

Scope 3: Grey energy and embodied carbon

The more operating emissions from real estate decrease, the more “grey” greenhouse gas (GHG) emissions or “embodied carbon” come to the fore. Grey energy is the total amount of non-renewable primary energy required for all upstream processes, from raw material extraction to manufacturing and processing to disposal, including the necessary transport. This grey energy is also associated with grey greenhouse gas emissions. Emissions from construction projects can be reduced by using less or CO₂-reduced materials and by extending the service life of components.

The following calculations for the last three new buildings and five current renovation projects are disclosed in two ways:

- **Life cycle emissions:** GHG emissions are usually expressed in kg CO₂e/m²a and are based on a life cycle of 60 years. The GHG emissions of building elements and materials with a shorter service life are taken into account multiple times accordingly. The figures in kg CO₂e/m² and in t CO₂ also refer to the entire service life of 60 years.
- **Upfront emissions:** Upfront emissions only take into account GHG emissions emitted for construction prior to operation. GHG emissions from the replacement of components during operation are not taken into account here.

The calculations were carried out on the same basis (SIA Merkblatt 2032:2020, life cycle assessment data from KBOB) by different providers in some cases, which may lead to deviations when comparing them and must be taken into account. While the calculations for the new buildings were carried out retrospectively, the calculations for the renovations were made before construction began. Tenant fit-outs are not included in this calculation. We follow the recommendations in the white paper “Scope 3 – Real Estate. Bilanzierung und Reporting” published by Charta Kreislaufforientiertes Bauen (Charter for Circular Construction).

The aim was to establish a basis for better assessing the ratio of grey CO₂ emissions compared to CO₂ emissions during operation and, building on this, to identify the various levers for reducing grey emissions.

Overview

Project	Lifecycle emissions			Upfront emissions			m ² ERA	Type	Comment
	kg CO ₂ /m ² a	kg CO ₂ /m ²	t CO ₂	kg CO ₂ /m ²	t CO ₂				
ATMOS Zürich (2021)	10.5	630	15 252	473	11 461	24 210	New construction	Reduction factor 0.75 for upfront emissions	
B2Binz Zürich (2023)	10.7	642	8 557	477	6 357	13 328	New construction	Reduction factor 0.75 for upfront emissions	
Clime Basel (2023)	9.3	558	4 050	419	3 041	7 258	New construction	Reduction factor 0.75 for upfront emissions	
Rue de l'Arquebuse 8 Genève (2025)	0.8	48	126	24	63	2 628	Modernisation		
Rue Jean Petitot 12 Genève (2026)	4.7	282	371	142	187	1 314	Total renovation		
Rue Henriette et Jeanne Rath 14 Genève (2026)	4.2	252	415	140	230	1 645	Total renovation		
Rue Jean Petitot 15 Genève (2026)	4.8	288	379	142	187	1 315	Total renovation		
Marktplatz 30/30A Basel (2028)	8.2	492	1 658	315	1 060	3 370	Total renovation	Incl. tenant fit-out (partly), new building floors	

Details New buildings

The three replacement buildings ATMOS, Clime and B2Binz were analysed and compared with each other in terms of their grey energy, also known as non-renewable primary energy (NRE).

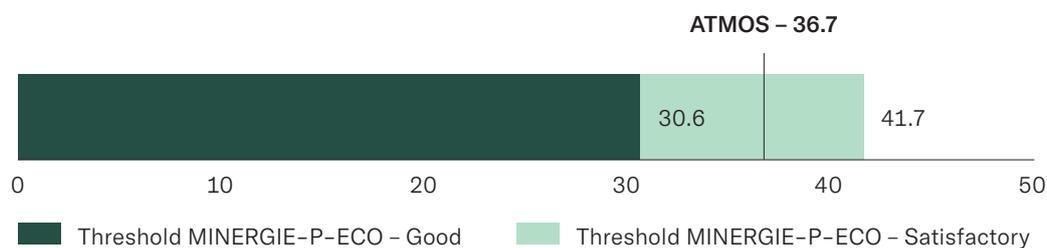
The figures show the non-renewable primary energy and the embodied greenhouse gas emissions in comparison with the upper and lower Minergie limits. The limits are dynamic for Minergie-ECO, i.e. they depend on the properties of the object being calculated (Minergie Switzerland, 2021).

ATMOS – Zurich

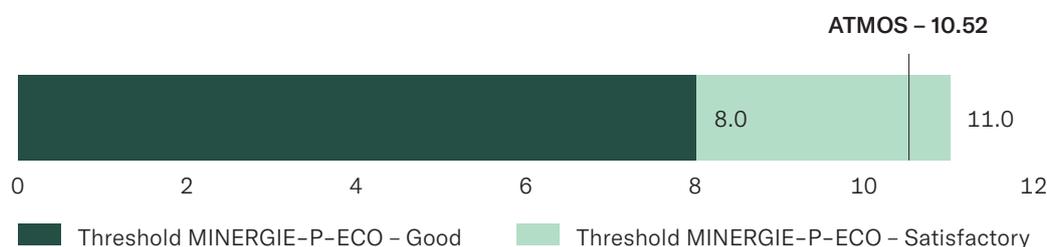
Hardturmstrasse 181, 183 / Förrlibuckstrasse 160, 190, 192

In Zurich-West, we have built the ATMOS business park with a total of 24 000 m² of flexible office and commercial space. The construction project by the renowned architectural firm EM2N blends harmoniously into the industrial environment of Zurich-West. The new building replaces the old Orion buildings and offers contemporary office use with well thought-out interior design, daylight and attractive meeting zones such as loggias, an outdoor terrace and a green roof garden. ATMOS fulfils high sustainability standards, is heated with district heating and is equipped with comprehensive energy monitoring.

Non renewable primary energy (NRE), in kWh/m²a



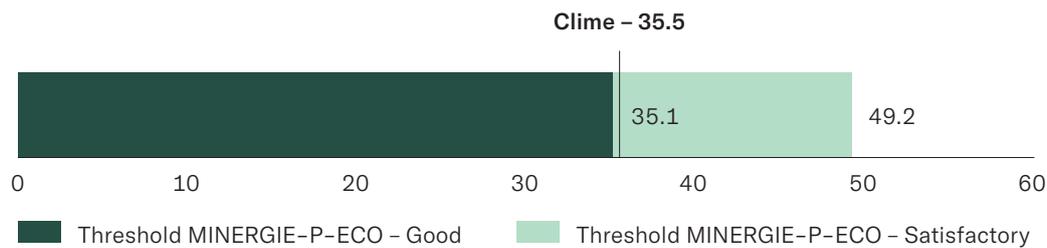
Embodied carbon emissions (office use, without tenant fit-out), in kg CO₂e/m²a



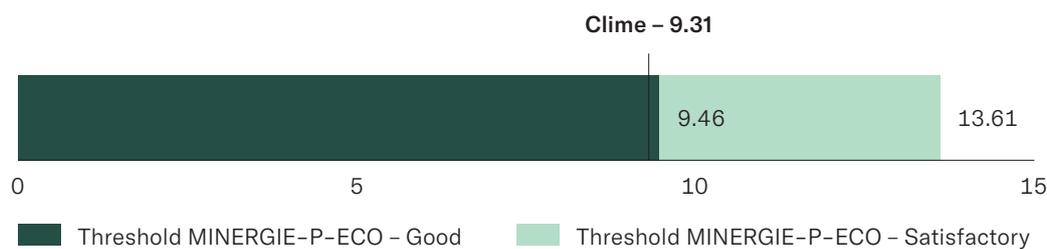
Clime – Basel, Grosspeterstrasse 18

The Clime office building in Basel was completed in June 2022 and the first tenants moved in in spring 2023. It is characterised by a striking architectural timber hybrid construction and offers 5 631 m² of flexible, divisible and expandable space with state-of-the-art infrastructure. The timber construction not only has a favourable CO₂ balance, but also creates a pleasant working atmosphere. The building offers flexibility for different working models and features innovative solutions such as electrochromic glazing for sun protection. Thanks to the timber construction method and the lower weight of the wood, the existing underground car park could be retained and there was no need to reinforce the underground components.

Non renewable primary energy (NRE), in kWh/m²a



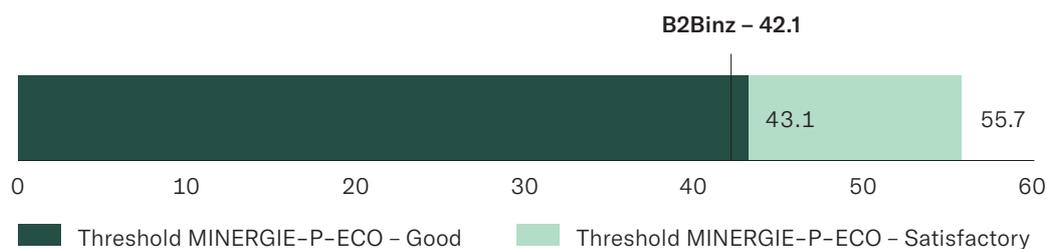
Embodied carbon emissions (office use, without tenant fit-out), in kg CO₂e/m²a



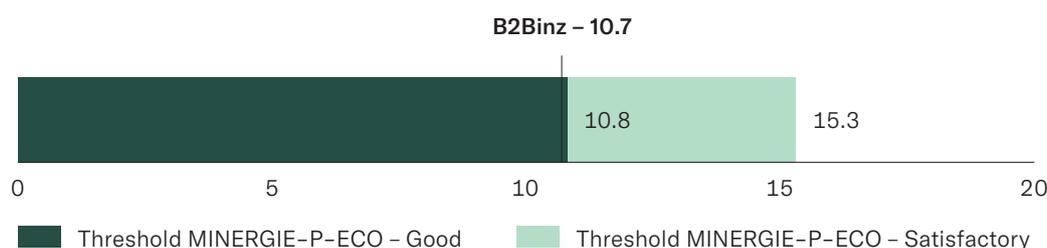
B2Binz – Zurich, Grubenstrasse 6/8

As part of the B2Binz project in Zurich, the commercial property on Grubenstrasse acquired in March 2020 is being replaced by a new mixed-use building with around 5 200 m² of office space and 6 100 m² of commercial space. The new building is scheduled for completion at the end of 2023. The project places great emphasis on sustainability and environmental compatibility, including the use of ECO cement to save CO₂, a simple and well-insulated façade construction and state-of-the-art energy and thermal insulation standards. Green terraces and roof structures, electric charging stations in the multi-storey car park and the operation of the building's own photovoltaic system on the roof round off the sustainability profile.

Non renewable primary energy (NRE), in kWh/m²a



Embodied carbon emissions (office use, without tenant fit-out), in kg CO₂e/m²a



Details Renovations

In 2025, both upfront emissions and life cycle emissions were calculated for a total of five current renovation projects.

Rue de l'Arquebuse 8, Geneva

Modernisation with fire protection measures, insulation of basement ceiling, complete renovation of sanitary facilities, renewal of main electrical distribution system.

0.8 kg CO₂-eq/m² ERA

0.24 opaque components

0.56 Building technology



Life cycle emissions amount to 0.8 kg CO₂e/m²a. Upfront emissions amount to approximately 63 t CO₂e.

Rue Jean-Petitot 12, Geneva

Complete renovation with new roof structure and roofing, including PV system, interior insulation, window replacement, basement ceiling insulation and complete renewal of building services. Building services account for 58% of the project's grey emissions.

4.7 kg CO₂-eq/m² ERA

0.93 opaque components

1.02 Windows and doors

2.74 Building technology



Life cycle emissions amount to 4.7 kg CO₂e/m²a. Upfront emissions amount to approximately 187 t CO₂e.

Rue Henriette- et-Jeanne-Rath 14 / Rue de Hesse 16bis, Geneva

Complete renovation with new roof construction and roofing, including PV system, interior insulation, window replacement, basement ceiling insulation, suspended plaster ceiling, complete renewal of building services. Building services account for 63% of the project's grey emissions.

4.2 kg CO₂-eq/m² ERA

1.23	opaque components
0.34	Windows and doors
2.67	Building technology



Life cycle emissions amount to 4.2 kg CO₂e/m²a. Upfront emissions amount to around 230 t CO₂e.

Rue Jean-Petitot 15, Geneva

Complete renovation with thermal insulation of the roof, including a very small PV system, interior insulation, window replacement, insulation of the basement ceiling, suspended plaster ceiling, complete renewal of building services. Building services account for 53% of the grey emissions of the project.

4.8 kg CO₂-eq/m² ERA

1.24	opaque components
0.93	Windows and doors
2.60	Building technology



Life cycle emissions amount to 4.8 kg CO₂e/m²a. Upfront emissions amount to approximately 187 t CO₂e.

Marktplatz 30, Basel

Total renovation. Complete gutting, façade left intact (listed building regulations). Due to emissions from interior floors and raised floors, life cycle emissions are higher than for a standard renovation. Building services account for 24% of the grey emissions of the project, which is more in line with data for new buildings.

8.7 kg CO₂-eq/m² ERA

5.46 opaque components

1.10 Windows and doors

2.11 Building technology



Life cycle emissions amount to 8.7 kg CO₂e/m²a. Upfront emissions amount to approximately 1 140 tonnes of CO₂e.