



WARM-MIX ASPHALT AND RECLAIMED ASPHALT PAVEMENT REDUCE GREENHOUSE GAS EMISSIONS

The Earth is a precious resource, and as stewards of our planet the asphalt pavement industry recognizes its responsibility to take care of the planet for future generations. With a long track record of working alongside agencies, regulators, and academia, the asphalt pavement industry is committed to reducing its greenhouse gas emissions by detailing historical efforts, setting realistic industry-wide reduction goals, and implanting a roadmap to reduce our environmental impacts. As we begin discussing our efforts it is important to understand that there are the two existing technologies, warm-mix asphalt (WMA) and reclaimed asphalt pavements (RAP), which reduce energy consumption and minimize greenhouse gas (GHG) emissions.

OVERVIEW OF ASPHALT PAVEMENT INDUSTRY ANNUAL SURVEY

Two key technologies to reduce emissions and energy consumption include WMA, which reduces energy use during production, and RAP, which reduces the need for virgin materials. In league with the Federal Highway Administration,

the National Asphalt Pavement Association annually conducts a survey, gathering data from asphalt mix producers on the use of these innovative technologies and quantifying the emission reduction achieved through the industry's wide-spread adoption. "Asphalt Pavement Industry Survey on Recycled Materials and Warm-Mix Asphalt Usage 2019" represents 212 companies owning 1,101 asphalt production facilities located in 48 states, the District of Columbia, and one U.S. territory. Conducted since 2010 the data showcases the environmental record of the industry.

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GHG EMISSION REDUCTION ESTIMATES FROM USE OF RAP

According to the 10th annual survey, the industry reclaimed 97 million tons of RAP for future use, saving about 58.9 million cubic yards, or enough landfill space to fill up the dome of the U.S. Capitol 1,223 times. This massive reclamation effort also saved \$5.3 billion in gate fees for disposal in landfills. Above recycling, the use of RAP in asphalt mixtures leads to quantifiable reductions in GHG emissions.

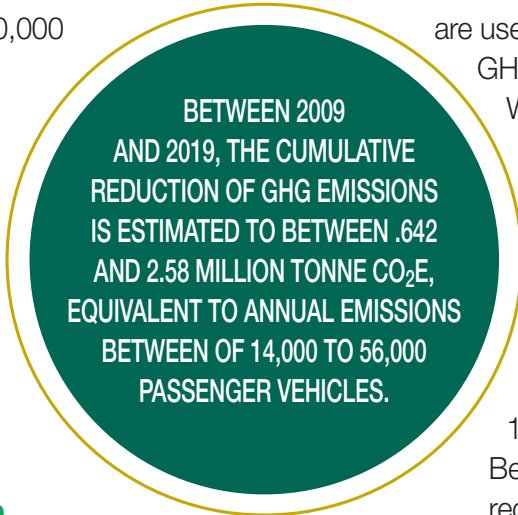
Emissions are reduced because the need to ship and manufacture raw materials is minimized.

Net reduction of GHG emissions from use of RAP in new asphalt mixtures in 2019 is estimated to be 2.4 million tonne CO₂e, equivalent to the annual emissions from approximately 520,000 passenger vehicles. Cumulatively for the period 2009-2019, the use of RAP is estimated to have eliminated 21.2 million tonne CO₂e, equivalent to an average annual emissions from approximately 460,000 passenger vehicles.

ENERGY AND GHG EMISSION REDUCTION ESTIMATES FROM PRODUCTION OF WMA AT REDUCED TEMPERATURE

Asphalt mix producers also continue to make significant use of energy-saving warm-mix asphalt (WMA) technologies. In 2019, contractors used WMA technologies in the production of 164.5 million tons of asphalt mix. Several environmental, worker safety, and construction benefits have been realized through the adoption of WMA technologies. Nearly half of the WMA production was at reduced temperatures decreasing the energy required to manufacture the mix. The most common WMA technology used is plant-based foaming, which injects a small amount of water into the asphalt binder during production.

Reductions in energy consumption and GHG emissions associated with the production of WMA are achieved from the reduced fuel (energy) required to heat the mixture. Researchers found the average temperature reduction, then calculated the expected energy savings from reduced temperature. These emission factors are used to estimate the combustion related GHG emission reduction from producing WMA at reduced temperature. The conservative and optimistic scenarios assume average reductions in mix production temperature of 10° F and 40° F, respectively. Meaning that in 2019 alone, America's use of WMA removed an estimated equivalent annual emissions between 11,000 to 46,000 passenger vehicles. Between 2009 and 2019, the cumulative reduction of GHG emissions is estimated to between .642 and 2.58 million tonne CO₂e, equivalent to annual emissions between of 14,000 to 56,000 passenger vehicles.



PATH FORWARD

As the industry continues to look for new ways to reduce its impact on climate, furthering the use of two proven technologies like RAP and WMA should be prioritized. The impacts of both are well documented, and research has proven that the production and construction of high quality, sustainable asphalt pavements provide benefits to the environment, communities, and businesses.

