

Comparative Life Cycle Analysis of Five Low Slope Roofing Systems

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A comparative Life Cycle Analysis of five of the most common low slope roofing systems in North America was commissioned. The methodology used was based on earlier European studies. All components of the roof assemblies were included, although the ultimate goal was to compare the impacts of the different waterproofing membranes considered (PVC, TPO, EPDM, Modified Bitumen, Built-Up Roofing – BUR). Operational impacts such as each roof assembly's impact on heating and cooling the building were included. This decision further complicated the study, as it imposed the need for looking at different geographic locations to reflect different heating and cooling loads. In a second step, the economic impacts of the system selection were analyzed in an analogous manner considering life cycle costing and related operational cost implications. Combining the impact and the cost elements allowed for the development of an “eco efficiency” metric.

All steps in the process will be discussed: reasons for the study, selecting the consultant, defining the scope, development of the methodology, selection of the analysis tool (TRACI) and the criteria to be evaluated, competitive roof assembly selection, defining the functional unit, data generation, compiling and interpreting the results, etc.

The tremendous difficulties encountered in sourcing input data will be highlighted. The lack of comprehensive data bases resulted in numerous compromises: approximating European data to North America, life cycle expectancies of the various systems, comparing product specific data to generic data for a class of products, etc. The effect such decisions have on the output will be presented.

The paper will conclude with an assessment on the usefulness and the applicability of the end product, and how it is being used.