

Technology co-adoption patterns in the Swiss residential building sector

Maria A. Hecher
Claudia R. Binder
Gloria Serra Coch
Susan Mühlemeier

HERUS, EPFL

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Km

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InnoNet-Energy

Diffusion of innovation
in the energy landscape:
The role of supply
and demand-side
network effects for
integrated energy
management systems

**EPFL****ENERGIE
ZUKUNFT
SCHWEIZ****Protoscar**

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Bundesamt für Energie BFE

EPFL

Prof. Claudia R. Binder
 Dr. Maria Anna Hecher
 Glòria Serra Coch
 Pablo Martinez
 Dr. Susan Mühlemeier



ENERGIE
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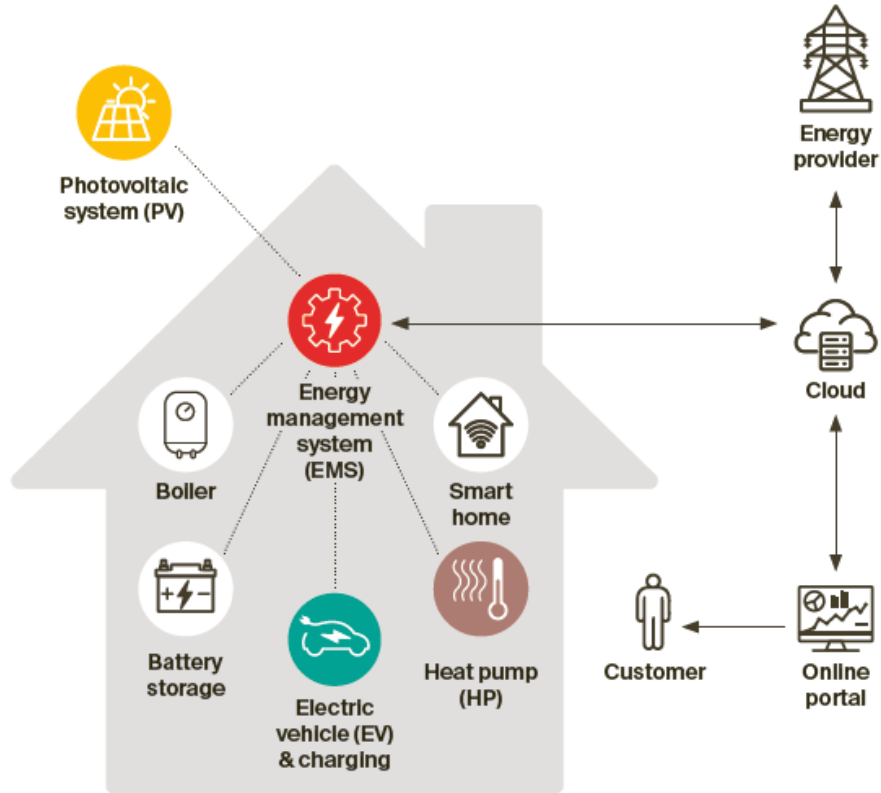
Stefan Liechti
 Marisa Timm



Protoscar

Ilaria Besozzi
 Maximilian Philippi

Energy management systems



Energy technology adoption survey in 2022

40'000 Swiss households who recently registered PV and EV (2019-2022)



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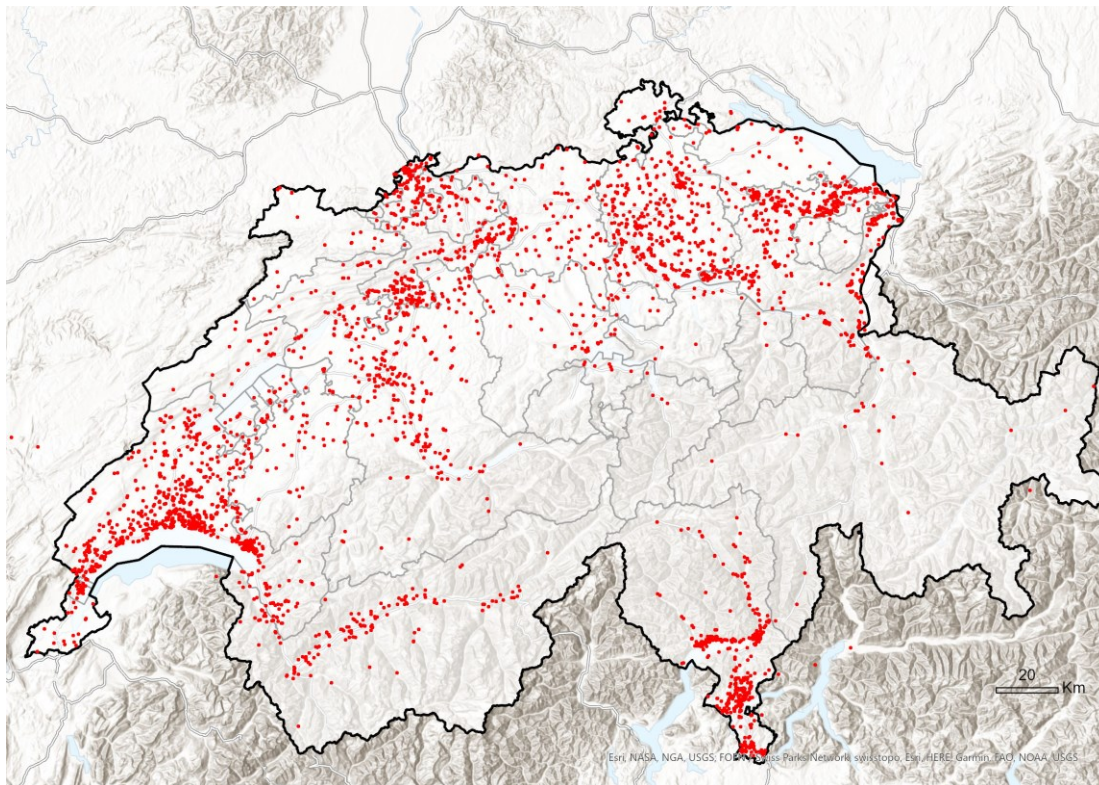


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Bundesamt für Strassen ASTRA



4'850 Swiss households in sample



German speaking part

SG/ST

ZH

...

25%

11%

11%

French speaking part

VD

BE/VS
/FRGE/JU
/NE

25%

14%

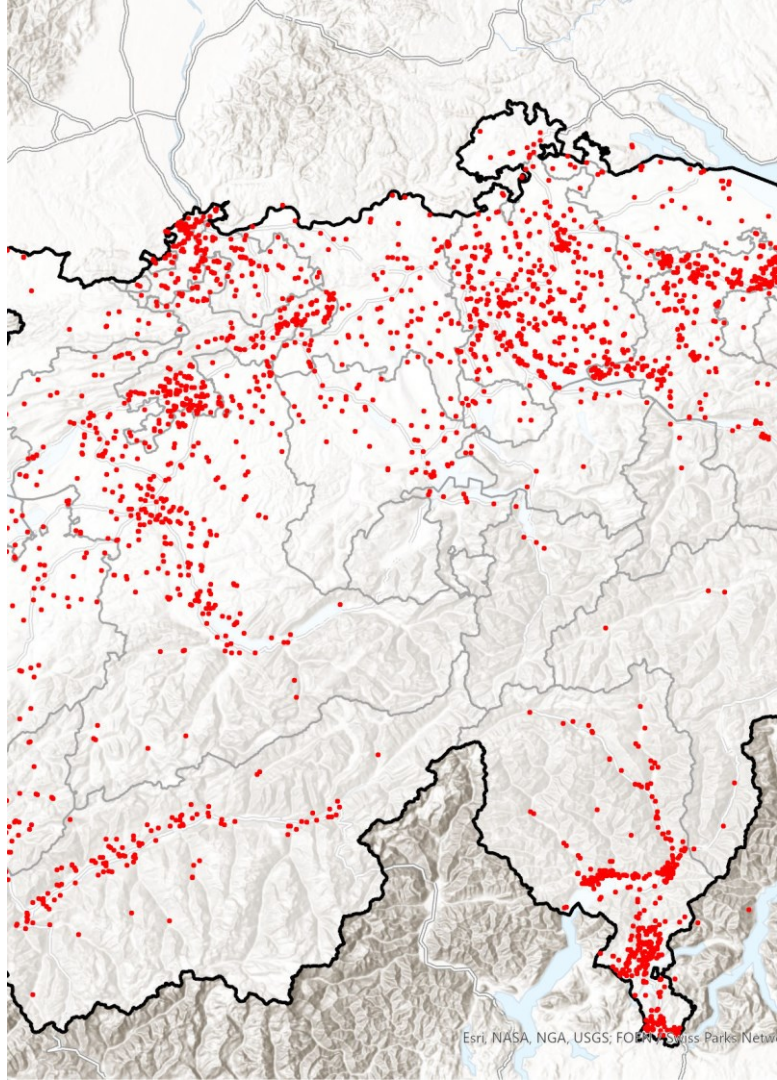
2%

Italian speaking part

TI





12%

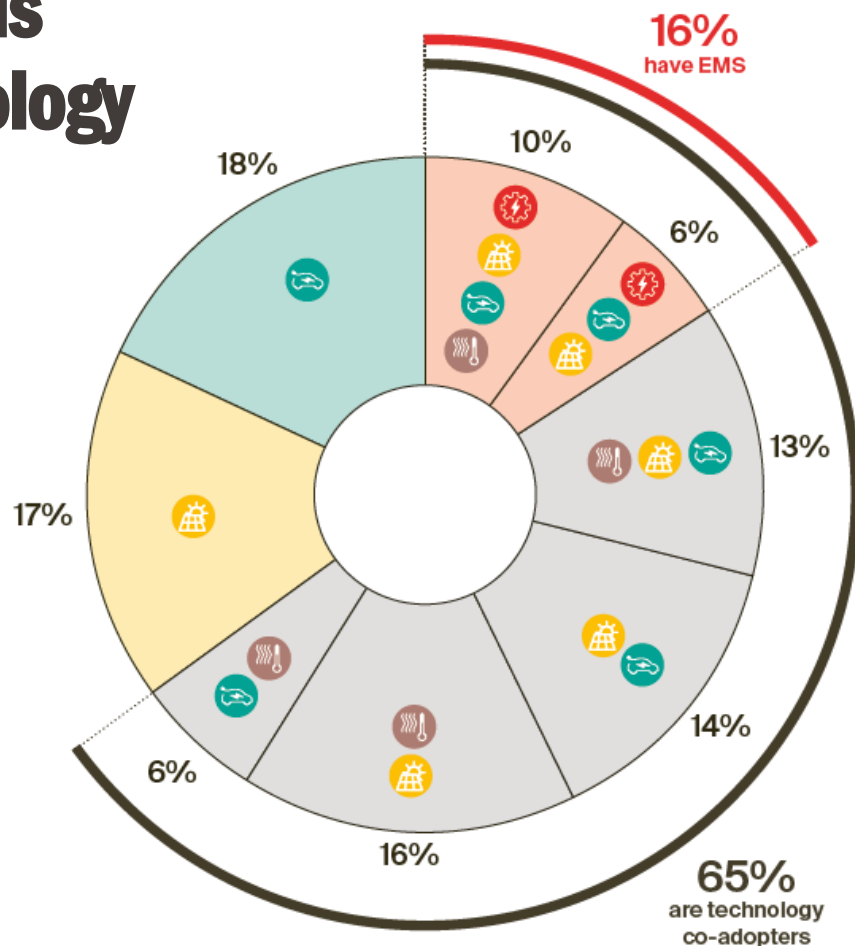
Esri, NASA, NGA, USGS, FOIA, Swiss Parked Network swisstopo, Esri, HERE, Garmin, FAO, NOAA, USGS







Energy technology co-adoption patterns

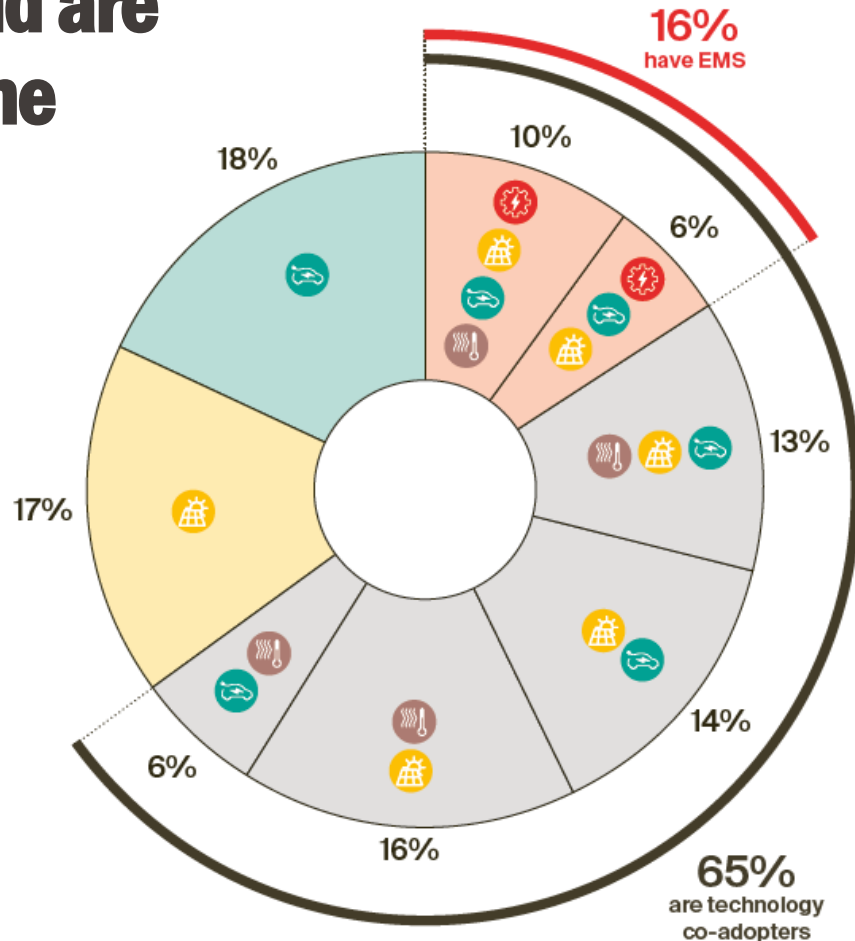
65% of households are energy technology co-adopters

-  Heat Pump (HP)
-  Photovoltaic (PV)
-  Electric Vehicle (EV)
-  Energy management system (EMS)



16% have EMS and are fully engaged in the energy transition

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-  Photovoltaic (PV)
-  Electric Vehicle (EV)
-  Energy management system (EMS)

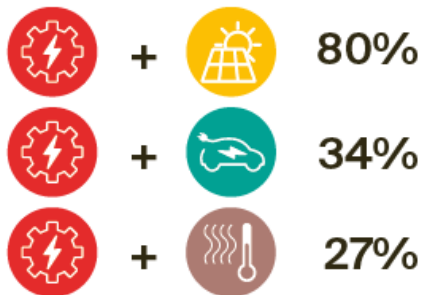


EMS mostly installed as a bundle with PV

Energy technology bundles

Installation at the same time

N=1480

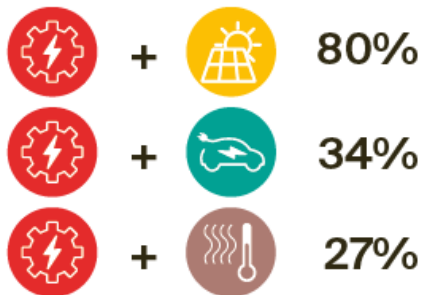


PV seems to be a trigger technology for EV

Energy technology bundles

Installation at the same time

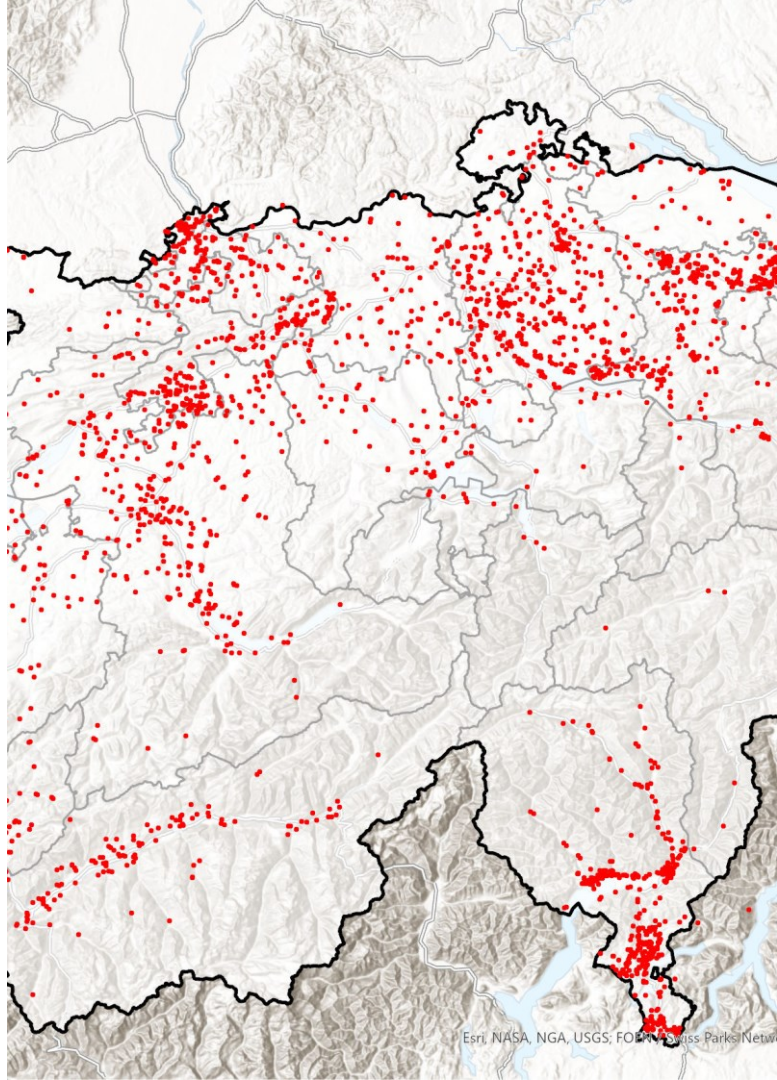
N=1480



Sequence of energy technology adoption







Profiles of energy technology adopters







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Esri, NASA, NGA, USGS, FOI, Swiss Parks Netw

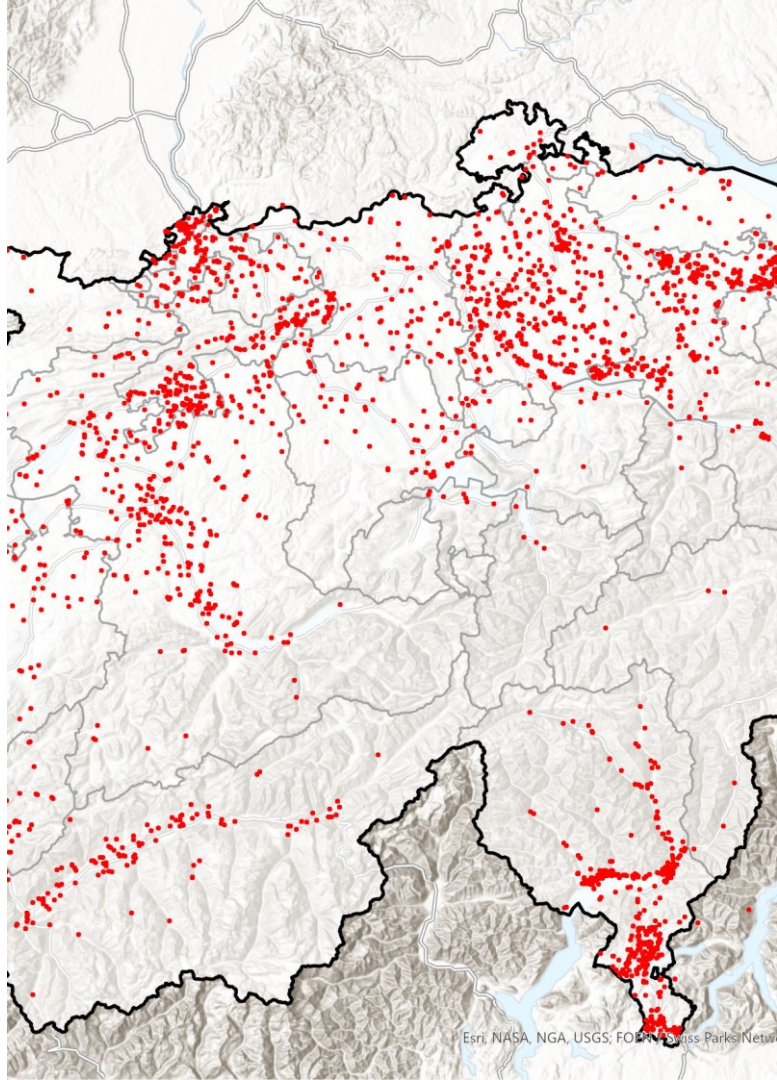
Energy technology adopters are mostly homeowners

	Survey respondents who have...			
	 EMS, PV and EV N=1076	 only PV N=630	 only EV N=800	 Swiss population
Socio-demographics				
Mean age	56	61	50	43
Tertiary education level	47%	37%	51%	25%
Employed	74%	56%	82%	59%
Retired	22%	41%	15%	23%
Monthly household income > CHF 9000	61%	33%	56%	12%
Couple with children	61%	49%	48%	34%
Buildings				
Homeowners	98%	100%	62%	36%
Single-family building	82%	83%	44%	57%
Renovation with technology adoption	25%	24%	8%	-

Around one quarter adopt energy technologies with building renovation

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Recommendations

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Promote energy technology co-adoption through bundles



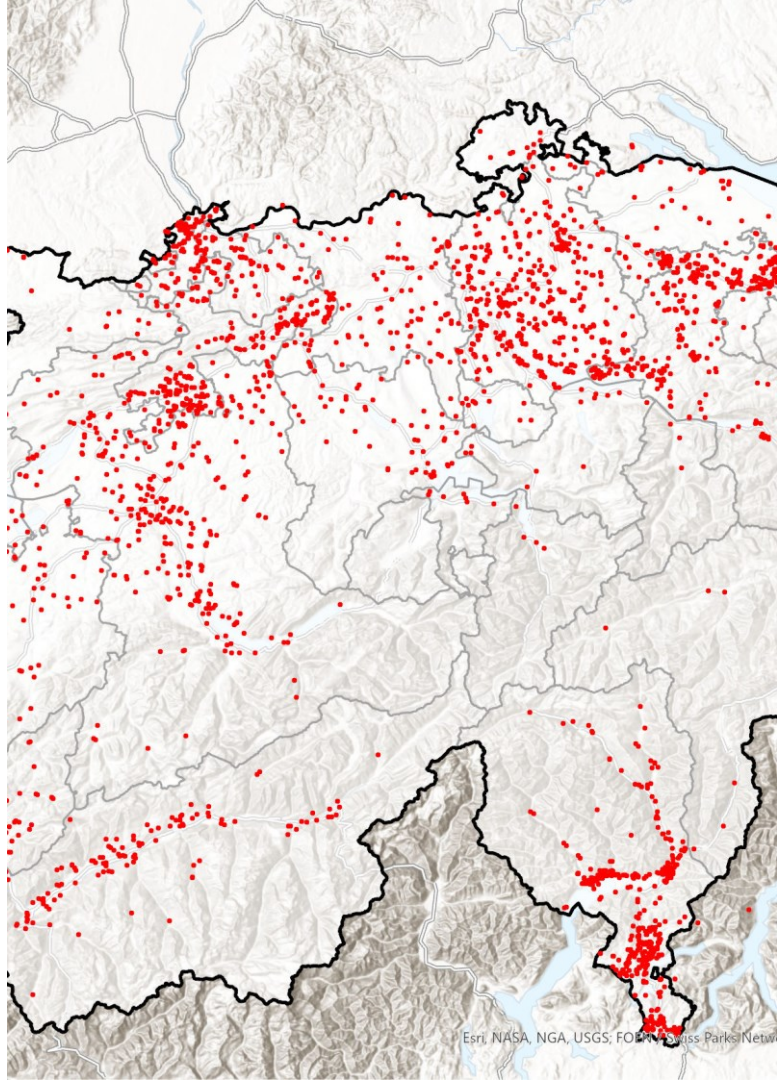
Offer technology bundles whenever PV installations or other large consumer technologies are purchased or registered.

Energy technology providers and energy utility companies are key.



Use windows of opportunities, especially moments when PV is installed, or when buildings are renovated.

Architects and engineers could raise awareness of integrating energy technologies.



Thank you

Maria Anna HECHER

maria.hecher@epfl.ch

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