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Swiss household energy demand Major Findings from the 1st wave of the Swiss Household Energy Demand Survey

Paul Burger (Basel), Valéry Bezençon (Neuchâtel), Tobias Brosch (Genève) Mehdi Farsi (Neuchâtel); Massimo Filippini (ETHZ), Ulf Hahnel (Genève), Ann-Kathrin Hess (Basel), Stefanie Hille (St. Gallen), Linda Lemaire (Neuchâtel), Adan Martinez Cruz (ETHZ), Corinne Moser (ZHAW), Iljana Schubert (Basel), Ivan Tilov (Neuchâtel), Uros Tomic (Basel), Benjamin Volland (Neuchâtel), Sylvain Weber (Neuchâtel)

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Background /challenges

- Overall goal energy transition: ~40% reduction of household's direct energy consumption until 2050
- Three major domains:
 - Electricity
 - Building/Housing
 - Mobility
- Task 1: Better understanding of households' energy demand (no microcensus available in Switzerland) → survey
- Task 2: Identifying promising intervention points short termed and with a longer perspective





1 The Survey

- 2 Descriptive Results
- 3 Preliminary analytical results
- 4 First ideas on policy implications
- 5 Discussion about first ideas



1.1 Survey design: Organizing the study object in a common framework based on the state of the art





1.2: Translation into a survey design

Structure of survey

-Dependent variables: heating, electricity, mobility, including expenditures, materials (appliances, cars etc.), and its use.

-Independent variables (determinants):

- -Socio-economic (i.e. education, living space & place etc.) -Psychological (emotions, values)
- -Social (routines, social segments, social interactions etc.)
- –Choice experiment on energy literacy (only a small segment, lead by ETHZ)
- -5014 respondents (collected mainly in April)
 -Representative according to age, gender, region, tenant/ owners, (but Ticino not included)





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2: Some descriptive results

Variables	Categories	Frequency	Percent
Gender	Male	2464	49.1
	Female	2550	50.9
Accommodation	Owner	1831	36.5
	Tenant	3074	61.3
	Living in a cooperative	109	2.2
Accommodation	House	1462	29.2
	Flat	3554	70.8
Education	Compulsory school or less	66	1.3
	Vocational, domestic, basic and general school	635	10.7
	Apprenticeship	1400	27.9
	High school	984	19.6
	Higher Education	2026	40.4
Region	Suisse romande	1242	24.8
	Alpen und Voralpen	1073	21.4
	Westmittelland	1207	24.1
	Ostmittelland	1492	29.8
Living area	City	2594	51.7
	Agglomeration	1358	27.1
	Countryside	1059	21.1



Some more descriptive results

Descriptive data	N	Min	Max	Mean	SD
Age	5014	18	90	46.19	15.34
	4070	0000	40000		0000
Income (CHF)	4270	3000	12000	6000-9000	~3000
Accommodation: size (m2)	4958	10	750	115.72	64.38
Age of accommodation	4429	1	7	4.42	2.13
(1 ≥2010 <i>to</i> 7 <1960)					
kWh (annual)	1558	500	49000	4446	4702
Mobility spending					
Heating bill in CHF (annual)	2169	0	9000	1452	1021





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3.1: Structure of findings

- 1. Socio-economic determinants (education, income, age, gender, structural (like type of houses, ownership, etc.)
- 2. Segmentations
- 3. Individual determinants (norms, emotions, trust, literacy etc.)

Comment: Results regarding socio-economic determinants are based on expenditures as dependent variable, results on segmentations partly on expenditures, other results differ also in what is being used as dependent variable. We have deliberately chosen different dependent variables to enable multiple perspectives!



3.2 Socio-economic determinants

(a) structural determinants

- Single houses multi-family houses/flats:
 - Heating (H): no significant difference; but flat owners spend 19% less than tenants;
 - Mobility (M): house owners spend 15% more than flat owners; tenants 9% more than owners;
 - Electricity (E): Flats have 35% lower expenditures
- Scale economies: Additional E 20% from 1-person to 2-person households, additional M & H below 10%.
- Location:
 - E: rural HH spend 10% more than urban HH
 - M: rural HH spend 28%, suburban HH 20% more than urban HH (rurals drive more and have less efficient cars).



3.2 Socio-economic determinants

(b) Individual endowment

- (Higher) Education does not matter to the exception of mobility
- Gender:
 - Female HH-heads spend less on mobility (~7%); single female HH consume less energy and are less likely to own a car.
- Income
 - Relative low elasticity (0.09 for E, 0.25 for H & M)
 - But: Luxury features of energy services in high income groups (= elasticity is increasing in income)
- Behaviour aspects (use of appliances etc.) show the lowest contribution in model's predictive power.



3.3 Segmentation

Role of/Interest in Segmentation: Interventions/campaigns directed to specific groups.

Three approaches:

- 1. Clusters on energy consumption and equipment:
 - 1) The wise majority (47% with low scores in all components)
 - 2 The drivers (37% with the highest scores on private mobility, which includes both equipment and usage)
 - ③ The heavy residential users (10% with high scores on electricity, private mobility, and home energy)
 - 4 The heavy users (3% with high scores in all components; like 3 but additionally in air travel and heating)



3.3 Segmentation





3.3 Top-down segmentation (types of Otte's lifestyle - segments):

Level of materiality				
High level	Conservatives (2.6%)	Liberals (16.3%)	Reflective (11.6%)	
Medium	Conventio- nalists (6.7%)	Advancement oriented (29.6%)	Hedonists (17.9%)	
Low level	Traditionalists (2,5%)	Home-centered (8.5%)	Entertainment oriented (4.3%)	
	Traditional / biographical closure	Semi-modern / biographical consolidation	Modern / biographical openness	Modernity / biographical perspective

Three specific variables: showering; electrical devices; air traveling



3.3 lifestyles segments (f)

- There are significant differences among the segments in all three domains.
 - As before: strong indications for patchwork character ("inconsistency" of behavior): There is (socially speaking) no such thing like an ideal type of energy behavior group (but a heterogeneous segment that is doing relatively well).
- Showering: Problem groups = hedonists, reflectives, upscaled liberals, advancement-oriented and entertainment-oriented (80% of Swiss population!);
- Electrical devices: Problem groups = entertainment-oriented, home-centered, upscaled liberals and hedonists (47%)
- Air traveling: Problem groups = reflectives, hedonists and upscaled liberals (46% of population!)



3.4 Individual/personal level

- 1. Norms:
 - Personal norms influence the reduction of electricity consumption and fuel expenditure
- 2. Values:
 - Egoistic values are detrimental to fuel as well as electricity consumption.
 - Addressing hedonistic values could also have a positive effect for reducing energy consumption
- 3. Emotions:
 - Positive emotions (e.g. pride) increase investments in green energy.
 - Negative emotions (e.g. guilt) decrease consumption of energy



3.4 Individual/personal level

- 4. Self-efficacy:
 - Has been shown as an important factor to reduce fuel consumption.
- 5. Literacy:
 - Poorly designed labels (like those for car efficiency) can have adverse effects (Hille et al. 2016)
 - High energy literacy and environmental values explain the probability that a vehicle owner knows the label of their vehicle in turn linked to driving an efficient vehicle
- 6. Trust:
 - Trust in the source of energy saving information has a varied relationship with electricity consumption.
 - Trust in information from local authority, social network is linked to lower electricity consumption





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4.1 What's new?

- A comprehensive set of results also representing different scientific perspectives.
- A basis for strengthening the much needed discussion on intervention points/ instruments etc.
- A basis for testing ideas for interventions/isntruments in the upcoming waves.
- A basis for looking at development (tendencies) through the upcoming waves.



4.2 Discussion points for changing behavior

Preliminary remarks:

- At least four types of actors to be considered when talking about policy implications:
 - a) National level (offices, politicians)
 - b) Cantonal level (offices, politicians)
 - c) Business level (utilities, retailers)
 - d) NGOs (civil society actors)
- Different time horizons:
 - a) Short term: from low hanging fruits to creating the frameconditions for substantial changes (cf. The case of the Minergy label) → launching and fostering change
 - b) mid-and long term: addressing the structural components



- Structural determinants have strongest predictive strength But: measures directed to reduce single households, single family homes, peri-urbanisation etc. = ?
 - Long term perspective (e.g. spatial planning)!
 - Role of an incentive tax?
 - Place for social innovation?
- 2. Huge diversity of behavior (within and across the three domains).

No "one-fits-to-all" measures/instruments

- Role of state? Facilitator? Social campaigns? (Information)
- Role of business sector? Role of NGO's?



4.2

- 3. What lessons are to be learnt from segmentation analysis?
 - Almost 50% of the population consumes energy moderately!
 - In what respect can the different segments really be used for adequate marketing?
- 4. Relevance and Variation regarding Norms, Emotions, Literacy, and Trust
 - Labels can play an important role, but they need to be adequate and transparent (cf. Minergie)
 Environmental friendliness can be a driving value, but
 - Environmental friendliness can be a driving value, but there are others. Well-being or hedonism could be even more important



Thank you for your attention.

