

#REMforum

8<sup>th</sup> St. Gallen Forum for Management of Renewable Energies  
May 11<sup>th</sup> & 12<sup>th</sup>, 2017 – Olma Messen St. Gallen

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# Local flexibility yes – but what's the consumer's opinion?

So far the consumers have to agree to be part of a „flexibility program“, agree to have a controlling device installed and agree the potential impacts on the availability of their infrastructure / energy services.

**=> But do consumers agree? And if yes, under which circumstances?**

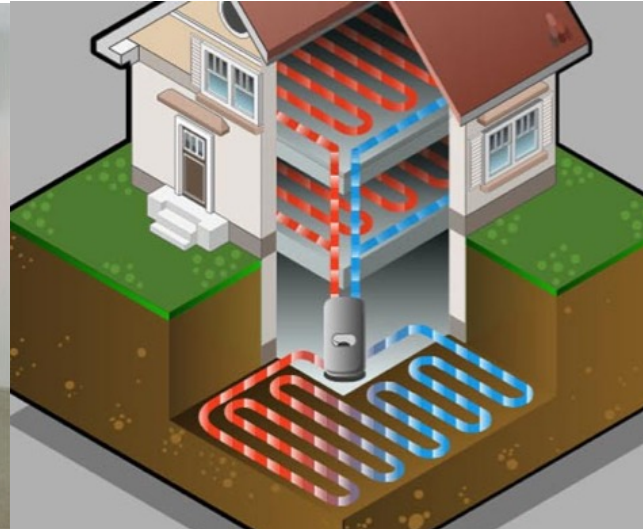


# Our Research Approach: Investigating prosumers' willingness to provide flexibility in three technology areas

1) Electric Vehicles

2) Heat Pumps


3) PV + Battery



## SCCER Mobility

In cooperation with the CTI

 **Energy funding programme**  
Swiss Competence Centers for Energy Research

 Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Swiss Confederation

Commission for Technology and Innovation CTI

## HeatReserves



## EMPOWER



# Research Questions

1. To what extent are prosumers willing to co-create flexibility?\*
2. Are there differences between the three technology areas? If so, how can they be explained?
3. Which prosumer segments are most promising candidates for providing flexibility in the electricity system?

*\*) Would owners of electric cars, heat pumps or PV+battery systems be willing give up some of their autonomy to use electricity whenever they want in exchange for lower electricity cost?*

# Methodological Approach: Choice-Based Conjoint Analysis

Technology specific attribute levels for “use of flexibility”

Attribute	Levels			
Monthly electricity cost	50 CHF	70 CHF	90 CHF	110 CHF
Use of flexibility	Super Flex	Flex Medium	Flex Light	No Flex
Electricity Mix (for remaining demand)	100% Unknown Origin	100% Nuclear	100% Hydro	100% Solar
Contract duration	4 Years	2 Years	1 Year	Can be cancelled anytime

<b>Electric Cars</b>	<b>Super Flex</b> Guaranteed charging level 40%; Unlimited amount of discharging cycles per 24 h	<b>Flex Medium</b> Guaranteed charging level 60%; max. 3 discharging cycles per 24 h	<b>Flex Light</b> Guaranteed charging level 80%; max. 1 discharging cycle per 24 h	<b>No Flex</b> No access of utility on battery
<b>Heat Pump</b>	<b>Super Flex</b> Guaranteed room temperature 16°; 5 min. hot shower per day	<b>Flex Medium</b> Guaranteed room temperature 18°; 10 min. hot shower per day	<b>Flex Light</b> Guaranteed room temperature 20°; 15 min. hot shower per day	<b>No Flex</b> Guaranteed room temperature 22°; Unlimited hot shower per day
<b>PV+Battery</b>	<b>Super Flex</b> 30% PV Self-Consumption; consumption data transmitted and used for forecasting	<b>Flex Medium</b> 45% PV Self-Consumption; consumption data transmitted	<b>Flex Light</b> 60% PV Self-Consumption; only data on battery charging level transmitted	<b>No Flex</b> 75% PV Self-Consumption; no data transmitted

# Survey example

Which of the following power products would you prefer?

## Energie und Flexibilität

Welches der folgenden Stromprodukte bevorzugen Sie? Die Angebote unterscheiden sich nur nach den genannten Eigenschaften.

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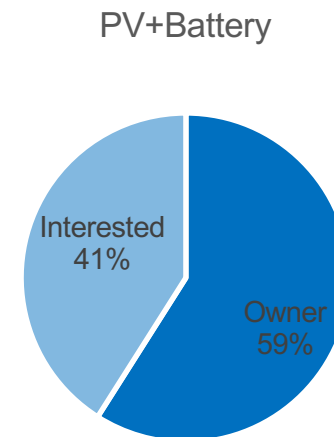
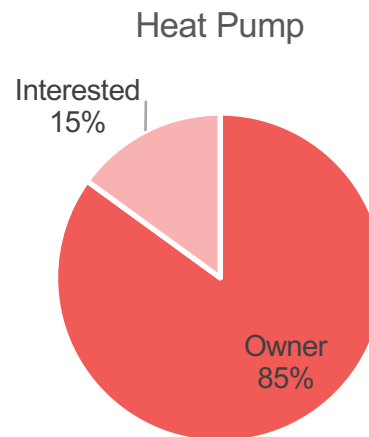
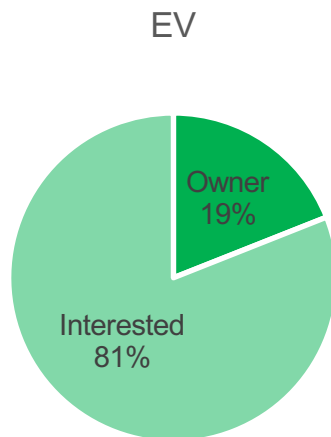
<b>Stromkosten pro Monat</b>	<b>50 CHF</b>	<b>110 CHF</b>	<b>90 CHF</b>	<b>70 CHF</b>
<b>Nutzung der Flexibilität</b>	<b>No Flex</b> 75% Selbstversorgung mit PV-Strom; Keine Daten werden übermittelt	<b>Flex Medium</b> 45% Selbstversorgung mit PV-Strom; Verbrauchsdaten werden übermittelt	<b>Flex Light</b> 60% Selbstversorgung mit PV-Strom; Nur der Batterie-Ladezustand wird übermittelt	<b>Super Flex</b> 30% Selbstversorgung mit PV-Strom; Verbrauchsdaten werden übermittelt und für Voraussagen genutzt
<b>Strommix (für den Reststrom)</b>	<b>100% Solarstrom</b>	<b>100% Unzertifizierter Graustrom</b>	<b>100% Wasserstrom</b>	<b>100% Atomstrom</b>
<b>Vertragsdauer</b>	<b>4 Jahre</b>	<b>1 Jahr</b>	<b>2 Jahre</b>	<b>Jederzeit kündbar</b>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



0%  100%

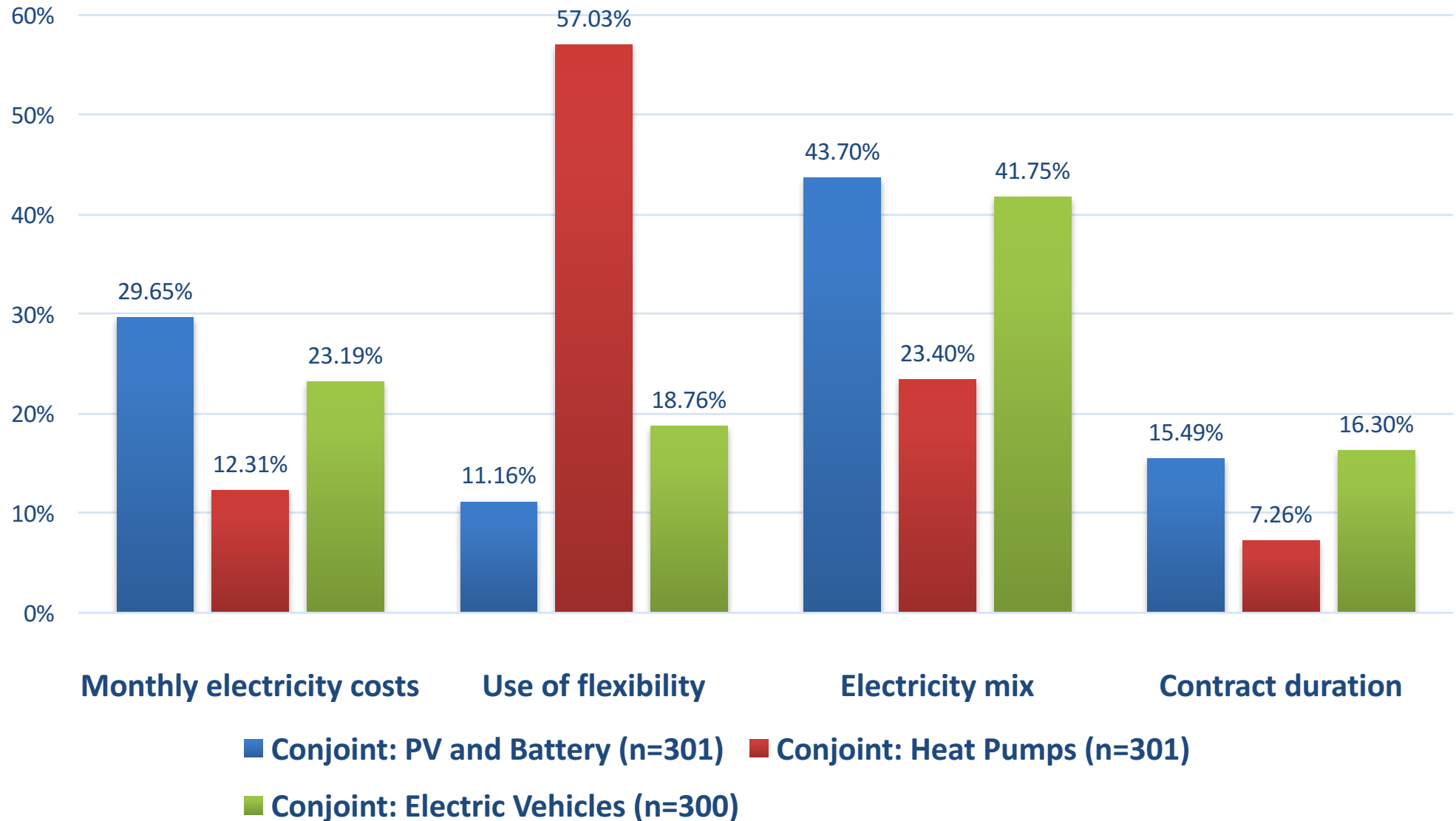
# Data and sample

1. N=902 people in Switzerland
2. Parallel survey in three technology areas (N= ca. 300 each)
3. Target population: People owning electric car/heat pump/PV+battery or interested in buying/investing in the next three years
4. Recruiting via B2C online panel (N>50'000) of a leading Swiss market research agency





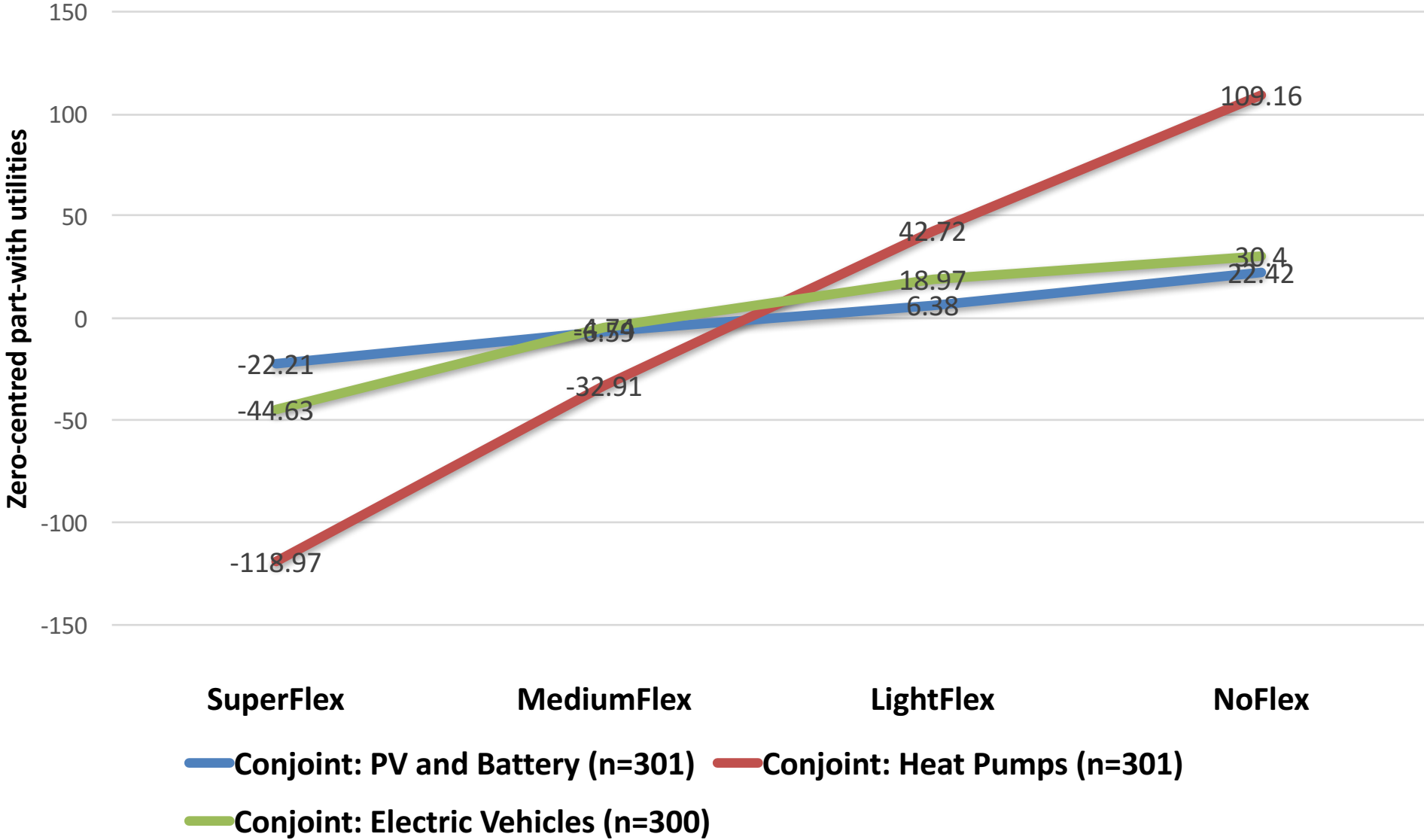
# Results (1): Comparison of Importances



## Results (2): Part-worth utilities

		Electric Vehicles (N=300)	PV + Battery (n=301)	Heat Pumps (N=301)
Monthly electricity costs	110 CHF	-57.8	-72.5	-25.8
	90 CHF	-5.4	-5.0	4.5
	70 CHF	26.0	30.0	7.9
	50 CHF	37.2	47.6	13.5
Use of flexibility	SuperFlex	-44.0	-14.9	-129.7
	MediumFlex	-4.8	-7.5	-32.6
	LightFlex	21.4	6.8	49.8
	NoFlex	27.5	15.6	112.6
Electricity mix	Unknown origin	-89.1	-97.8	-49.1
	Nuclear	-74.8	-74.6	-42.3
	Hydro	73.8	71.8	43.1
	Solar	90.1	100.6	48.3
Contract duration	4 years	-28.8	-25.9	-12.5
	2 years	-1.4	-1.5	1.2
	1 year	4.8	2.5	2.7
	Cancel anytime	25.4	25.0	8.6

# Results (2): Comparison of part-worth utilities for attribute „Use of flexibility“



# Conclusions

1. To our knowledge, this is the first study systematically investigating prosumers' willingness to co-create flexibility across three technology areas
2. There is some willingness to co-create flexibility in exchange for more favorable electricity tariffs
3. Some forms of flexibility provision are more painful than others (e.g. heat vs. EV battery)
4. For utilities looking to mobilize decentralized flexibility resources, electric car drivers and owners of PV+battery systems are lower hanging fruit than heat pump owners.

# Limitations and further research

1. While we have carefully chosen attribute levels to make each of the three choice experiments as close to realistic decisions as possible, there is a trade-off between comparability and specificity of design. Further research can try to replicate our **comparison across technology areas with different operationalization of flexibility**.
2. There is scope for further **segmentation**, e.g. niche vs mainstream customers.
3. We have yet to look into **explanations for differences** in willingness to co-create flexibility (e.g. sociodemographic, psychographic factors).

# Thank you!



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