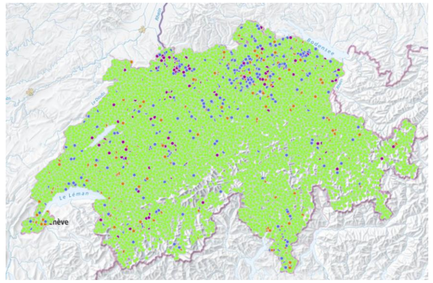
- Residential
- Commercial
- Industry
- Mobility

...

Image source: https://clipart-library.com

Estimating the buildings’ heat demand

Federal register of buildings and dwellings (RBD/GWR)



Federal office of energy statistics

Energy certificates (“Geak” – CECB)

GEAK
Gebäudeenergieausweis der Kantone

Data flow

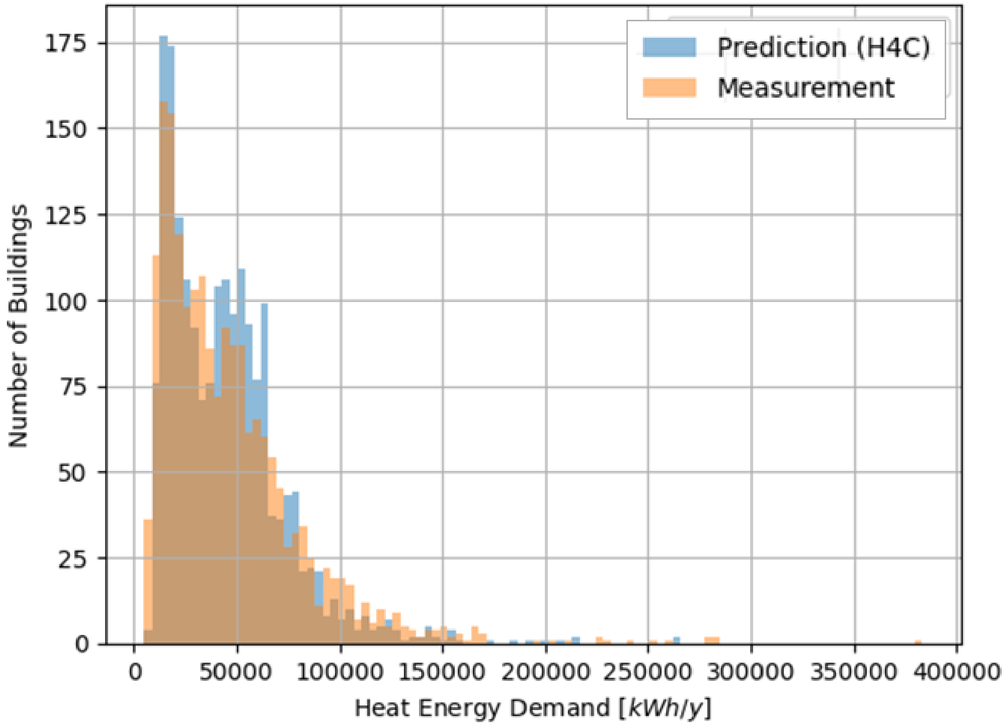
Address → Parameters from public data bases → Model → Demand/ profile prediction

Image source: maps.admin.ch, www.bfe.admin.ch, www.geak.ch

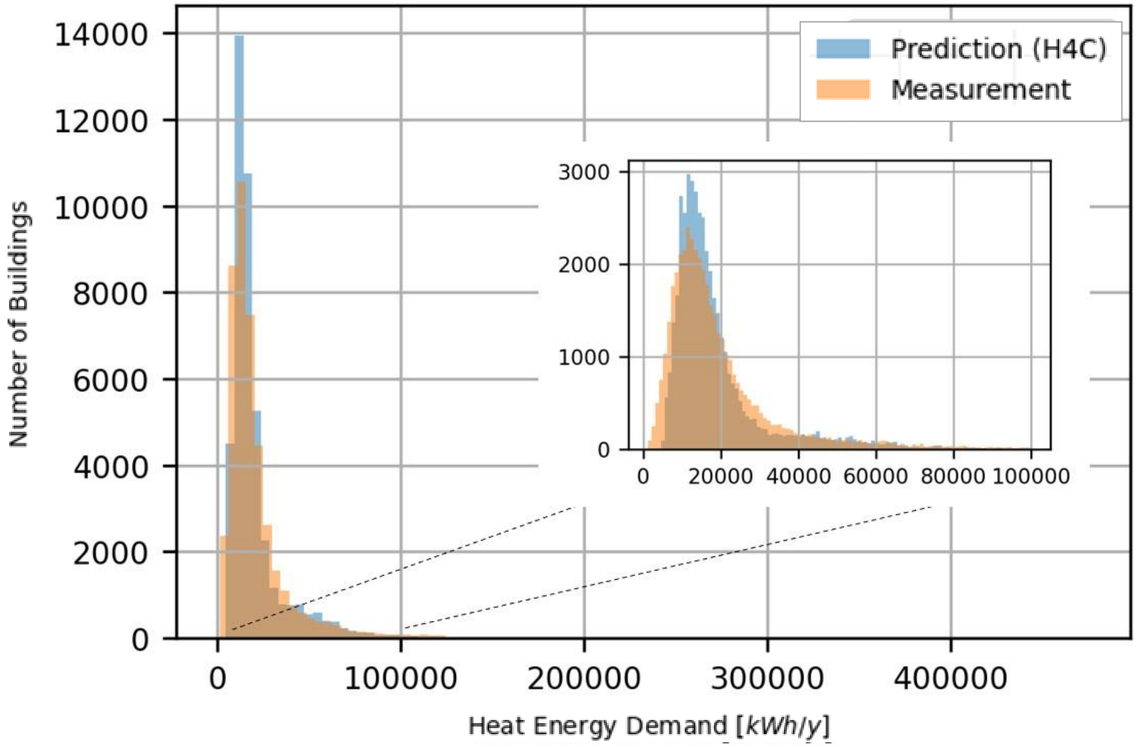
Estimating the buildings’ heat demand

Comparison with actual gas/district heating consumption

City St. Gallen



Canton Basel-Landschaft



Identified challenges

Data availability

- *Real-world* (non-aggregated) consumption *data difficult* to obtain
- Challenges with *data protection*

Data quality

- Building properties *not reliable* (outdated, contradictions, etc.)
- Consumption values *not standardised* (space heating mixed with domestic hot water (or not))

Ambiguity of task

- *Too little information* about usage, details of building etc.

Potential fixes

Data modelling

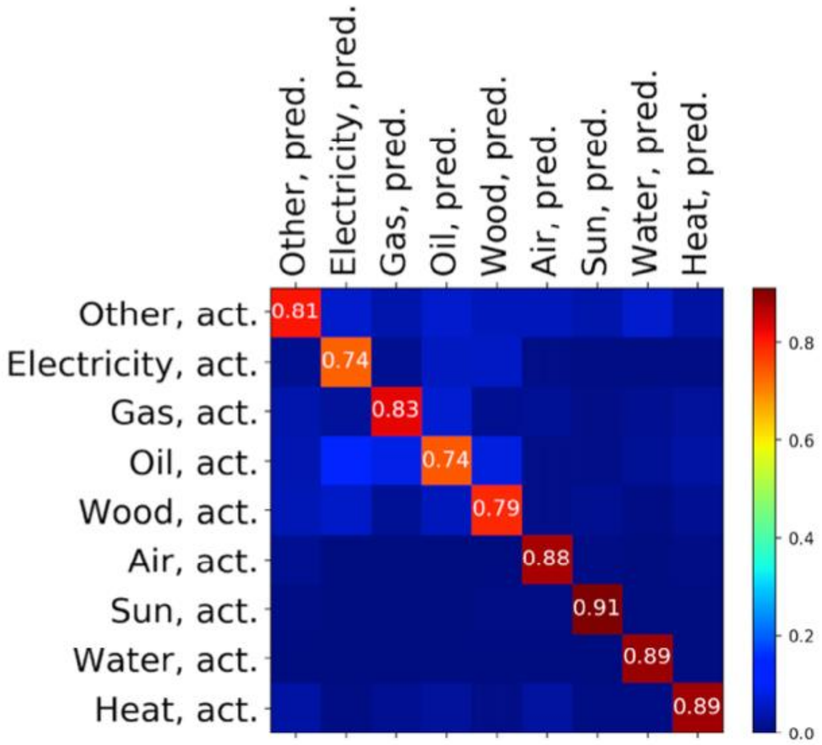
Train a machine-learning model on target property to

- check consistency of database entry
- impute missing values

Fusing data from multiple sources

- Building application
- Building certificates
- Complementary information (firing control, etc.)

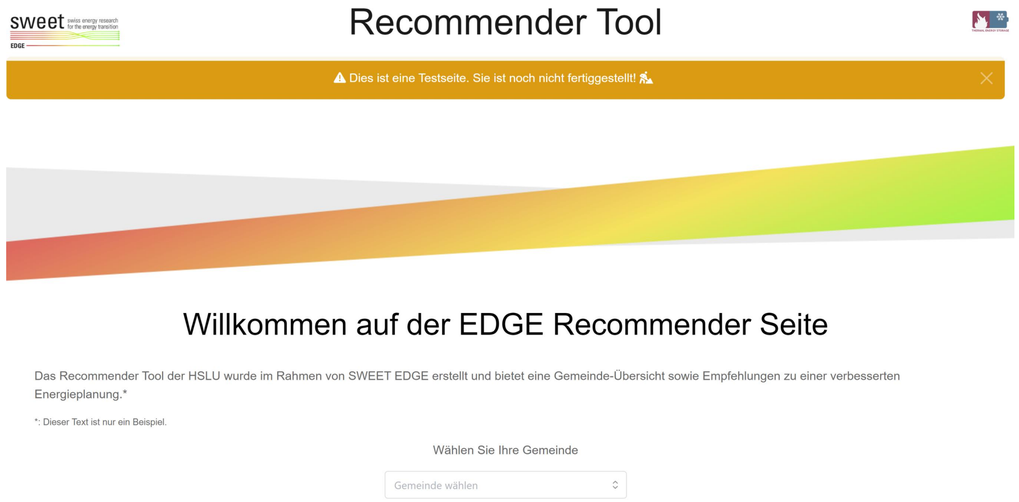
ML-model for heating system type based on building properties



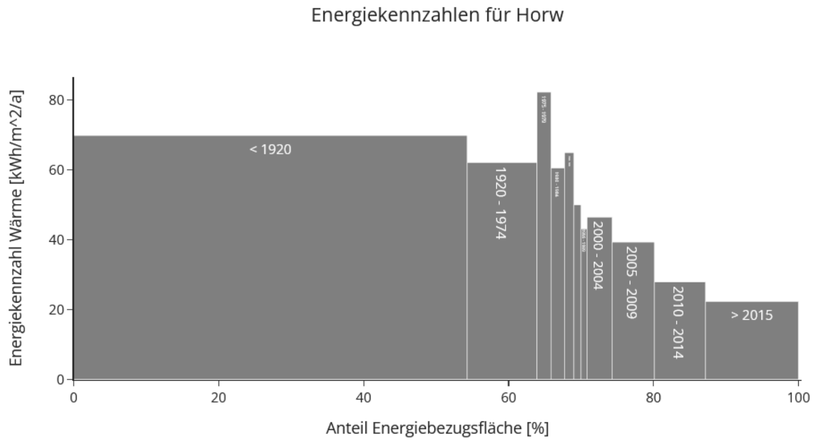
Reference: E. Linder et al. (2024), in preparation

Community energy planning based on public data

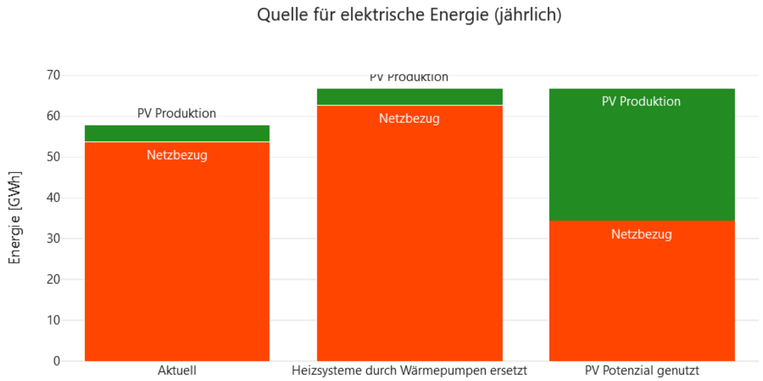
Prototype

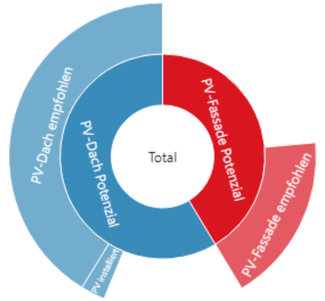


Automated generation of plots for energy strategy

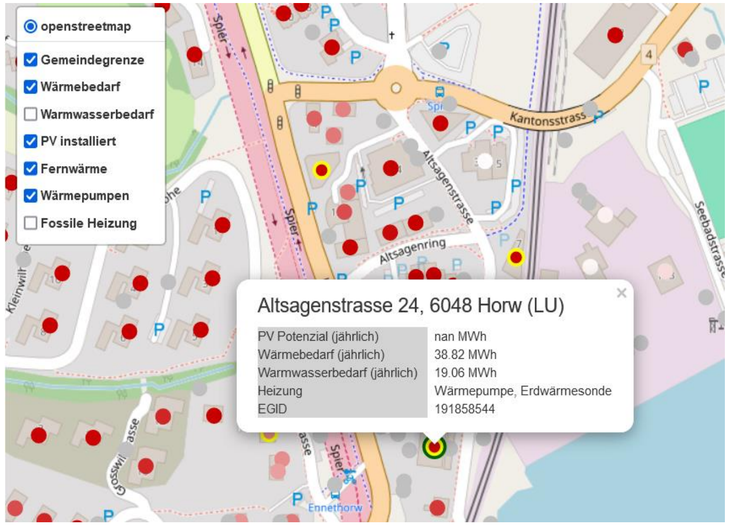


Impact analysis of renewable integration scenarios





Identification of retrofitting targets



Reference: M. Meyer et al. (2023), DOI: 10.1088/1742-6596/2600/2/022010

Identified challenges

Data availability

- *Real-world* (non-aggregated) energy system (setup, consumption) *data difficult* to obtain
- Challenges with *data protection*

Data quality

- Energy system data (e.g. grid topology) *not available or reliable,* monitoring data patchy
- Often only meta-data relevant to application available

Diversity of tasks

- *Very diverse questions* ranging from operation of single device to evolution of city in 2050

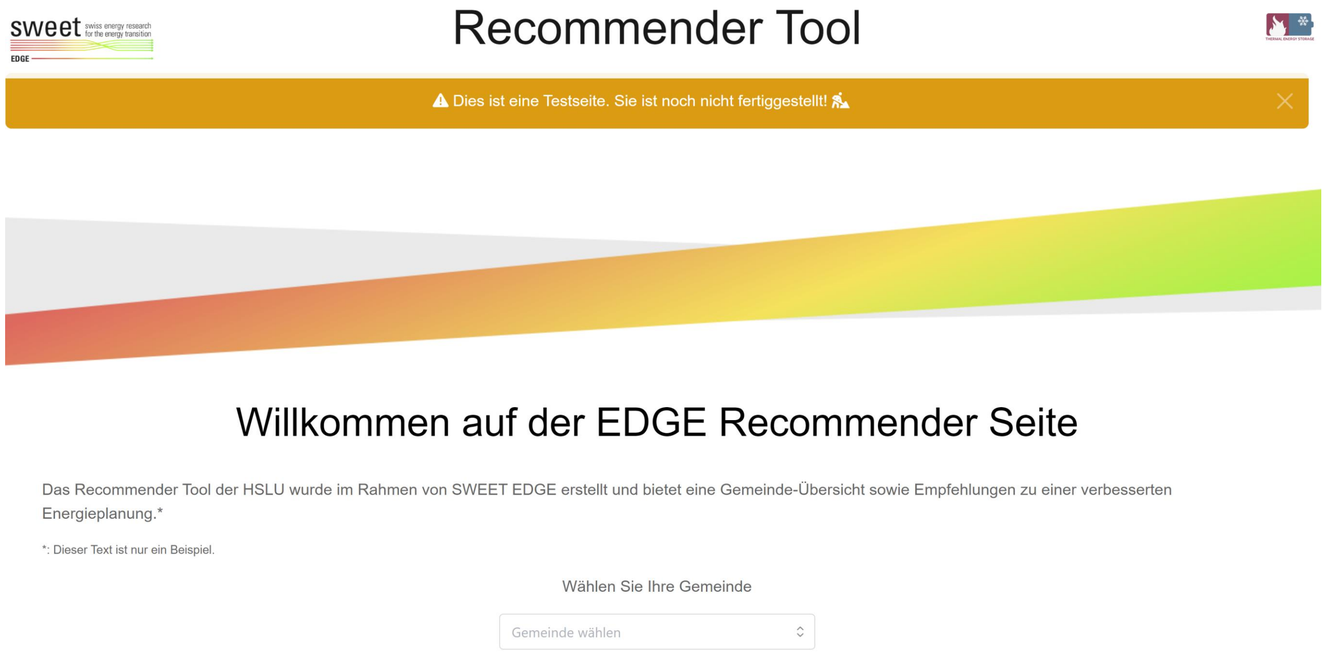
Important points

- Relevant public data is available
- The value of the data set can be improved substantially by combining with (non-public) data
- Data quality may be an issue, but there are methods to improve the quality
- The research community can support you in your challenge
- Successful applications / use-cases help to move others

Call for action: Do you want to be a first mover?

We are currently looking for communities / utilities / planners interested in testing the recommender tool.

If you want to test it for your community, please get in contact with me (philipp.schuetz@hslu.ch).



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