Increasing the Percentage of Recycled Hot Mix Asphalt

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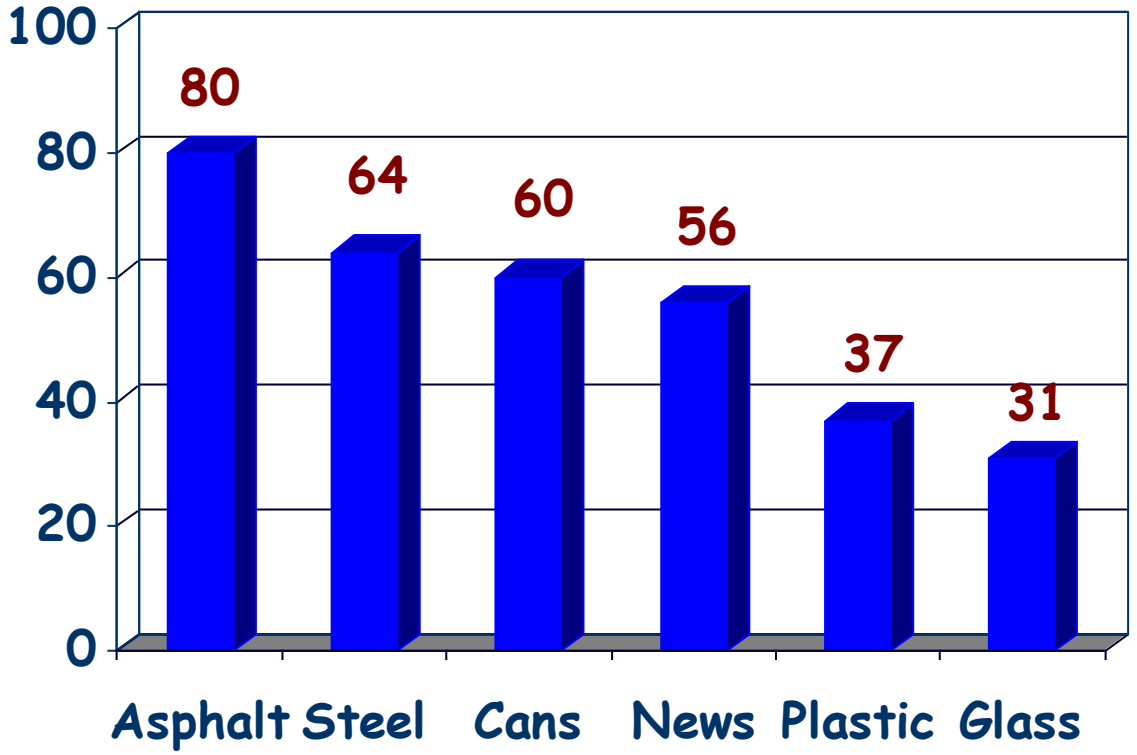
Historically

- Reclaimed Asphalt Pavement (RAP) has been the most widely recycled product



Why?

- Valuable resource – reduced material costs
- Cost savings – avoid disposal costs
- Competitive edge – lower bid prices
- It is the right thing to do.

Today

- Strong incentives to increase RAP use
  - Increased material and energy costs
  - Material supply issues
  - Growing environmental concerns
- Growing demand to
  - Use RAP in more mixes (i.e. surfaces)
  - Use higher RAP quantities

Typical Asphalt Mix

- 95% aggregate
- 5% asphalt binder

Reusing:

- Reduces need to quarry more aggregate
- Reduces energy/costs to produce, process, transport aggregate
- Reduces asphalt demand

Currently

- Most states allow at least some RAP use
  - But a few don't
- AASHTO specs allow easy use of 15% to 25% RAP
  - Can go higher with more testing
  - Some states do not allow higher percentages or use in some types of mixes

Note

- Cold and hot in-place recycling can reuse essentially 100% of the material
- Focus here is on hot mix asphalt for high type pavements

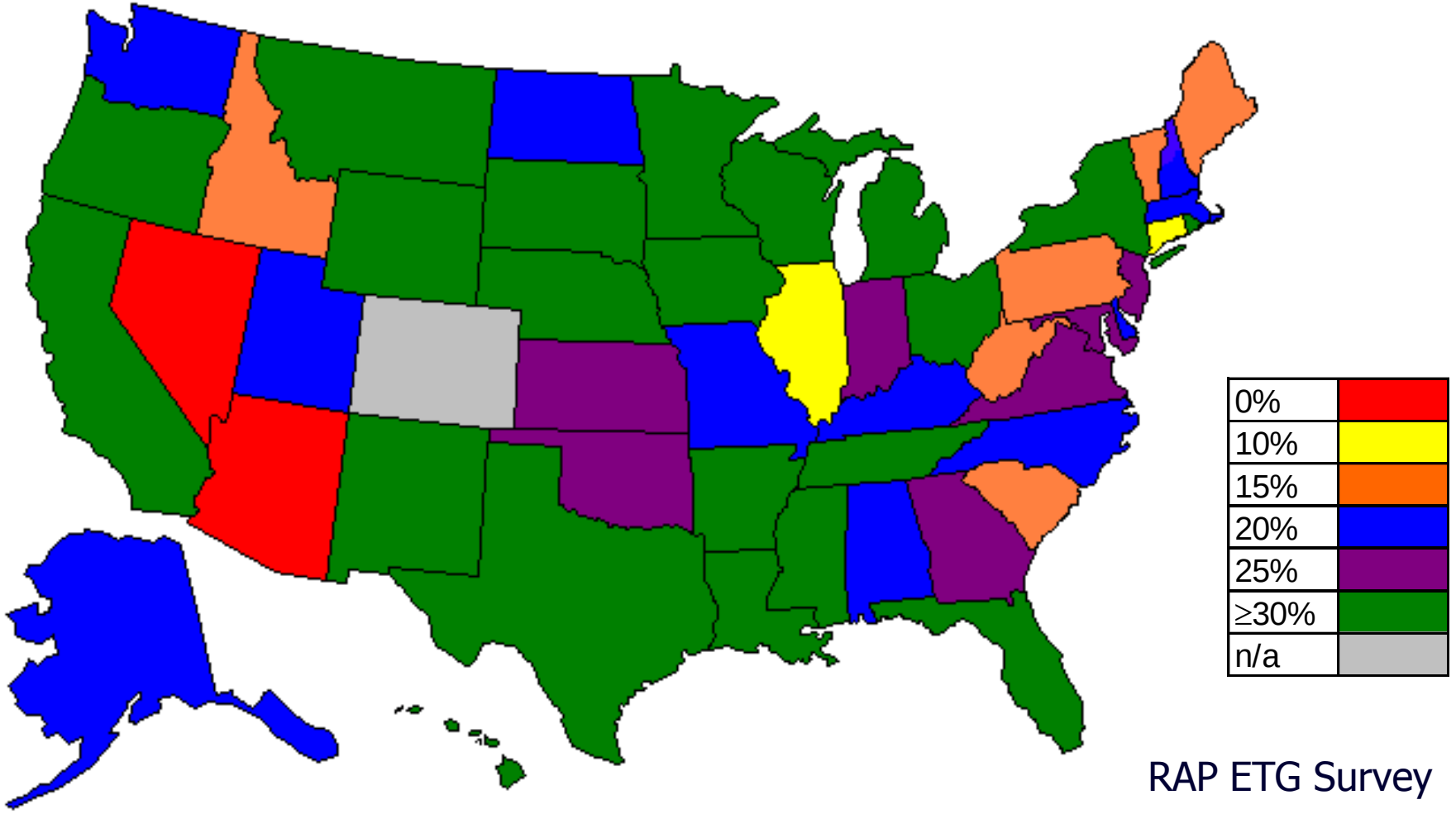
Specification Barriers

- Quality Concerns (including friction)
- Consistency of RAP
- Ability to Meet Volumetric Requirements
- Durability of Mixes
- Stiffness of Binder
- Use with Polymers

Industry Barriers

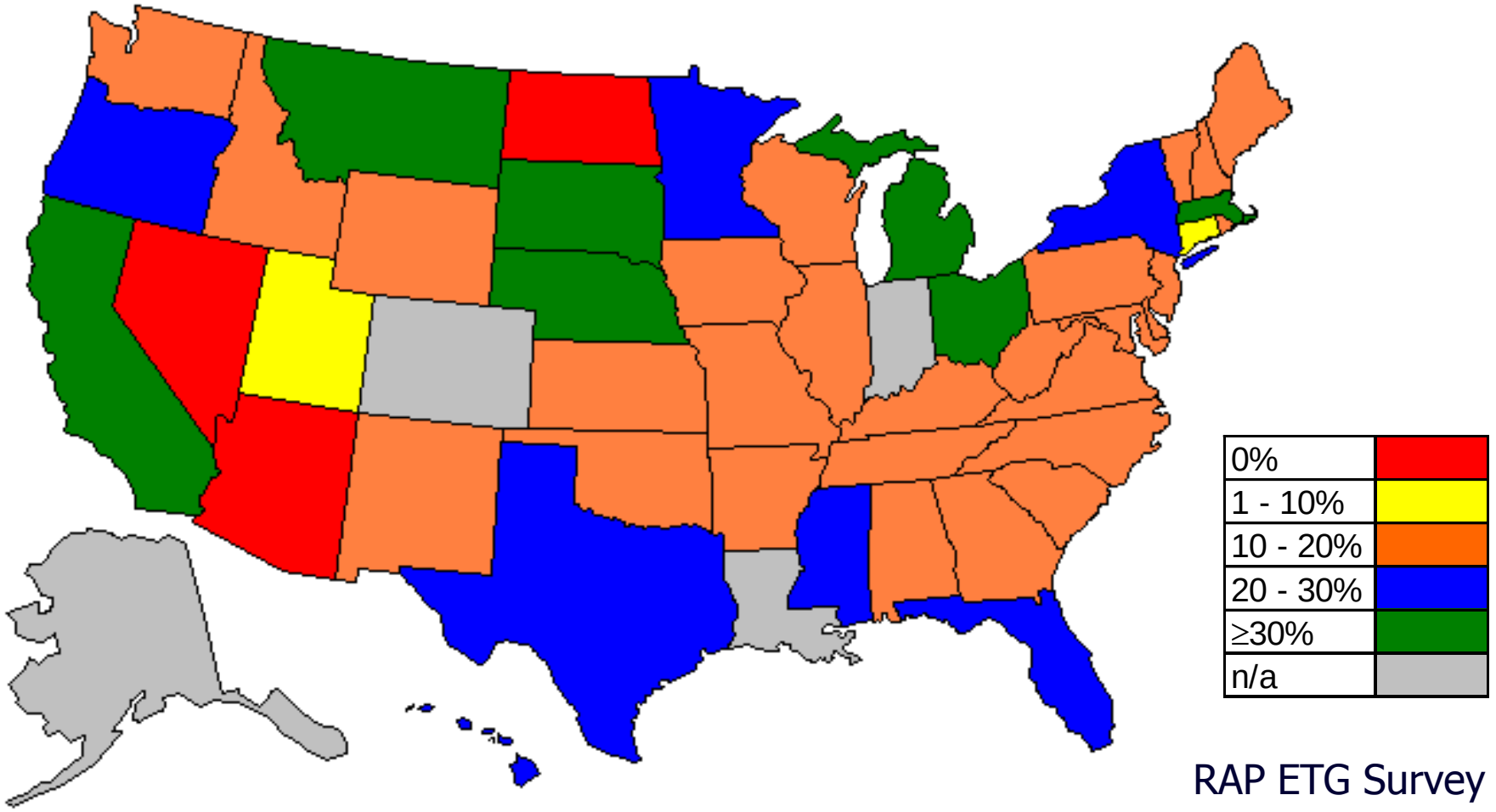
- Control of RAP
- Dust & Moisture
- Increased QC
- State Specifications

Base Mixes -- Specified



RAP ETG Survey

Base Mixes -- Average Use



RAP ETG Survey

Surface Mixes

- Typically specs allow lower RAP contents
  - Friction of unknown aggregate types
  - Potential for cracking of stiffened mixes
- Thinner lifts, less overall aggregate demand
- But, more frequently replaced
- Potential big impact

Removing (or Lowering) Barriers

- FHWA Hot Mix Asphalt Recycling Expert Task Group
- Research – national, state

HMA Recycling ETG

- FHWA initiated in May 2007
- Managed by NCAT
- Purpose – Coordinate, develop national guidance and recommendations on RAP use
- Goal – encourage all states to allow 15-20% RAP, then increase some to 25-30%
- Demo projects, document performance, share info, best practices, research

Research Underway

- NCHRP Project on designing high RAP content mixes
- FHWA funded work on high RAP contents (NCAT/NCSC/UNH)
- RAP in Surface Mixes
- Other State and Federally sponsored research across the country

RAP mixes can perform as well as or better than virgin mixes.

RAP ETG wants to show states how to successfully use 25% RAP and more.

Higher RAP Contents

- Can work – can *perform* – if properly designed, produced and constructed
- **But**, need attention to detail
- Some precautions are needed
  - Many of these are the same as for aggregate best practices

Some Keys to Success

- Processing the RAP
- Stockpiling the RAP
- Control during production

In GOK Pile

After Processing

Processing RAP

- Mixed RAP can be variable
  - Crushing/Screening to break up clumps
  - Processing can improve uniformity
  - Uniformity essential to meet specifications

Fractionating RAP

- Improves uniformity (remixes)
- Allows use of different sizes to meet mix volumetrics
- Allows better control of gradation (and binder content)

Stockpiling Practices

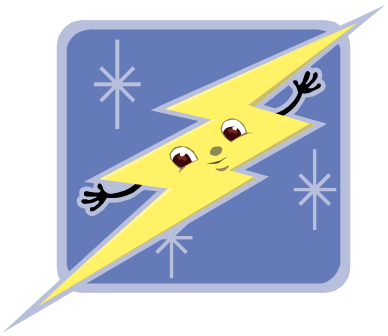
- Avoid segregation
- Avoid contamination
- Reduce stockpile moisture

Reduce Stockpile Moisture

- Reduce fuel consumption and drying costs by keeping your materials dry
- Lower moisture leads to increased production capacity
- Lower maintenance and fuel costs for loaders
- Lower paving costs

What Can Careful RAP Use Mean?

- It is estimated that the usage of 1 ton of HMA containing RAP conserves 200,000 BTU's of energy
  - Less aggregate to mine, process & deliver
  - Less asphalt to refine & deliver



Example - Heritage Group

- Uses 900,000 tons RAP per year
- 1,460,000 gallons gas
- Fuel 1650 Ford Expeditions

Thanks to:

- HMA Recycling ETG (Cecil Jones)
  - Info on NCAT website
- NAPA, AASHTO, FHWA, APAI sponsored workshop, *Materials and Energy Conservation in Hot Mix Asphalt*
  - Available on NAPA website
- Gerry Huber
- And to you!