


# Asphalt Pavement Industry Survey on Recycled Materials and Warm-Mix Asphalt Usage 2016

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Information Series 138

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7th Annual Survey

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## Executive Summary

The results of the asphalt pavement industry survey for the 2016 construction season show that asphalt mixture producers have a strong record of employing sustainable practices and continue to increase their use of recycled materials and warm-mix asphalt (WMA). The use of recycled materials, particularly reclaimed asphalt pavement (RAP) and reclaimed asphalt shingles (RAS), conserves raw materials and reduces overall asphalt mixture costs, allowing road owners to achieve more roadway maintenance and construction activities within limited budgets. WMA technologies can improve compaction at reduced temperatures, ensuring pavement performance and long life; conserve energy; reduce emissions from production and paving operations; and improve conditions for workers.

The objective of this survey, first conducted for the 2009 and 2010 construction seasons, was to quantify the use of recycled materials, primarily RAP and RAS, as well as the production of WMA by the asphalt pavement industry. For the 2016 construction season, the National Asphalt Pavement Association (NAPA) conducted a voluntary survey of asphalt mixture producers across the United States on tons produced, along with a survey of state asphalt pavement associations (SAPAs) regarding total tons of asphalt pavement mixture produced in their state.

Asphalt mixture producers from all 50 states completed the 2016 construction season survey. A total of 229 companies with 1,146 production plants were represented in the survey.

The following are highlights of the survey of usage during the 2016 construction season:

### Reclaimed Asphalt Pavement

- Asphalt mixture producers remain the country's most diligent recyclers, with more than 99 percent of asphalt mixture reclaimed from old asphalt pavements being put back to use in new pavements.
- The total estimated tons of RAP used in asphalt mixtures reached 76.9 million tons in 2016. This is a 3.6 percent increase from the 2015 construction season and represents a greater than 37 percent increase from the total estimated tons of RAP used in 2009. During the same time frame, total asphalt mixture tonnage increased only 4.6 percent.
- The percentage of producers reporting use of RAP decreased slightly from 99 percent of respondents in 2015 to 98 percent in 2016. Four producers reported landfilling a small amount of RAP during 2016.
- RAP usage during the 2016 construction season is estimated to have reduced the need for 3.8 million tons (21.5 million barrels) of asphalt binder and more than 73 million tons of aggregate, with a total estimated value of more than \$2 billion.
- The total estimated amount of RAP stockpiled nationwide at the end of the 2016 construction season was about 93.6 million tons.
- Fractionated RAP represents about 22 percent of RAP use nationwide, and the tons of RAP mixtures produced using softer binders are estimated at 24 percent while tons produced using recycling agents is estimated at 7 percent.
- Reclaiming 81.7 million tons of RAP for future use saved about 49.4 million cubic yards of landfill space.

## Reclaimed Asphalt Shingles

- The total estimated tons of RAS used in asphalt mixtures decreased 28 percent to an estimated 1.39 million tons in 2016. Still, the use of RAS in the 2016 construction season increased 98 percent from the estimated 702,000 tons used in asphalt mixtures in 2009.
- RAS usage during the 2016 construction season is estimated to have reduced the need for 278,000 tons (1.5 million barrels) of asphalt binder and nearly 695,000 tons of aggregate, with an estimated value of more than \$103 million.

## Other Findings

- The use of softer binders and recycling agents with mixtures incorporating RAP and RAS was reported nationwide. There was little correlation between the level of RAP used and the use of softer binders and/or recycling agents, but their use with RAS was more consistent.
- A reported total of 768,470 tons of other recycled materials was used in nearly 6.5 million tons of asphalt mixtures by 53 companies in 29 states during the 2016 construction season.
- Other recycled materials commonly reported as being used in asphalt mixtures during the 2016 construction season were ground tire rubber, blast furnace slag, steel slag, and cellulose fibers. Recycled materials less commonly reported as being used in asphalt mixtures included fly ash, foundry sand, and poly fibers.

## Warm-Mix Asphalt

- The estimated total production of WMA for the 2015 construction season was 116.8 million tons. This was a 2.5 percent decrease from the estimated 119.8 million tons of WMA in 2015. WMA saw increased tonnage in the Commercial & Residential and the Other Agency sector; however, this was insufficient to offset decreased asphalt mixture tonnage in the DOT sector.
- WMA made up 31.2 percent of the total estimated asphalt mixture market in 2016.
- Production plant foaming, representing nearly 77 percent of the market, is the most commonly used warm-mix technology; chemical additive technologies accounted for a little more than 21 percent of the market.