Wergelandsveien 7 case study

The renowned Wergelandsveien 7 building in Oslo, Norway was renovated in 2015 utilizing Q-Air 6-pane glazing and a brief case study is presented here. 60% energy savings was calculated, while 50% (i.e., 1.000.000 kWh/a) was actually saved as a result of the renovation. Unfortunately, not all parts of the building were improved and no sophisticated optimisation, which could offer an improved energy end-result, was undertaken.

REFLEX

Q-Air

Aleš Kralj, February 2018

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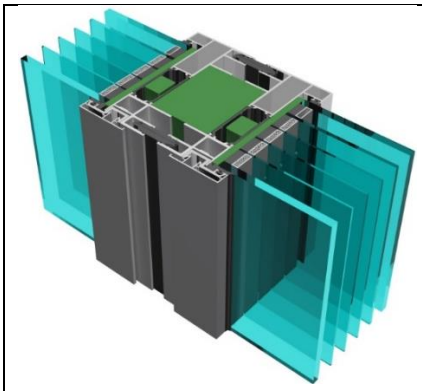
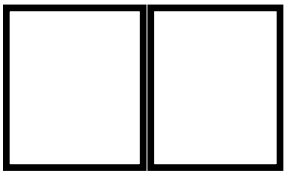
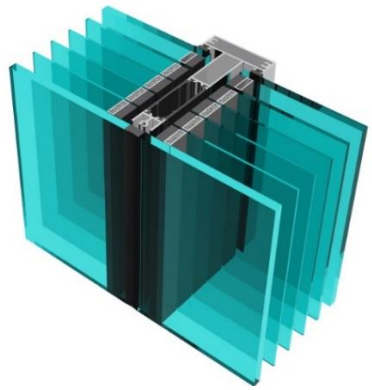
Installed 6-pane glazing system overview

Before the renovation, the Wergelandsveien 7 building in Oslo was fitted with 1960's triple-pane glazing with wooden framing. The estimated U_g before the renovation[1] was 2.2 W/m^{2}K. Below the windows there were parapets with a U value[1] of 0.59 W/m^{2}K.

Two glazing systems were used in the renovation; the ground floor featured large panoramic "gigant" 6-pane panels with U_g=0.26 W/m^{2}K, while the upper floors had customised 6-panes with 20 mm spacers and U_g=0.24 W/m^{2}K (calculated according to EN 673). The largest installed glass unit was 3332x2054 mm. Detailed data sources are given in reference[2] .

Image above, Wergelandsveien 7 building, ground floor close-up and upper floor close-up view.

	Input parameters	**Upper floors**
	Framing configuration 	Calculated U_{cw} EN ISO 12631:2012
	U_g=0.24 W/m^{2}K U_f=0.80 W/m^{2}K Ψ=0.016 W/mK	Glass element 1166x1436 mm U_{cw}=0.36 W/m^{2}K
	Input parameters	**Ground floor**
	Framing configuration 	Calculated U_{cw} EN ISO 12631:2012
	U_g=0.26 W/m^{2}K U_f=0.80 W/m^{2}K Ψ=0.016 W/mK	Glass element 3332x2054 mm U_{cw}=0.32 W/m^{2}K

[1] MALOVRH-REBEC K., et. al., Multipane single and double skin transparent façade building performance in terms of indoor daylight, heating and cooling requirements. V: *Advanced building skins*, 12th Conference on Advanced Building Skins 2-3 October 2017, Bern, Switzerland. Bern: Advanced Building Skins., 774-784 (2017).

[2] Uroš Leskovšek, "REPORT, CALCULATION OF U VALUE PROJECT: WERGELANDSVEIEN", Trimo report, September (2015).

The upper floors of the building had opaque parapets, which were gas filled with mineral wool combos and an overall U_{cw} value of 0.13 W/m^{2}K. The average U_{cw} value of the upper floors[2] was 0.23 W/m^{2}K.

Annual energy results

Building energy parameters:

	Specific energy consumption	Total energy consumption 10.000 m^2
Before renovation[3]	220 kWh/m^{2}a	2,200,000 kWh
After renovation: expected[3]	100 kWh/m^{2}a	1.000.000 kWh
After renovation: measured[4]	110 kWh/m^{2}a	1.100.000 kWh

It is unfortunate that more accurate measurements were not provided despite numerous requests.

It is easy to see that the performance gain is nowhere near where 6-pane glazing can go. The building was not designed as a low-heating building. Glazed surfaces had the EN410 solar gain value of 0.25. To the best of our knowledge, the building does not use variable air volume ventilation, which would save a lot of heating demand. We also assume that heating is direct electric as it is common in Norway. Electricity end-consumption seems high if heat pumps were used. One of the other contributing factors to the non-optimal performance is the fact that not all building was renovated.

Since completion – 3-yaeasrs to-date, the building performed flawlessly and to client's satisfaction[5].

Nevertheless, application of the 6-pane glazing without modulated external solar shading has demonstrated that such a system's performance is predictable. If reported values are to be believed, then 10% discrepancy between achieved and calculated energy performance is an excellent achievement.

[3] Atle Geving, "Kutter strømregningen med 60 prosent", https://www.dagbladet.no/ 9. February 2016
[4] Reported values by the building owners.
[5] "Höegh Eiendom først i Norge med innovativ fasadeløsning", ENOVA, https://www.enova.no/bedrift/bygg-og-eiendom/historier/hegh-eiendom-forst-i-norge-med-innovativ-fasadelosning/ (2017).