The Dutch method for assessing the environmental impact of building's materials: reducing the shadow cost of the building:

Material use represents 70% of the climate impact caused by the Dutch construction industry.[1]
In this study, a sustainable office building project in Driebergen-Zeist, (NL) which is aiming for an Outstanding level in BREEAM.NL, was assessed during its preliminary design phase. The Dutch method turned out to be a useful and accessible tool which helped to find and assess various scenarios for reducing the shadow cost of the building.

The Netherlands is compiling a national environmental database (NMD) which regroups the shadow cost of various building materials. Life cycle assessment (LCA) is used to determine the environmental impact of each product in the NMD. With the help of an approved tool, the different materials of the building can then be selected from the database and combined to assess the total shadow cost of the building. The shadow cost is a virtual value that represents the price that society should pay in order to compensate for the environmental damages caused by the building. Doing this assessment is required by the national building regulation since January 2013 but no maximum shadow cost is prescribed. In the Dutch version of the BREEAM certification system however, the reference value for a standard building is 1€/m² of Gross Floor Area (GFA).
The study case's first design scored 0.65 €/m²GFA and was further reduced by 25% by:

- reducing the basement rather than removing it completely
- implementing a massive wooden construction instead of the concrete core of the building
- estimating the shadow cost of a new type of climate ceiling
- selecting the most reliable products data in the NMD when available.

The results of this study challenged certain preconceived strategies to reduce the environmental impact of the building but also questioned the reliability of the Dutch method. For example, the use of laminated wood for the structure of the building revealed itself to be worse than reinforced concrete. Indeed, we tend to associate laminated wood with the good environmental performance of massive wood but laminated wood requires much more manufacture processing such as sawing, drying, pressing and gluing…The glue itself may cause a high impact on human health due to the release of Volatile Organic Compounds (VOC) during the production and use phase. Also, a bigger amount of material is necessary to ensure the same load bearing capacity as the concrete. However, a significant amount of products in the database such as the laminated wood are not yet verified or simply missing in the NMD resulting in an unrealistic shadow cost. This is the main weakness of the Dutch system which relies on the willingness of the manufacturer to pay for the assessment of the environmental performance of their material in order to be included into the NMD.
Still, the results being expressed in a single indicator (the shadow cost of the building), and the way of calculating being harmonized allows the industry to compare buildings to each other and even analyze the environmental performance of Dutch buildings. This analysis should permit the government to determine a clever reference value for the building regulation. It is believed that having a reference value will encourage the manufacturer to introduce more products in the database which should make the Dutch method a more reliable tool. Furthermore, by developing their own method, the Netherlands can improve the accuracy of the environmental assessment by adjusting it to the Dutch context and by adding environmental impact categories.

[1] Bijleveld, M., Bergsma, G., Krutwagen, B. & Afman, M., may 2014. Meten is weten in de Nederlandse bouw, Delft: CE Delft.