Full programme

Abstracts

EN

FR

DE

Session 3

Energy communities & energy demand

Moderated by
Philippe Thalmann
Selin Yilmaz

sweet swiss energy research for the energy transition

SWICE + LANTERN

A sustainability lifestyle typology of teleworkers: Differences in commuting carbon footprints and subjective wellbeing?

Thao Vu, Timo Ohnmacht, Bernadette Sütterlin,
Debora Frei, Tobias Arnold, Rachel Linley

10:00 - 10:20

Agenda

Research rationale

Conceptual and methodological framework

Data and methods

Findings

Policy recommendations

Key takeaways

Research rationale

Telework

- **decreases** commuting trips and respective CO_2 emissions, but creates additional opportunities for leisure travel (Balthasar et al., 2024)
- **increases** living space demand for the home office (Z'Rotz et al., 2026)

  and distances between place of living and regular workplaces (Ravalet & Rérat, 2019)

Research gap

- previous research has not accounted for the heterogeneity of teleworker groups, on the effects of teleworking
  - on carbon footprints in commuting
  - subjective well-being
  - and their mutual interrelations

So what?

- Lifestyle research and tailored interventions: More wellbeing, less carbon footprint

Conceptual and methodological framework

- Telework is defined as paid work carried out outside the employer's usual workplace on an occasional or regular basis.

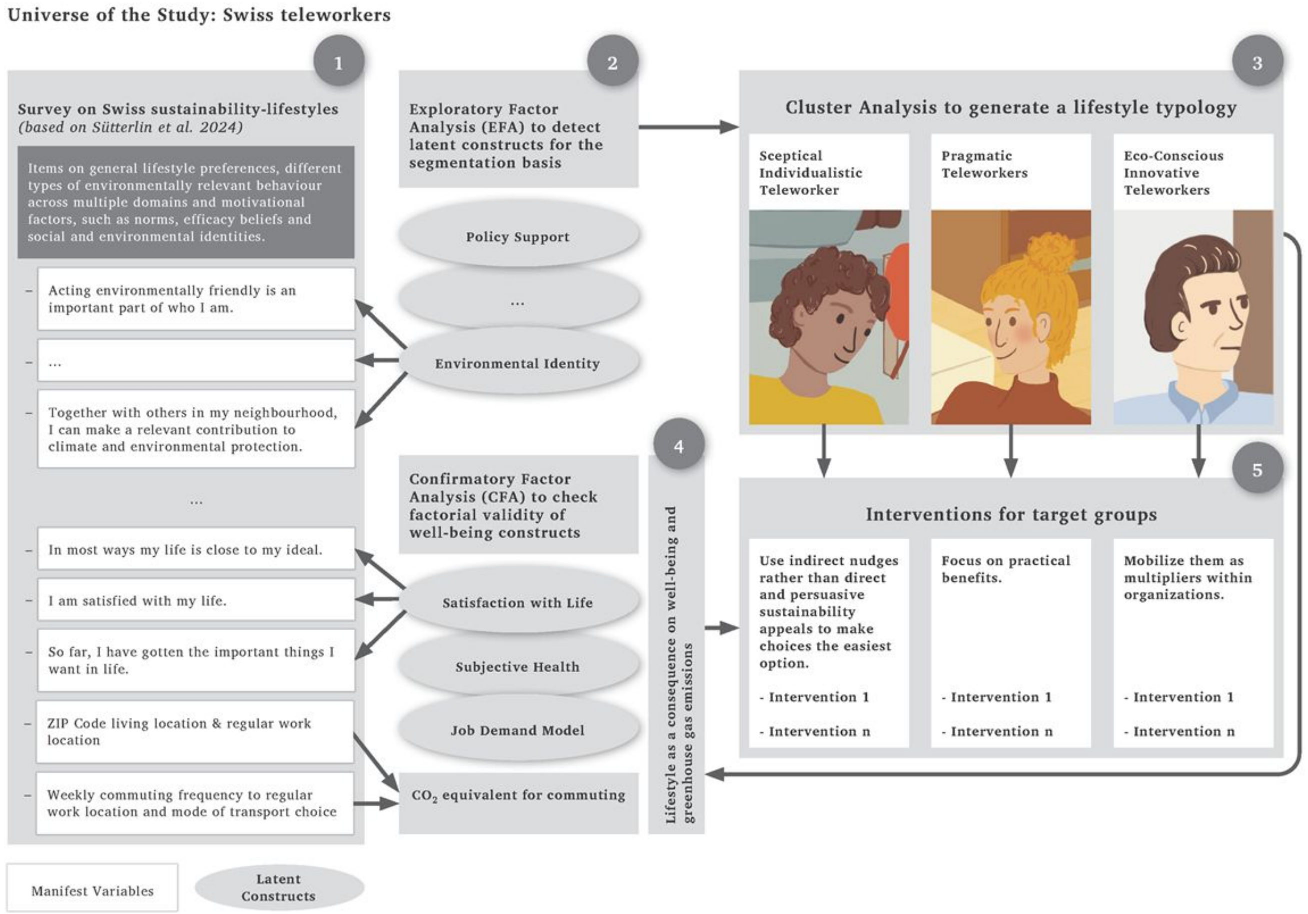


Fig.1. Conceptual and methodological framework.

sweet swiss energy research for the energy transition
SWICE + LANTERN

Data

- Online survey of 1,230 teleworkers in Switzerland
- Aged 18+
- French/German language regions
- Oct 2024 – Jan 2025
- Sample validated against Swiss national labour statistics
- Items and constructs are derived from Sütterlin et al. (2024)

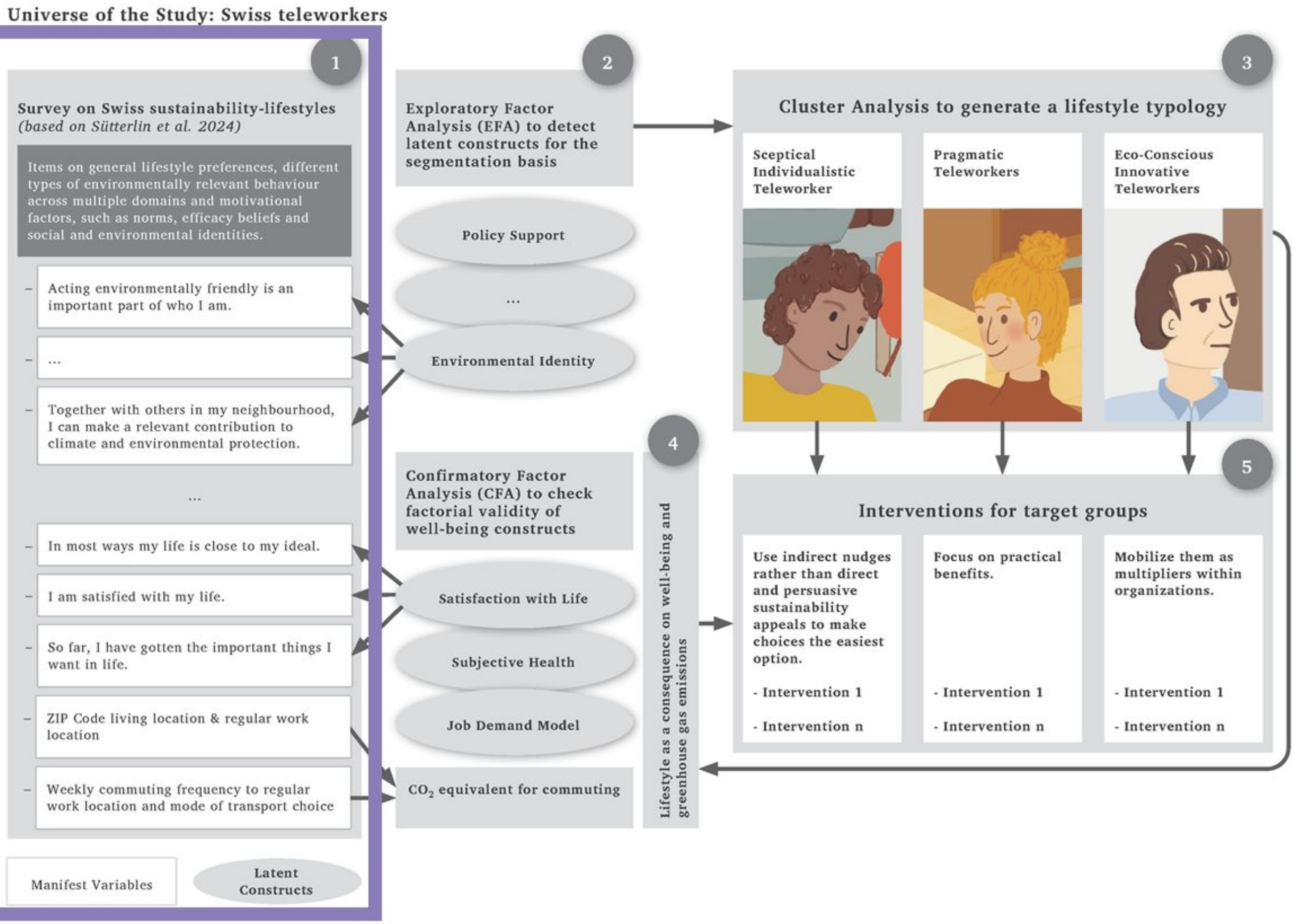


Fig.1. Conceptual and methodological framework.

sweet swiss energy research for the energy transition
SWICE + LANTERN

Latent constructs

- Exploratory Factor Analysis
- 45 items into 10 factors

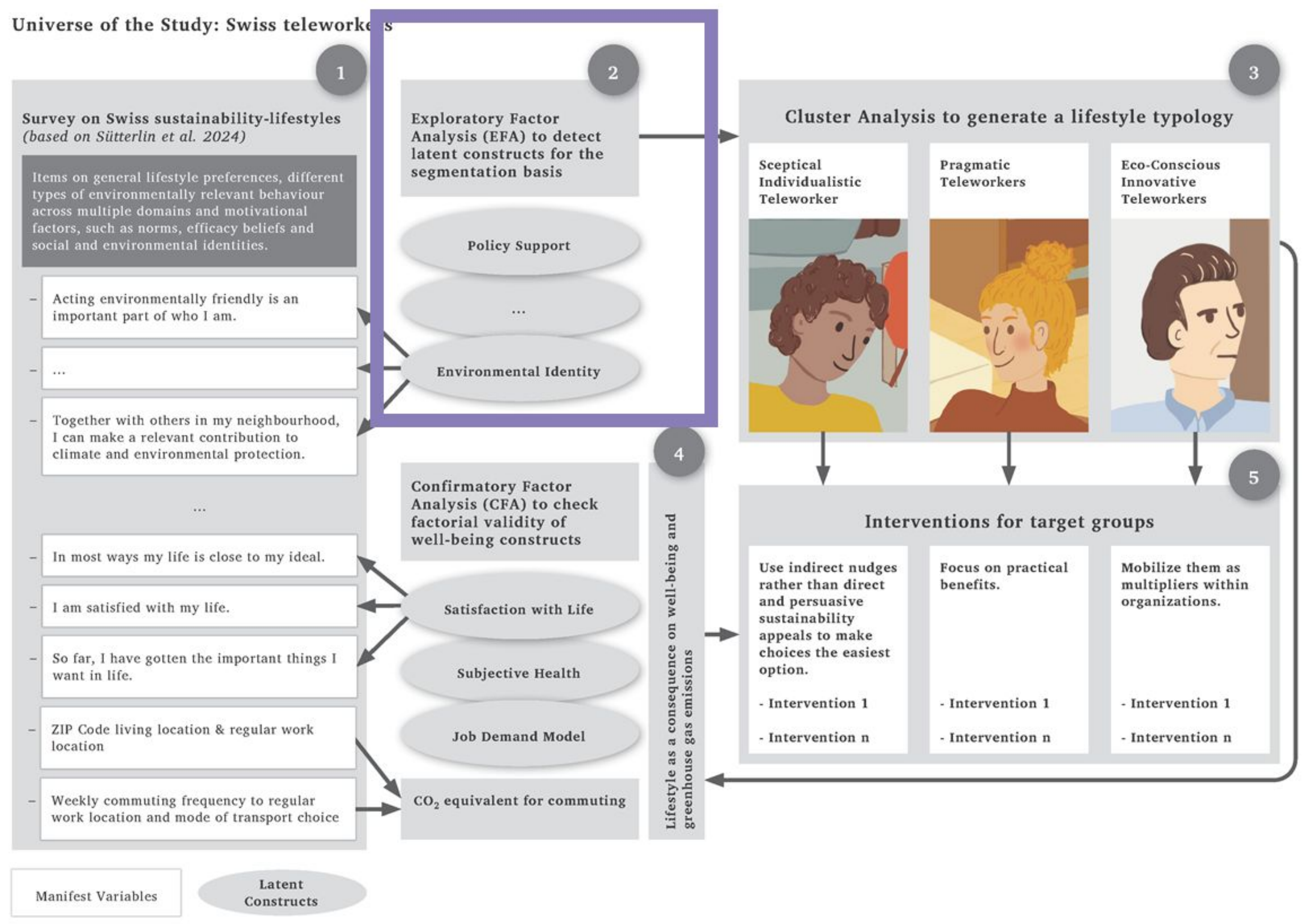
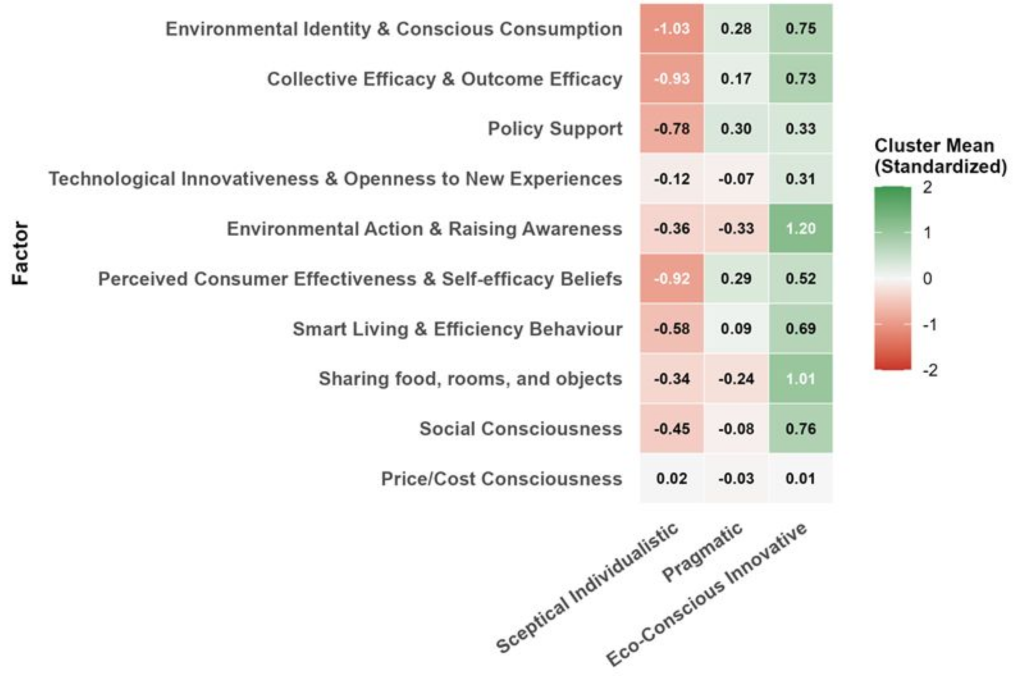


Fig.1. Conceptual and methodological framework.

sweet swiss energy research for the energy transition
SWICE + LANTERN

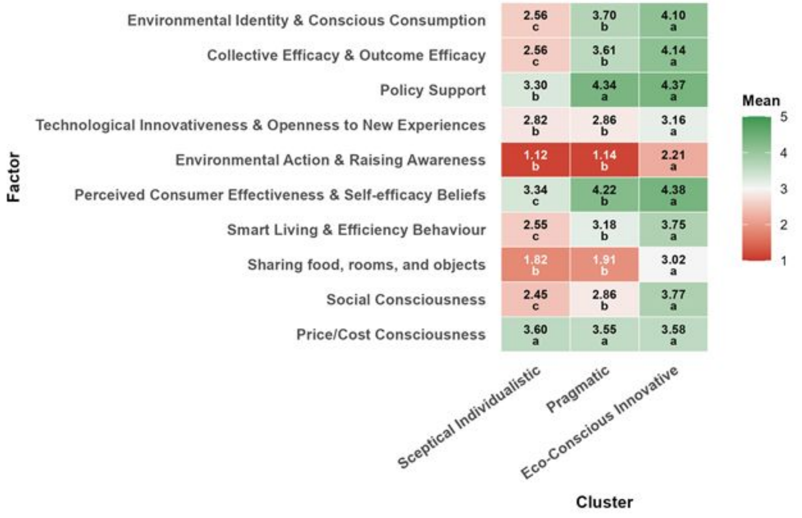
Cluster analysis

AIO	Latent Constructs
Activities	Smart living and efficiency behaviour; sharing food, rooms, and objects; environmental action and conscious consumption; price/cost consciousness
Interest	Environmental identity; consciousness consumption; technological innovativeness
Opinions	Policy support; collective efficacy and outcome efficacy; self-efficacy beliefs and perceived consumer effectiveness



Note: Values indicate standardized cluster means.

Fig. 2. Cluster profiles by factor used for segmentation (z-scores).



Note: Letters (a–c) show significance groups per factor.
Clusters with the same letter do not differ significantly ($p < .05$, Bonferroni).
Different letters indicate significant differences. "a" = highest mean group, "c" = lowest.

Fig. 3. Cluster profiles across factors representing the segmentation basis (Means + Significance Letters).

sweet swiss energy research for the energy transition
SWICE + LANTERN

Teleworker typology

Pragmatic
47.1%

- Exhibit functional stand toward sustainability
- Balanced gender distribution
- Highest hh income
- Average educational level

Sceptical Individualistic
29.1%

- Lowest sustainability engagement
- Predominantly male
- Lower hh income
- Lowest educational level

Eco-Conscious Innovative
23.8 %

- Strongest sustainability engagement
- More women
- Middle-income hh
- Highest educational level

Dependent variables

- Confirmatory Factor Analysis
- Lifestyle as cause approach
- Commuting-related CO_2eq emissions followed Balthasar et al.'s (2024) method
- Wellbeing = f(
  - Satisfaction with life
  - Subjective health
  - Job demand model)

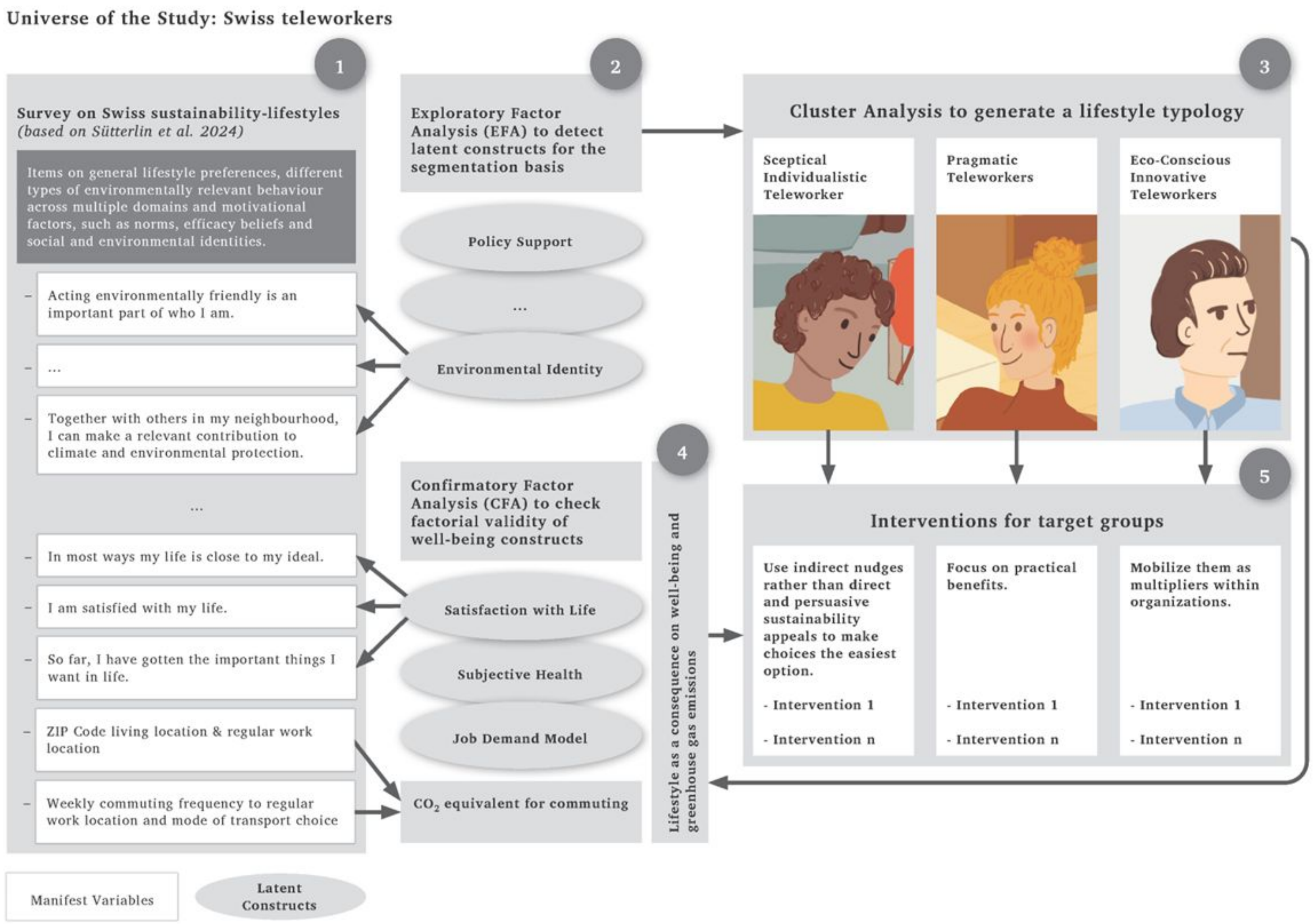
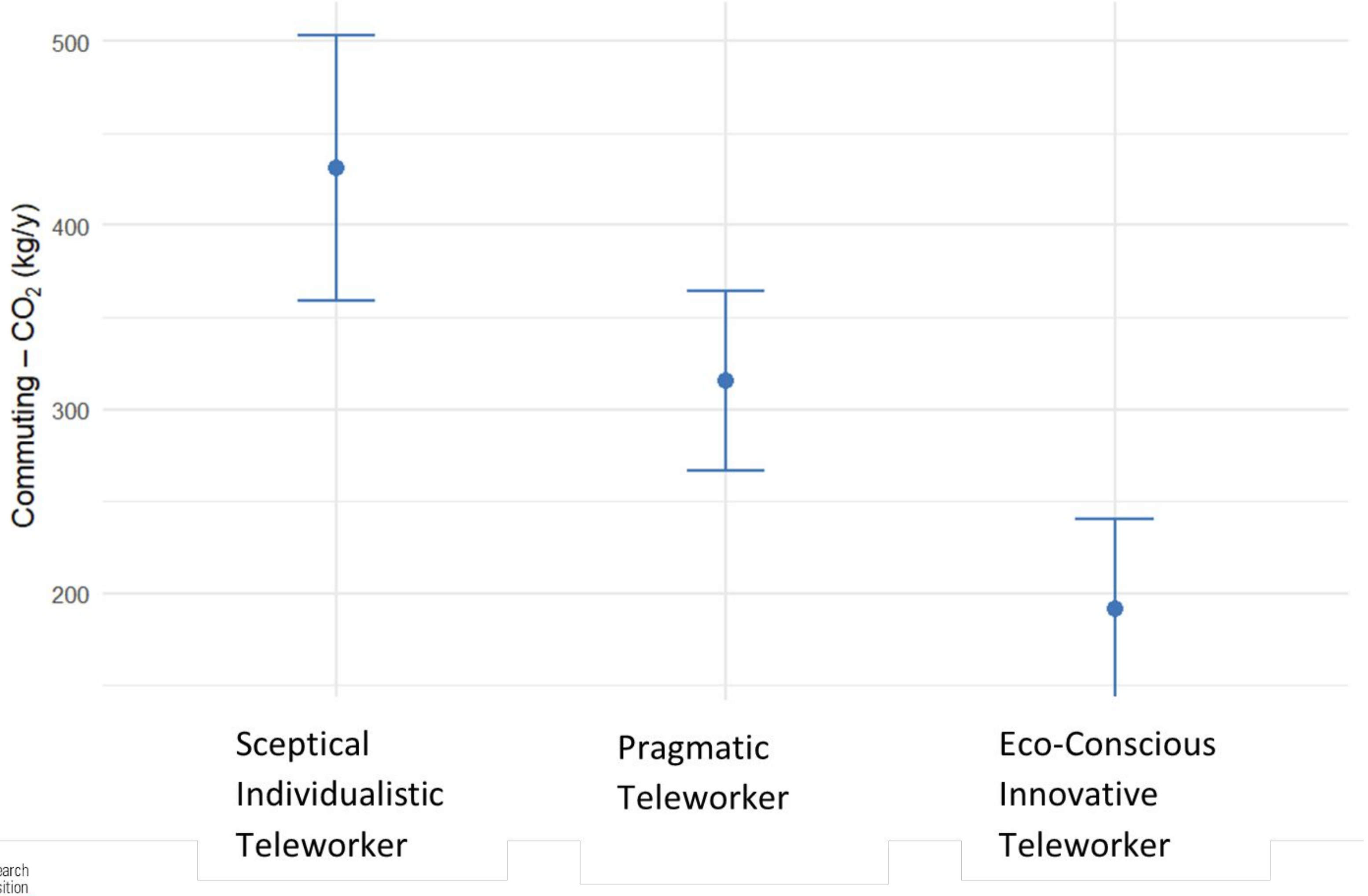


Fig.1. Conceptual and methodological framework.

Eco-conscious innovative teleworkers

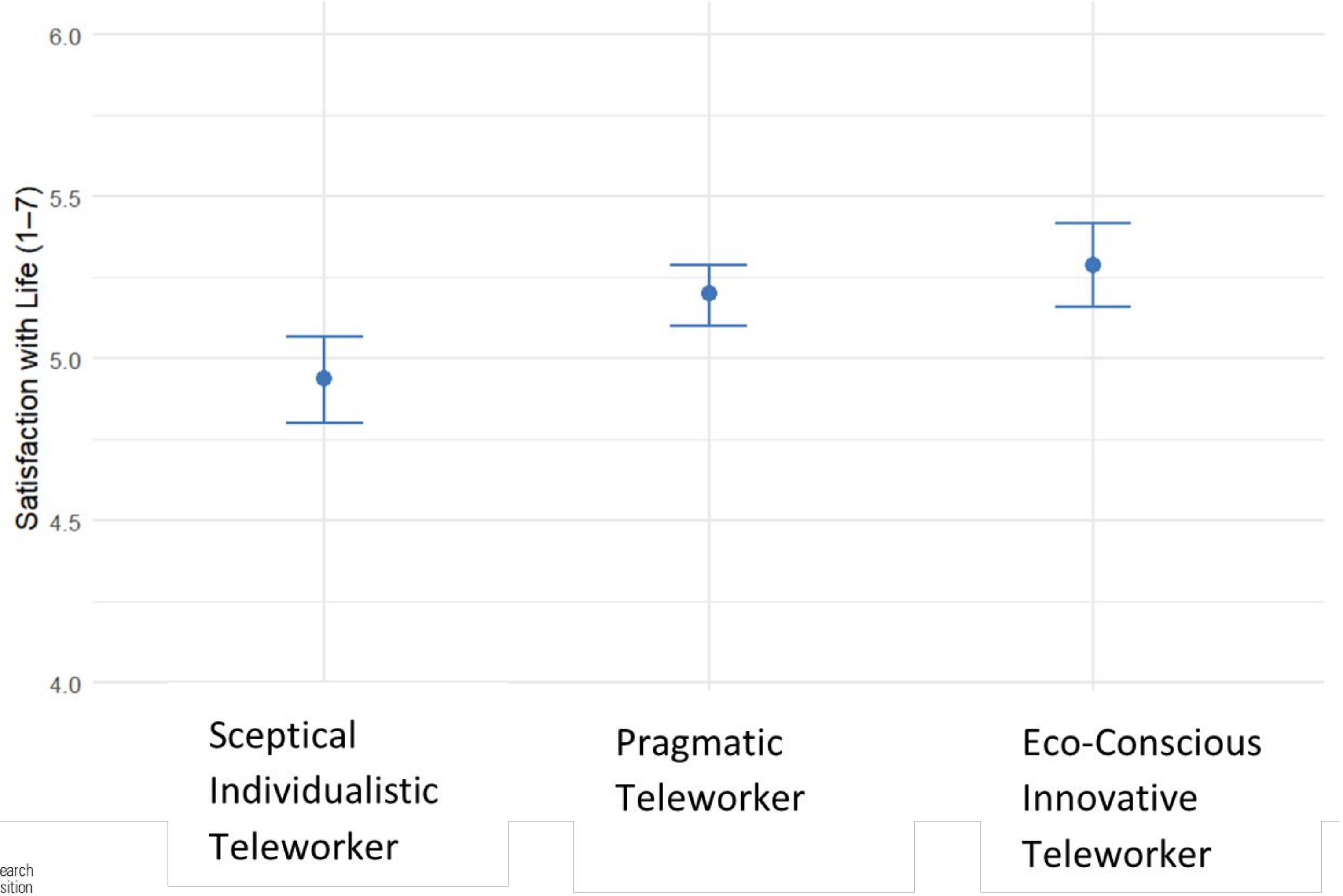
Lower commuting-related CO2eq emissions



sweet swiss energy research for the energy transition
SWICE + LANTERN

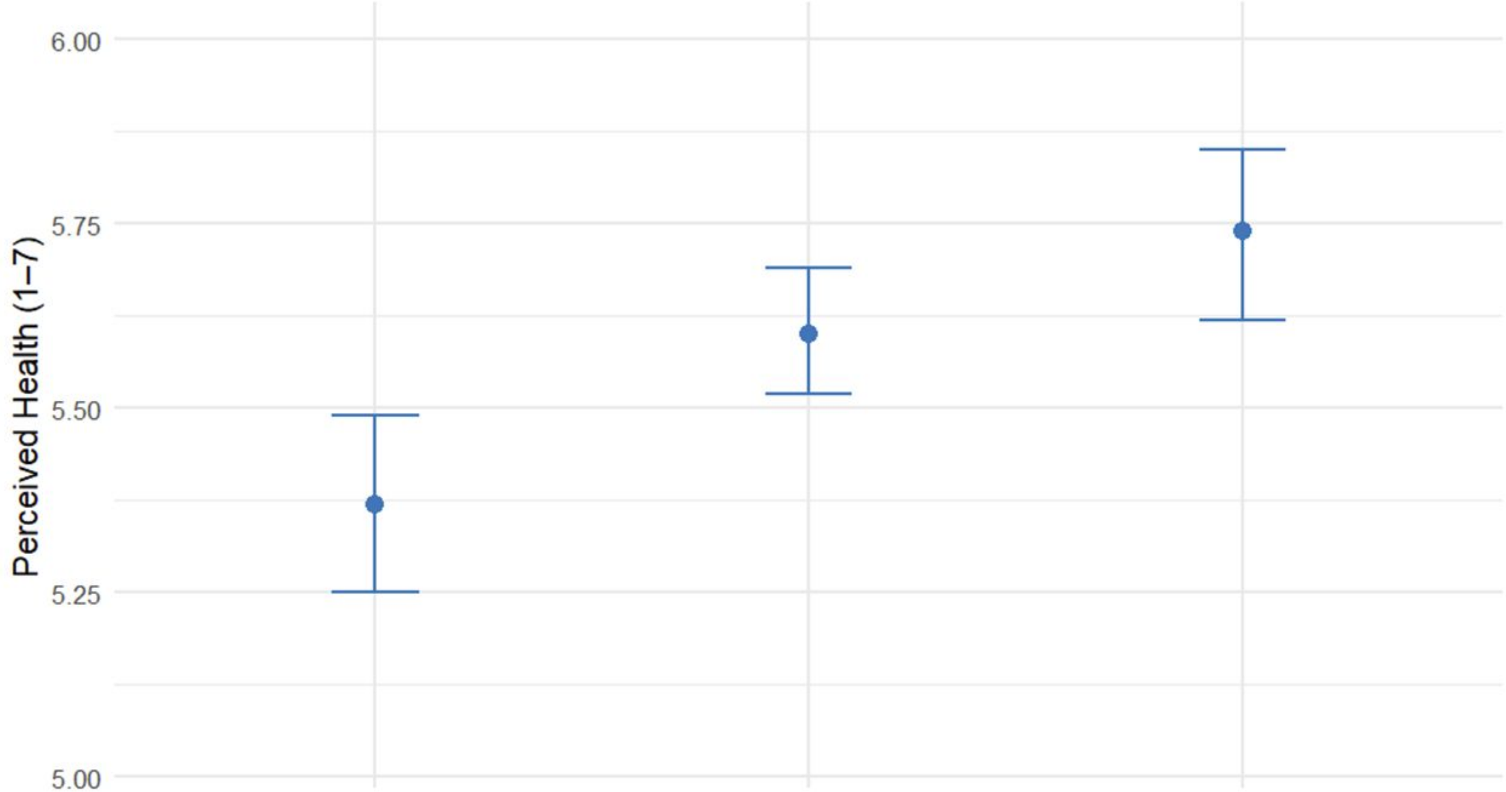
Sceptical individualistic teleworkers

Lower satisfied with life



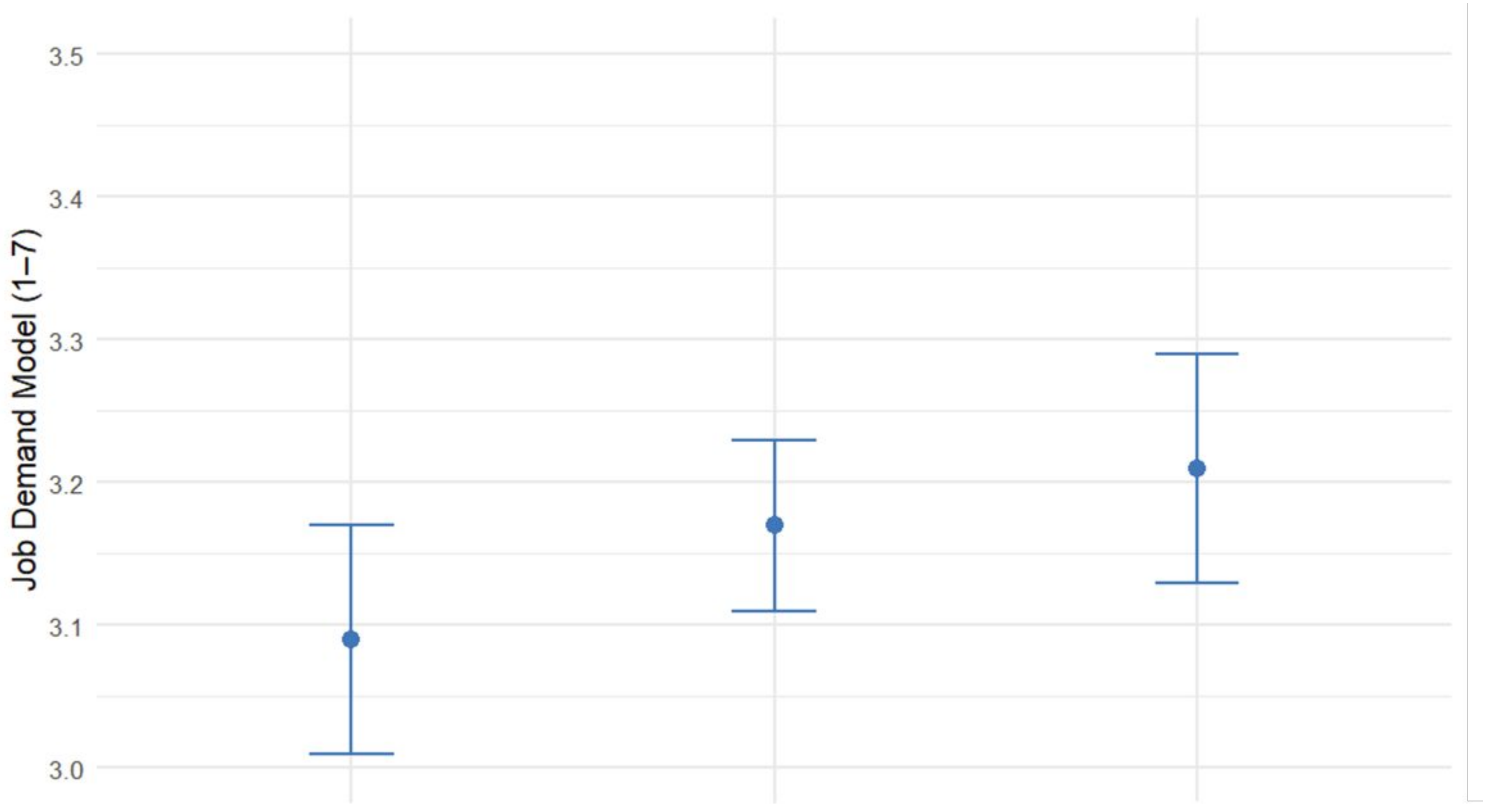
Sceptical individualistic teleworkers

Lower perceived health



Sceptical Individualistic Teleworker	Pragmatic Teleworker	Eco-Conscious Innovative Teleworker

No differences in job demand



Sceptical Individualistic Teleworker

Pragmatic Teleworker

Eco-Conscious Innovative Teleworker

sweet swiss energy research for the energy transition
SWICE + LANTERN

Mutual relations between well-being and CO_2 emissions?

Only for sceptical individualistic teleworkers

	Well-being indicators		
Predictor	**Satisfaction (β)**	**Job Demand Model (β)**	**Health (β)**
CO_2 emissions	.024	-.016	.157
SI (vs. ECI)	-.104**	-.096**	-.093*
PR (vs. ECI)	-.015	-.049	.017
CO_2 × SI	-.030	.069	-.135*
CO_2 × PR	.013	.043	-.100
Adj. R^2	.09	.01	.14
F	3.03**	1.34	4.30***
n	1186	1182	1187

Intervention design

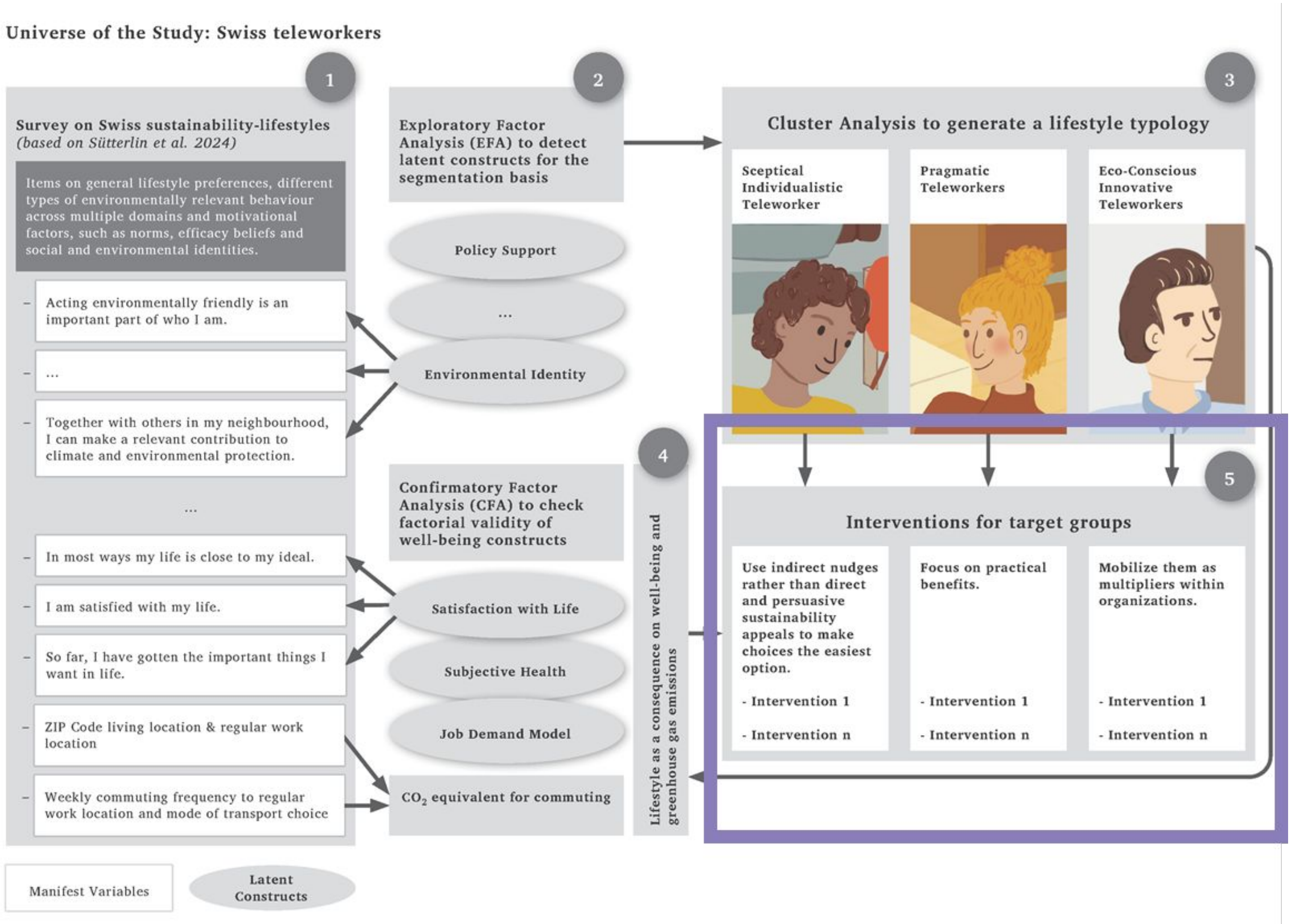


Fig.1. Conceptual and methodological framework.

sweet swiss energy research for the energy transition
SWICE + LANTERN

Policy recommendations

	Pragmatic Teleworker	Sceptical Individualistic Teleworker	Eco-Conscious Innovative Teleworker
Knowledge Effectiveness			
Dos	• Personal convenience • Time savings	• Efficiency (higher well-being) • Autonomy • Convenience	• Environmental goals • Social engagement
Don'ts	• Abstract communicating of environmental goals	• Moral appeals	
Normative Persuasion	• Promote productive travel time in train • Financial advantages of shared mobility services	• Use indirect nudges rather than direct sustainability appeals	• Promote existing sustainability to expand to other areas • Supportive communication
Role Models			• Mobilize them as multipliers within organizations or neighbourhoods

sweet swiss energy research for the energy transition
SWICE + LANTERN

Key takeaways

- Teleworker heterogeneity matters
- CO_2 emission outcomes vary among teleworker types
- Well-being (health, satisfaction) vary among teleworker types
- Stronger ecological orientations within teleworker types are associated with substantially lower commuting-related CO_2eq emissions
- For one type (sceptical individualistic) more CO_2 emissions is related with lower perceived health
- Starting point for interventions towards less CO_2 emissions with higher well-being
- Effective energy reduction policy requires group-specific measures tailored to each teleworker type

Thank you

Lucerne School of Business
Institute of Tourism and Mobility ITM
Dr. Thao Vu
Lecturer

Phone direct + 41 41 228 4221
thao.vu@hslu.ch

sweet swiss energy research for the energy transition
SWICE + LANTERN

References

Balthasar, N., Ohnmacht, T., Z'Rotz, J., Hostettler Macias, L., & Rérat, P. (2024). The effects of teleworking on CO2 emissions from commuting: Baselining key data to investigate transformative change in living labs. *Consumption and Society*, 1–23. https://doi.org/10.1332/27528499Y2024D000000019.

Ravalet,, E., & Rérat, P. (2025), Teleworking: Decreasing Mobility or Increasing Tolerance of Commuting Distances?, *Built Environ 45* (2019) 582–602. https://doi.org/10.2148/benv.45.4.582.

Sütterlin, B., Frei, D., Oberkalmsteiner, J., Lobsiger-Kägi, E., & Tomic, U. (2024). *Sustainability lifestyle typology: Deliverable report D1.2. SWEET call 1-2021: SWICE.* ZHAW. https://digitalcollection.zhaw.ch/server/api/core/bitstreams/096154d1-987d-4101-a593-42a4a21a661b/content

Z'Rotz, J., Gabrielle Wanzenried, G., & Sibylla Amstutz, S. (2026). Exploring the relationship between telework and housing space: Empirical evidence for Switzerland, Urban Transitions, 6, 100042. https://doi.org/10.1016/j.ubtr.2026.100042.

Teleworking, energy demand and well-being: interactions between mobility, housing and digital infrastructure

Jana Z'Rotz, Prof. Dr. Timo Ohnmacht,
Dr. Dimitri Marincek, Prof. Dr. Patrick Rérat

10:20 - 10:40 h

Teleworking, energy demand and well-being: Interactions between mobility, housing and ICT infrastructure.

SWEET SWICE & SWEET Lantern Conference 2026

10 June 2026

Jana Z'Rotz
Senior Research Associate, PhD Candidate
Lucerne School of Business
Institute of Management & Economics IBR
T direct +41 41 228 99 63
jana.zrotz@hslu.ch

SWICE WP6

sweet swiss energy research for the energy transition

SWICE + LANTERN

Overview

Introduction

Literature review

Four empirical papers

Conclusion

Introduction

- Teleworking refers to paid work carried out outside the normal workplace (Balthasar et al., 2024; Ravalet & Rérat, 2019; Wöhner, 2023).
- In Switzerland, the number of people teleworking at least occasionally increased from 25% (before the pandemic) to 37% in 2024 (BFS, 2025).
- Teleworking may increase worker and family **well-being and paid work-life balance** when the time saved by not commuting can be used for additional activities (Pabilonia & Vernon 2022).
- Teleworking has some **advantages** such as autonomy, efficiency and productivity (Vayre et al. 2022).
- On the negative side, telework may blur the boundaries between paid work and private life (Thulin et al., 2019).
- However, these impacts of teleworking are shaped by gendered everyday-life arrangements (Alon et al., 2020; Lanfranconi et al., 2025; Steinmetz et al., 2022).

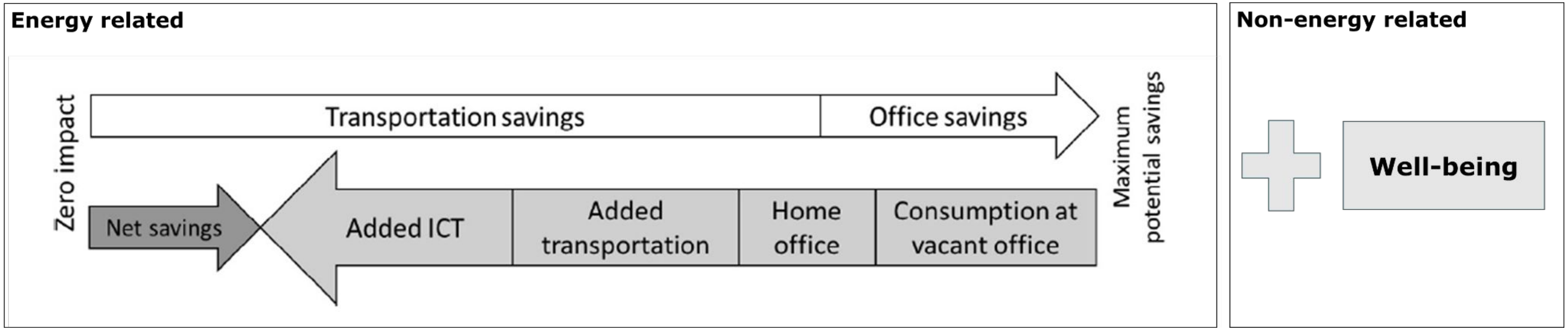
Introduction

- So far, teleworking has mainly been discussed in the context of reducing the environmental impact of commuting (Wöhner, 2022).
- In this context, research shows that reducing commuting is one option (e.g. for Switzerland, see Balthasar et al., 2024; Ohnmacht et al., 2020; Ravalet & Rérat, 2019), although there are also rebound effects (Hostettler Macias et al., 2022, 2025; Ravalet & Rérat 2019,).
- To get a full picture of the impact of teleworking on sustainability and well-being, commuting, ICT infrastructure and housing space and well-being need to be taken into account (O'Brien & Yazdani Aliabadi, 2020).

Research question:

- How is telework associated with sustainability and well-being?
- How do these associations differ from a gender perspective?

Literature



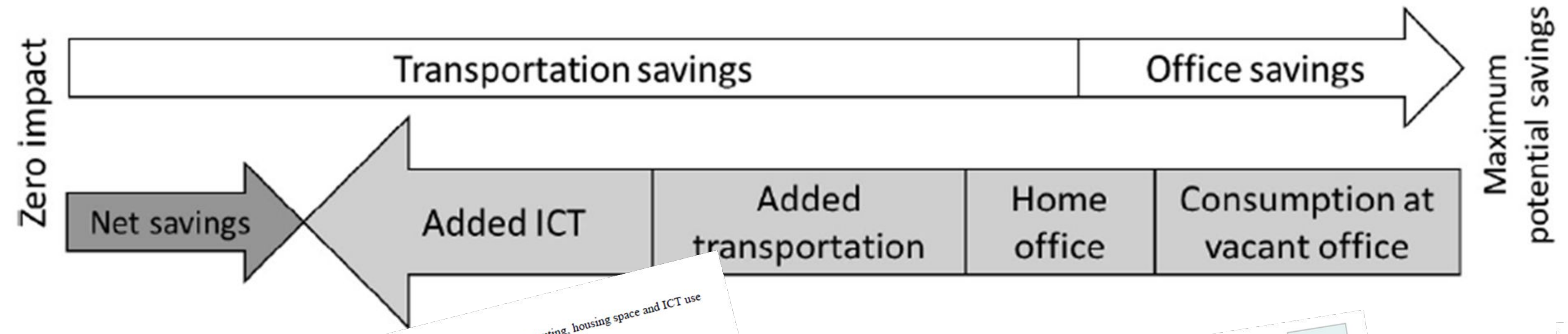
(O'Brien & Yazdani Aliabadi, 2020, pp. 3–4).

- The direct effects are immediate: reduced commuting distances and thus CO_2 emissions, (for Switzerland Giovanis, 2018; Ravalet & Rérat, 2019; Ohnmacht et al., 2024; Wöhner, 2022,).
- Rebound and spillover effects may be unanticipated, such as an increase in housing space, or an increase in the number of journeys made for non-paid work purposes.
- Non-energy impacts of teleworking: impact on well-being, time allocation, and paid work-life balance

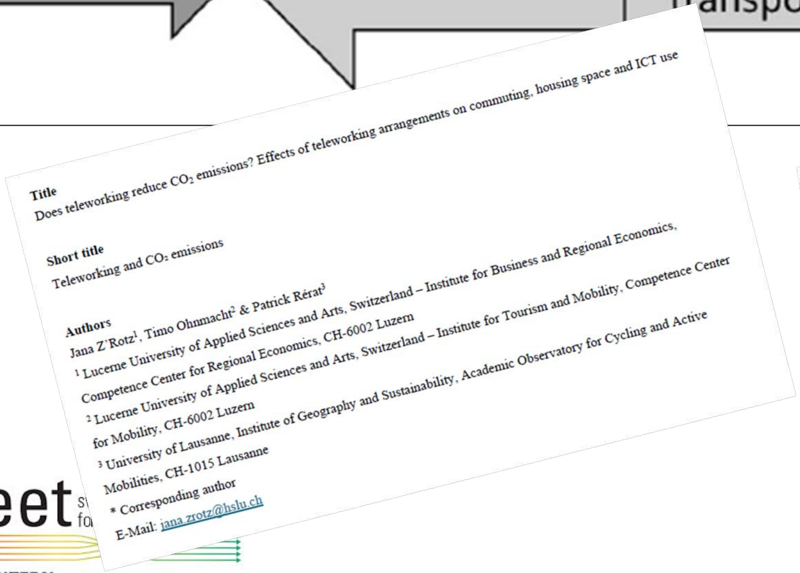
Research question:

How is telework associated with sustainability and well-being?
How do these associations differ from a gender perspective?

Energy related



Non-energy related

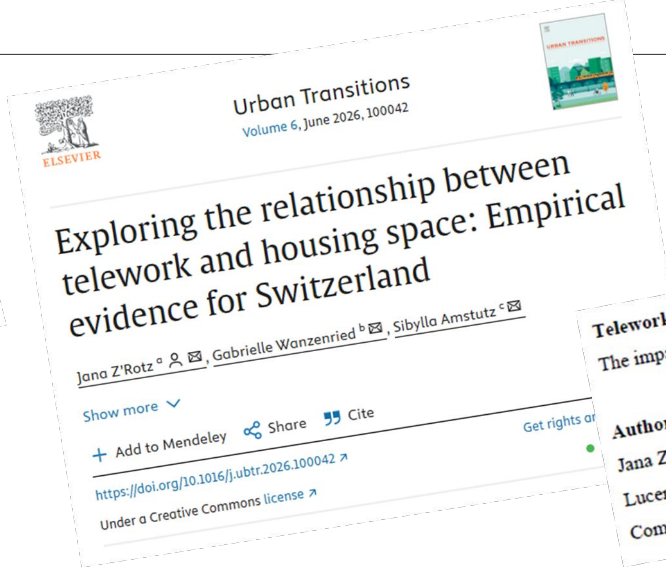


Title
Does teleworking reduce CO_2 emissions? Effects of teleworking arrangements on commuting, housing space and ICT use

Short title
Teleworking and CO_2 emissions

Authors

Jana Z'Rotz[1], Timo Ohnmacht[2] & Patrick Rérat[3]
[1] Lucerne University of Applied Sciences and Arts, Switzerland – Institute for Business and Regional Economics, Competence Center for Regional Economics, CH-6002 Luzern
[2] Lucerne University of Applied Sciences and Arts, Switzerland – Institute for Tourism and Mobility, Competence Center for Mobility, CH-6002 Luzern
[3] University of Lausanne, Institute of Geography and Sustainability, Academic Observatory for Cycling and Active Mobilities, CH-1015 Lausanne
* Corresponding author
E-Mail: jana.zrotz@hslu.ch



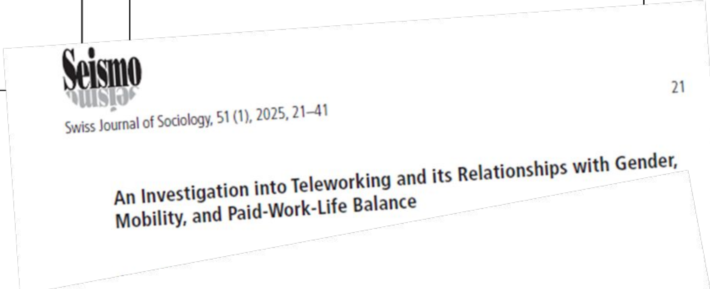
ELSEVIER
Urban Transitions
Volume 6, June 2026, 100042

Exploring the relationship between telework and housing space: Empirical evidence for Switzerland

Jana Z'Rotz [a], Gabrielle Wanzenried [b], Sibylla Amstutz [c]

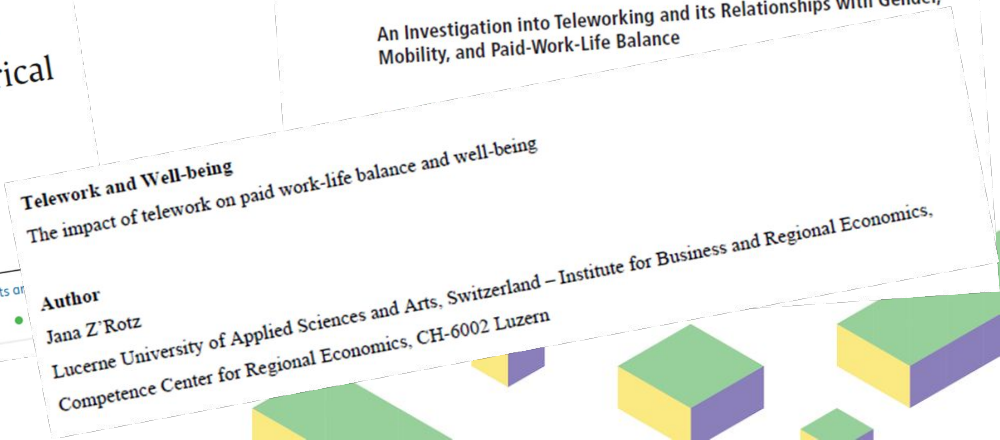
Show more
Add to Mendeley Share Cite

https://doi.org/10.1016/j.ubtr.2026.100042



Seismo
Swiss Journal of Sociology, 51 (1), 2025, 21–41
21

An Investigation into Teleworking and its Relationships with Gender, Mobility, and Paid-Work-Life Balance



Telework and Well-being
The impact of telework on paid work-life balance and well-being

Author

Jana Z'Rotz
Lucerne University of Applied Sciences and Arts, Switzerland – Institute for Business and Regional Economics, Competence Center for Regional Economics, CH-6002 Luzern

sweet
SWICE + LANTERN

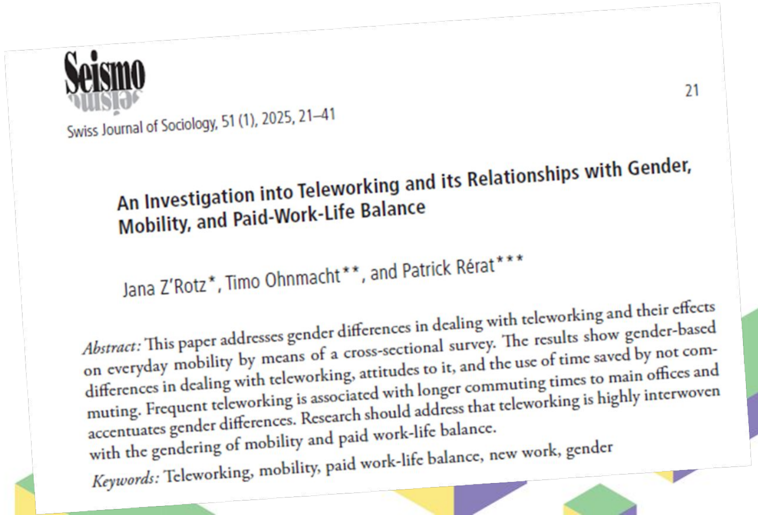
Four empirical papers: Telework, motives and attitudes, housing, CO_2 emissions and well-being

	Paper 1 (Z'Rotz et al., 2025)	Paper 2 (Z'Rotz, Wanzenried, & Amstutz, 2026)	Paper 3 (Z'Rotz, Ohnmacht, & Rérat, 2026)	Paper 4 (Z'Rotz, 2026)
Survey period	Sept. - Nov. 2022	Nov. 2022	Dec. 2024	Dec. 2024
Geographical scope	Schaffhausen (as workplace)	German-speaking Switzerland	German- and French-speaking Switzerland	German- and French-speaking Switzerland
Target group / selection	Public administration employees with an official email address	Tenant households in urban agglomeration municipalities	Individuals who teleworked at least once in the past month	Individuals who teleworked at least once in the past month
Sample	Teleworkers and non-teleworkers, n = 278	Teleworkers and non-teleworkers, n = 948	Teleworkers only, n = 1033	Teleworkers only, n = 1230
Analysis	Bivariate analysis (mean comparisons, group comparisons)	Two-step regression approach; probit model for likelihood of teleworking; OLS regression for housing space per person	Net-effect calculation; regression models for total and domain-specific emissions	Regression model; structural equation modelling (SEM); mediation analysis of indirect effects through work-life balance mechanisms

Paper 1: An Investigation into Teleworking and its Relationships with Gender, Mobility, and Paid-Work-Life Balance

Main findings:

- ❖ Gender differences in the reasons for telework, commuting time and use of time saved by not commuting.
- ❖ Telework can support paid work-life balance, but it may also reproduce existing gendered divisions of unpaid work.
- ❖ Telework is a socially embedded practice that is used differently depending on gender, parenthood and everyday life arrangements.


Seismo
Swiss Journal of Sociology, 51 (1), 2025, 21–41
21

An Investigation into Teleworking and its Relationships with Gender, Mobility, and Paid-Work-Life Balance

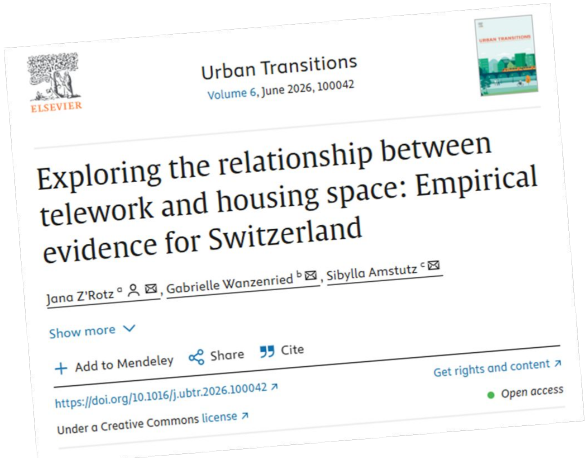
Jana Z'Rotz*, Timo Ohnmacht**, and Patrick Rérat***

Abstract: This paper addresses gender differences in dealing with teleworking and their effects on everyday mobility by means of a cross-sectional survey. The results show gender-based differences in dealing with teleworking, attitudes to it, and the use of time saved by not commuting. Frequent teleworking is associated with longer commuting times to main offices and accentuates gender differences. Research should address that teleworking is highly interwoven with the gendering of mobility and paid work-life balance.

Keywords: Teleworking, mobility, paid work-life balance, new work, gender

sweet swiss energy research for the energy transition
SWICE + LANTERN

Paper 2: Exploring the relationship between telework and housing space



ELSEVIER

Urban Transitions

Volume 6, June 2026, 100042

Exploring the relationship between telework and housing space: Empirical evidence for Switzerland

Jana Z'Rotz [a], Gabrielle Wanzenried [b], Sibylla Amstutz [c]

Show more

+ Add to Mendeley Share Cite

https://doi.org/10.1016/j.ubtr.2026.100042

Main findings:

- ❖ Teleworkers use around +6 m² housing space per person compared to non-teleworkers.
- ❖ Telework is socially selective and depends on housing conditions.
- ❖ Housing space is shaped by the interplay of telework, household composition, professional status, housing costs and residential location.

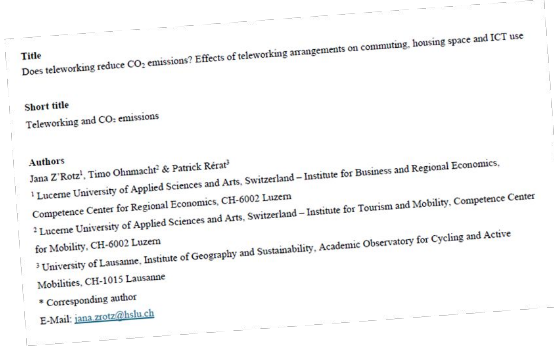
Conclusion

- ❖ Telework reshapes the home as a workplace.
- ❖ Telework can contribute to higher housing space demand and has therefore implications for housing and sustainability

sweet swiss energy research for the energy transition

SWICE + LANTERN

Paper 3: Does teleworking reduce CO2 emissions? Effects of teleworking arrangements on commuting, housing space and ICT use



Title

Does teleworking reduce CO_2 emissions? Effects of teleworking arrangements on commuting, housing space and ICT use

Short title

Teleworking and CO_2 emissions

Authors

Jana Z'Rotz[1], Timo Ohnmacht[2] & Patrick Rérat[3]

[1] Lucerne University of Applied Sciences and Arts, Switzerland – Institute for Business and Regional Economics, Competence Center for Regional Economics, CH-6002 Luzern

[2] Lucerne University of Applied Sciences and Arts, Switzerland – Institute for Tourism and Mobility, Competence Center for Mobility, CH-6002 Luzern

[3] University of Lausanne, Institute of Geography and Sustainability, Academic Observatory for Cycling and Active Mobilities, CH-1015 Lausanne

* Corresponding author

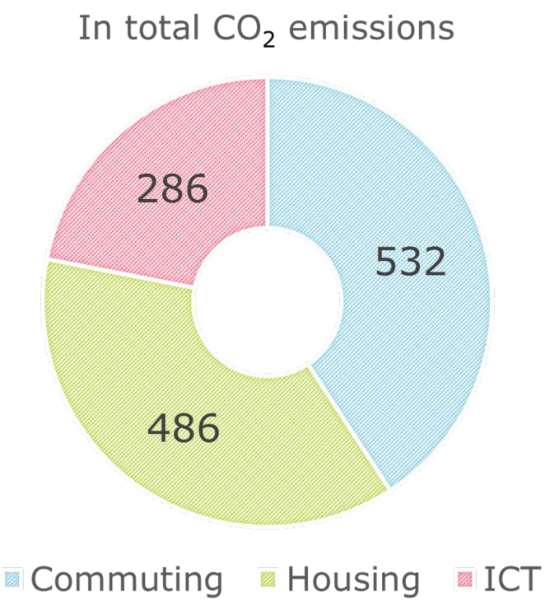
E-Mail: jana.zrotz@hslu.ch

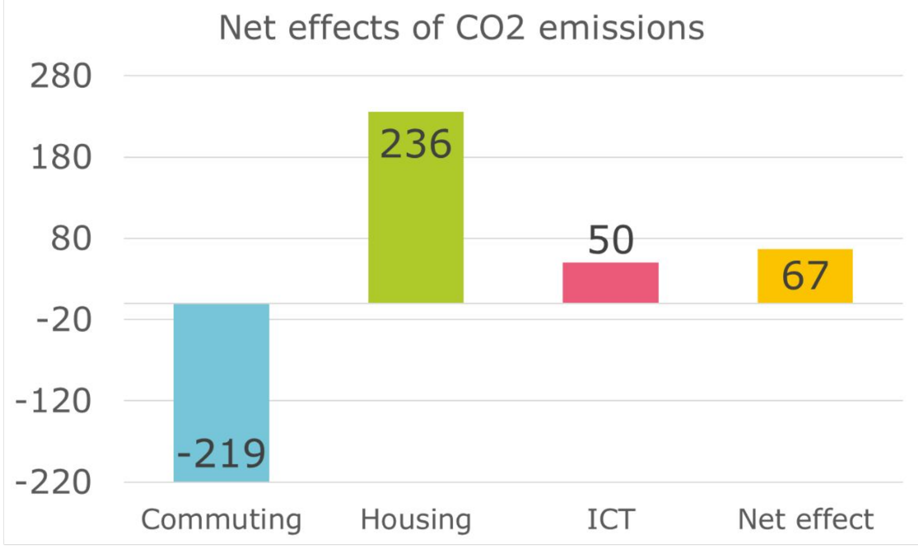
Main findings:

In average per teleworker:

In total 1322 kg CO2eq per year

Net effect of 67 kg CO2eq per year





Conclusion

- ❖ Teleworkers reduce commuting emissions, but these savings are largely offset by additional emissions from housing space and ICT infrastructure, pointing to relevant rebound and spillover effects.

sweet swiss energy research for the energy transition

SWICE + LANTERN

Paper 4: Telework, paid work-life balance and well-being *(work in progress)*

Telework and Well-being
The impact of telework on paid work-life balance and well-being

Author
Jana Z'Rotz
Lucerne University of Applied Sciences and Arts, Switzerland – Institute for Business and Regional Economics,
Competence Center for Regional Economics, CH-6002 Luzern

Main findings:

- ❖ Telework intensity not directly linked to higher well-being
- ❖ Positive effects occur indirectly through:
  perceived flexibility, paid work-life balance satisfaction, lower work-to-family conflict
- ❖ No direct gender effect on well-being: Gender differences emerge through work-life arrangements, care responsibilities and access to flexibility

Conclusion

- ❖ Telework does not improve well-being by itself. Its benefits depend on the flexibility and paid work-life balance it enables.
- ❖ These mechanisms remain gendered and are shaped by everyday work, care and household arrangements.

Conclusion

- ❖ Telework is not simply a sustainability measure or a neutral form of flexibility.
- ❖ Teleworkers are a heterogeneous group: different motives, attitudes and everyday needs.

Environmental implications

- ❖ Less commuting; but savings can be offset by larger housing space, separate home office rooms or additional ICT

Social implications

- ❖ Telework can support flexibility and paid work-life balance and therefore well-being,
- ❖ But benefits depend on household arrangements, boundary management, suitable working conditions

Key message

- ❖ Telework contributes to sustainability and well-being when it actually reduces commuting, does not require additional housing space or duplicated ICT equipment, and supports flexibility and clear boundaries between paid work and private life.

Limitation and outlook

Limitation

- The papers are mainly based on cross-sectional survey data.
- Several analyses focus on teleworkers only.
- The studies also rely on self-reported information and simplified assumptions, especially in the calculation of CO_2eq emissions related to housing space and ICT infrastructure.

Outlook

- Future studies should therefore analyze how telework affects all household members and how paid work, unpaid work, mobility and housing decisions are coordinated within households.

HSLU Lucerne University of Applied Sciences and Arts

Thank you!

Lucerne School of Business
Institute of Management & Economics IBR
Jana Z'Rotz
Senior Research Associate

Phone direct +41 41 228 99 63
jana.zrotz@hslu.ch

sweet swiss energy research for the energy transition
SWICE + LANTERN

Coffee break

10:40 - 11:10

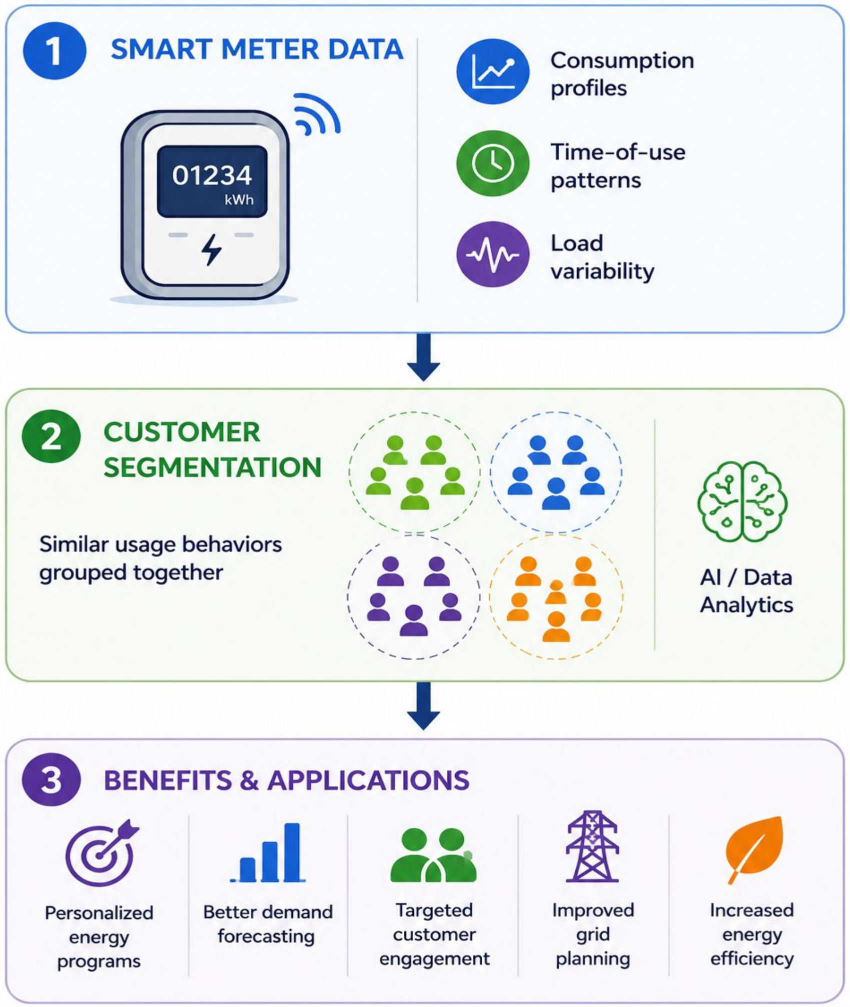
Customer segmentation for demand response using smart meter data and surveys

Jan Sigrist, Arnab Chatterjee, Philipp Heer

11:10 - 11:30

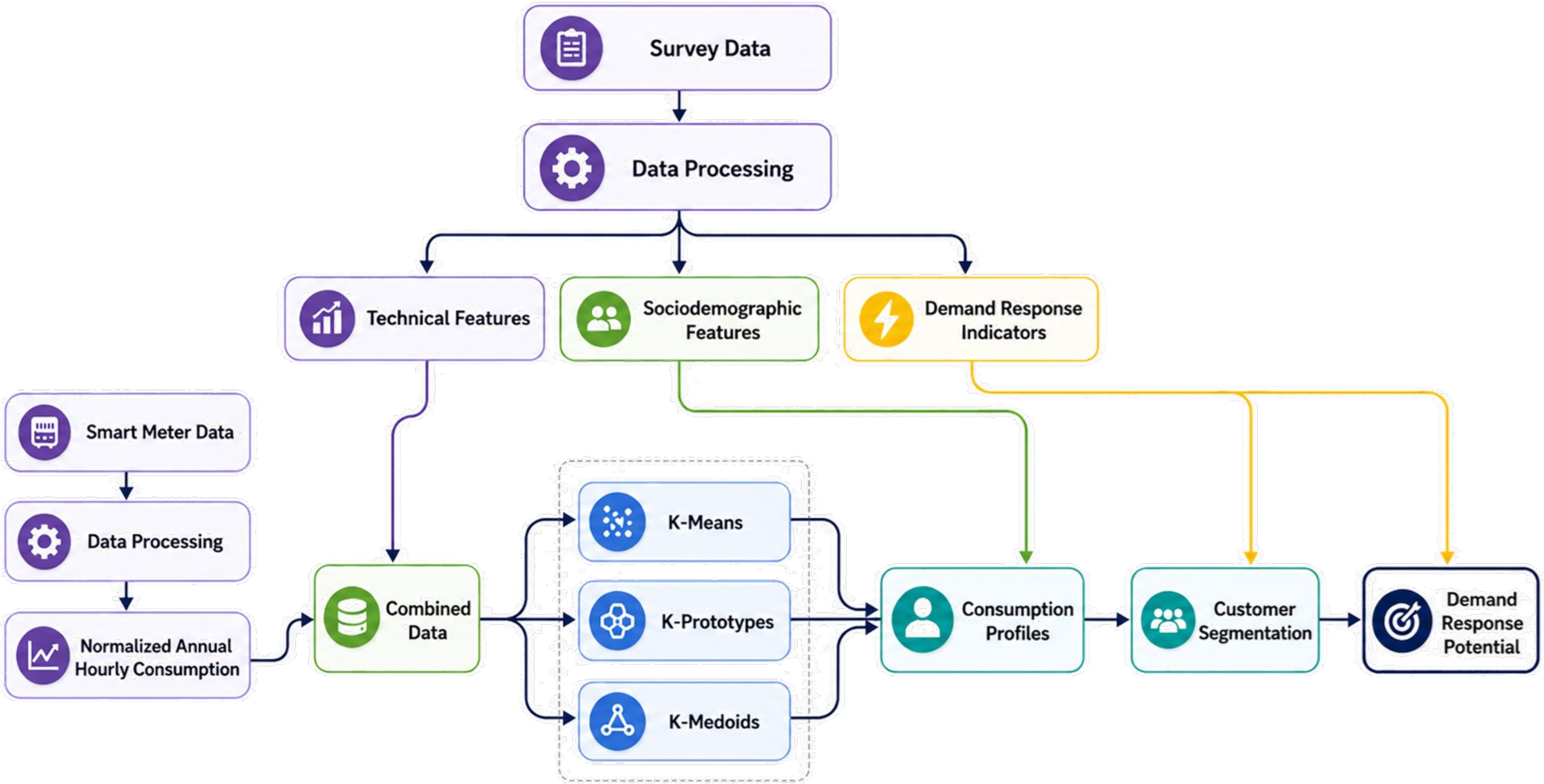
Introduction

Empa
Materials Science and Technology

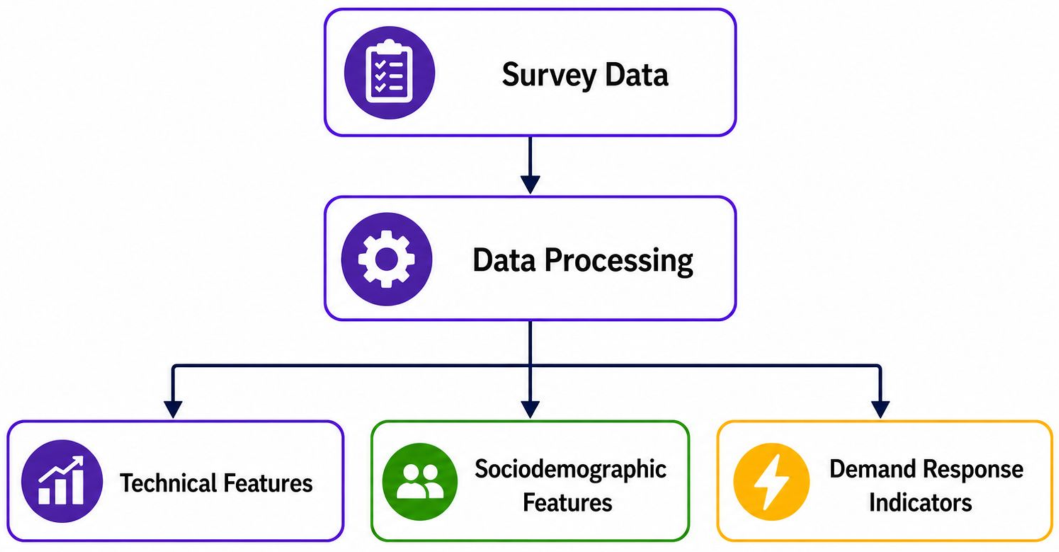


- ❖ Smart meter adoption is moving from pilot-scale to mainstream coverage, creating more consistent data foundation for customer analytics.
- ❖ Possible to identify usage patterns such as peak demand, EV charging, heat pumps, solar self-consumption, and other behavioral signals.
- ❖ Enable behavior-based segmentation beyond basic demographics, allowing utilities to tailor tariffs, energy efficiency campaigns, and service offers more precisely.
- ❖ The result is better customer engagement, higher conversion on targeted programs, and more efficient network and marketing decisions.

Methodology

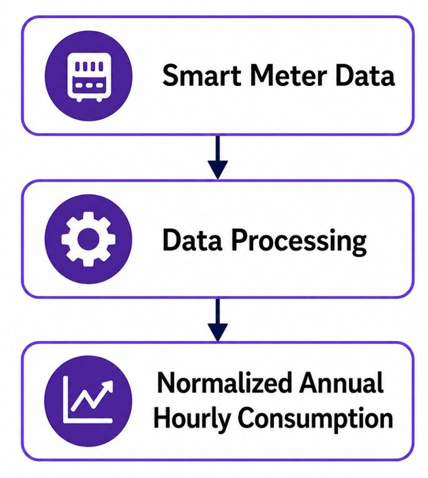


Methodology - Survey data processing



- Investigation consisted primarily of Single -family houses (houses) and Multi-family houses (flats)
- Technical Features
  Houses: Heating, PV, EV, Battery Storage
  Flats: Water Heating, Washing Machine
- Sociodemographic Features
  Age, Income, Education, Employment…
- Demand Response Indicators
  Attitude towards utility interventions and consumption optimization

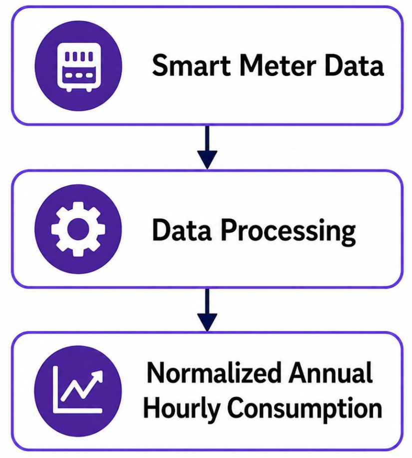
Methodology - Smart meter data processing

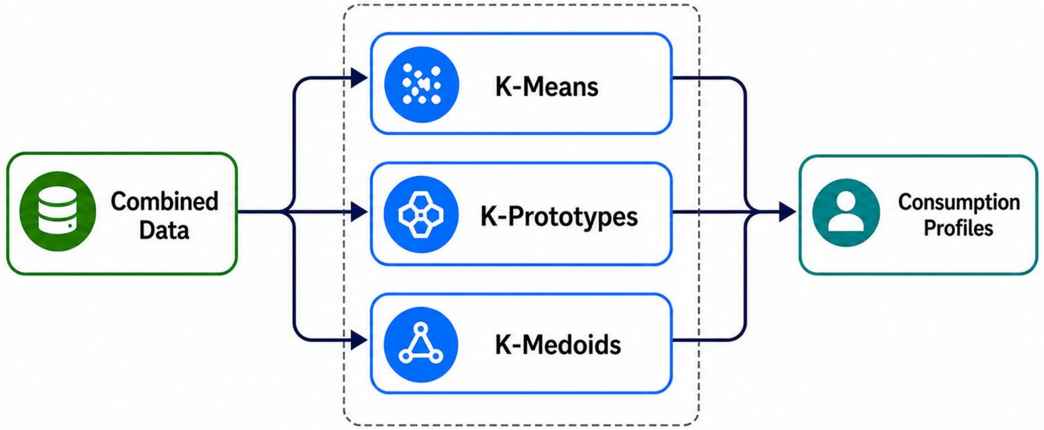


- ❖ 1273 (1481) households from Stadtwerke Winterthur (SWW)
- ❖ 15-minute intervals of electricity consumed
- ❖ 1. January – 31. December 2024 (366 days)

Methodology - Smart meter data processing

Empa
Materials Science and Technology



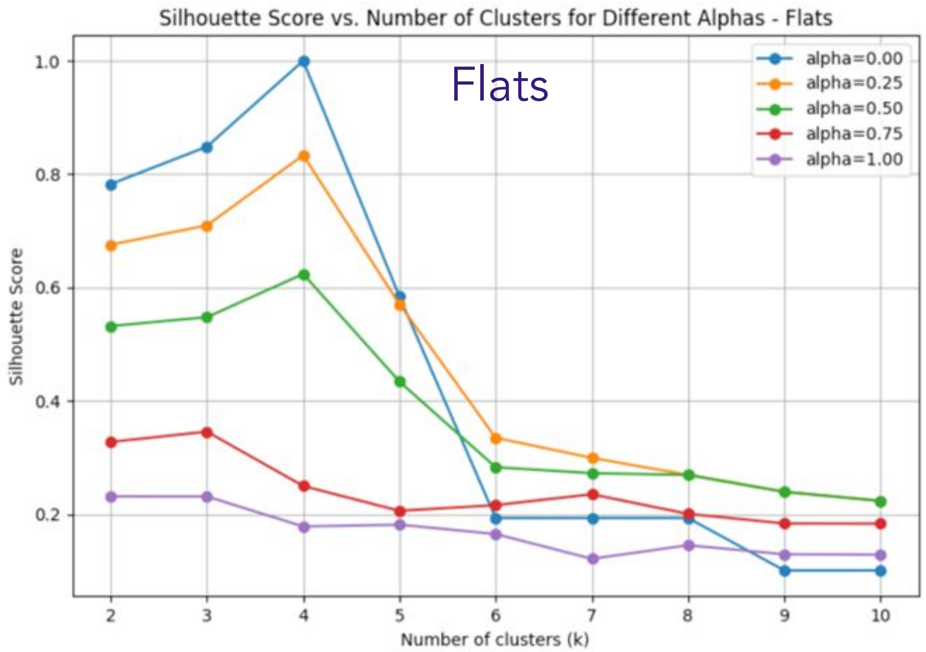


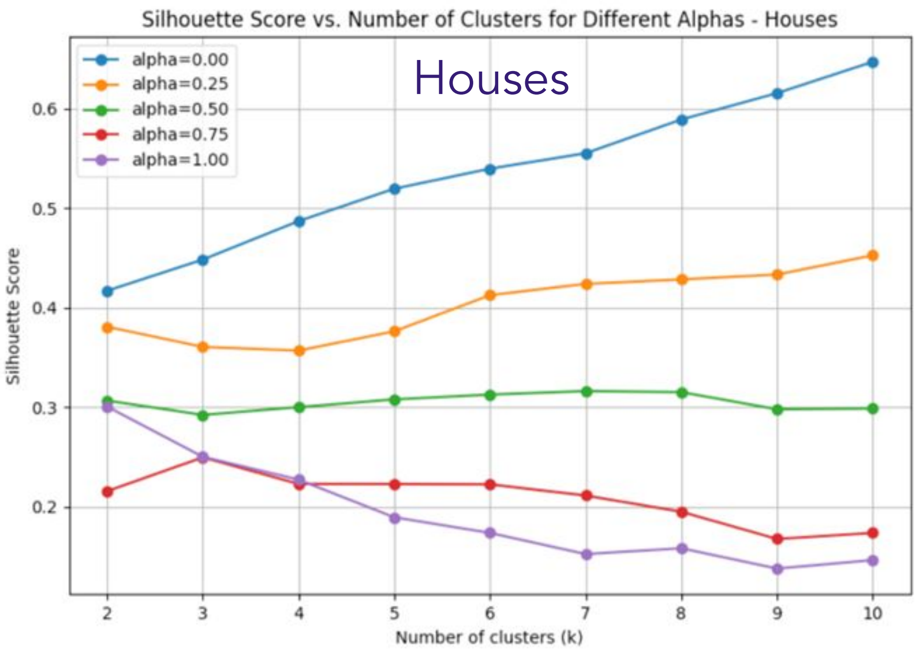
- 1273 (1481) households from Stadtwerke Winterthur (SWW)
- 15-minute intervals of electricity consumed
- 1. January – 31. December 2024 (366 days)

- K-Means
  Uses only smart meter data and serves as a reference for pure consumption profiling

- K-Prototypes & K-Medoids
  Smart meter data + technical features
  Consumption profiles + Distribution of technical assets

Results - Clustering Algorithm





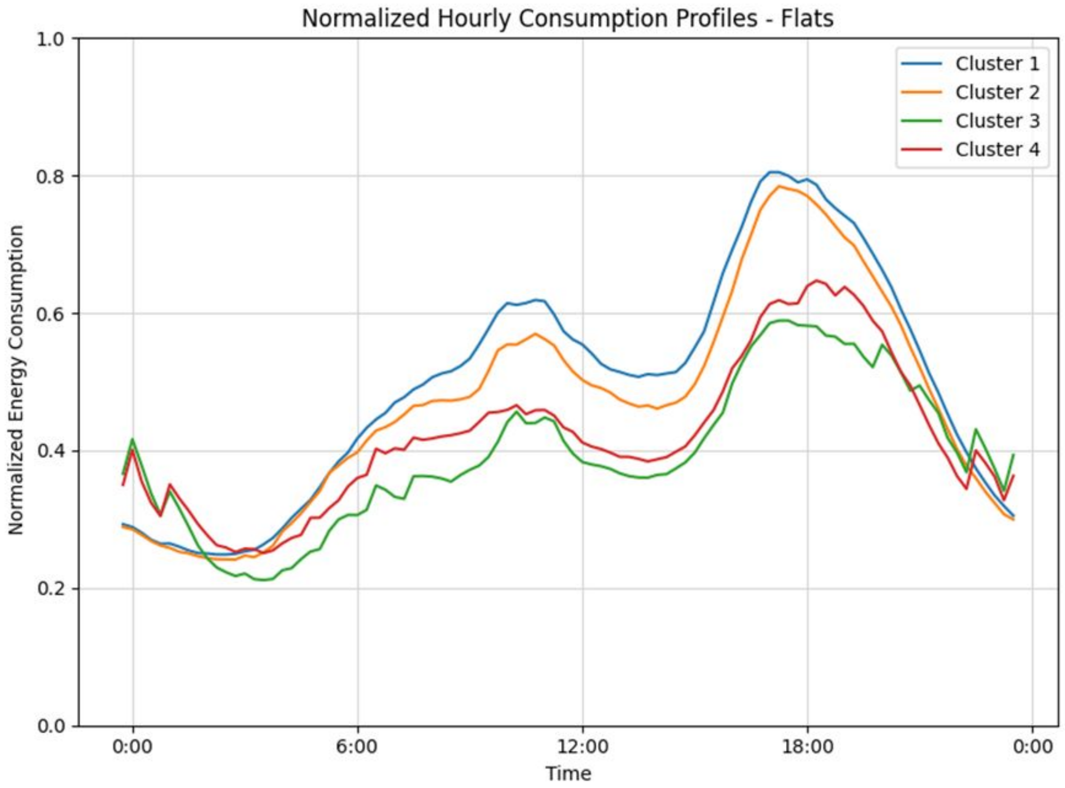
Method	Weight	Clusters	Silhouette Score
K-Means	–	3	0.23
K-Prototypes	$\gamma = 3$	3	0.35
K-Medoids	$\alpha = 0.25$	4	**0.83**

Method	Weight	Clusters	Silhouette Score
K-Means	–	5	0.19
K-Prototypes	$\gamma = 3$	5	0.31
K-Medoids	$\alpha = 0.25$	6	**0.41**

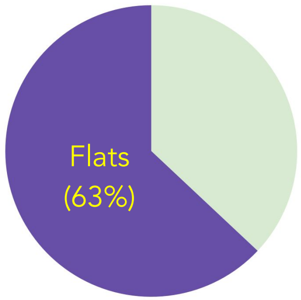
K-Medoids yielded highest Silhouette score and most distinct distribution of technical assets

sweet swiss energy research for the energy transition
SWICE + LANTERN

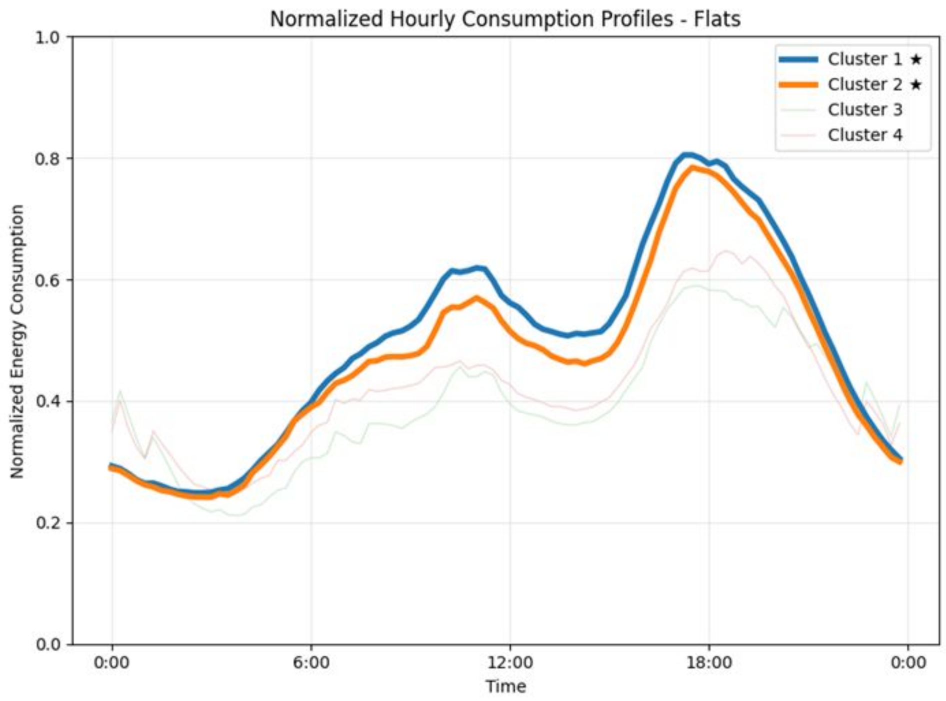
Results - Flats



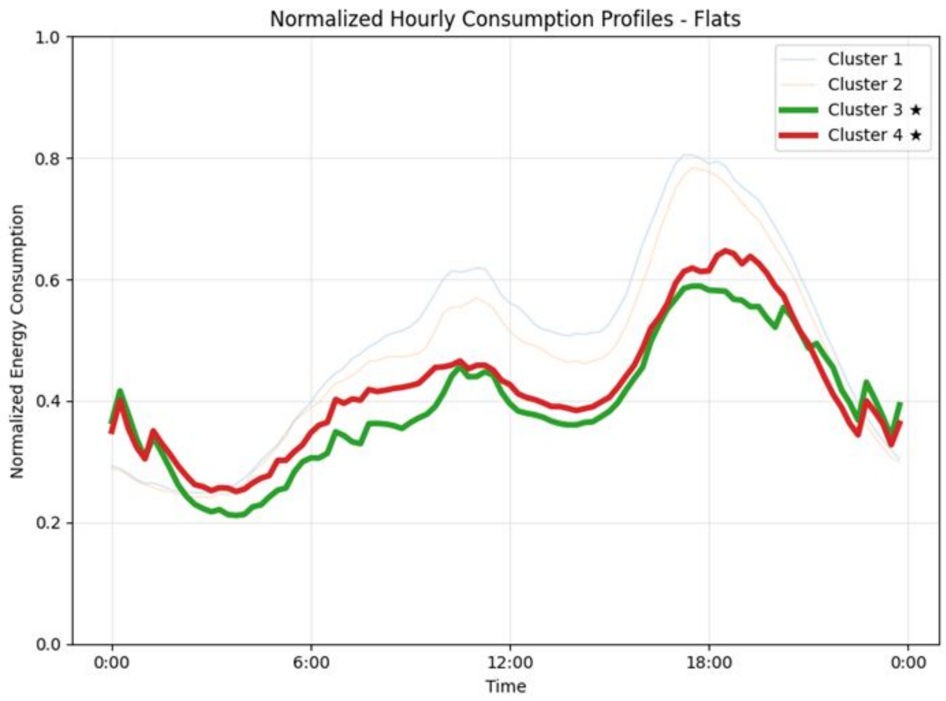
- All four clusters follow a similar daily pattern: low usage overnight, rising demand in the morning, and a strong evening peak.
- Clusters 1 and 2 show the highest consumption overall, with the most pronounced evening peak and a visible late-morning bump.
- Cluster 3 remains the lowest for most of the day, indicating a more moderate consumption profile.
- Cluster 4 lies between the high- and low-demand groups, with smoother and less pronounced peaks.



Results - Flats cluster comparisons

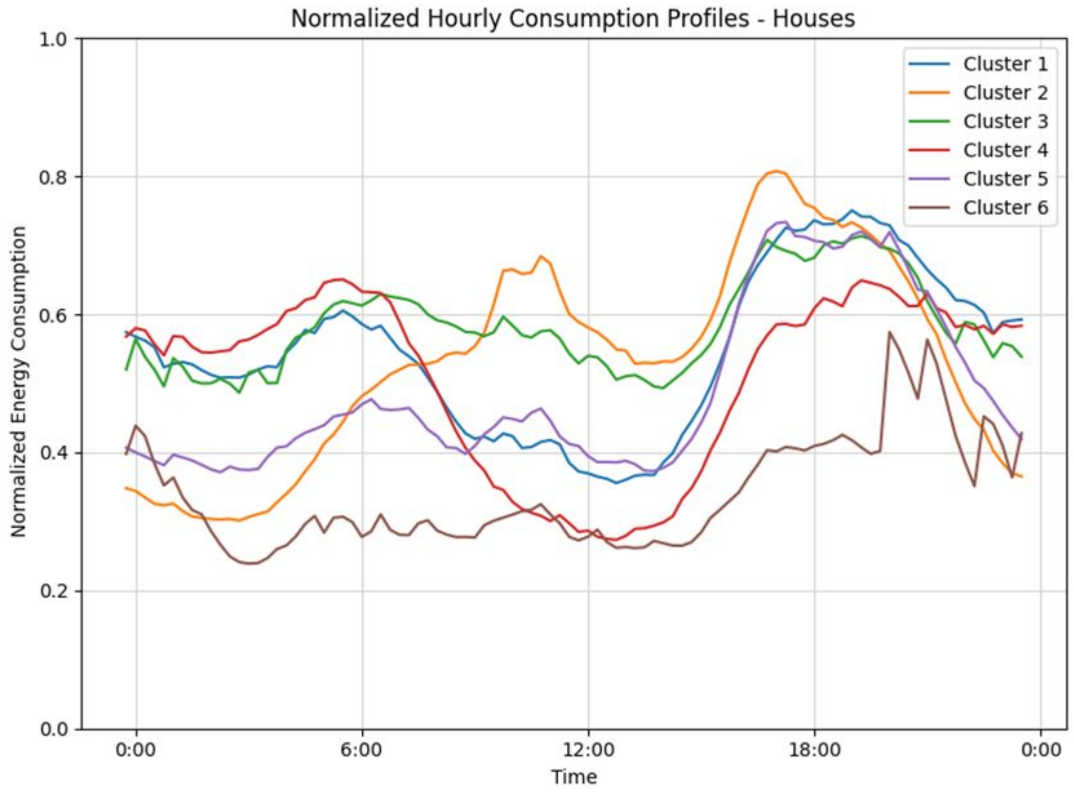


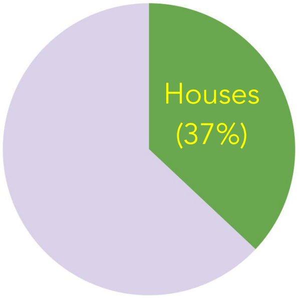
	Cluster 1	Cluster 2
# Households	333	313
Daily consumption [kWh]	5.66	3.83
Available Technology	Washing Machine	-



	Cluster 3	Cluster 4
# Households	81	74
Daily consumption [kWh]	5.48	7.17
Available Technology	Electric Boiler	Electric Boiler + Washing Machine

Results - Houses

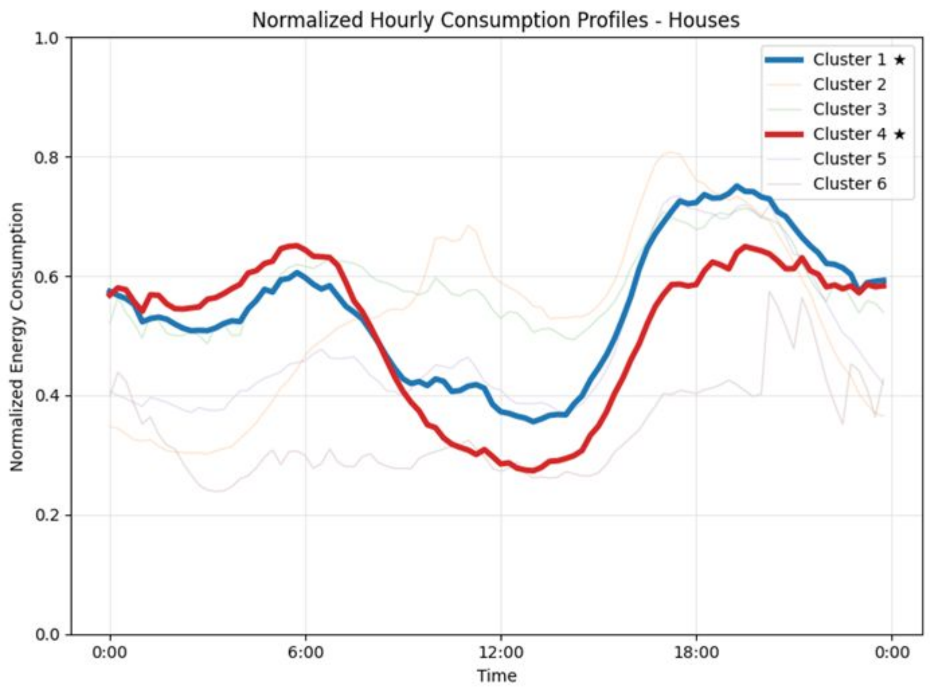


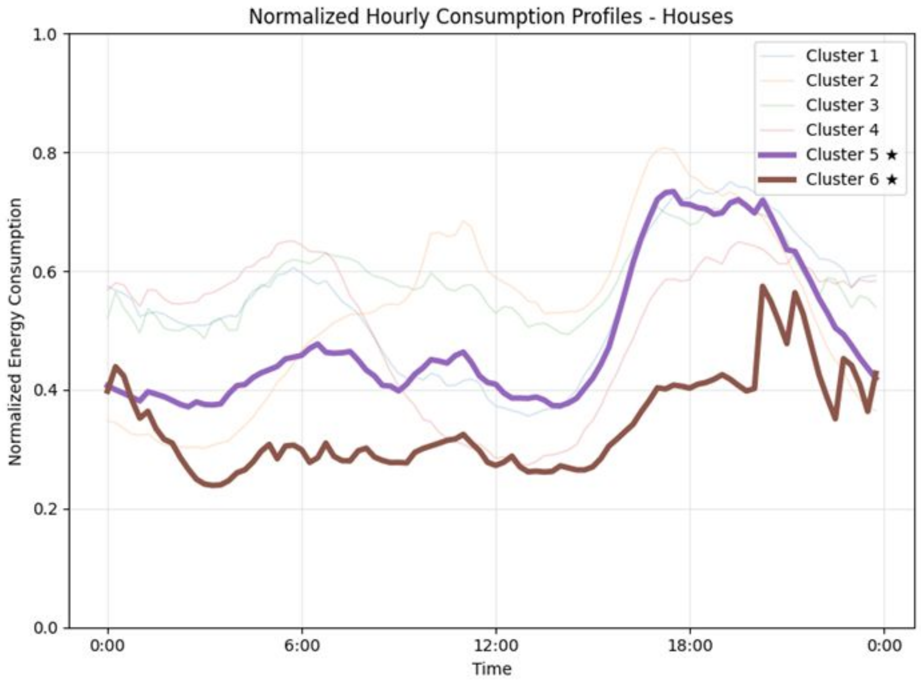


- ❖ House clusters show more diverse daily patterns than flats, with greater separation between low-, medium-, and high-consumption groups.
- ❖ Most clusters rise toward the evening, with the strongest peaks occurring around 17:00–20:00, suggesting evening demand is the main differentiator.
- ❖ Some clusters, especially 2 and 6, show sharper fluctuations and more distinct peaks, while others are smoother and more stable through the day.
- ❖ Lower-consuming clusters remain well below the others for much of the day, indicating clearly different household usage behaviors.

Results - Houses cluster comparisons

Empa
Materials Science and Technology



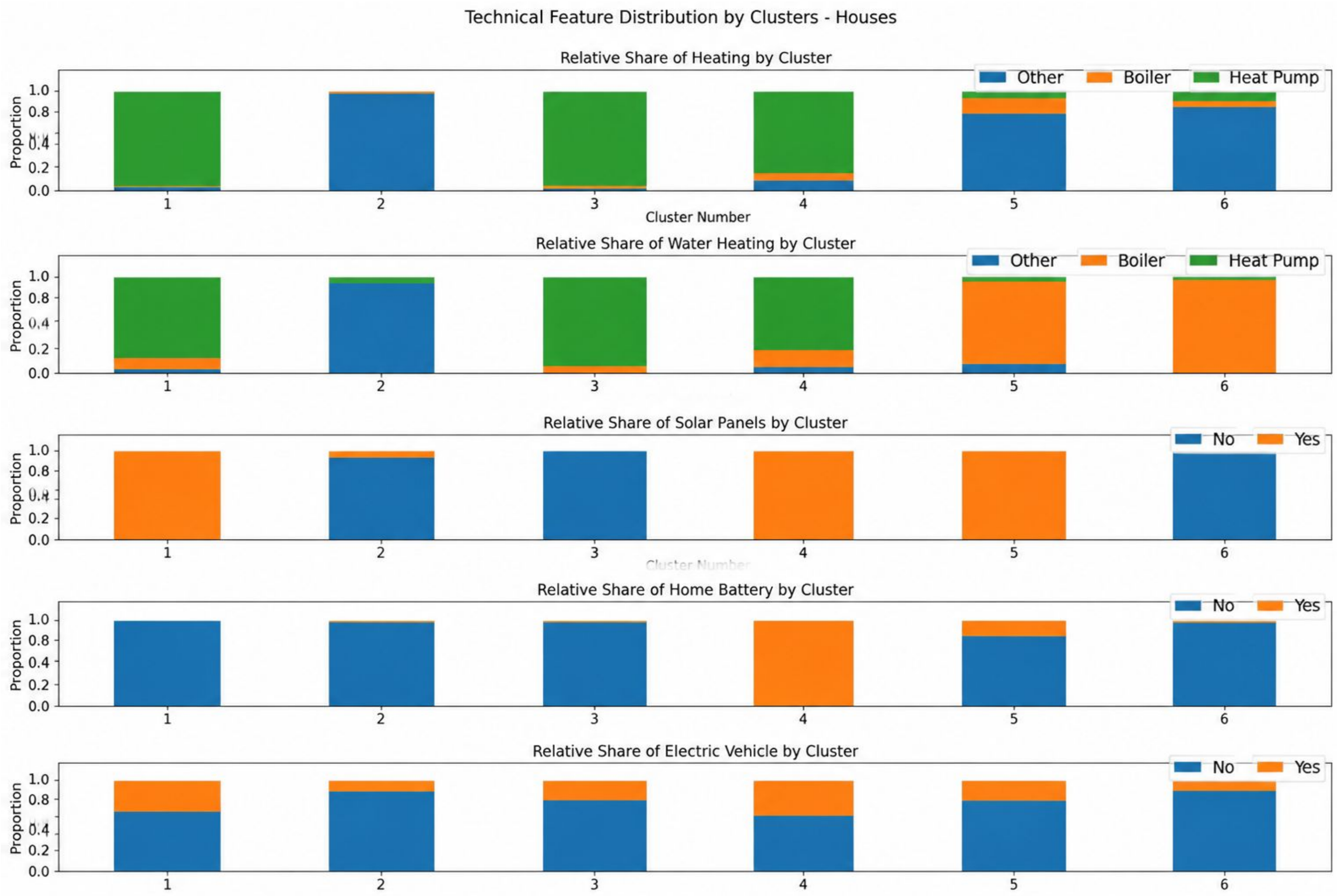


	Cluster 1	Cluster 4
# Households	73	65
Daily consumption [kWh]	17.04	13.91
Available Technology	HP + PV	HP + PV + Battery

	Cluster 5	Cluster 6
# Households	76	63
Daily consumption [kWh]	8.94	15.80
Available Technology	Non electric heating + Boiler + PV	Non electric heating + Boiler

sweet swiss energy research for the energy transition
SWICE + LANTERN

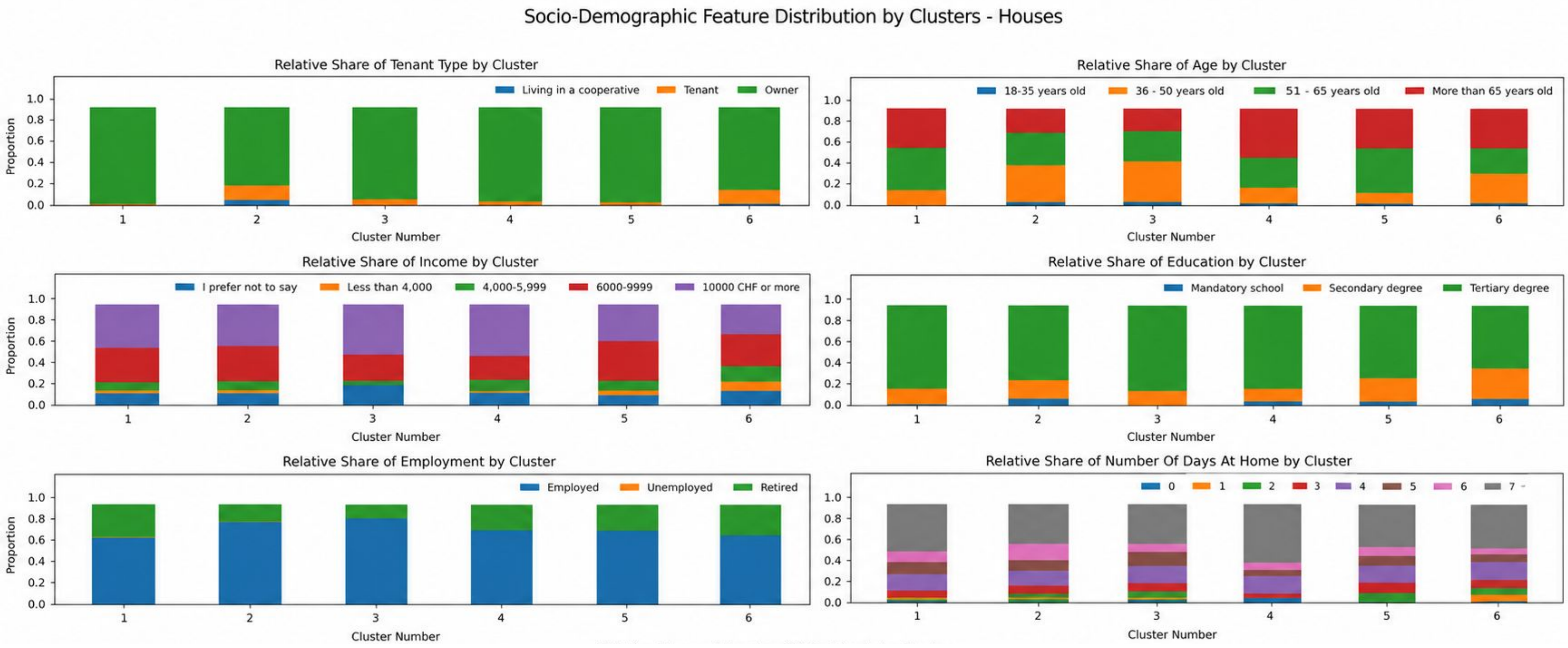
Results - Houses technical assets



sweet swiss energy research for the energy transition

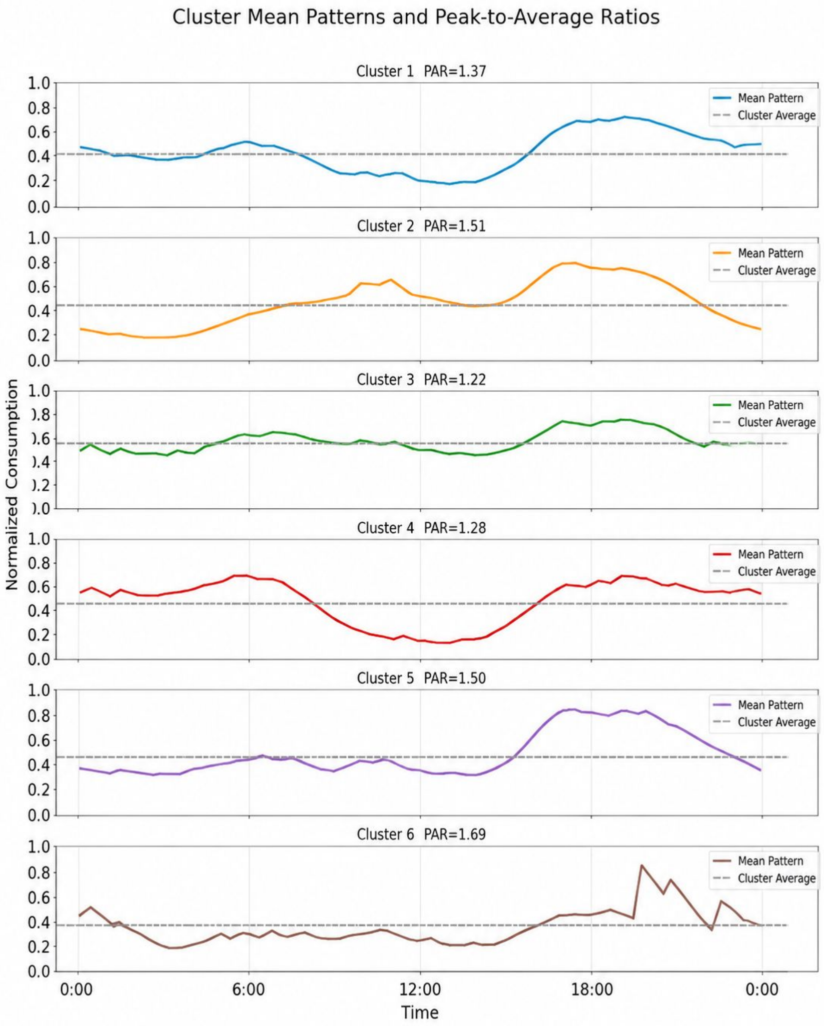
SWICE + LANTERN

Results - Houses socio-demographic features



Results - PAR (houses)

Empa
Materials Science and Technology



- Cluster 6 represents the most concentrated demand pattern, where energy use is packed into relatively short peak periods rather than spread evenly across the day. This suggests a household group with sharper, less flexible daily load behavior.

- Clusters 2 and 5 also reflect fairly peak-driven behavior, meaning their demand is still concentrated in specific hours, especially in the stronger evening-use window. These clusters are likely more sensitive to peak-related demand-response strategies.

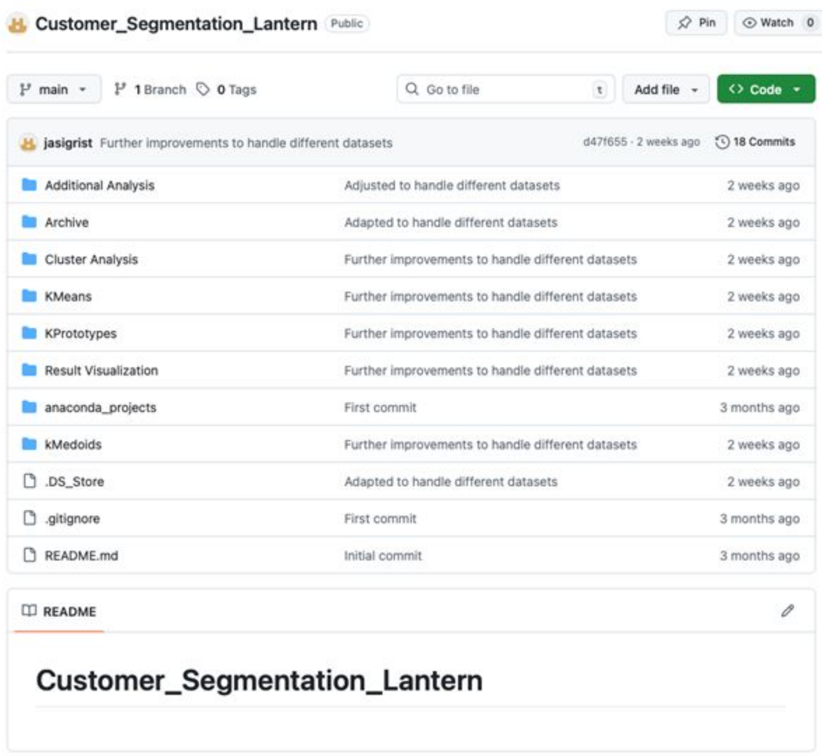
- Clusters 1 and 4 appear more moderate, with recognizable peaks but a less extreme concentration of load than the high-PAR groups. They can be interpreted as intermediate profiles between strongly peaked and more stable demand behavior.

- Cluster 3 is the most even and balanced profile, with demand spread more smoothly through the day and less dominated by short peak periods. That makes it the least peak-intensive cluster in behavioral terms.

sweet swiss energy research for the energy transition
SWICE + LANTERN

Conclusion

- **K-Medoids** yielded the best most distinct customer segmentation
- Flats and houses differ in available technologies and therefore also in the consumption profiles
- Technical features overshadow socio demographic influence on consumption patterns
- Sociodemographic characteristics determine which technologies are available
- High acceptance for utility interventions in Winterthur
- Demand Response measures most effective in highly electrified houses: Flexible high-intensity technologies available



sweet swiss energy research for the energy transition
SWICE + LANTERN

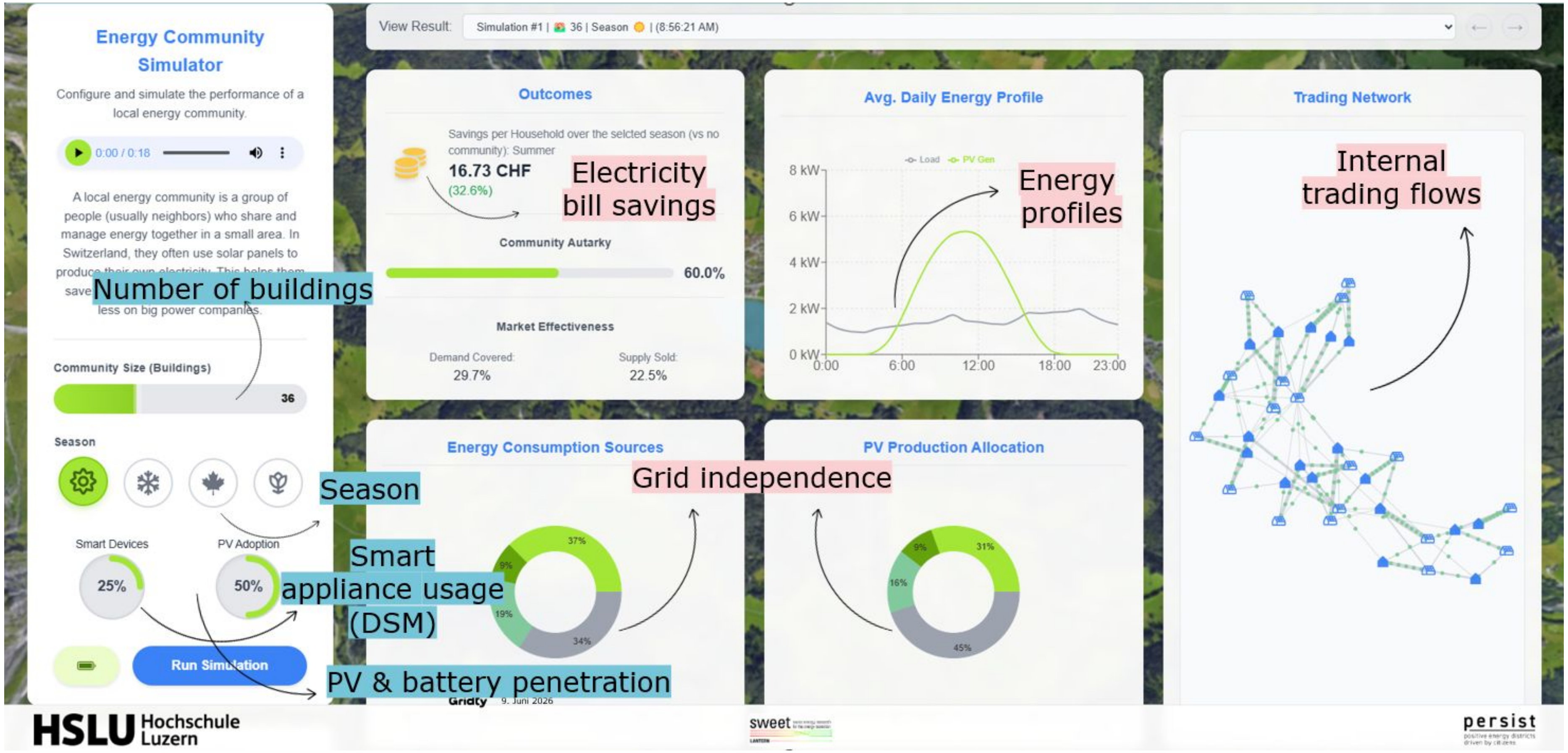
Assessment of local electricity community potential: Swiss case studies

Tania B. Lopez-Garcia, Igor Torshin

11:30 - 11:50

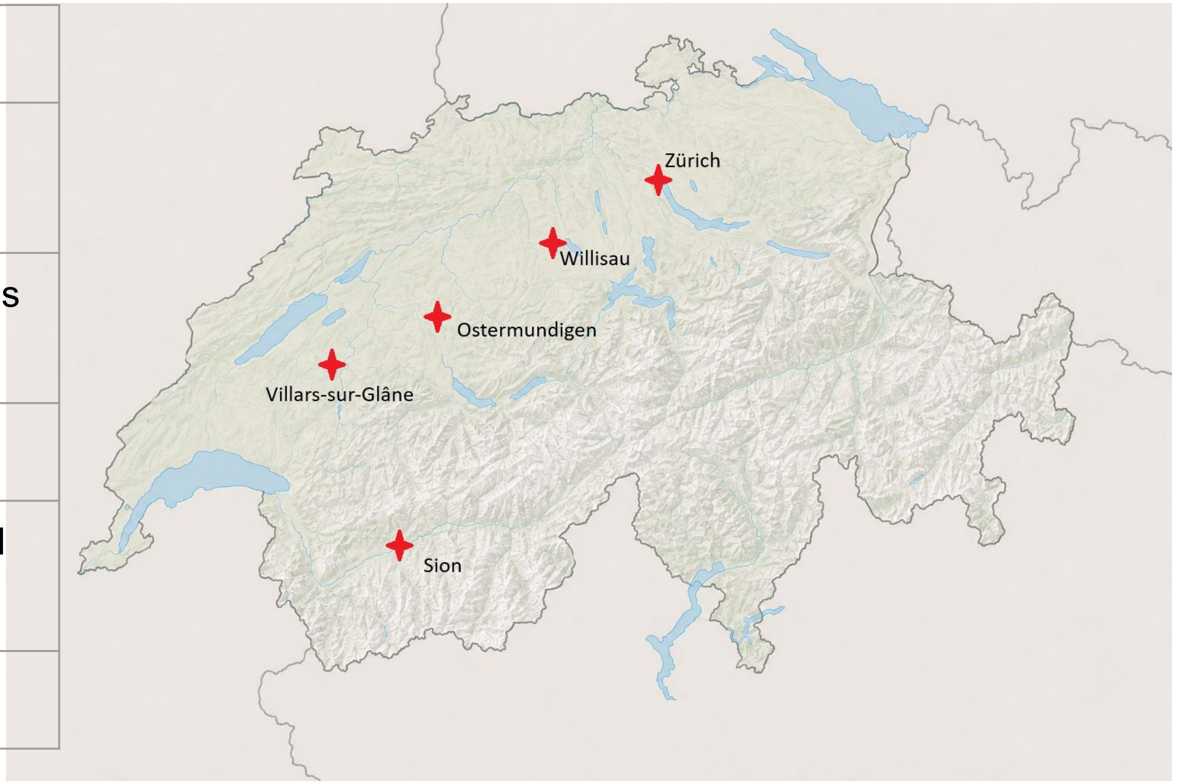
Introduction

The work presented here is based on the "work in progress" of the Gridly tool.



Swiss case studies

Location	Typology	Key Features
Zürich (ZH)	Urban centre	High density, mixed-use, load diversity
Ostermundigen (BE)	Suburban	Residential dominance, good solar access
Willisau (LU)	Rural-forest	Agricultural loads, lower density
Villars-sur-Glâne (FR)	Rural-urban edge	New builds, mixed residential/commerical
Sion (VS)	Alpine rural	Large PV potential, limited load diversity



Local electricity community simulation

- For each place, a random location was chosen: buildings within a 200m radius were selected
- Only residential, partial residential and non-residential such as schools, offices, factories were kept (GWR 1020, 1040, 1060).
- 3 Scenarios: 25%, 50%, 75% of *residential* members with PV.
- No batteries or load flexibility were considered.

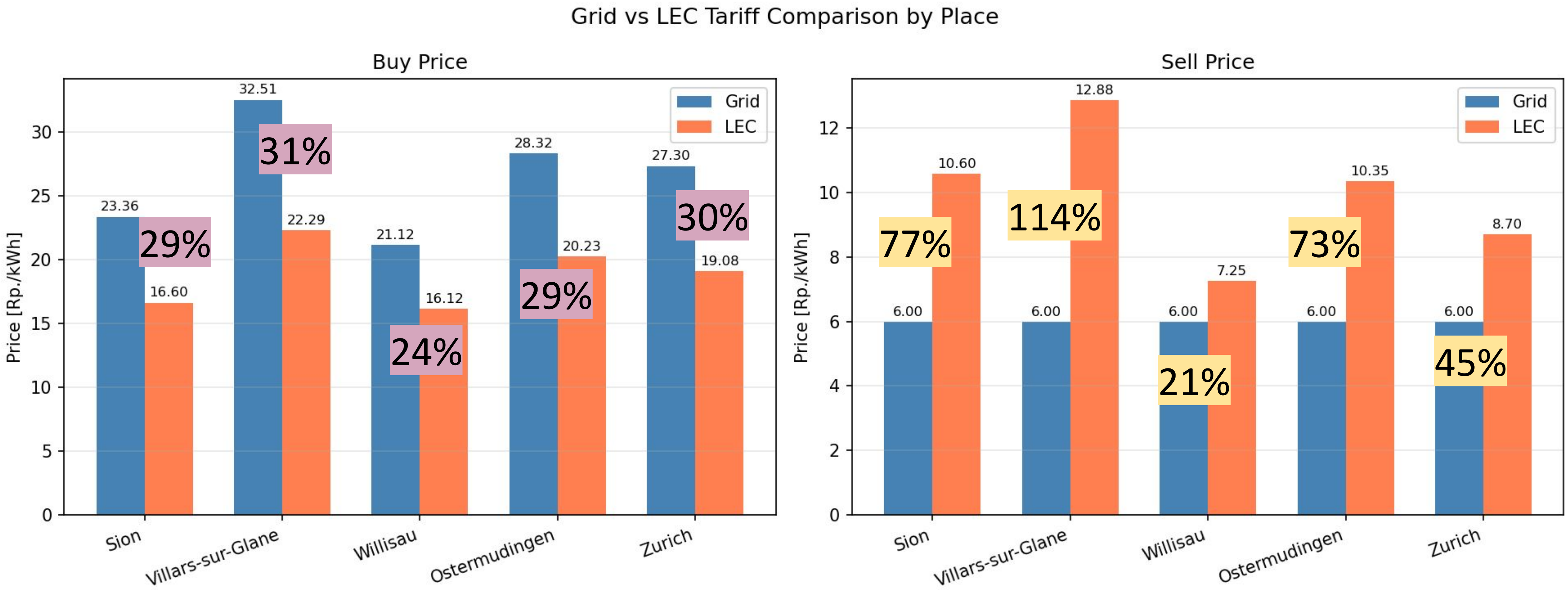
Community configuration and DSO tariffs

Location	Residential (GWR 1020)	Partial residential (GWR 1040)	Non-residential (GWR 1060)
Zürich (ZH)	49 (547 dwellings) 11 d/b	24	39
Ostermundigen (BE)	169 (1053 dwellings) 6 d/b	2	48
Willisau (LU)	78 (213 dwellings) 3 d/b	20	47
Villars-sur-Glâne (FR)	67 (173 dwellings) 2.5 d/b	0	47
Sion (VS)	131 (444 dwellings) 3.5 d/b	23	78

- Different tariffs from corresponding DSOs were considered.

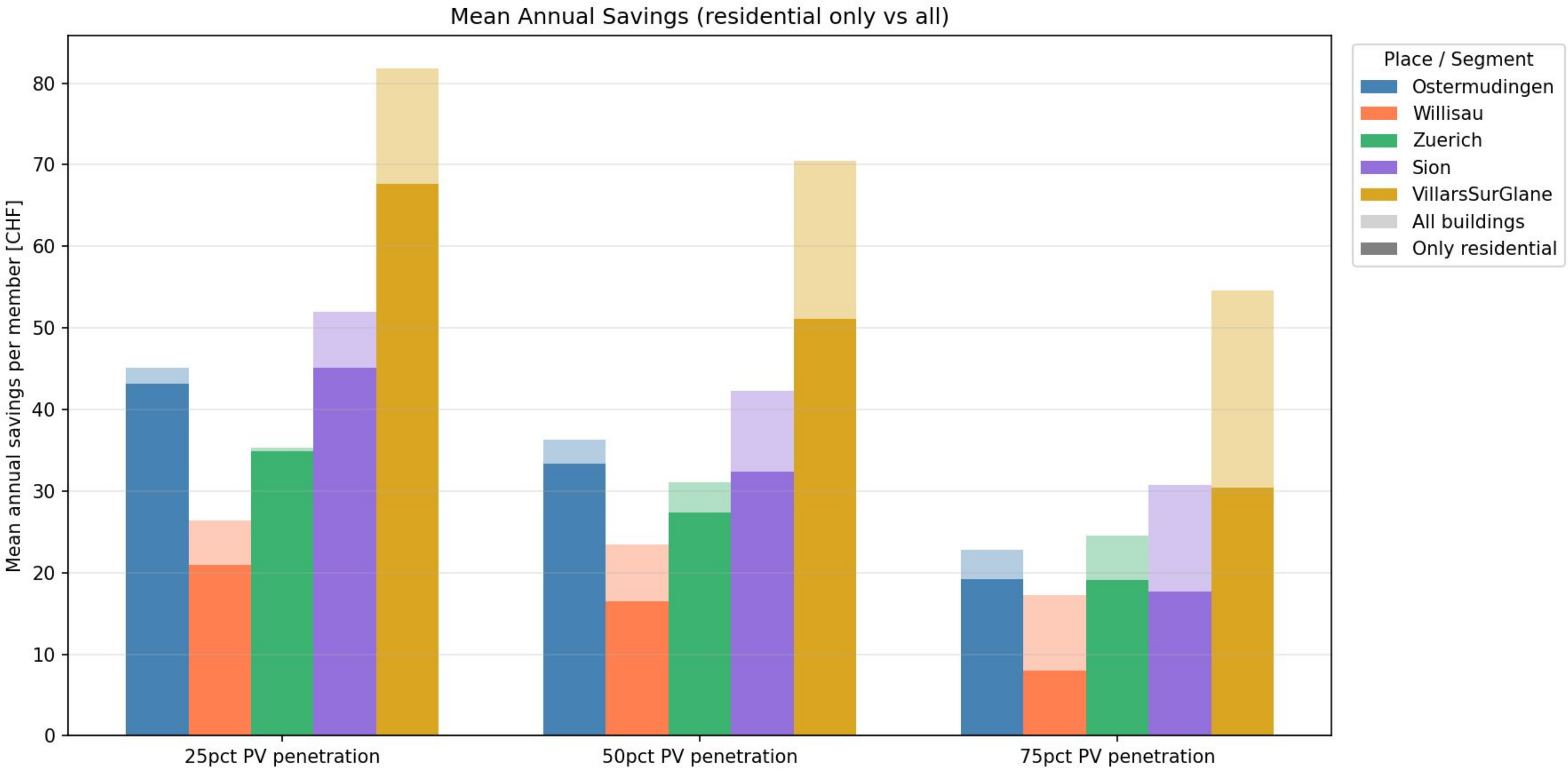
	Provider	Energy price	Grid price	Taxes & others
Ostermundigen	BKW	14.07	10.92	3.33
Willisau	CKW	8.5	9.38	3.24
Zürich	EWZ	11.4	13.8	2.1
		7.0	8.5	2.1
Villars-sur-Glane	Group E	19.7	8.5	4.31
		15.05	3.15	3.5
Sion	Oiken	15.2	5.4	2.76

Price comparisons



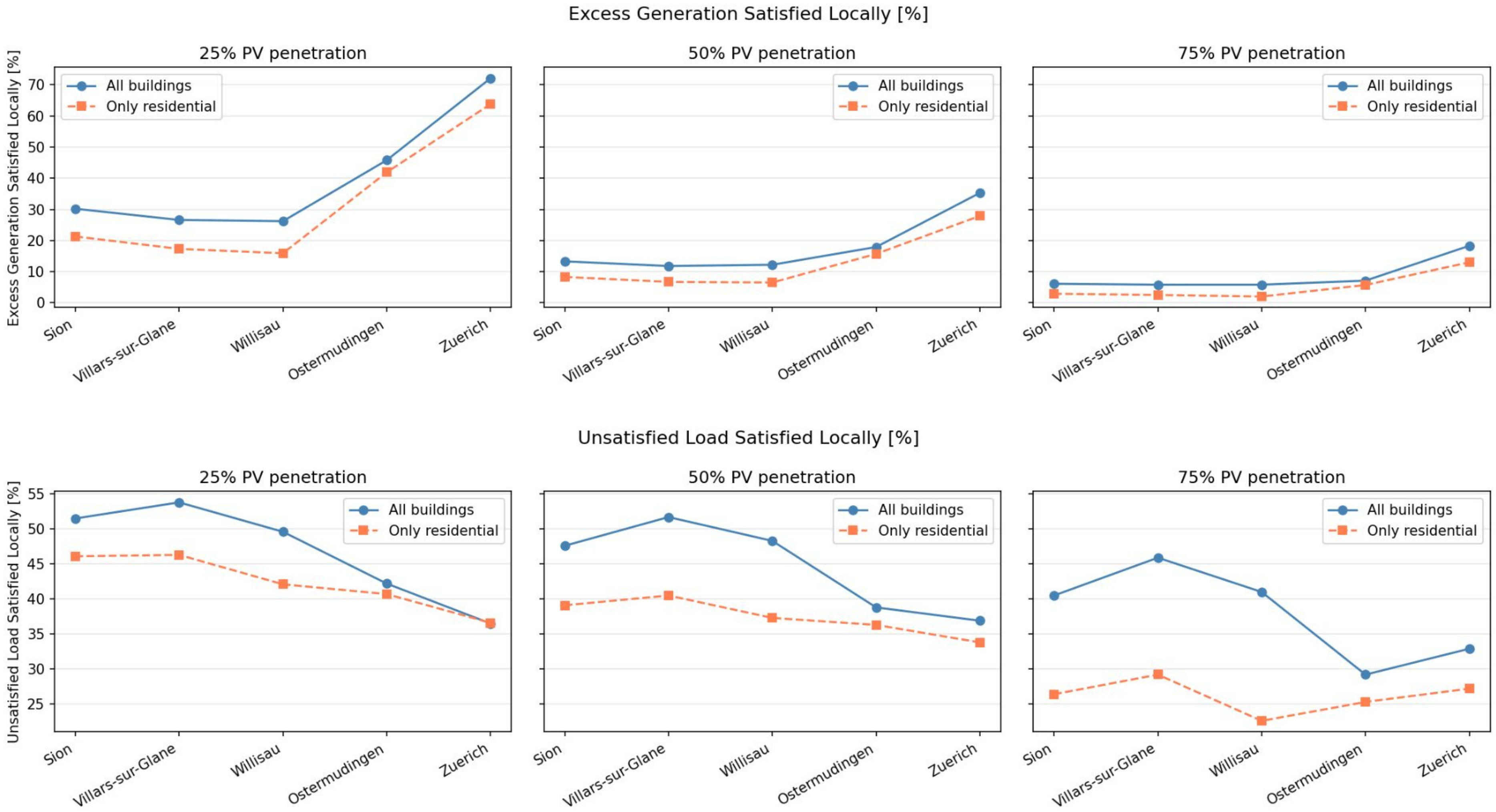
sweet swiss energy research for the energy transition
SWICE + LANTERN

Savings results



sweet swiss energy research for the energy transition
SWICE + LANTERN

Self-consumption results



sweet swiss energy research for the energy transition
SWICE + LANTERN

Conclusion

Aspects that play a role:

- Building composition: MFH with many dwellings vs SFH or only a few dwellings
- DSO tariff composition: High/low energy tariff vs high/low grid-usage tariff -> affects the setting of the internal LEC price
- Different load profiles (from non-residential) are beneficial (especially when many members have PV)

Future work:

- Analysis of larger areas (many points in a municipality)
- Improve load estimation
- Sensitivity analysis on the effect of solar irradiance.

Renewable adoption and economic performance: How local governance unlocks energy community potential

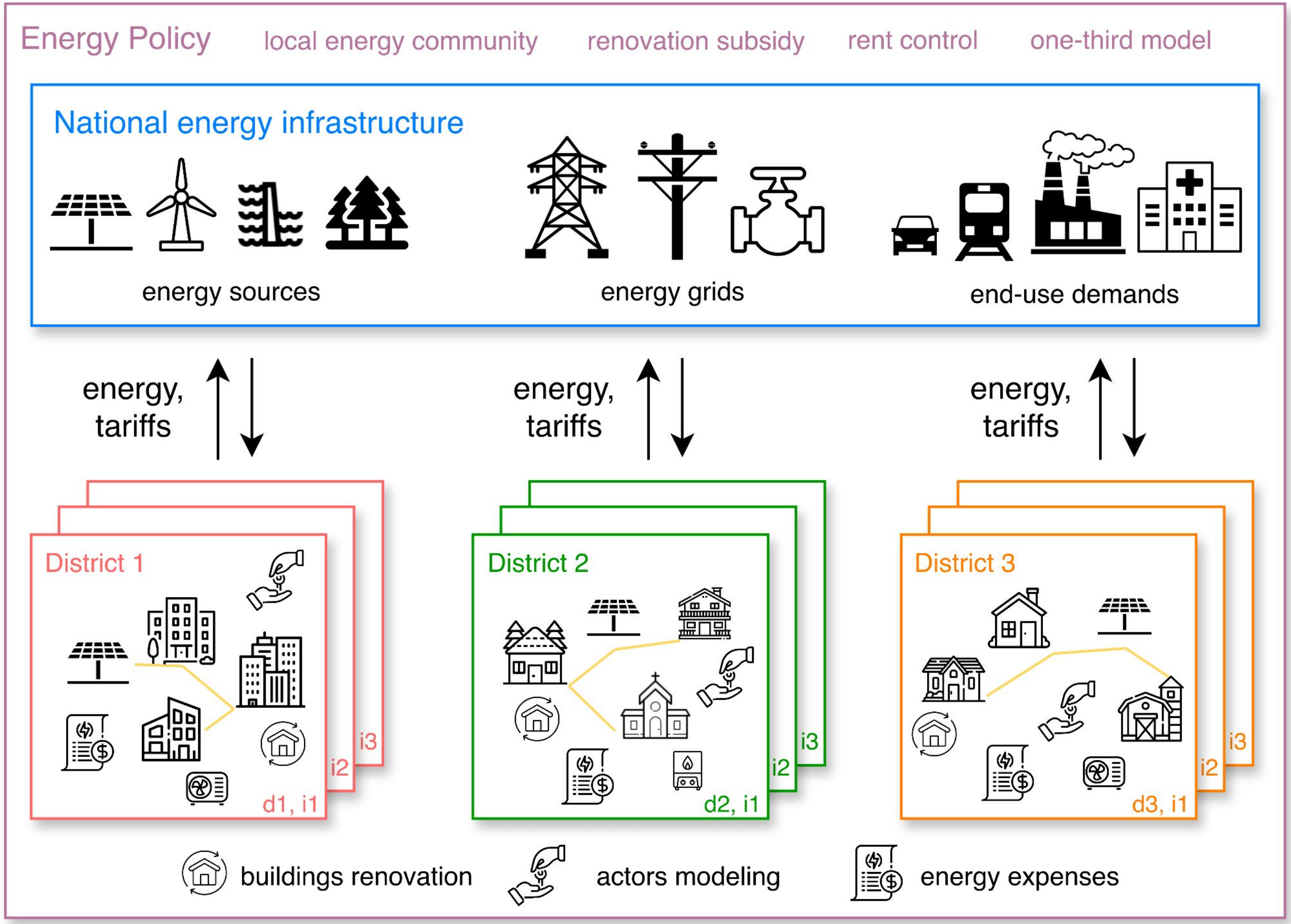
Cédric Terrier, Dorsan Lepour,
Arthur Chuat, Ziqian Wang, François Maréchal

SWICE WP7 (energy systems)

11:50 - 12:10

Modeling Framework

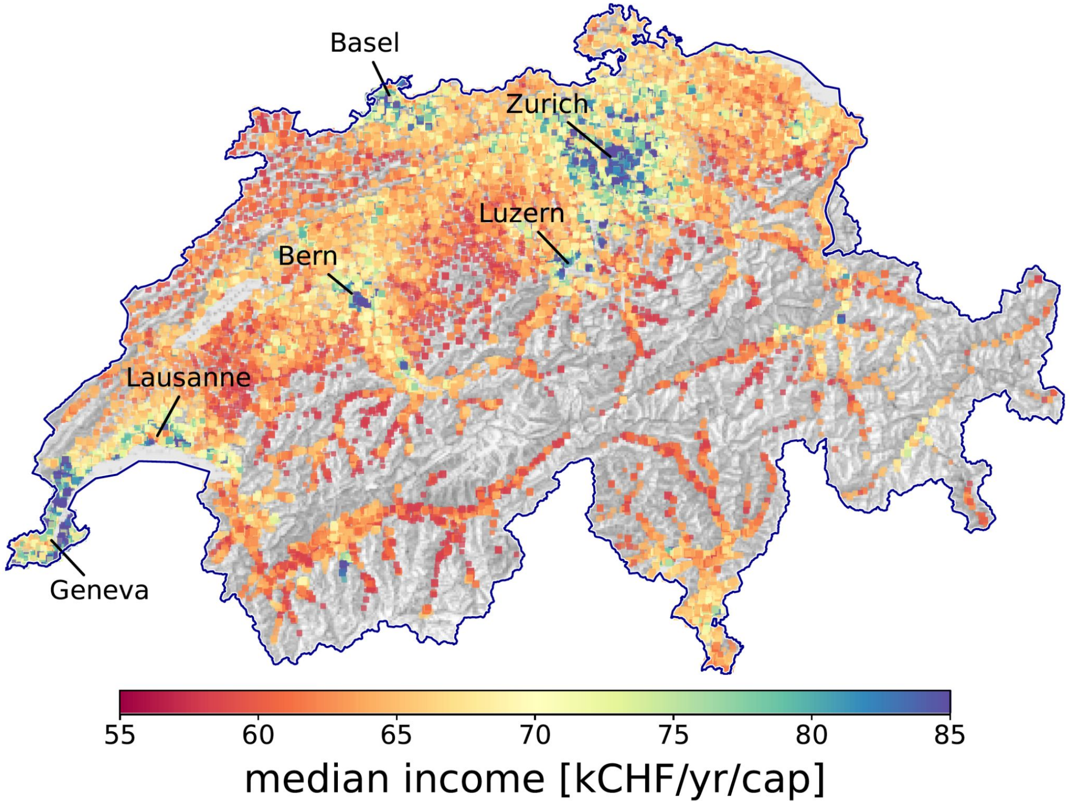
- Multi-scale:
  - Buildings
  - Districts
  - Country
- Multi-service:
  - Heating
  - Electricity
  - Mobility
- Multi-temporal:
  - Daily operation
  - Seasonal storage



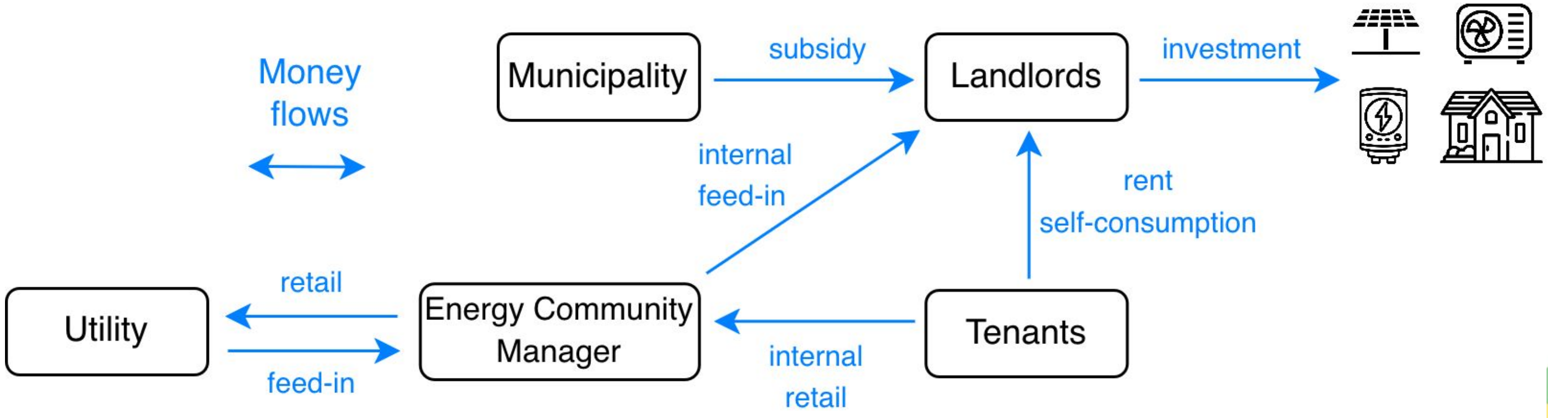
sweet swiss energy research for the energy transition
SWICE + LANTERN

Actors-modeling framework

- Multi-actors:
  - Tenants, Landlords
  - Municipality
  - Utility companies
  - Energy community manager
- Objective: mitigate energy poverty and promote investment using energy communities

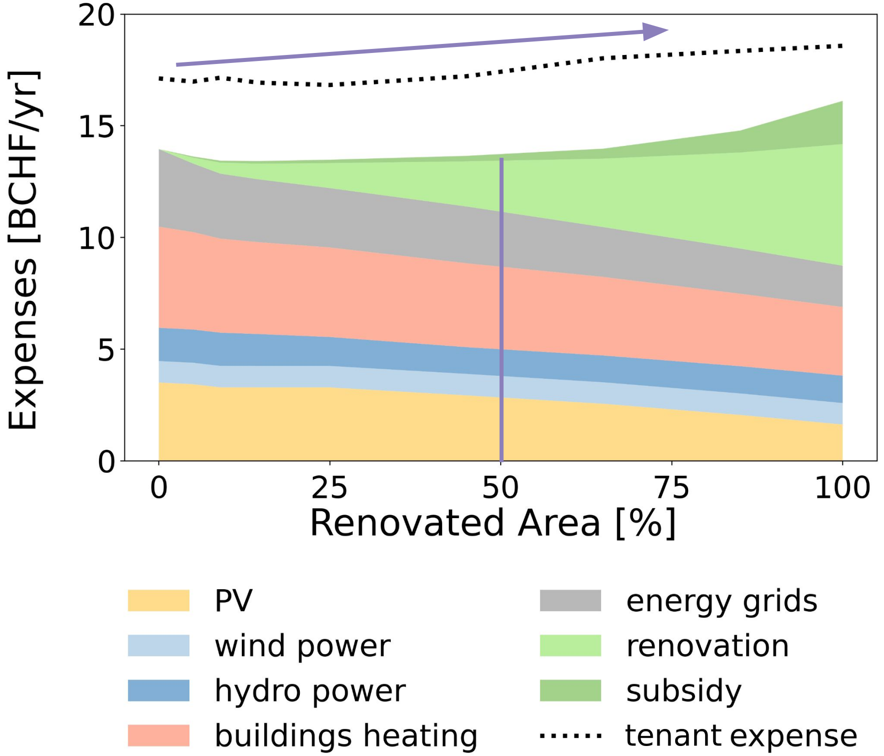


Distribution of equivalised median income in neighborhoods

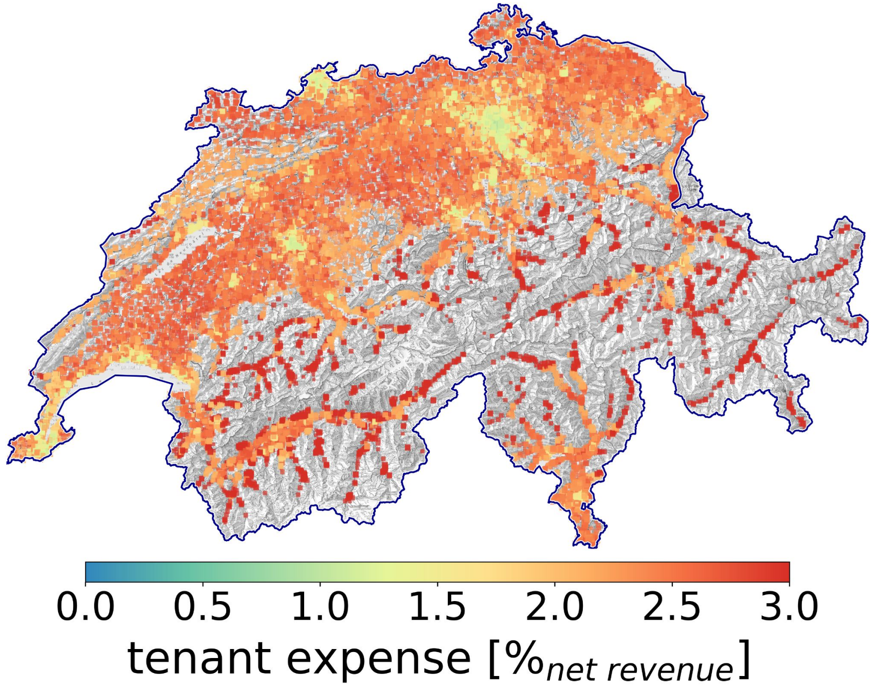


SWEET swiss energy research for the energy transition
SWICE + LANTERN

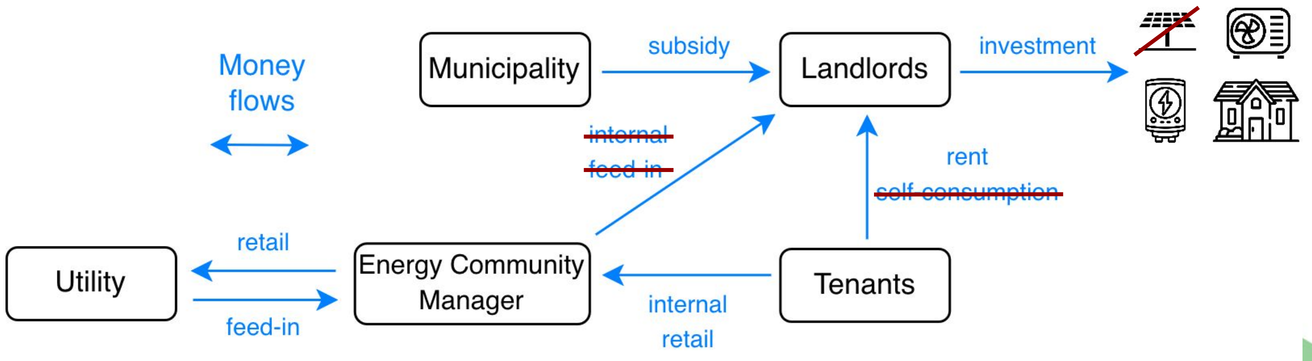
Baseline scenario: business as usual



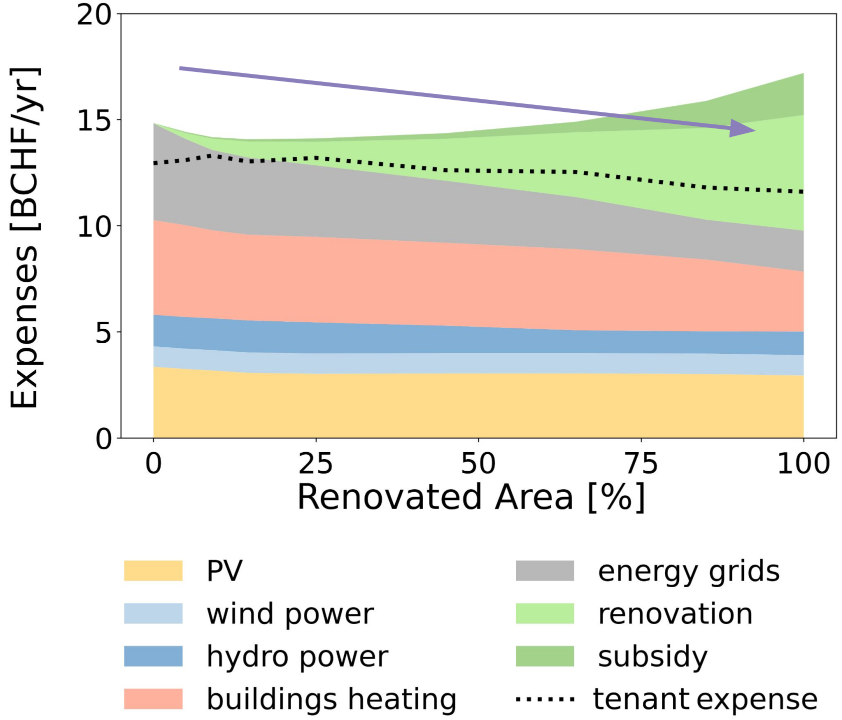
Mean for lowest income quintile: 6.4%

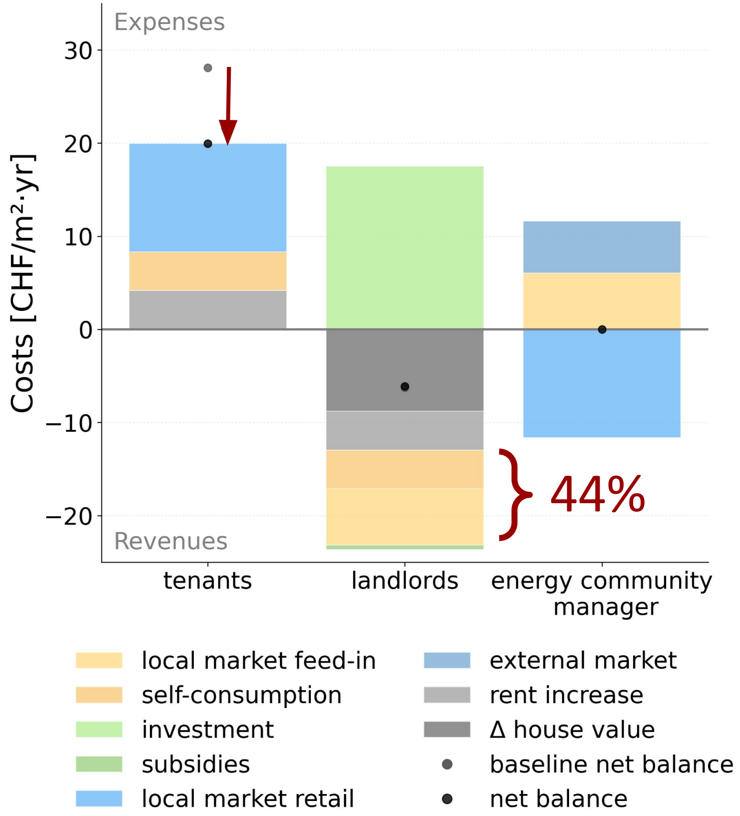


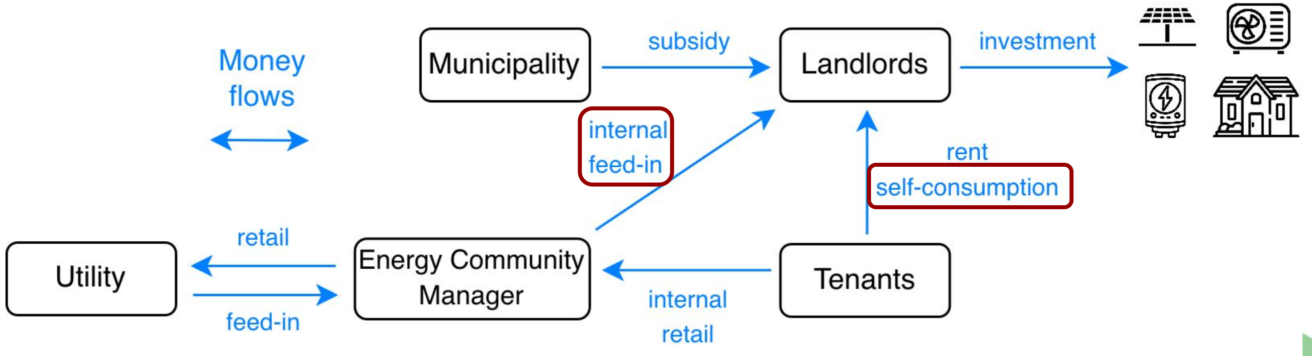
Distribution of expenses for energy bill and rent increase.
Mean: 2.33% (2019: 1.67%)



Using energy communities to recover investments



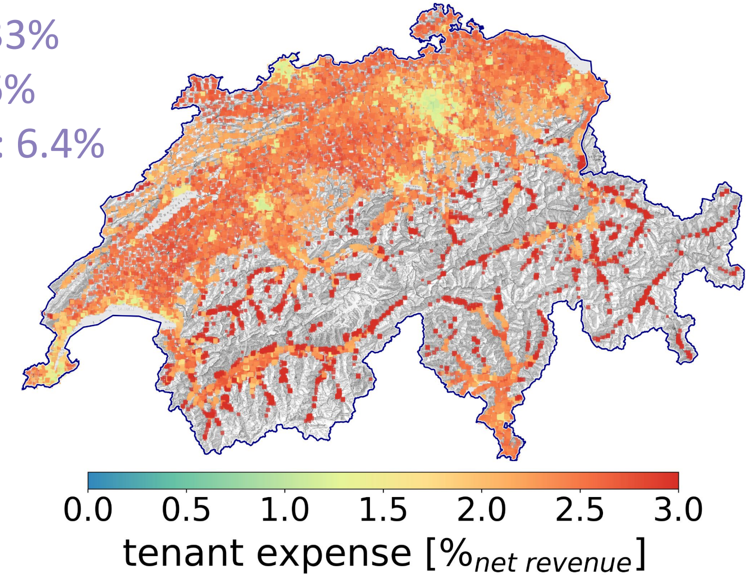




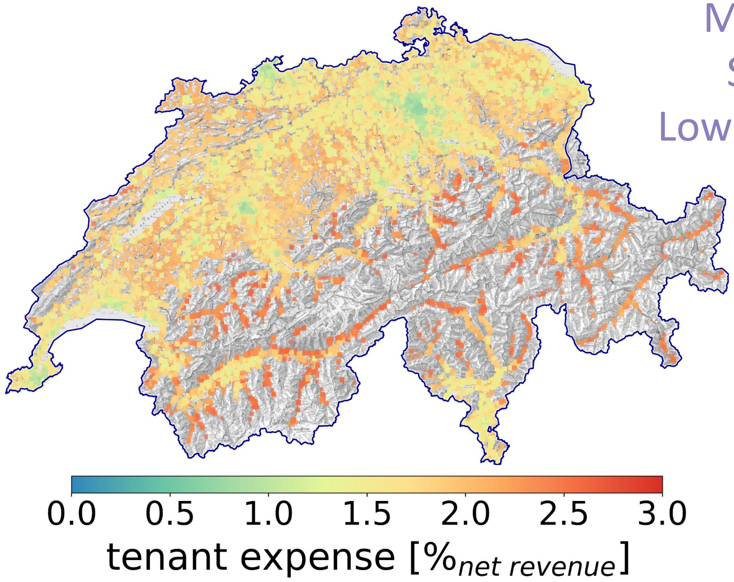
sweet swiss energy research for the energy transition
SWICE + LANTERN

Using energy communities to recover investments

Mean: 2.33%
Std: 0.56%
Low income: 6.4%



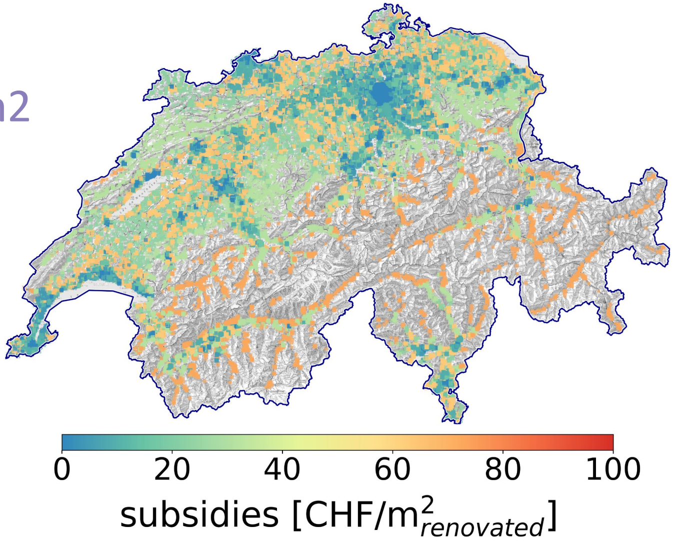
Energy communities →

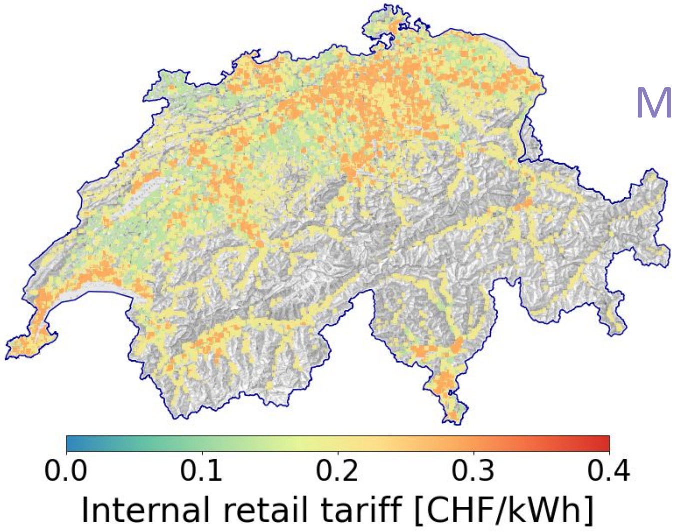


Mean: 1.67%
Std: 0.37%
Low income: 4.7%

Mean: 33 CHF/m2

Today: 60-200 CHF/m2



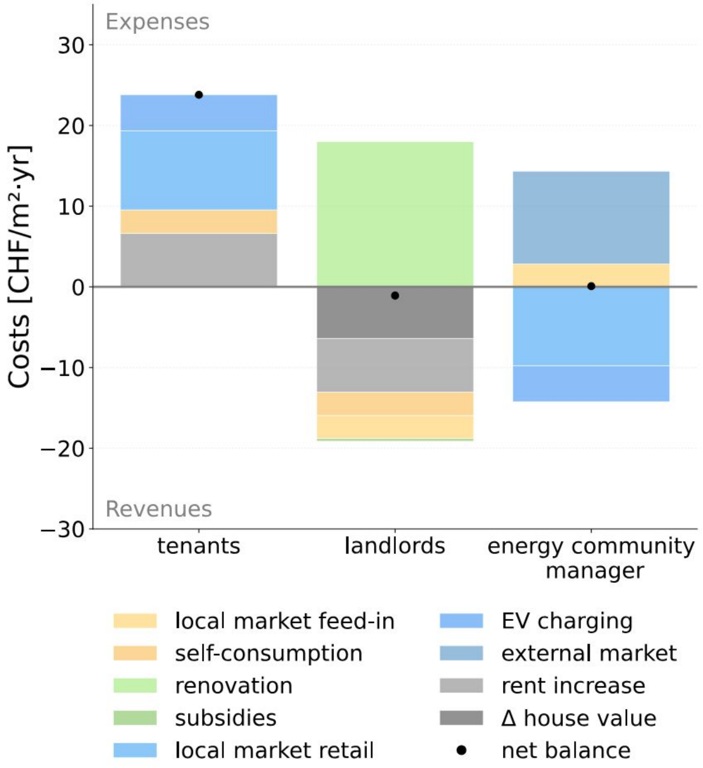


Mean: 0.23 CHF/kWh

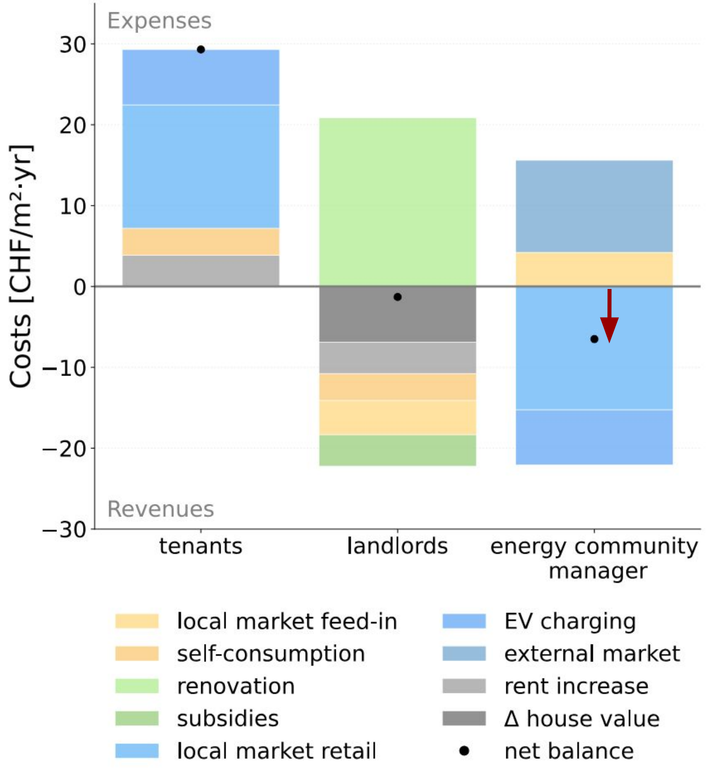
Today: 0.27-0.37 CHF/kWh

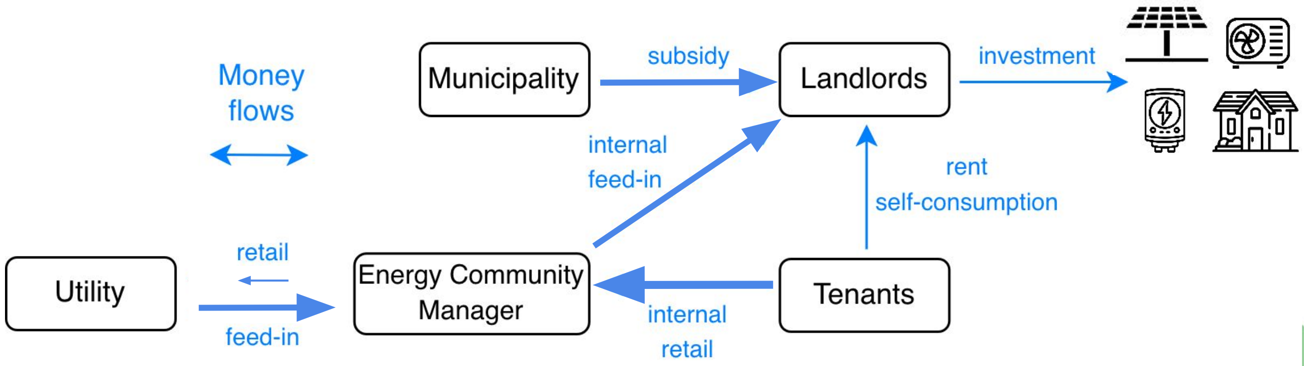
sweet swiss energy research for the energy transition
SWICE + LANTERN

Profit-driven energy community management



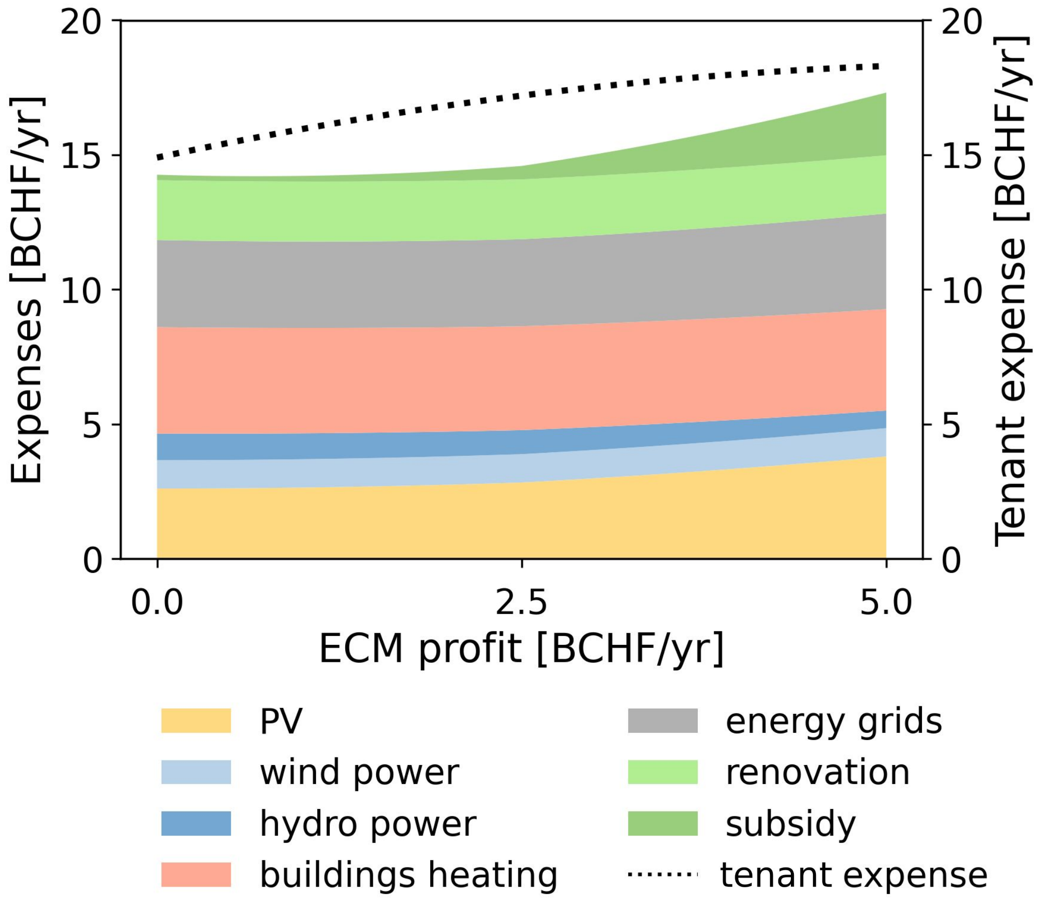
Profit driven





Profit-driven energy community management

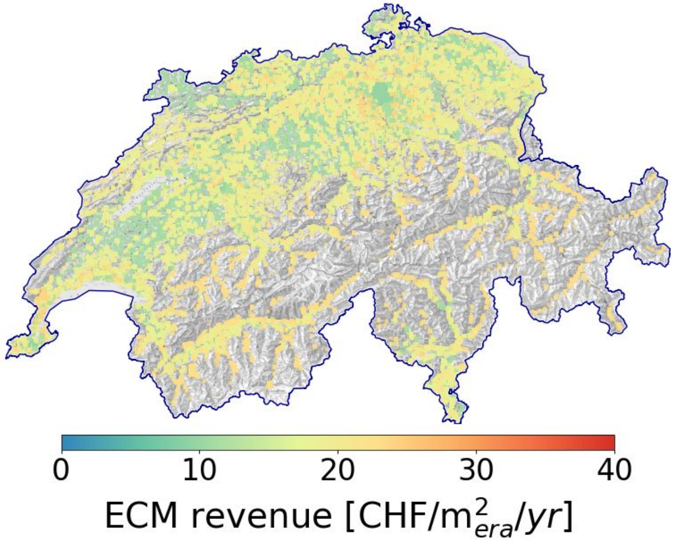
- Profit is at the expense of tenants up to 2.5 BCHF/yr
- Beyond that, subsidies drive profit
- Over-investment in PV capacity is detrimental to energy grids



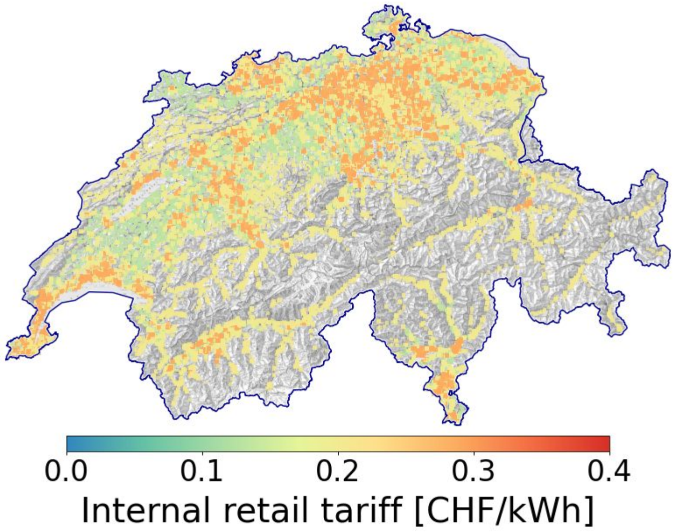
Profit-driven energy community management

- Most revenues are made in suburban, rural and mountainous areas
- A profit-driven strategy increases energy expenses disparity
- Internal retail tariffs get close to the ones of utility companies

Non-profit

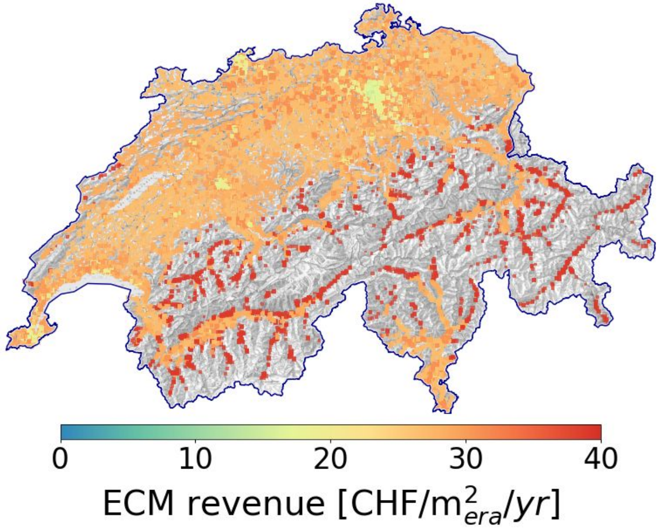


Average: 14 CHF/m2/yr

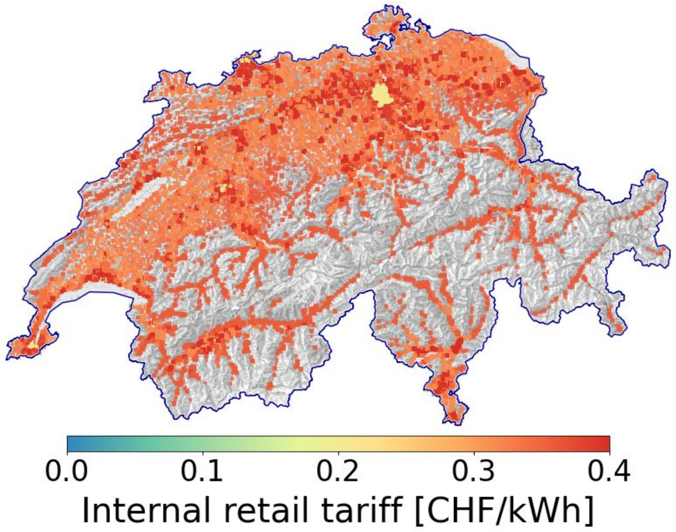


Average: 0.23 CHF/kWh

Profit-driven (5 BCHF/yr)



Average: 22 CHF/m2/yr



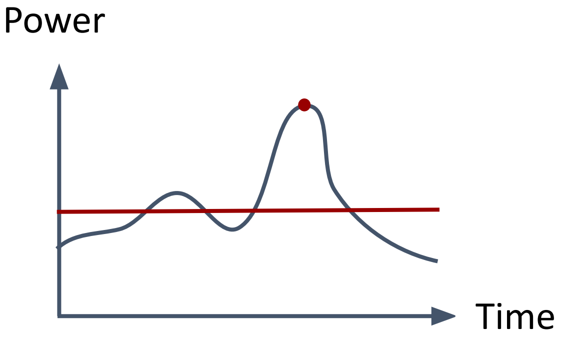
Average: 0.33 CHF/kWh

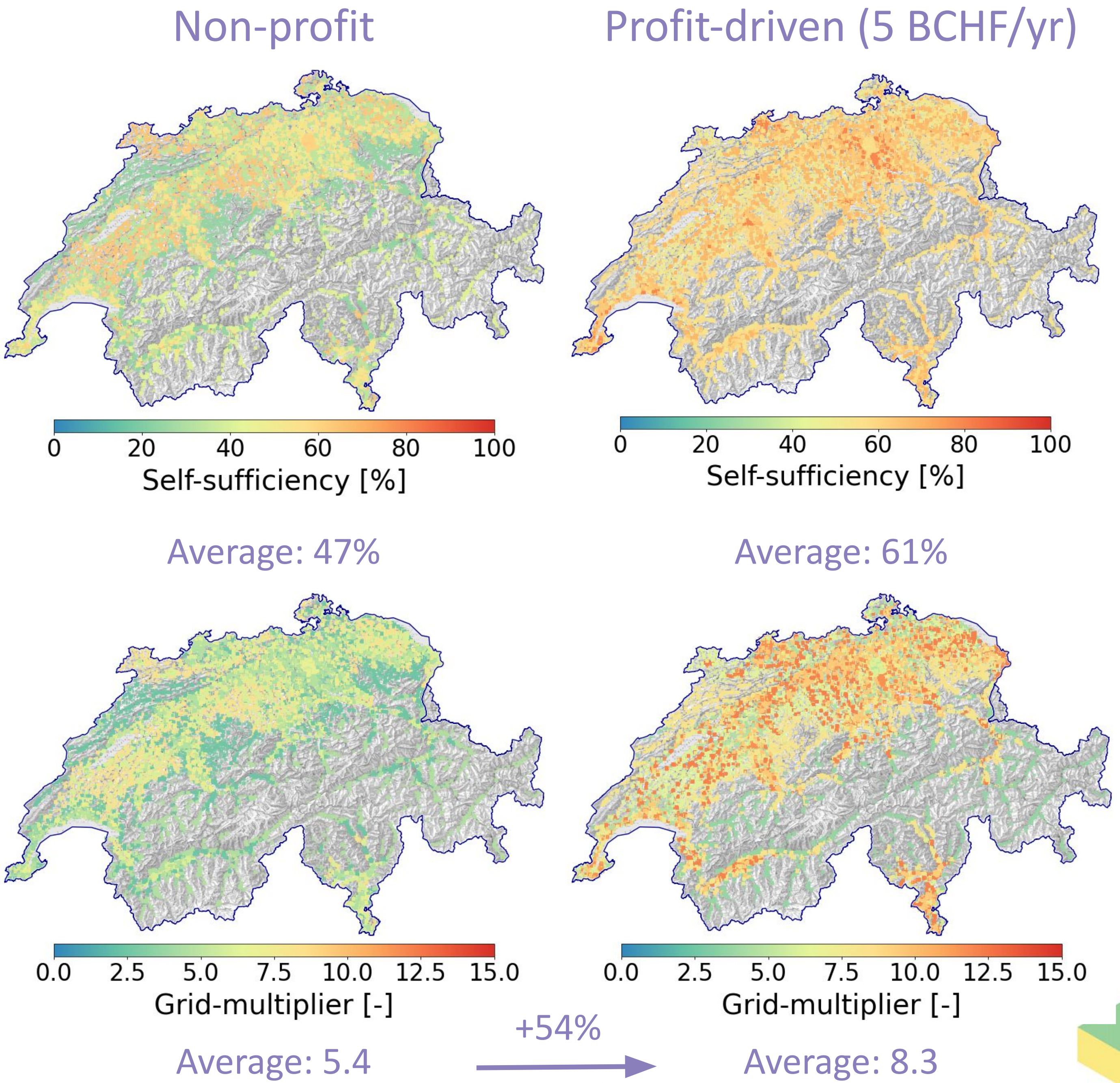
sweet swiss energy research for the energy transition
SWICE + LANTERN

Profit-driven energy community management

- Electricity self-sufficiency in neighborhoods reach up to 80%
- Low electricity purchase and high peak loads increase retail tariffs

$$GM = \frac{\text{Peak}}{\text{Average}}$$





sweet swiss energy research for the energy transition
SWICE + LANTERN

Conclusion 1: How to “uberize” the energy distribution system?

Phase 1: market penetration (profit: +2.5 BCHF/yr)

Digital interface
Connection between PV owners and consumers

Activate network
Negotiate internal tariffs

Grid service
Sell services for demand side management

Phase 2: competition with utility (profit: +2.5 BCHF/yr)

PV centralization
Increase electricity exchange within communities

PV over-investment
Promote PV through attractive feed-in tariff and subsidies

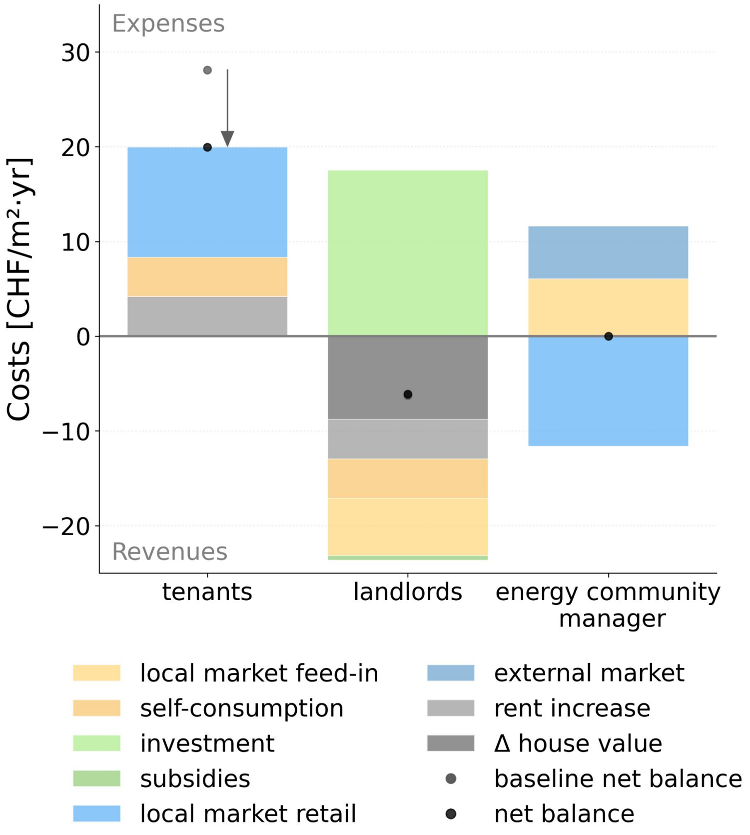
Systemic impact
Increase tariffs through high self-sufficiency

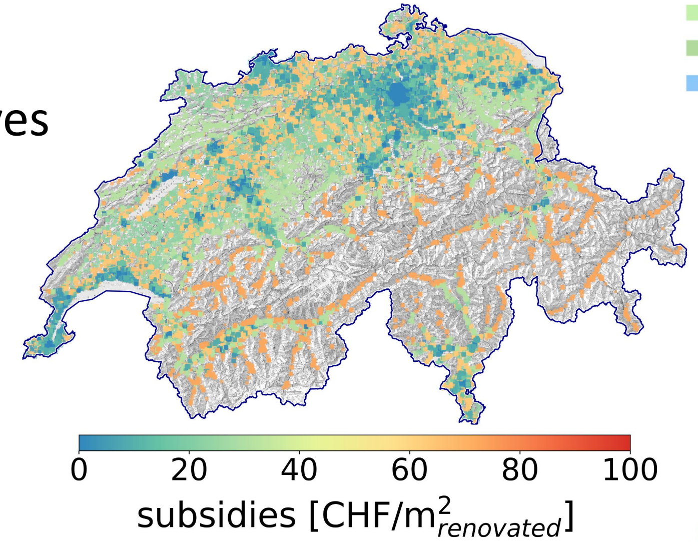
Strength	**Weakness**
Digital interfaces Network Data on users habits Diversified models Dominant position in other sectors	Low expertise in energy High intermittency (energy / income)
Opportunity	**Threat**
New market with profit up to 5 BCHF/yr Vacant position PV cost decrease Increasing need to manage electricity in LV grids	Rejection from local actors Competition with utility Regulations

SWOT analysis on the positioning of digital companies as energy community managers.

Conclusion 2: Policy recommendations

1. Instead of raising rents, landlords recover their investments by participating in energy communities (44% of the income).
2. Allocate subsidies toward rural regions, as they have high energy demands, low income and large buildings
3. Regulate profit for energy community management
4. Utility companies should consider energy communities in their business models
5. Promote local governance and cooperatives





Holistic governance of a neighbourhood energy community. Églantine case

Florinel Radu

12:10 - 12:30

"**Families will likely have to move.**" Building renovations are causing concern in Schönberg.
La Libérté, 7th of January 2026

A new demonstration in Geneva to denounce tenant evictions.
RTS 7th of May 2026

Nearly 2,500 people took to the streets in Zurich on Saturday to protest rising rents, luxury renovations, and the eviction of tenants from their neighbourhood.
Swissinfo 30th of May 2026

sweet swiss energy research for the energy transition
SWICE + LANTERN

Social dimension

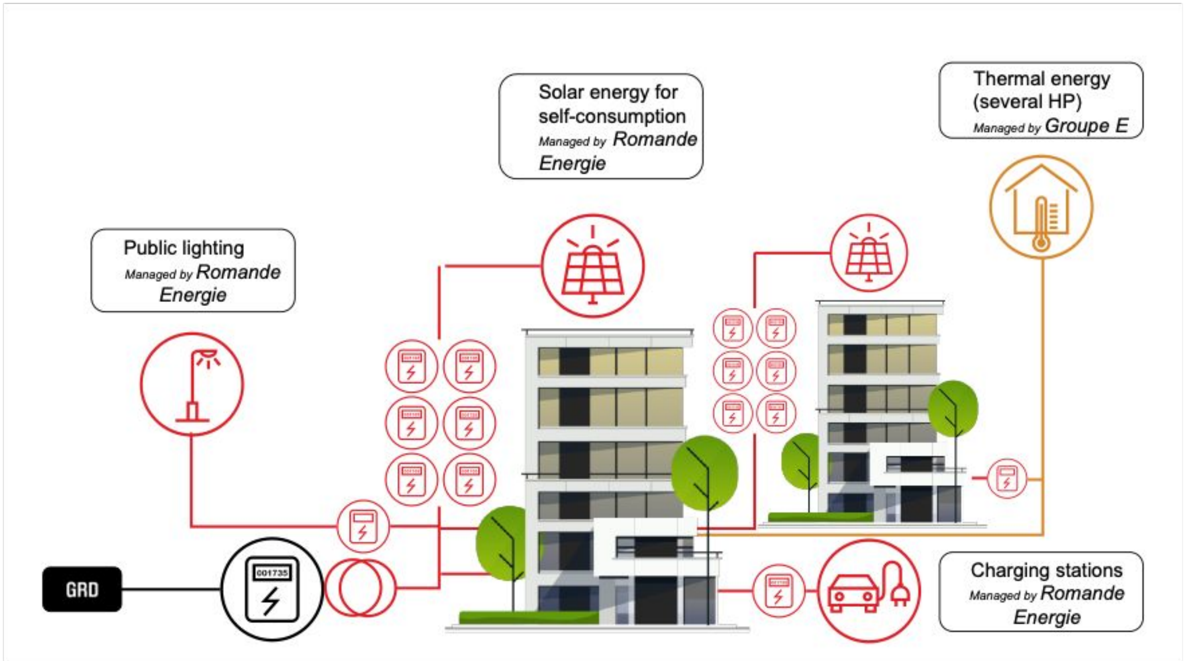
Neighbourhood Energy Community (NEC) as a trigger of a holistic transformation project

sweet swiss energy research for the energy transition

SWICE + LANTERN

Églantine: connection of Energy & Social systems

Shared governance: residents' and owners' associations, utility companies and intermediary (us!)



ROMANDE ENERGIE

celsius groupe e

NeoVac

TRANSFORM

Transform Institute
Heritage, Construction and Users

naef

cpev

la Mobilière

Atlantis,& Allegro (PPE)

COGESTIM

Bernard Nicod

Retraites Populaires

vaudoise

Maja (PPE)

OMNIA IMMOBILIER

Régie Braun sa

J. SAFRA SARASIN

morges

Belicia (PPE)

RILSA

IMMOPRO

How to replicate and scale niche innovations?

Common challenges for new organizational forms

Erlenmatt Ost, Basel

Quartierstrom, Walenstadt

Waterkraftwerk Schulhaus Sursee

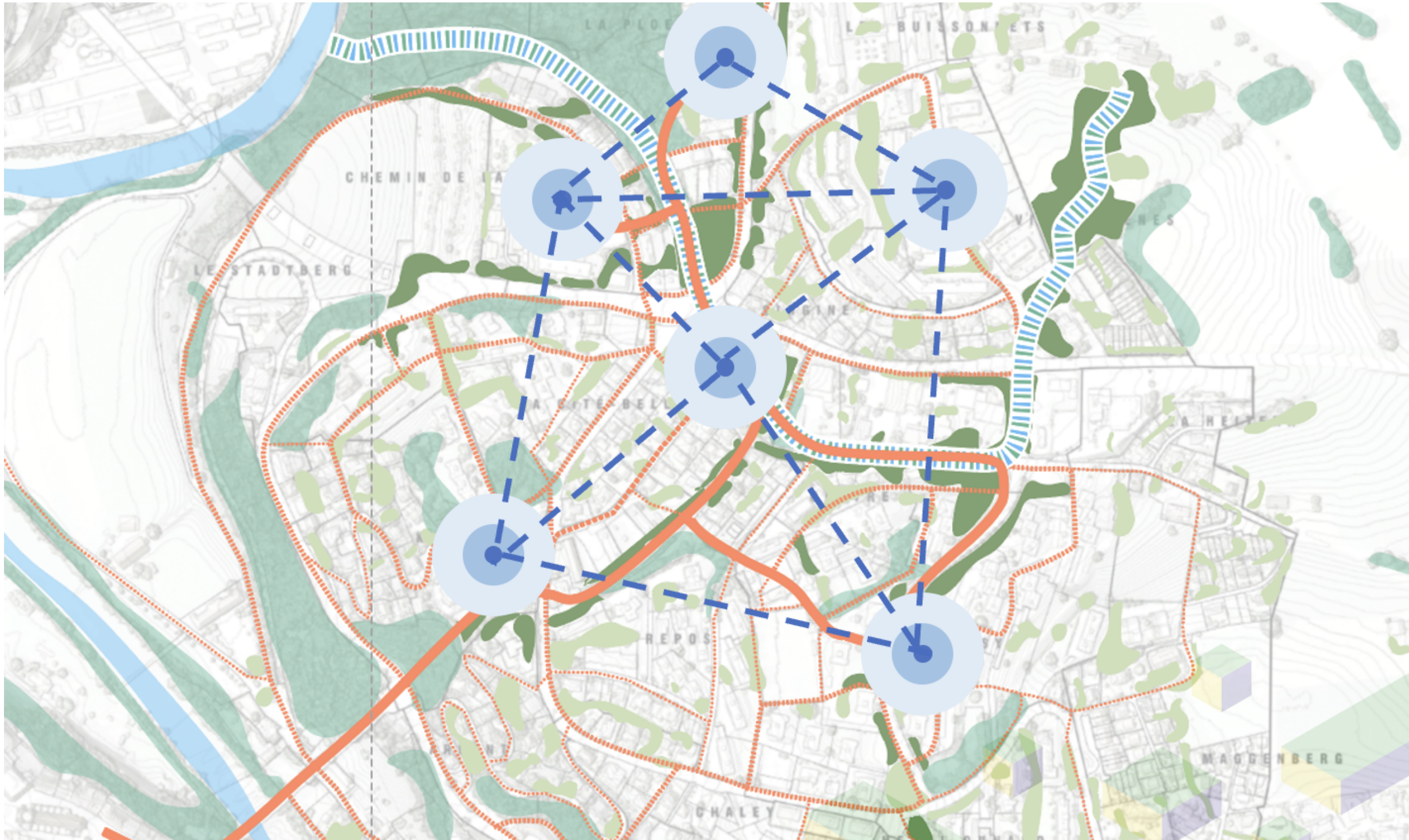
NEC: trigger and epicentre of neighbourhood’s resilient transition

Replication and scaling of NECs: network in Schönberg

“Not just a mere energy trader” (Cristóbal et al 2023), but a catalyser of energies

Empowered Community as an outcome of NEC process

Sustainability and Resilience scenarios of change



Slide titlaNEC: new organ of the neighbourhoode

Not the reproduction of a model > Organic process of implementation

Technology adaptation instead of social acceptance

From holistic system diagnosis to solution co-design

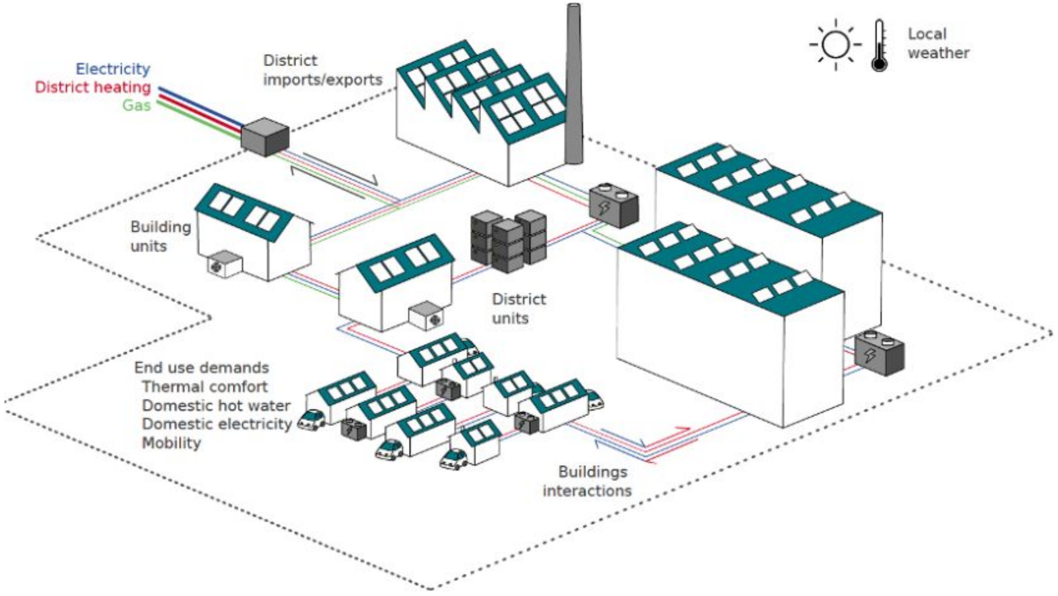
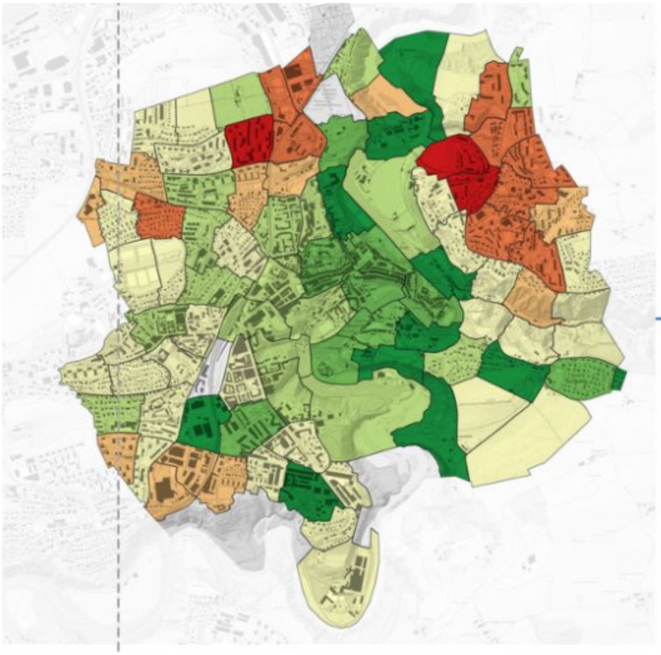
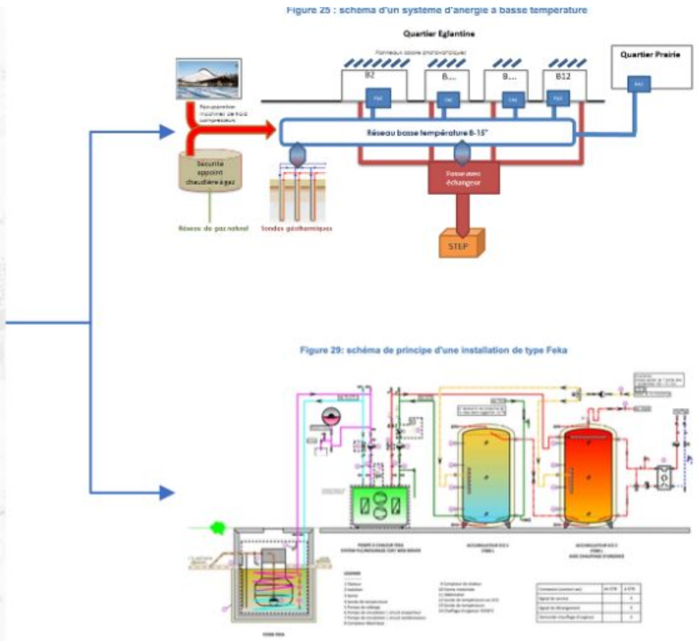


Figure 1: District energy hub model in REHO.

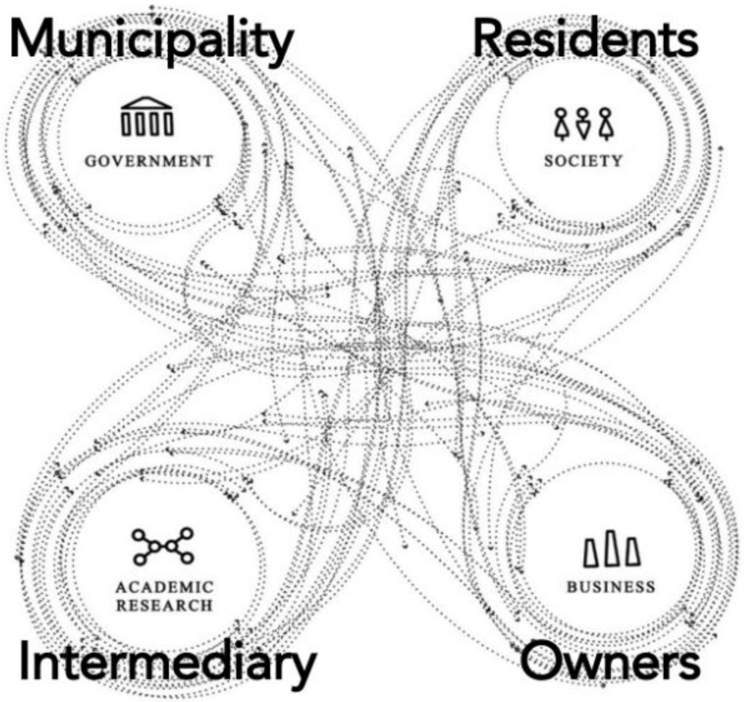
+

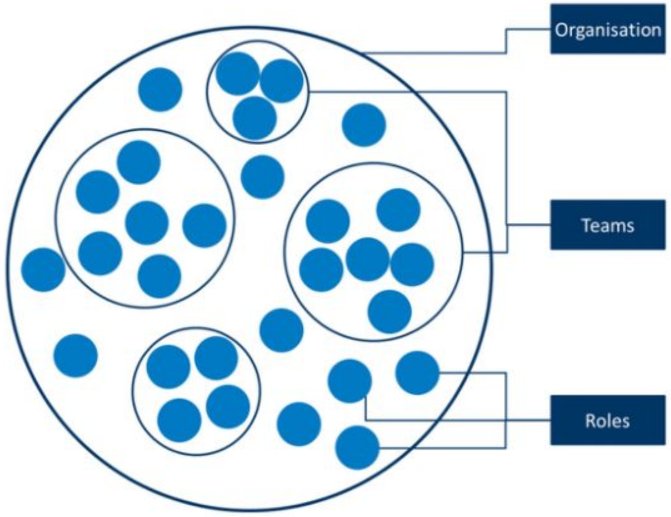




Holistic governance

Initiation of a Living Lab (Municipality) > Synergetic organization, holacracy decision-making



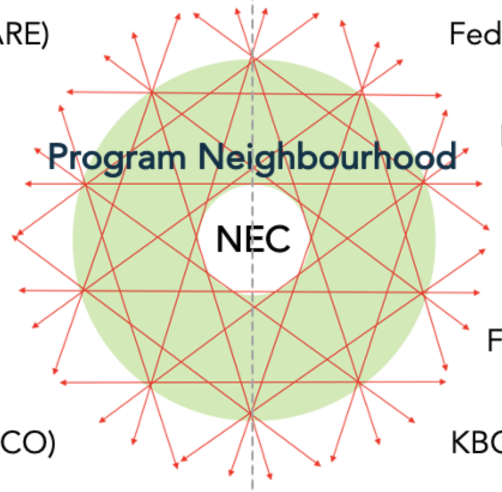


Holacracy

Interdepartmental policy framework for a resilient transition of neighbourhoods

NECs at the core of Program Neighbourhood

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra



Lunch break
12:30 - 13:45