

# 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
6937.25 kg CO2 equivalents	8100.33 kg CO2 equivalents	14.36%	40.0%

The 'Greedy Algorithm Plural' algorithm yields the best results, substituting 4/10 demand elements (40.0%). Using 'GWP' as the optimization metric, a total score of 6937.25 kg CO2 equivalents is achieved. For comparison, a score of 8100.33 kg CO2 equivalents would have been obtained by employing exclusively new materials. This results in a total saving of 14.36%. Note that impacts of transporting the materials to the construction site is accounted for and contributes to 34.04% of the total score. 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 <sup>3</sup>
Density steel	7850	kg/m <sup>3</sup>
GWP new timber	28.9	kg CO2 equivalents
GWP reused timber	2.25	kg CO2 equivalents
GWP new steel	800	kg CO2 equivalents
GWP reused steel	4	kg CO2 equivalents
GWP transportation	96.0	kg/m <sup>3</sup> per tonne

## Information about datasets

Elements	Filename	Number of elements
Reused	pdf_supply.csv	10
Demand	pdf_demand.csv	10

## Impact of transportation

Transportation score	Percentage of total score	Transportation all new
2361.33 kg CO2 equivalents	34.04%	2603.13 kg CO2 equivalents

All calculations in this report take impacts of transportation of the materials to the construction site into consideration. Transportation itself is responsible for 2361.33 kg CO2 equivalents. This accounts for 34.04% of the total score of 6937.25 kg CO2 equivalents. For comparison, the transportation impact for exclusively using new materials would have been 2603.13 kg CO2 equivalents.

## Performance of algorithms

Name	Total score	Substitutions	Time
Greedy Algorithm Plural	6937.25 kg CO2 equivalents	40.0%	0.028s
Maximum Bipartite Matching	6946.47 kg CO2 equivalents	40.0%	0.006s

The design tool is runned with 2 algorithms, namely: Greedy Algorithm Plural, and Maximum Bipartite Matching. The Greedy Algorithm Plural yields the lowest score, as shown in the table. The substitutions by this algorithm are completed in 0.028 seconds.