AMOénergie

Geneva's solution to bridge the performance gap in energy retrofit

Sarah DELMENICO
Scientific associate, HEPIA
sarah.delmenico@hesge.ch

Context and Performance Gap

A 2018 case study[1] led by the University of Geneva found that, on average, retrofit multi-family housing (MFH) achieved only 42% of the targeted energy savings, despite significant owner investments and public subsidies. This gap largely results from inconsistent application of energy concepts across project phases and insufficient attention to the operational phase (SIA 6), during which performance targets are rarely verified by stakeholders. Closing this significant performance gap is essential to achieving regional, cantonal, and national climate goals.

On average, only 42 %[1] of targeted energy savings are achieved in retrofits.
Despite major investments and subsidies.

Energie advisor "AMOénergie" as a solution

To bridge this shortfall, the Canton of Geneva launched in 2019 a pilot program called AMOénergie (Energy Advisor) and a performance-based bonus for projects reaching at least 85 % of targeted savings.

The Energy Advisors program supports MFH owners throughout all project phases, including the preliminary study, planning, and construction stages, as well as a 2 years operational period post-retrofit. During this last phase, the Energy advisor helps to identify and resolve installation deficiencies and system calibration issues that may affect the building's operational performance.

Results

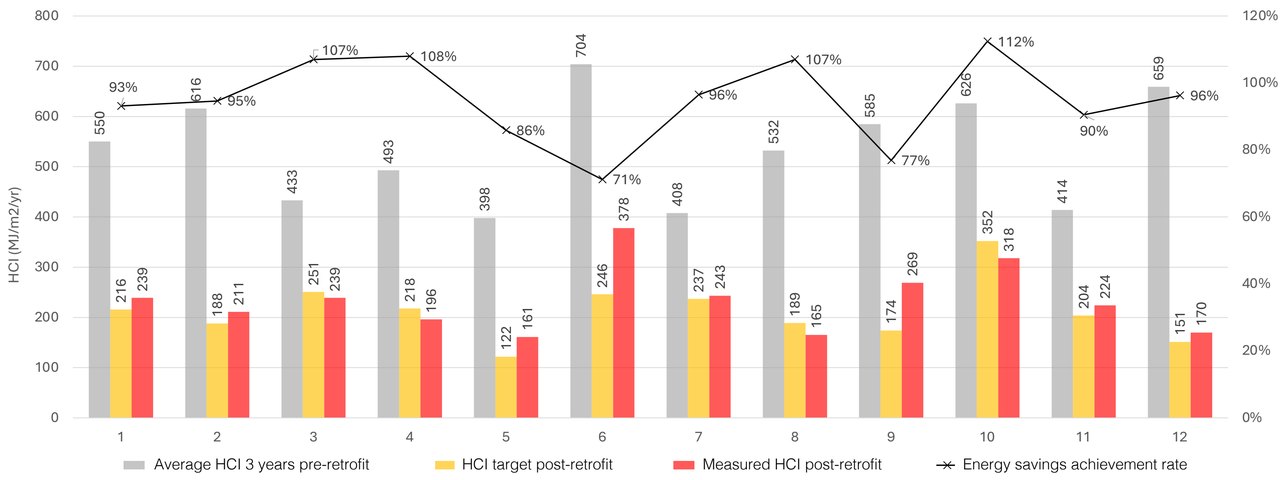
Building	Construction period	Energy Reference Area (m2)	Heating system before retrofit	Heating system after retrofit	HCI before retrofit (MJ/m2*year)	HCI target (MJ/m2*year)	Energy reduction target (MJ/m2*year)	Energy reduction target (%)	HCI after retrofit (MJ/m2*year)	Measured energy reduction (MJ/m2*year)	Measured energy reduction (%)	Measured Performance (%)	Performance gap (%)
1	1996-2000	410	1	4	550	216	334	-61%	239	311	-57%	93%	7%
2	1961-1970	2 135	1	4	616	188	428	-69%	211	405	-66%	95%	5%
3	1961-1970	13 352	3	3	433	251	182	-42%	239	194	-45%	107%	-7%
4	1971-1980	2 107	1	4	493	218	275	-56%	196	297	-60%	108%	-8%
5	1961-1970	6 574	1	4	398	122	276	-69%	161	237	-60%	86%	14%
6	1971-1980	3 530	2	2	704	246	458	-65%	378	326	-46%	71%	29%
7	1971-1980	13 492	1	1	408	237	171	-42%	243	165	-40%	96%	4%
8	1961-1970	8 681	3	4	532	189	343	-64%	165	367	-69%	107%	-7%
9	1961-1970	19 992	1	4+2	585	174	411	-70%	269	316	-54%	77%	23%
10	1971-1980	4 010	1	1	626	352	274	-44%	318	308	-49%	112%	-12%
11	1971-1980	3 206	2	2	414	204	210	-51%	224	190	-46%	90%	10%
12	1991-1995	1 620	1	4	659	151	508	-77%	170	489	-74%	96%	4%
Total / average		79 109			535	212	323	-58%	234	300	-55%	94%	**6%**

Heating System: 1 = Oil / 2 = Gaz / 3 = District heating / 4 = Heat pump (air-water)

The AMOénergie closes the performance gap.
12 pilot buildings achieved an average of 94 % of targeted savings.
10 exceeded 85 %,
4 surpassed 100 %.

Five years later, 12 buildings completed the full process and achieved an average of 94 % of expected energy savings, based on the Heat Consumption Index (HCI). Ten buildings achieved over 85 % of their targets, qualifying for the performance bonus, and four even surpassed 100 %.

Energy Advisors were instrumental in this outcome by helping owners define ambitious goals, monitoring them across all project phases, including a two-year post-retrofit period and engaging the contractor's teams to deliver results.



Energy savings performance of the 12 completed retrofit projects supported by the Energy Advisor pilot program

Energy Advisors guide owners through all project stages
From planning to two years post-retrofit, ensuring that ambitious goals are met and maintained.

Cost Analysis and Energy Savings

Cost analysis indicates that Energy Advisor fees represent a small fraction of total project expenditures, ranging from 0.1 % to 2.4 %, with an average of 0.6 %.

Assuming that only 50 % of the energy targets would be met without the involvement of Energy Advisors, and considering an average renovation lifespan of 30 years, the marginal cost of each additional kilowatt-hour saved through the Energie Advisor program is estimated at CHF 0.0009. This corresponds to an average return of 1108 kWh of energy savings for every Swiss franc invested in energy advisor services over the renovation lifespan.

Building	Construction period	Total Project cost (CHF rounded)	Advisor fee (CHF rounded)	Advisor Fee (% of Total)
2	1961-1970	4 700 000	32 000	0.7%
3	1961-1970	27 200 000	94 000	0.3%
4	1971-1980	4 000 000	39 000	1.0%
7	1971-1980	1 500 000	36 000	2.4%
8	1961-1970	5 000 000	95 000	1.9%
9	1961-1970	59 000 000	38 000	0.1%
Average		16 900 000	55 667	0.6%

Image : Lionel Rinquet

The cost of Energy Advisor services is approximately 0.6% of the total project budget.
For every Swiss franc invested, over 1100 kWh in savings are generated over the renovation lifespan, making the service highly cost-effective.

Prospects

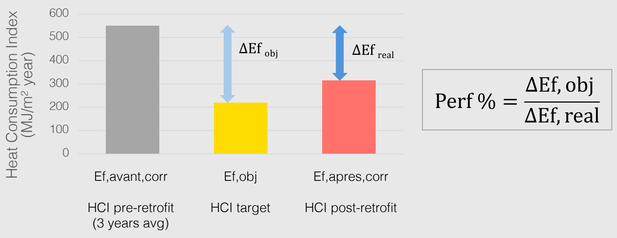
The program remains active, with 68 projects supported to date, although subsidies have been reduced. Its successful transition to full-scale implementation depends on two critical factors: sustained governmental support to incentivise homeowners to participate, and the availability of a sufficient number of qualified energy advisors to ensure technical quality and delivery capacity.

A proven, replicable model.
The program supports over 60 buildings and offers a scalable blueprint for other regions.

An Energy Advisor mandate is a highly effective investment, enabling substantial energy savings and significantly narrowing the post-retrofit performance gap at minimal relative cost.

Heat Consumption Index (HCI)

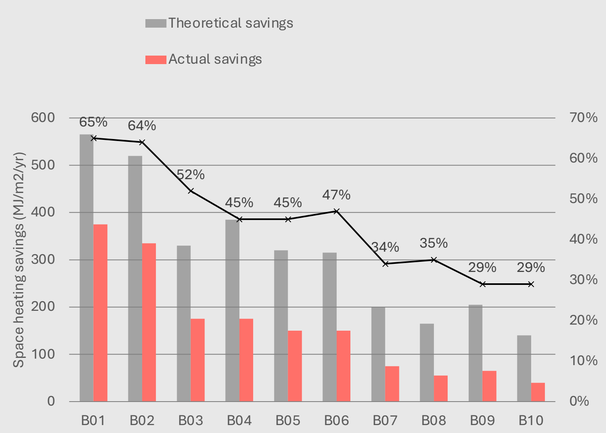
The Heat Consumption Index (HCI) represents the annual **measured energy used for heating and domestic hot water**, normalised by the building's heated area (ERA) and adjusted for climate variations using degree-days.



$$\text{Perf } \% = \frac{\Delta Ef, obj}{\Delta Ef, real}$$

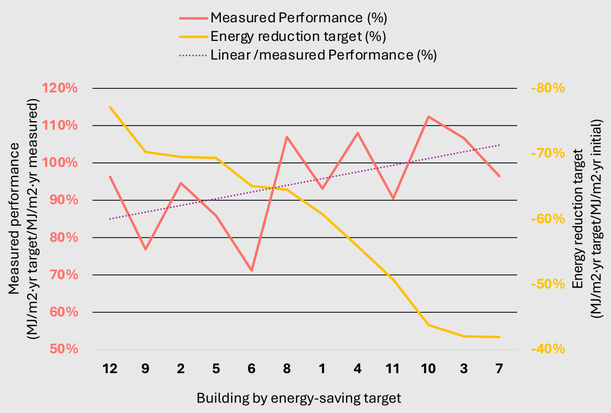
Calculation of performance for Energy Advisor projects

2018 UNIGE Compare Renove Study[1]
Performance Gaps in Renovation Projects in GE



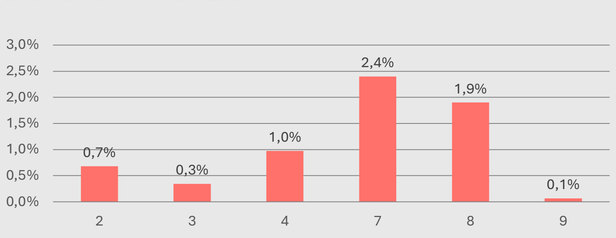
On average, only 42 % of the targeted energy savings are achieved in retrofit projects.

Achieved performance and targeted reduction

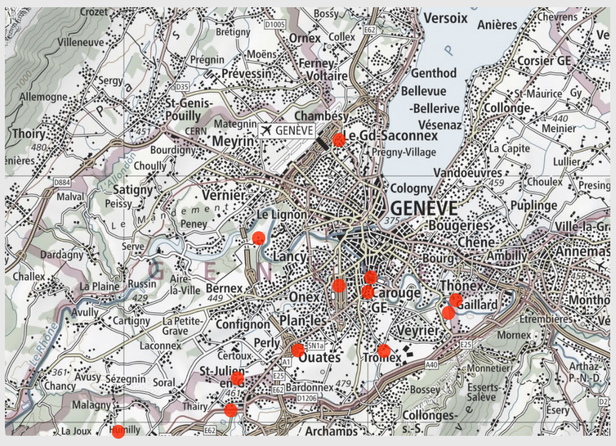


Projects with ambitious savings targets tend to fall short more often than those with modest goals, although this trend is not definitive.

Ratio of the Energy Advisor's fees and the total cost of the renovation



Locations of the 12 retrofitted buildings analysed
part of the AMOénergie program 2019-2025



Academic team:

h e p i a
Haute école du paysage, d'ingénierie et d'architecture de Genève

Prof. Lionel Rinquet
Grit Fowler
Sarah Delmenico
Denis Iglesias

Field Partners and Funding:

Caroline Cacheiro
Clare Ahnlund

1 KHOURY, Jad et al. *COMPARE RENOVE : du catalogue de solutions à la performance réelle des rénovations énergétiques (écarts de performance, bonnes pratiques et enseignements tirés).* 2018