NTNU

May 04, 2023

Results from Element Matching

Project name: Sognsveien 17

Construction site located at: 59.94161606, 10.72994518

Summary of results

Total score	Score without reuse	Savings	Substitutions
285.29 kg CO2 equivalents	813.29 kg CO2 equivalents	64.92%	76.0%

The 'Maximum Bipartite Matching' algorithm yields the best results, substituting 76/100 demand elements (76.0%). Using 'GWP' as the optimization metric, a total score of 285.29 kg CO2 equivalents is achieved. For comparison, a score of 813.29 kg CO2 equivalents would have been obtained by employing exclusively new materials. This results in a total saving of 64.92%. Note that impacts of transporting the materials to the construction site is not accounted for. Open the CSV-file "Sognsveien 17_substitutions.csv" to examine the substitutions.

Constants used in calculations

Constant	Value	Unit
Density timber	491.0	kg/m^3
Density steel	7850	kg/m^3
GWP new timber	28.9	kg C02 equivalents
GWP reused timber	2.25	kg C02 equivalents
GWP new steel	800	kg C02 equivalents
GWP reused steel	4	kg C02 equivalents

Information about datasets

Elements	Filename	Number of elements
Reused	pdf_supply.csv	100
Demand	pdf_demand.csv	100

Performance of algorithms

Name	Total score	Substitutions	Time
Maximum Bipartite Matching	285.29 kg CO2 equivalents	76.0%	0.036s
Greedy Algorithm Plural	289.67 kg CO2 equivalents	76.0%	0.248s

The design tool is runned with 2 algorithms, namely: Maximum Bipartite Matching, and Greedy Algorithm Plural. The Maximum Bipartite Matching yields the lowest score, as shown in the table. The substitutions by this algorithm are completed in 0.036 seconds.