Hourly Demand Profiles for Space Heating and Electricity

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Space heating profiles
Identification of Swiss building archetypes

145 Archetype buildings

50 single-family residential

50 multi-family residential

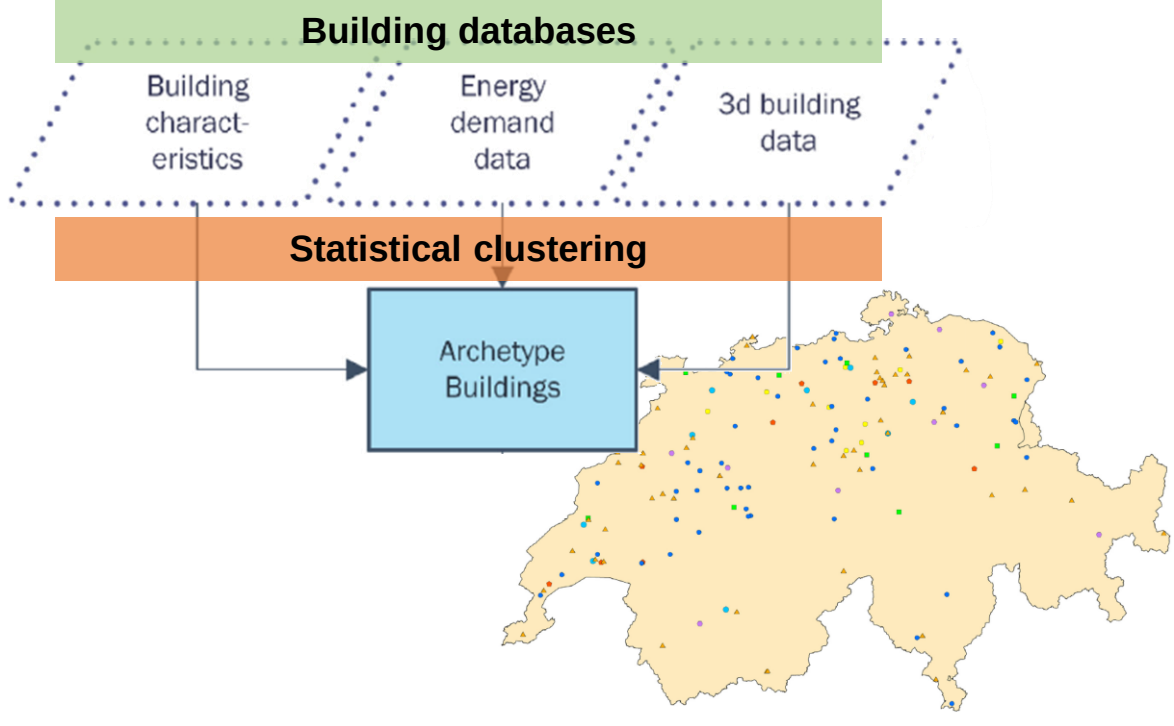
9 office buildings

9 hospital buildings

9 restaurants

9 school buildings

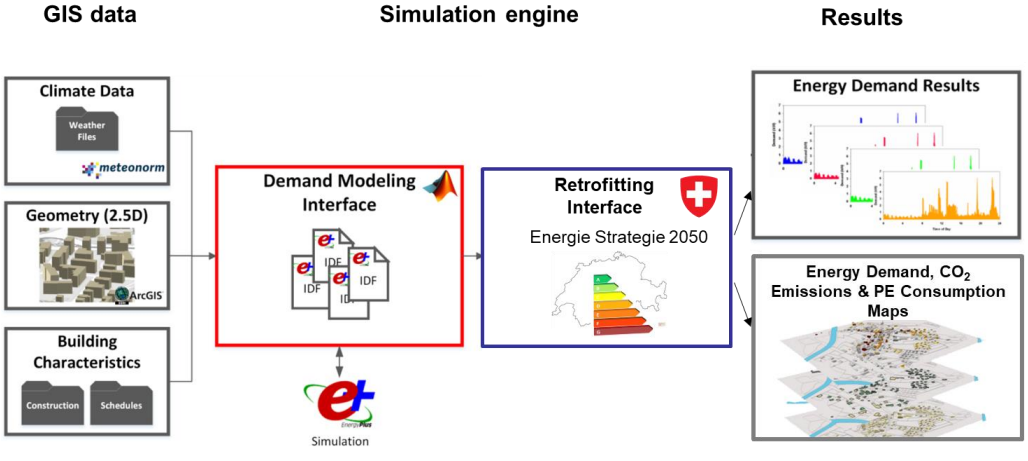
9 shops



Portia Murray, Julien Marquant, Mathias Niffeler, Georgios Mavromatidis, Kristina Orehounig (2020) Optimal transformation strategies for buildings, neighbourhoods and districts to reach CO2 emission reduction targets. Energy & Buildings. 207, 109569.

Heating demand modelling with CESAR

CESAR Tool



- Urban energy simulation software developed at Empa & ETHZ
- Enables the generation of hourly heating, cooling, electricity demand profiles for urban areas at building-level resolution

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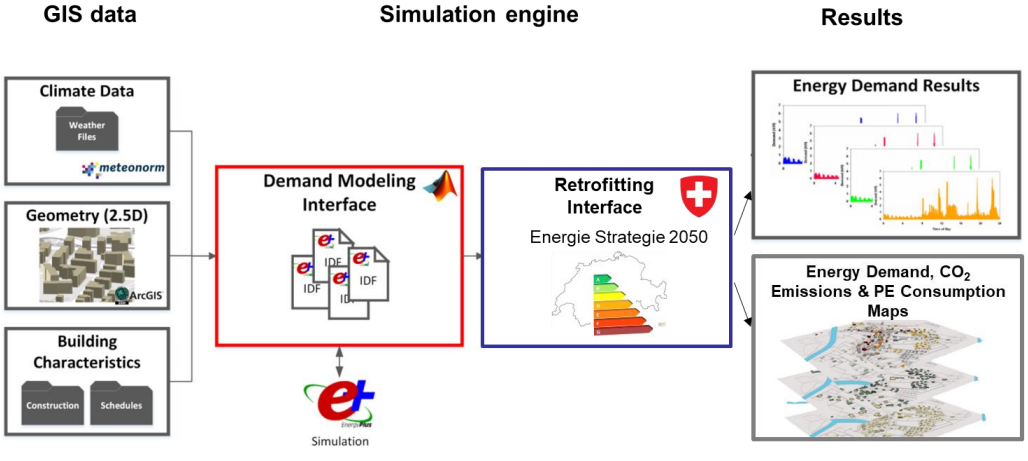

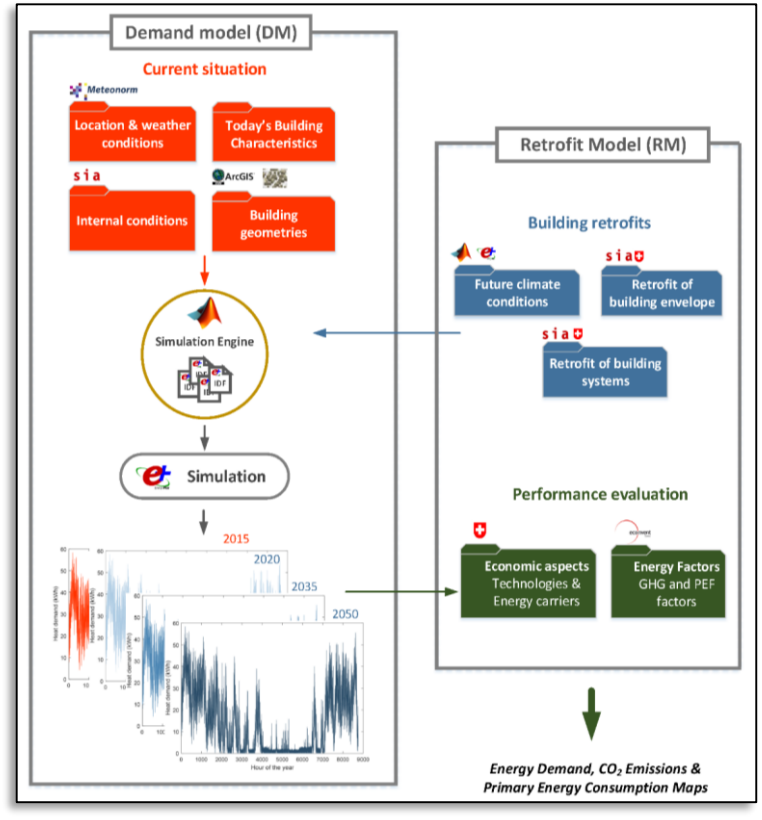

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Heating demand simulation per archetype

145 Archetype buildings		**7 Retrofit scenarios**
50 single-family residential		No retrofit
50 multi-family residential		Ground retrofit
9 office buildings	X	Roof retrofit
9 hospital buildings		Wall retrofit
9 restaurants		Window retrofit
9 school buildings		Window + Wall retrofit
9 shops		Full retrofit

Heating demand simulation per archetype

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7 Retrofit scenarios

No retrofit

Ground retrofit

Roof retrofit

Wall retrofit

Window retrofit

Window + Wall retrofit

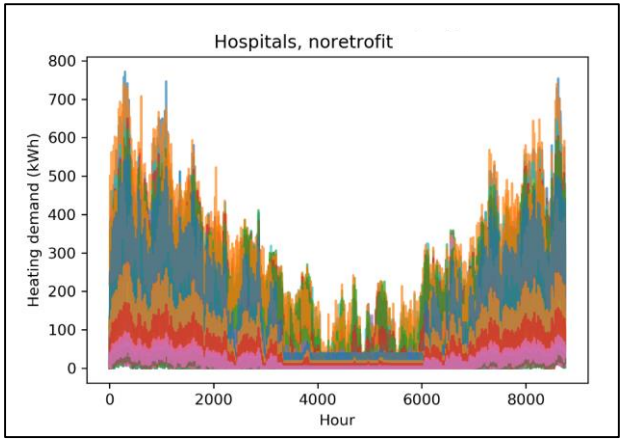
Full retrofit

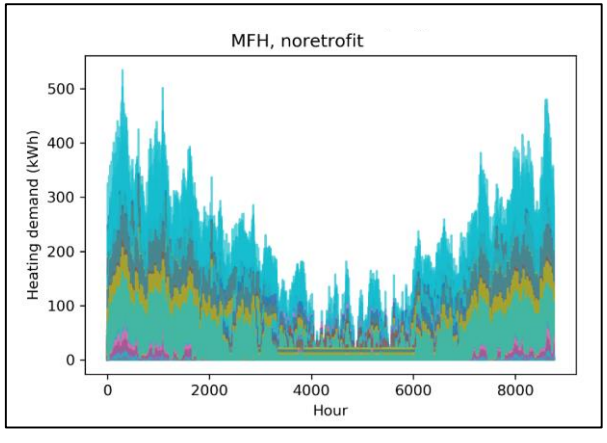
X

54 weather files

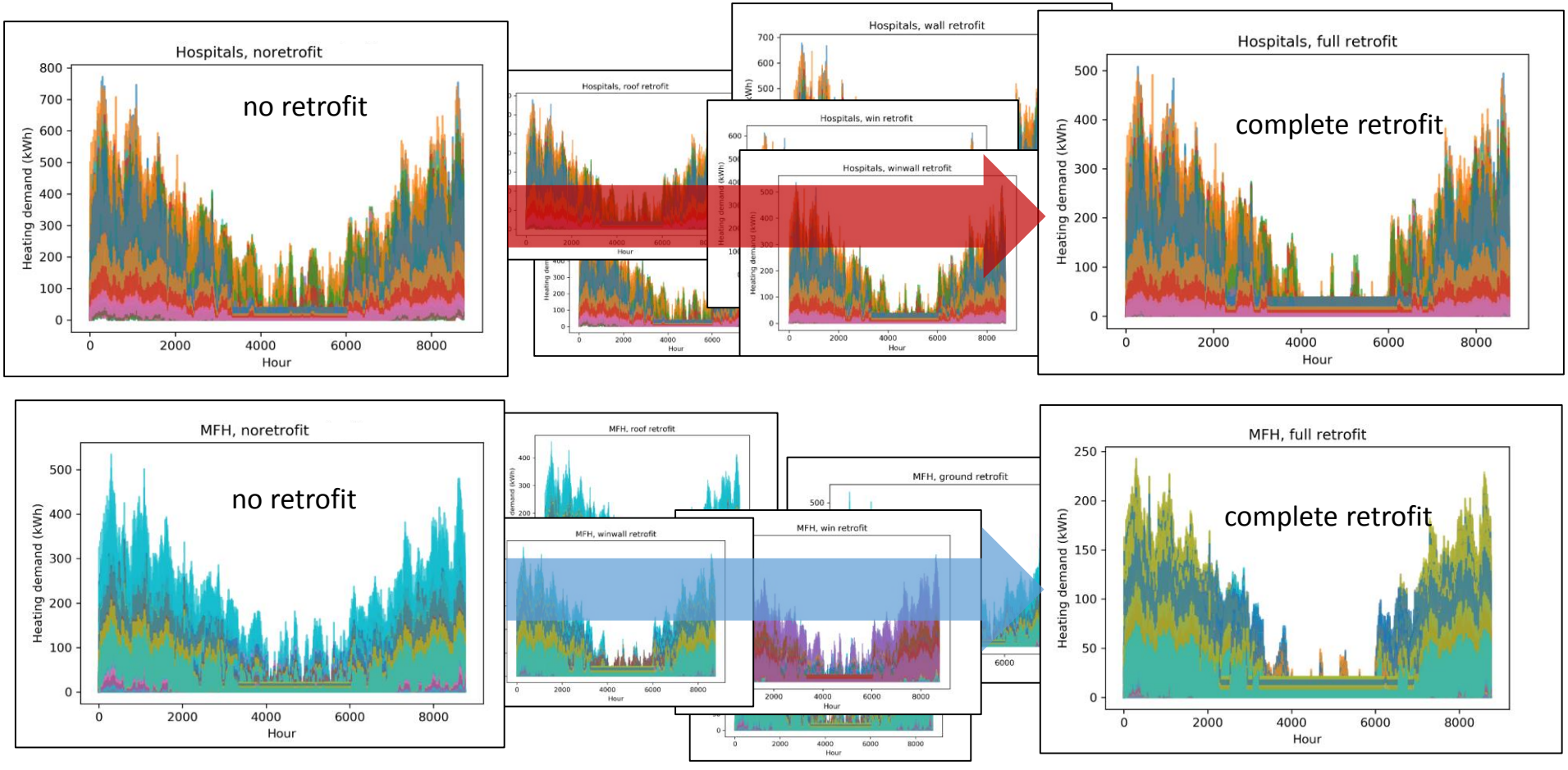
SIA 2028 climate regions

Heating demand simulation per archetype

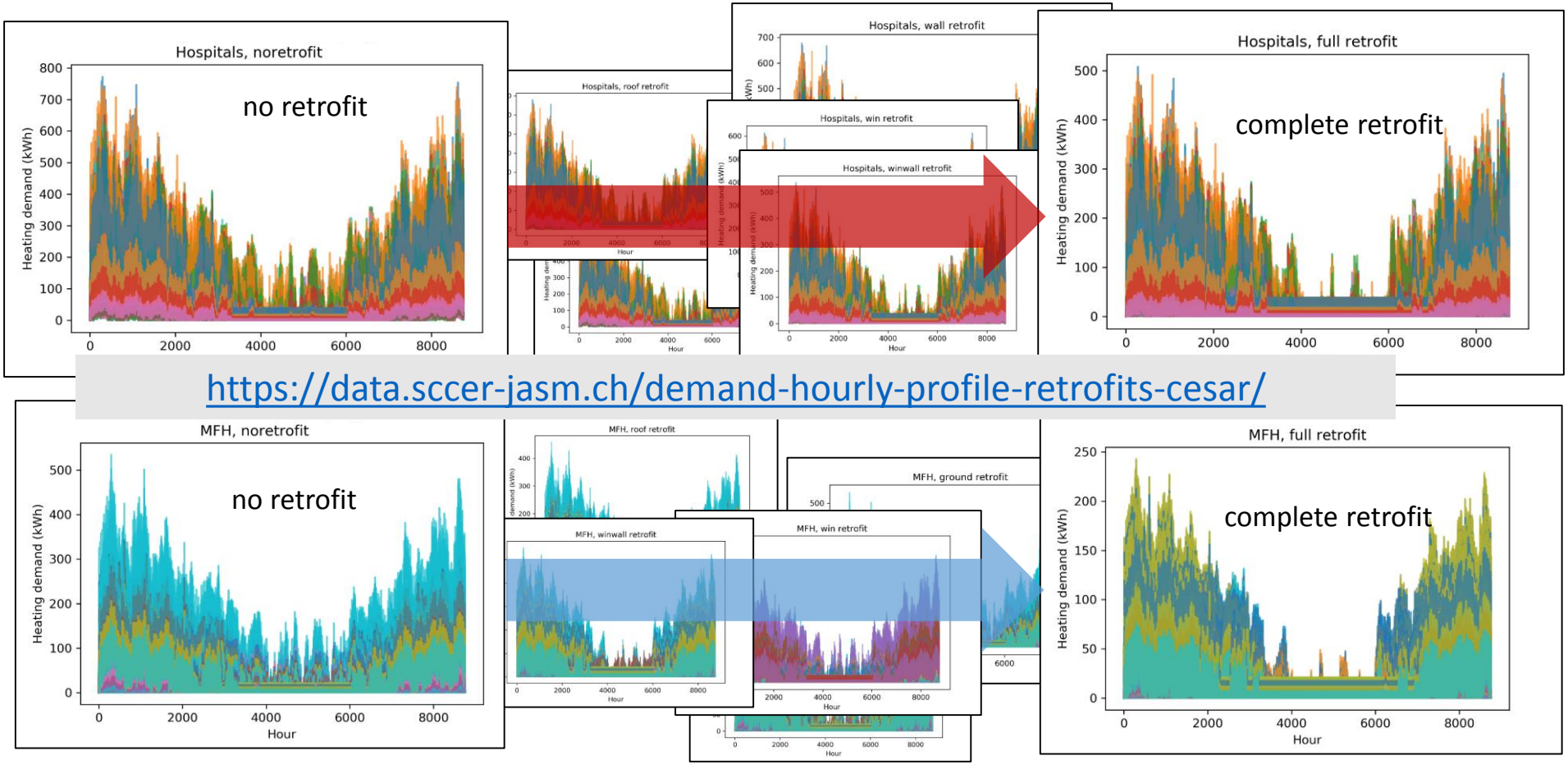




Heating demand simulation per archetype



Heating demand simulation per archetype



Forecasting of residential electricity demand curves

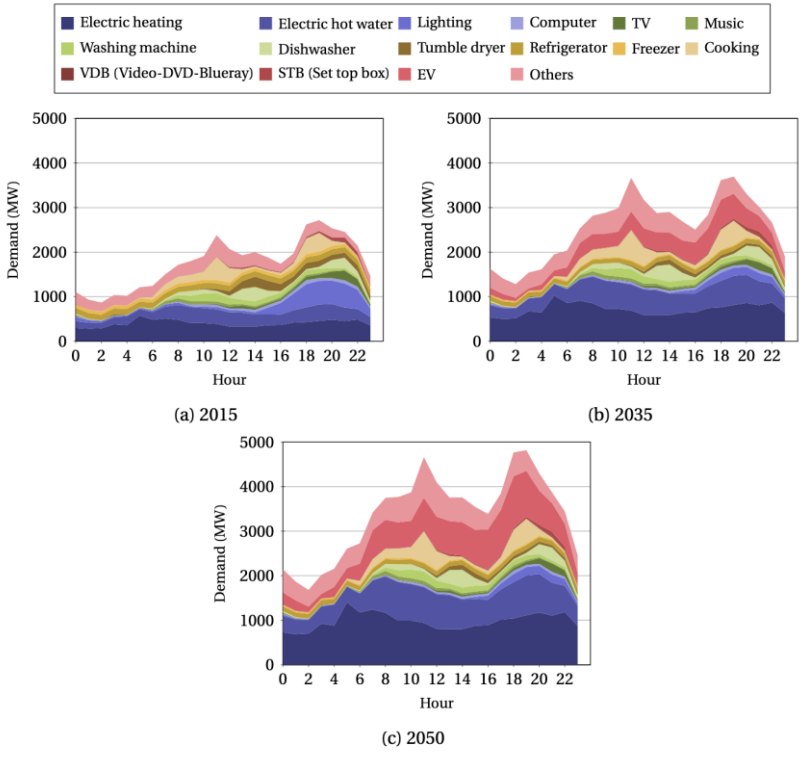
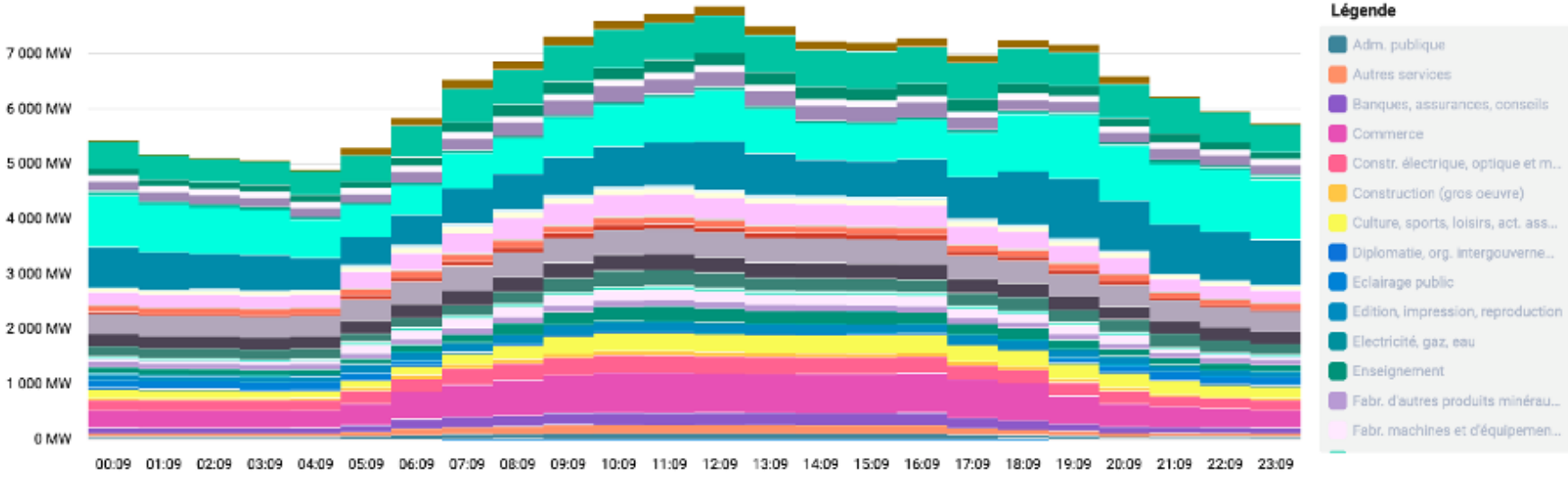


Figure 2.2: Comparison of the demand profiles of domestic appliances for the Swiss household in 2015, 2035 and 2050

- Forecasting of electricity demand for appliances and lighting
- Growing number of households and appliances per household
- Demand reduction with the increase in efficiency
- Reduction in evening peak
- **Importance of Minimum Energy Performance Standards**

Yilmaz, S., Rinaldi, A., Patel, M.K. (2020). Energy Policy. Vol:139. 111323. https://doi.org/10.1016/j.enpol.2020.111323

Spatiotemporal modelling of electricity demand



- Characterisation of electricity demand by municipality
- Characterisation of consumption per NOGA code and per usage for 2 day types and 12 months.
- Collaboration with Service Industriels de Genève: **www.*electrowhat.ch***

Thank you for your attention!

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