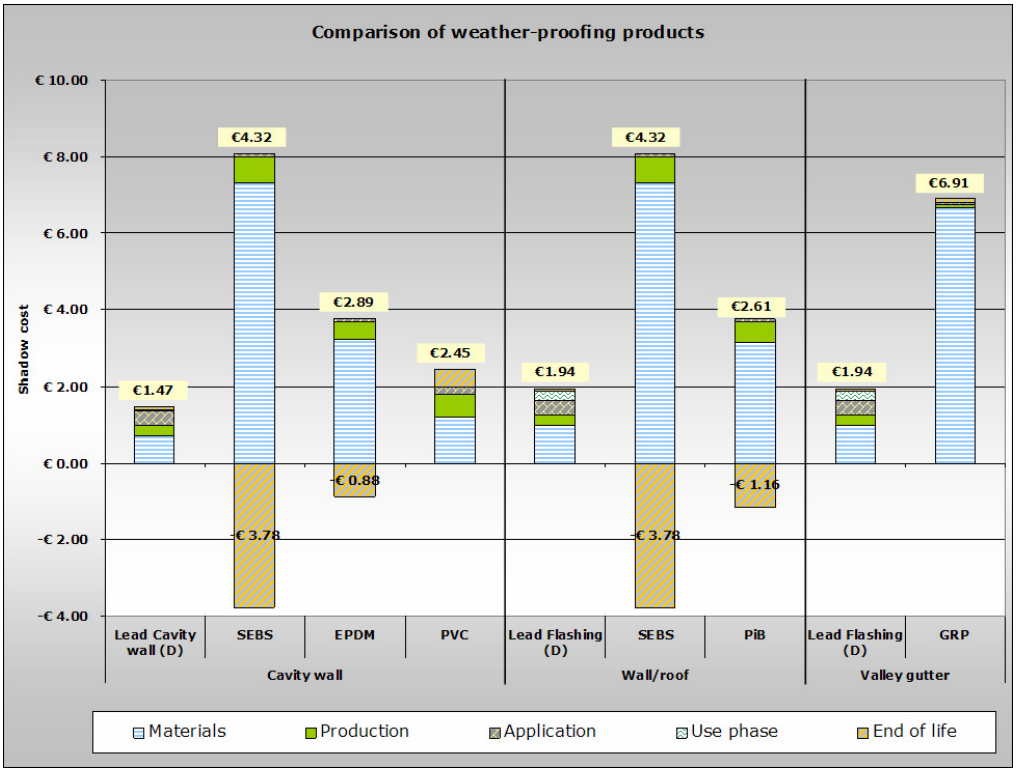
Summary of LCA study 2006
(TNO-report 2006-A-R0232/B)
"Environmental performance of lead sheet and alternative weatherproofing products"

Life cycle assessment (LCA) is an established international method of reviewing materials from an environmental perspective. A study performed in 1998 showed good results for lead regarding its environmental performance as a weatherproofing product. TNO has updated this 1998 report, based on the currently available data for lead sheet and several alternative materials to be compared.

The main goal of the study was to compare of the environmental impact of the use of lead sheet as a building weatherproofing material with the environmental impact of selected competing materials applied in the German and Dutch markets. The second goal was to determine which aspects of the life cycle were of greatest significance.

Weatherproofing a building can be divided into a number of different functions. Lead sheet can be used as a roof or wall cladding, to protect cavity walls and to protect the transition from roof to wall. The three functions investigated here, were:

- Weatherproofing material used in cavity walls (lead sheet, aluminium-reinforced SEBS, reinforced EPDM, PVC);
- Weatherproofing material in wall-roof junctions (lead sheet, aluminium-reinforced SEBS, aluminium-reinforced PiB);
- Discharge of rainwater by valley gutters from sloping roofs (lead sheet, glass-reinforced plastic).



Comparison of the environmental performance expressed as shadow cost (€) of products for weatherproofing of cavity walls, wall-roof junctions and as valley gutters. The value in the box on top of each bar gives the total net shadow cost of each product.

In the Figure the results of the comparison are shown graphically with the net environmental impact of each product expressed as a "shadow cost". This approach of summing the costs associated with the required abatement of the diverse environmental effects enables a simple comparison to be made between different products.

The good environmental performance of lead sheet compared with the other products is largely due to its long service life and its limited need for primary raw materials. The largest part of the environmental impact of lead sheet results from small losses of lead during installation and end of life collection which cause the life cycle not to be fully closed. From a life cycle assessment perspective, such losses are expected to be replenished with primary lead. However the modelling of the losses in this way is a very conservative approach because in reality the losses would be made up from secondary lead which is available in abundance as a result of extraordinarily high levels of lead recycling.

Sensitivity analyses for the SEBS:bitumen ratio for the aluminium reinforced SEBS-bitumen, for the production process of the glass fibre reinforced polyester and for the recovery percentage of aluminium from the aluminium reinforced products showed some impact on the environmental performance of the products but did not result in a change in the ranking of the products.

Based upon the life cycle assessment of lead sheet and other weatherproofing products the following conclusion was drawn:

CONCLUSION

Lead sheet has the best environmental performance as a weatherproofing product of all the products that were assessed. For cavity wall applications the alternative products were aluminium-reinforced SEBS, reinforced EPDM and plasticised PVC sheet, while for wall-roof junctions the alternatives were aluminium-reinforced SEBS and aluminium-reinforced PiB sheet. For use as a valley gutter, lead sheet was compared with glass-reinforced polyester. The functional unit used as the basis of the comparison was 1 m^2 installed weatherproofing material for a 75-year service period in the Netherlands and Germany. This functional unit was applied for all three functions (cavity wall, wall-roof junctions and valley gutter) analysed in the study.

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