NTNU

April 26, 2023

Results from Element Matching

Project name: Bod nidarosdomen

Construction site located at: 63.4269, 10.3969

Summary of results

Total score	Substitutions	Savings
1843727.7 kg CO2 equivalents	0.0%	0.0%

The 'Maximum Bipartite Matching Plural' algorithm yields the best results, substituting 0/34 demand elements (0.0%). Using GWP as the optimization metric, a total score of 1843727.7 kg CO2 equivalents is achieved. For comparison, a score of 1843727.7 kg CO2 equivalents would have been obtained by employing exclusively new materials. This results in a total saving of 0.0%. Note that transportation is not accounted for. Open the CSV file with the file path './Results/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	10
Demand	DEMAND_DATAFRAME_SVERRE.xlsx	34

Performance of algorithms

Name	Score	Substitutions	Time
Maximum Bipartite Matching Plural	1843727.7	0.0%	0.006
Maximum Bipartite Matching	1843727.7	0.0%	0.008
Greedy Algorithm	1843727.7	0.0%	0.038
Greedy Algorithm Plural	1843727.7	0.0%	0.064

The design tool is runned with 4 algorithms, namely: Maximum Bipartite Matching Plural, Maximum Bipartite Matching, Greedy Algorithm, and Greedy Algorithm Plural. The Maximum Bipartite Matching Plural yields the lowest score, as shown in the table. The substitutions by this algorithm are completed in 0.006 seconds.