

Reducing Greenhouse Gas Emissions

in
Asphalt Paving Operations

Robert E. Lee, P.E.



Mission & Vision

Provide a transportation system that is:

- Safe
- Efficient
- Environmental Sensitive
- and Cost Effective



Environmental Stewardship



- Conserve Materials
- Reduce Waste
- Reduce Energy Consumption
- Improve Air and Water Quality
 - CO_{2eq} emissions
- Paving Technologies that provide these Environmental Attributes
 - Warm Mix Asphalt (WMA)
 - Reclaimed Asphalt Pavement (RAP)
 - Recycled Asphalt Shingles (RAS)



- Data based on these factors
 - Binder manufacturing and processing
 - Aggregate mining and processing
 - Transportation of raw materials and HMA to the jobsite
 - HMA plant production
 - HMA laydown operations
- Emission data based on CO₂ eq. per ton of HMA produced, and
- Total CO₂ eq. for the year

Reduced Emissions

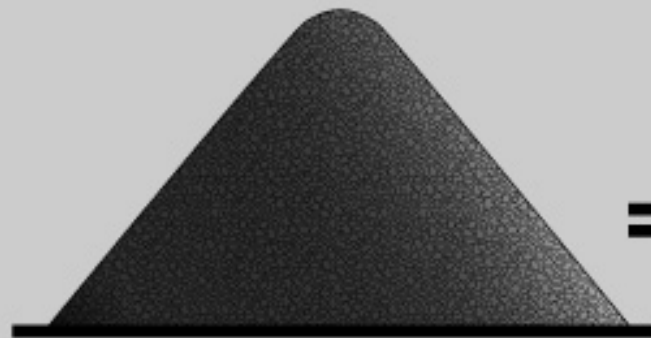


WMA — 97.6 lbs. of
CO₂eq / ton of mix
~ about a 10% reduction

HMA - 109 lbs. of
CO₂eq / ton of mix



RAP is Worth the Virgin Material it Replaces

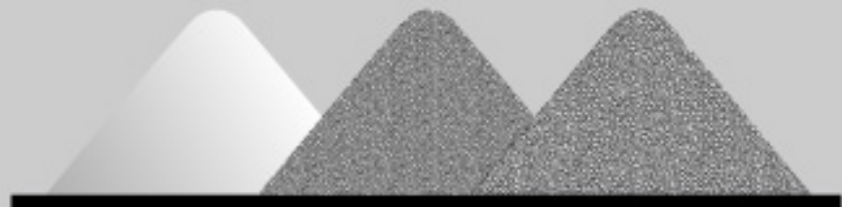


10,000 Tons of RAP

=



**20 – 6000 Gallon Transport Trailers
of Asphalt and 9500 Tons of Clean
Aggregate**



Using 20% RAP in HMA reduces carbon emissions by about 8.5%

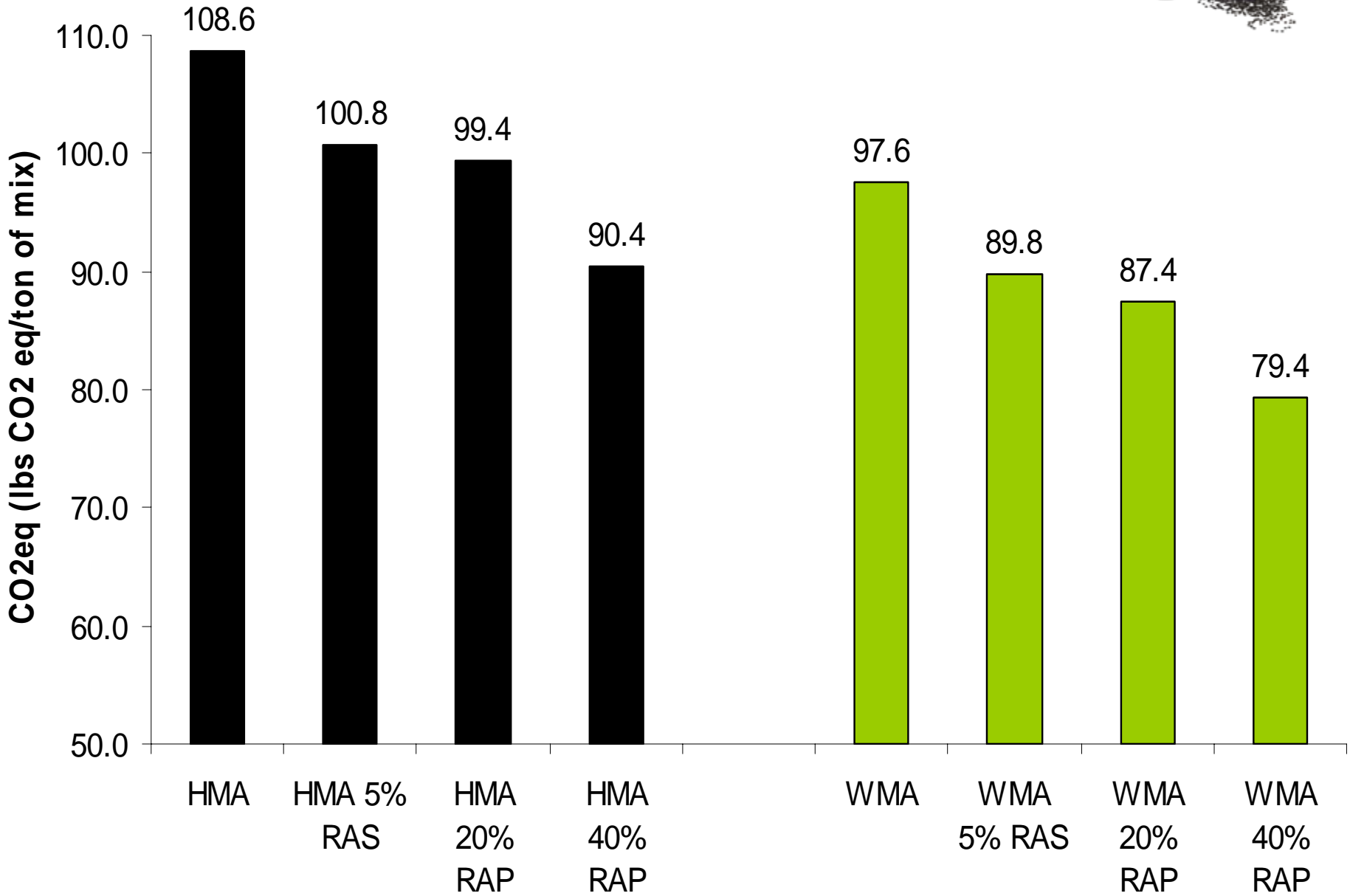
Recycled Asphalt Shingles

10,000 tons of ground shingles replaces:

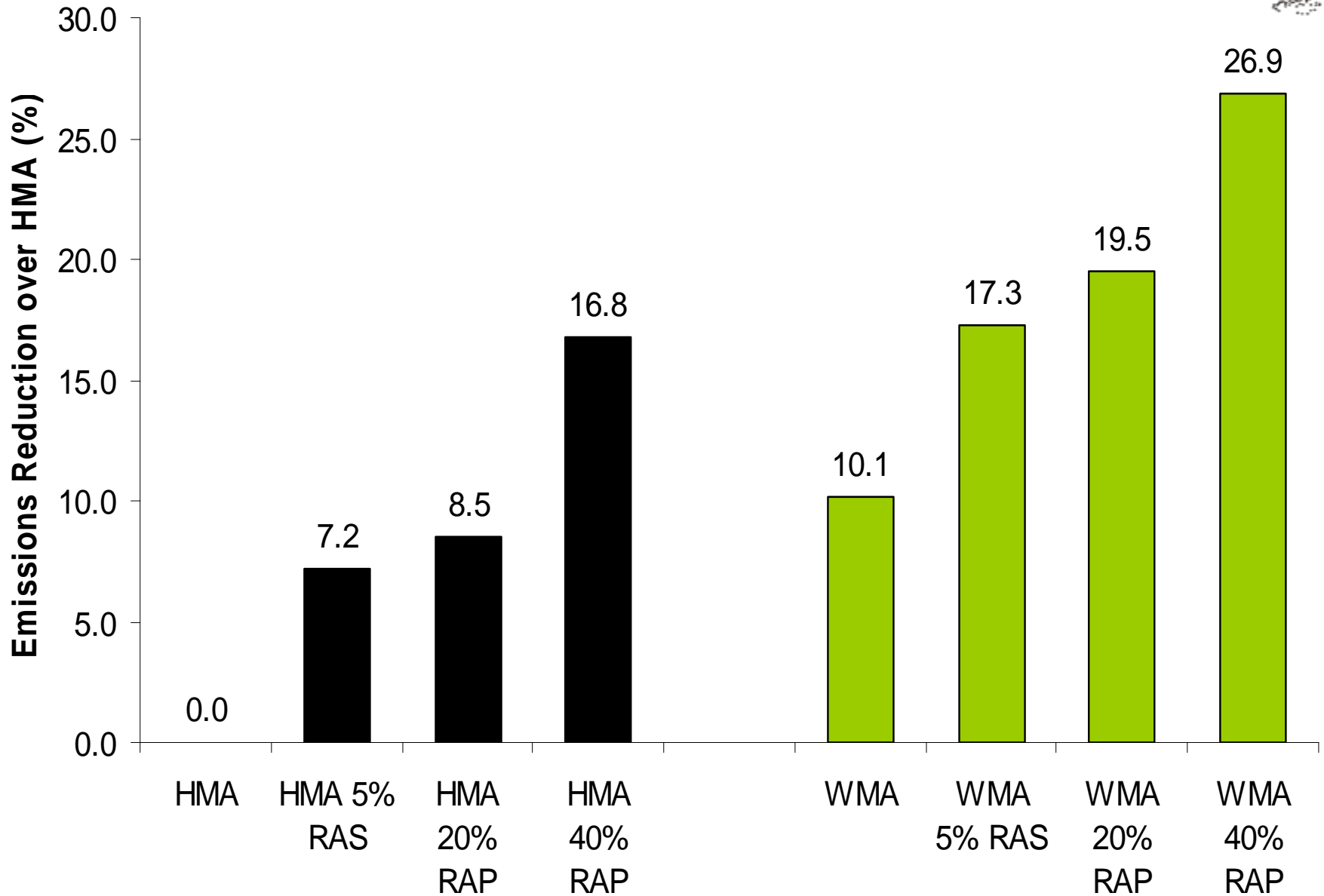
- 468,000 gallons of asphalt
- 8,000 tons of aggregate
- Using 5% RAS in HMA reduces carbon emissions by approx. 7.0%



GHG Emissions



GHG Emissions Reductions



Combined Technologies

- **WMA with 15% RAP and 5% RAS**
 - 83 lbs. of carbon emissions per ton of mix as compared to 109 lbs. with HMA and no recycled materials

**That's over a
23%
reduction in
emissions**



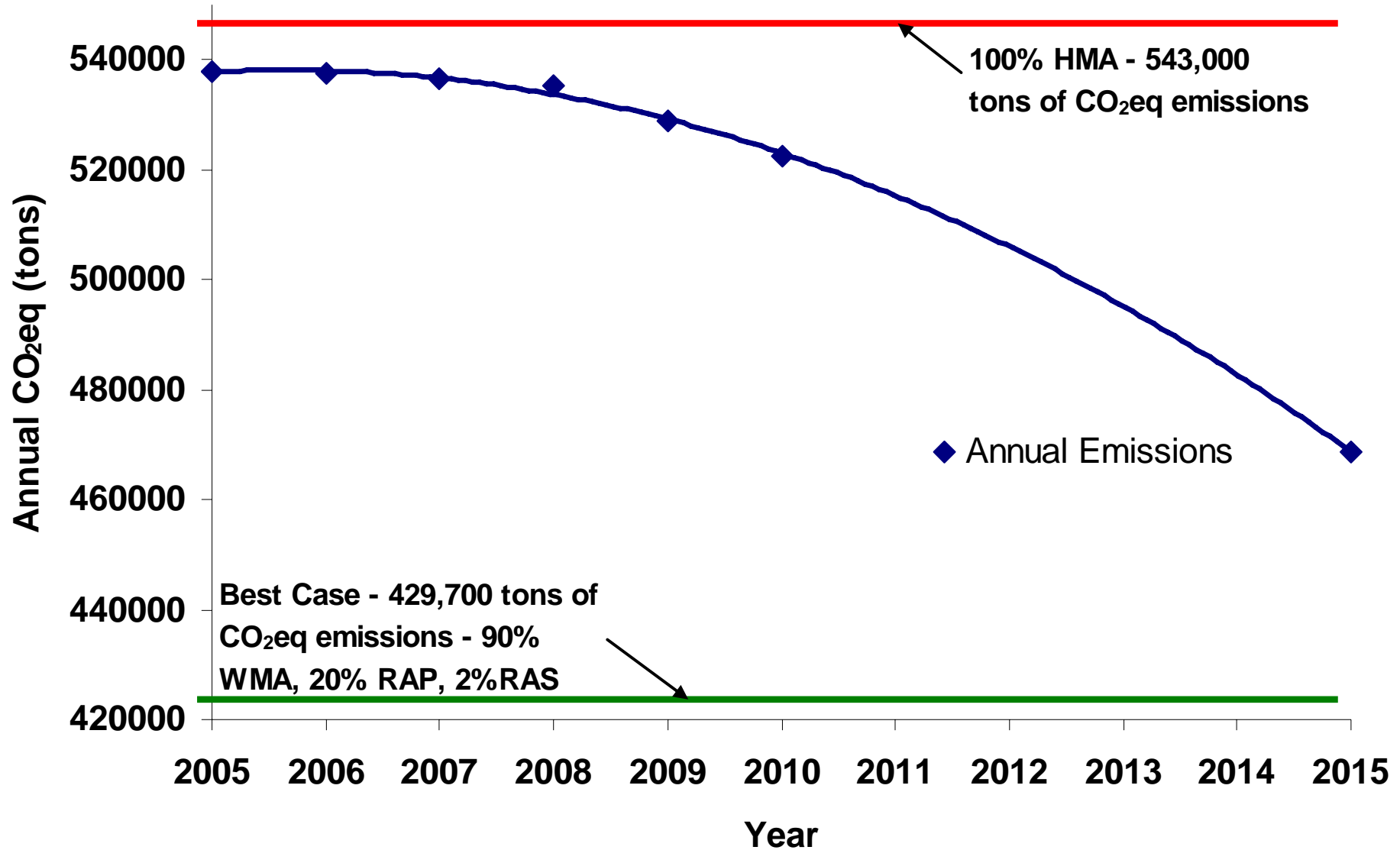


Equivalencies

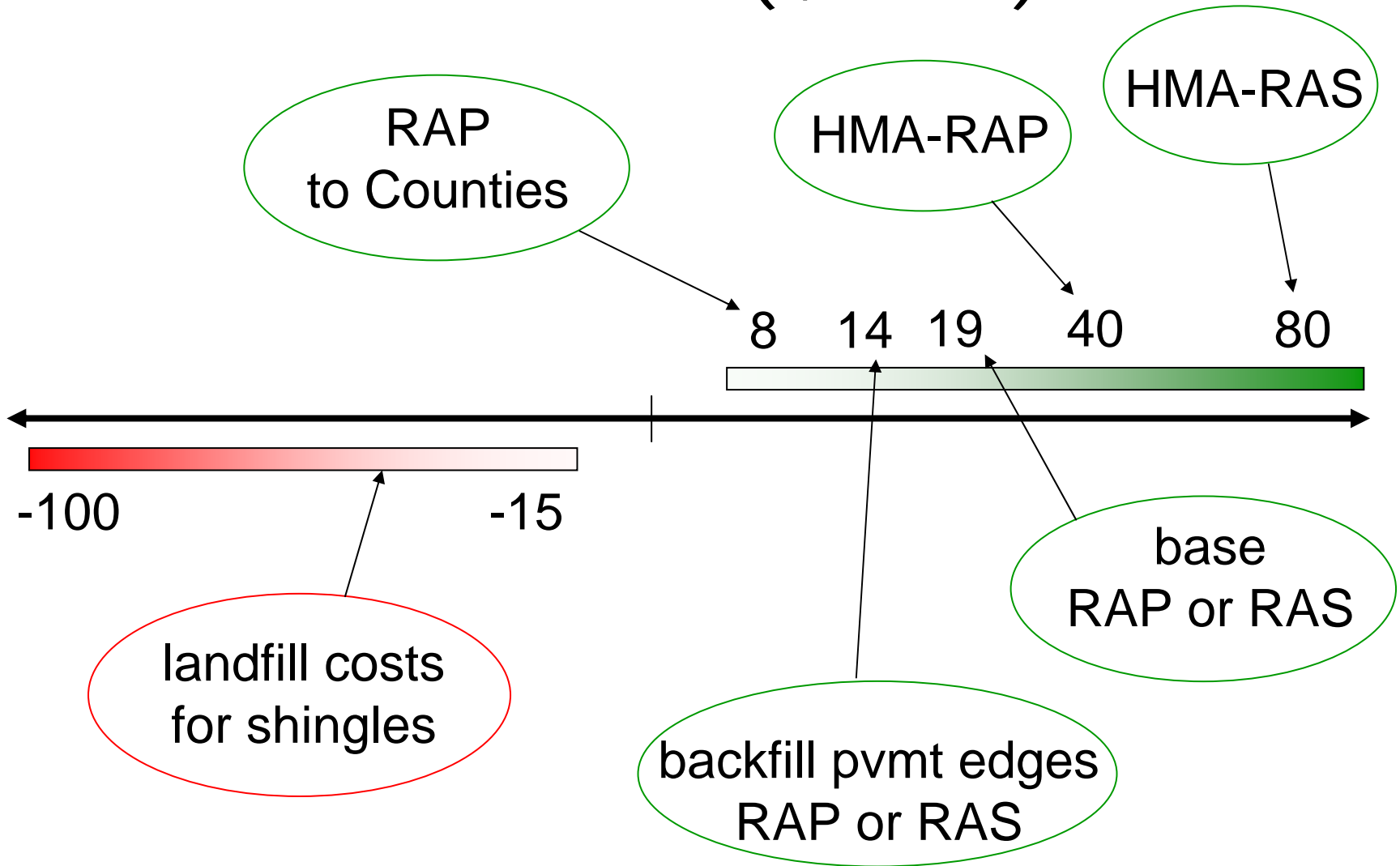
Using Warm Mix with 15% RAP and 5% RAS

- **At 9 million tons of mix produced annually, the amount of CO₂eq reduced would be 115,000 tons:**
- **That's the equivalent of taking 19,982 cars off the road for one year.**
- **Or consuming 11,755,644 gallons of gasoline**
- **Or producing electricity for 13,572 homes for one year.**
- **Or the GHG emissions avoided by recycling 35,188 tons of waste instead of sending it to the landfill.**

Projected Goals



Value (\$/ton)





Questions?