

Asphalt Institute Foundation (AIF) Research Initiative Proposal

Sustainable Materials Management of (Bituminous) Asphalt Roofing

Problem Statement

Research proposals are needed to develop sustainable materials management (SMM) practices that will conserve resources, reduce landfill waste, and reduce costs while maintaining the quality performance of (bituminous) asphalt roofing products.

Background Information

According to a recent report published by the U.S. Environmental Protection Agency (EPA)^[1], the amount of construction and demolition (C&D) debris generated in 2015 was over 547 million tons, with waste asphalt shingles contributing approximately 13.5 million tons to that total. Despite being 2% of the total C&D debris generated, asphalt shingles contributed disproportionately to the amount of debris added to landfills, with only 15% going to “next use” applications. In addition to these disposal challenges, alternative roofing materials represent an ongoing challenge to the asphalt roofing industry, with thermoplastic roofing materials being used in low-slope markets and metal/alternative products seeing increased use in the steep-slope market.

Achieving a sustainable future for the asphalt roofing industry depends in part on engaging the principles of sustainable materials management (SMM) which offers a “...systemic approach to using and reusing materials more productively over their entire life cycles.”^[2] With performance warranties extending 20 or more years for both steep-slope (shingles) and low-slope roofing applications, long-term performance must be a consideration as part of the SMM practices. The US EPA considers the major stages in a material’s life cycle to be “...raw material acquisition, materials manufacture, production, use/reuse/maintenance, and waste management” as shown in the figure.^[2]



Research is needed to establish SMM practices for the asphalt roofing industry by evaluating areas of impact that can be made in the life cycle of asphalt roofing products. Research should consider, but not be limited to, the following:

1. Identifying the characteristics and properties needed to design and manufacture more durable asphalt roofing materials.
 - How can the performance and life cycle of roofing products be improved to sustainably compete with alternative products in the market?
2. Evaluating methods to increase the reuse and recycling of asphalt roofing materials (shingles and/or roll goods) and reduce the amount being discarded in landfills.
 - Other than applications in the asphalt industry, what end-use applications exist that are not restricted by transit or other market influences where shingles may be recycled?
 - How can the use of recycled asphalt shingles be effectively increased in the asphalt industry while maintaining or improving the long-term performance of their products?
3. Evaluating how SMM practices may lead to a reduction in the environmental footprint of the asphalt shingle industry.
 - How can SMM practices be used in material production and placement to result in a reduction in the public’s exposure to odor?
4. Identifying strategic partners in the effort to implement SMM practices.
 - What is the role of public agencies in implementing an effective SMM practice for the asphalt roofing industry?

Expected Impacts

Establishing an effective sustainable materials management practice for the asphalt roofing industry ensures that asphalt materials will continue to be used as a product of choice for steep-slope and low-slope applications.

References

1. “Construction and Demolition Debris Management in the United States, 2015”, U.S. Environmental Protection Agency, Office of Resource Conservation and Recovery, March 2020.
2. <https://www.epa.gov/smm/sustainable-materials-management-basics> Accessed 2021/03/22.