

## WP4.3. Steering tool and Performance Gap

### Potential impact on the Swiss Energy Strategy 2050 (for Switzerland)

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We developed a tool that allows calculating the theoretical (or gross) and the realistic (or net) heat saving potential for the Swiss building stock. The tool is based on following studies / inputs: i) GIS heat demand database of the Swiss building stock (Task 3.1.2 D34); ii) characterization of performance gap in building retrofit (task 4.3.1 D70).

For each building of the database, the theoretical (or gross) potential for space heating is defined as the difference between the specific heat demand before retrofit given by the database, and the limit value to be achieved by retrofit in normed use conditions (SIA 380/1). As an overall result, if the entire Swiss building stock would undergo deep energy retrofit according to SIA standard 380/1, the corresponding theoretical (or gross) saving potential for space heating is estimated to 38.1 TWh/yr.

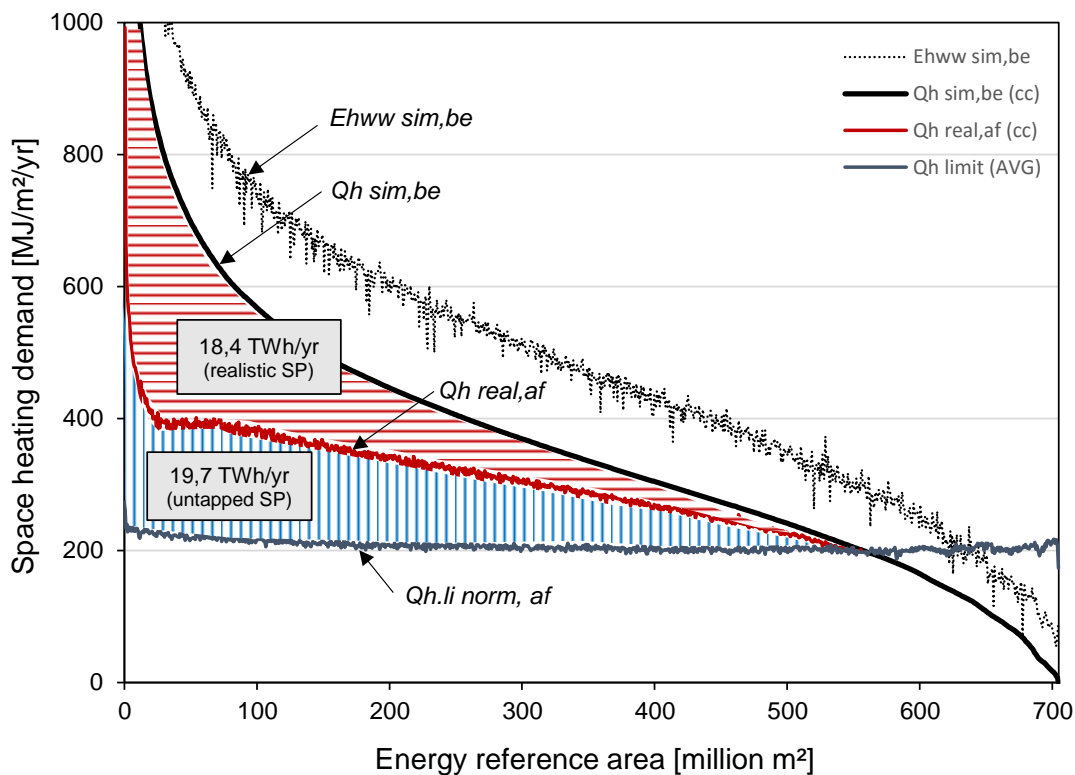


Figure 5: Sorted space-heating demand of the total Swiss building stock, and realistic energy saving potential under current retrofit and operation practice (demand ranked using model Schneider et al., 2016)

The realistic (or net) saving potential of retrofitted buildings is defined as the difference between the specific heat demand before retrofit and an estimated realistic space heat demand after retrofit, taking into account the performance gap between the theoretical and actual performance of building retrofit. For each building, we estimate the latter value by way of a statistical relation between theoretical and actual energy savings for space heating as observed on a representative set of multi-family building retrofit (see characterization of performance gap in building retrofit, task 4.3.1 D70 / M78).

When applying this relationship for each building of the entire Swiss building stock, the total realistic saving potential for space heating amounts to 18.4 TWh/yr. This represents almost half (48%) of the theoretical saving potential, so that 19.7 TWh/yr will remain untapped unless current practices and use relating to building retrofit evolve.

Table 1: Theoretical (gross) and realistic (net) space heating saving potential of the Swiss building stock.

Building categories		Construction periods			Total (incl.unknown)
		Before 1946	1946 - 1980	After 1980	
Multi-family houses (≥ 3 dw.)	TSP	4.4	7.8	4.0	16.2
	RSP	2.1	3.6	1.7	7.4
	AF	48%	46%	41%	46%
Single and two family houses (1-2 dw.)	TSP	5.1	5.3	3.7	14.1
	RSP	2.7	2.8	1.6	7.1
	AF	52%	52%	45%	50%
Mixed use buildings	TSP	1.8	1.7	1.0	4.6
	RSP	1.0	0.9	0.5	2.4
	AF	52%	52%	48%	51%
Non-residential buildings	TSP	0.7	1.4	0.7	3.1
	RSP	0.4	0.7	0.3	1.5
	AF	50%	51%	44%	49%
Total CH stock	TSP	12.1	16.3	9.4	<b>38.1</b>
	RSP	6.1	8.0	4.1	<b>18.4</b>
	AF	51%	49%	44%	<b>48%</b>

TSP: Theoretical saving potential [TWh/yr]  
 RSP: Realistic saving potential (cf. relation given before) [TWh/yr]  
 AF: Achievable potential (RSP / TSP) [%]

The tool further allows quantifying of scenarios of massive retrofit. As an example, following figure shows the forecasted evolution of the final energy (SH and DHW) used for heating the Swiss building stock while considering an ambitious scenario (2% annual retrofit rate, all building categories and ages, “worst first”). The tool and the scenarios should be developed and refined within phase 2 of SCCER FEED&D.

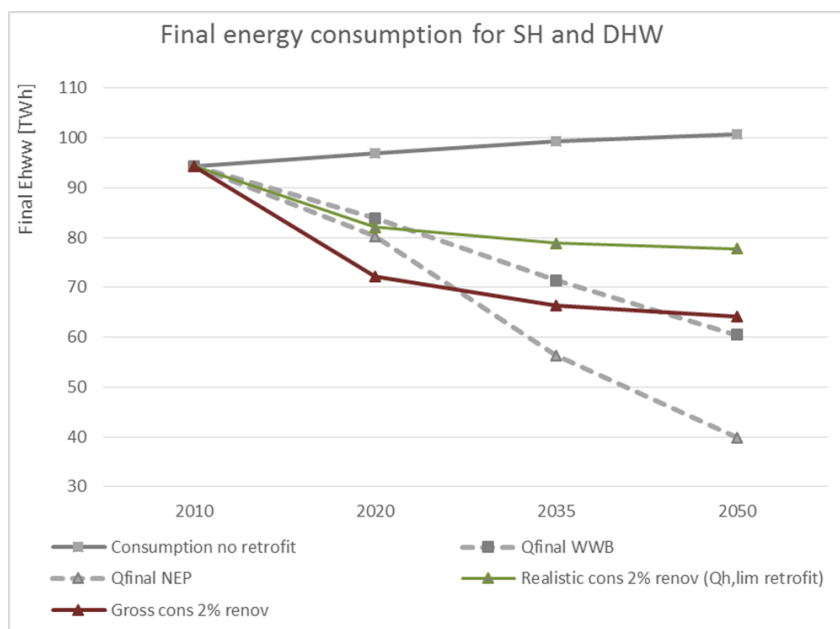


Figure 6: Forecasted evolution of the final energy used for heating the Swiss building stock (SH and DHW) in an ambitious scenario (2% annual retrofit rate, all building categories and ages, “worst first”).