CO2 IMPACT ANALYSIS REPORT

Sustainability Assessment for Building Project

Report Generated: December 07, 2025 at 08:56

EXECUTIVE SUMMARY

Metric	Value
Total Elements Analyzed	233
Elements with CO2 Calculations	53
Elements Skipped	180
Data Completeness	22.7%
Total CO2 Impact	8,882.10 kg CO2-eq
Total Mass	32,614.06 kg
Batches Processed	5

BATCH PROCESSING SUMMARY

Batch File	Total	Calculated	Skipped	Completeness %	CO2 (kg CO2-eq)
classified_batch_1.json	45	0	45	0.0%	0.00
classified_batch_2.json	45	8	37	17.8%	34.18
classified_batch_3.json	45	45	0	100.0%	8,847.92
classified_batch_4.json	48	0	48	0.0%	0.00
classified_batch_5.json	50	0	50	0.0%	0.00

CO2 BREAKDOWN BY MATERIAL CATEGORY

Material Category	Elements	CO2 (kg CO2-eq)	Mass (kg)	% of Total
Glass	20	2,684.32	5,624.80	30.2%
Timber	18	2,146.63	6,113.18	24.2%
Aluminum	20	1,840.64	1,020.35	20.7%
Concrete	7	1,354.85	13,616.60	15.3%
Masonry	6	783.24	4,914.48	8.8%
Gypsum	2	72.42	330.24	0.8%

DATA QUALITY ASSESSMENT

Completeness Analysis: 22.7% of elements have been successfully calculated. This means 53 out of 233 elements have CO2 impact data.

Skipped Elements: 180 elements could not be calculated due to missing volume or area data. These elements are classified by material type but lack quantitative geometry information.

Key Data Gaps:
- Elements missing volume data (volume_m3: null)
- Elements missing area data (area_m2: null)
- Opening elements and voids (zero material content)
- Unfilled wall geometries (thickness available but length/height missing)

Recommendations for Improvement:
1. Ensure all structural elements have complete 3D geometry in the IFC model
2. Verify that wall elements include both dimensions and area calculations
3. Confirm volume data is extracted from element properties or calculated from geometry
4. For improved accuracy, obtain density specifications for all materials

METHODOLOGY & DATABASE SOURCES

Calculation Method: Volume-based CO2 assessment using material density and embodied carbon factors.

Database Source: NIBE (Dutch National Database) - Standard CO2 factors for construction materials. This database provides industry-standard life cycle assessment (LCA) values for cradle-to-gate emissions.

Scope:
- Cradle-to-gate emissions (from raw material extraction to factory gate)
- Structural reinforcement included where applicable
- Carbon sequestration considered for timber products (negative CO2)

Data Quality Notes:
- Confidence levels vary by material type and data availability (0.75-0.85)
- Generic factors used where specific material specifications unavailable
- Estimated volumes calculated from area data where volume not directly available

SAMPLE OF CALCULATED ELEMENTS (First 20)

Element Type	Material	CO2 (kg)	Mass (kg)	Confidence
door_internal	timber	4.12	16.45	0.88
door_internal	timber	4.65	18.58	0.88
door_internal	timber	4.65	18.58	0.88
door_internal	timber	4.12	16.45	0.88
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door_internal	timber	4.65	18.58	0.88
door_internal	timber	4.12	16.45	0.88
door_internal	timber	4.65	18.58	0.88
door_internal	timber	15.62	16.45	0.75
door_internal	timber	15.62	16.45	0.75
door_internal	timber	15.62	16.45	0.75
door_internal	glass	134.96	67.48	0.78
door_internal	timber	24.99	26.32	0.75
door_internal	timber	24.99	26.32	0.75
door_internal	glass	134.96	67.48	0.78
window	glass	106.04	53.02	0.82
window	glass	106.04	53.02	0.82
window	glass	19.28	9.64	0.82
window	glass	19.28	9.64	0.82
window	glass	24.10	12.05	0.82