

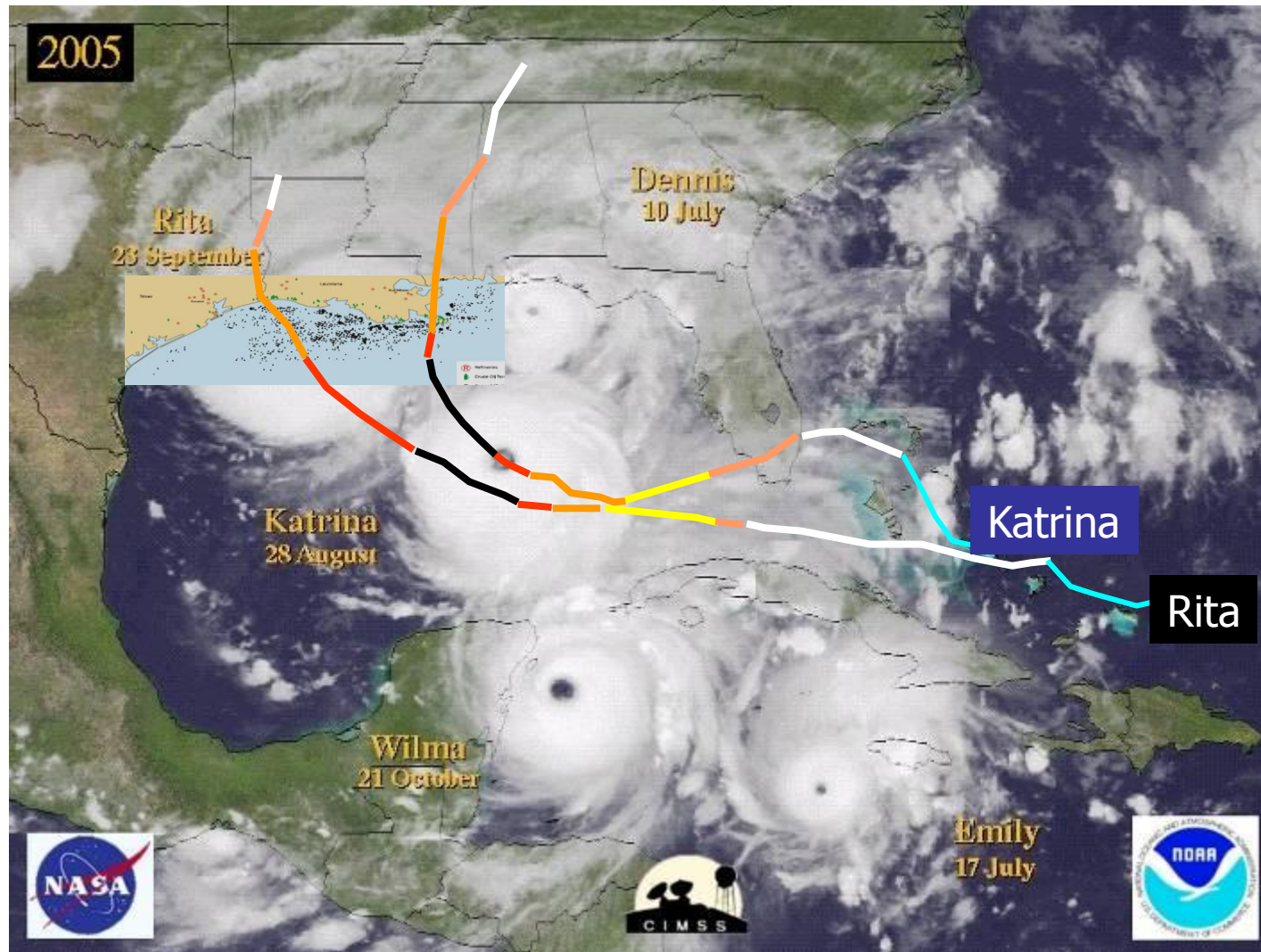
Adapting to Rising Costs of Materials

**Association of Modified Asphalt Producers
8th Annual Meeting – February 12-14, 2007
Boston, MA**

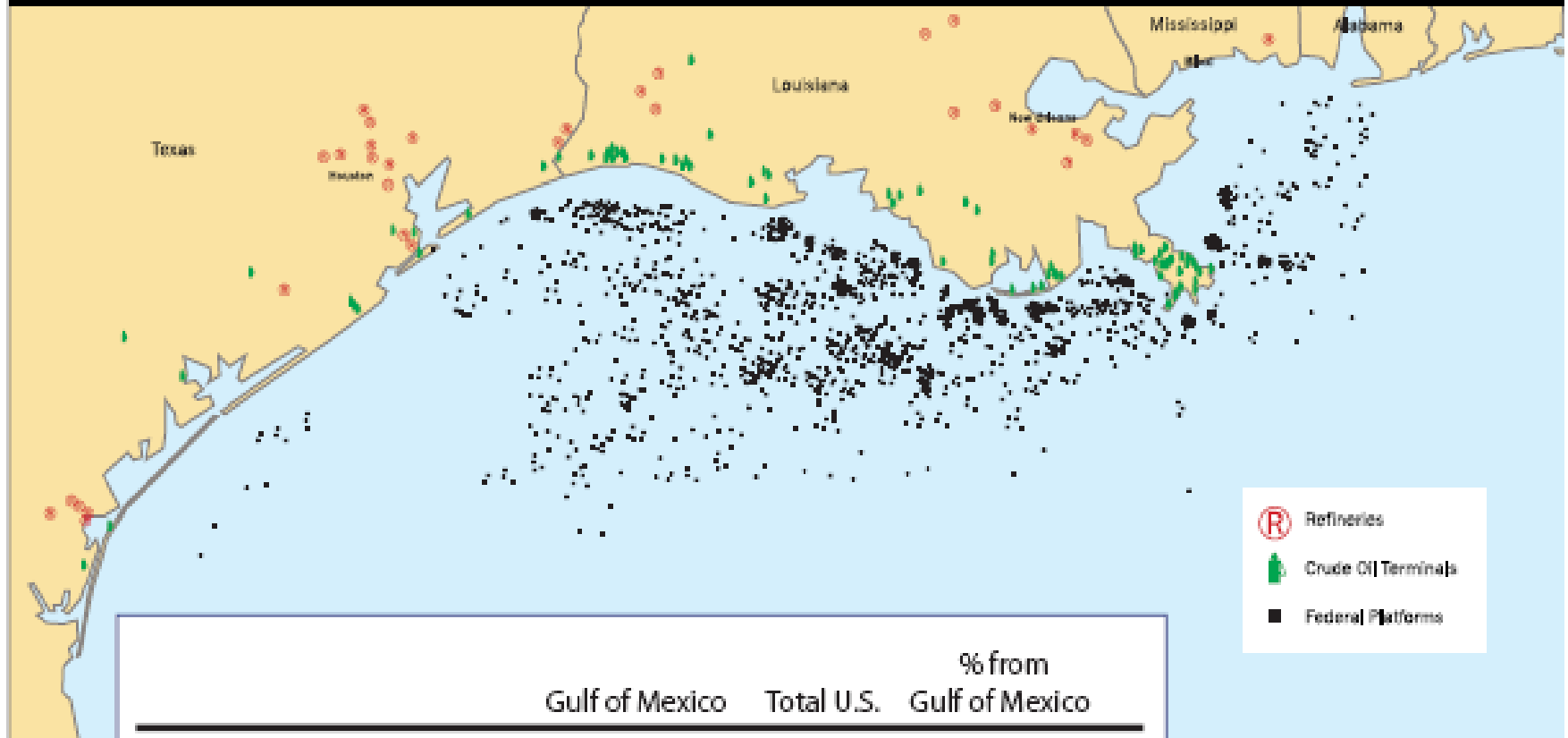
***Peter T. Grass, P.E.
President, Asphalt Institute***



2005 Tropical Cyclones



Gulf Coast Oil and Natural Gas Operations



	Gulf of Mexico	Total U.S.	% from Gulf of Mexico
Oil production (million b/d)	1.5	5.5	27%
Natural Gas production (bcf/d)	10.6	52	20%
Refinery Capacity (million b/d)	8.1	17	48%
<i>of which in LA and MS</i>	<i>3.1</i>	<i>17</i>	<i>18%</i>
Crude Oil Imports (million b/d)	6.5	10.8	60%
<i>of which into LA and MS ports</i>	<i>2.5</i>	<i>10.8</i>	<i>23%</i>

Source: U.S. Energy Information Administration

Katrina's Impact on Oil & Gas Operations

August 29th

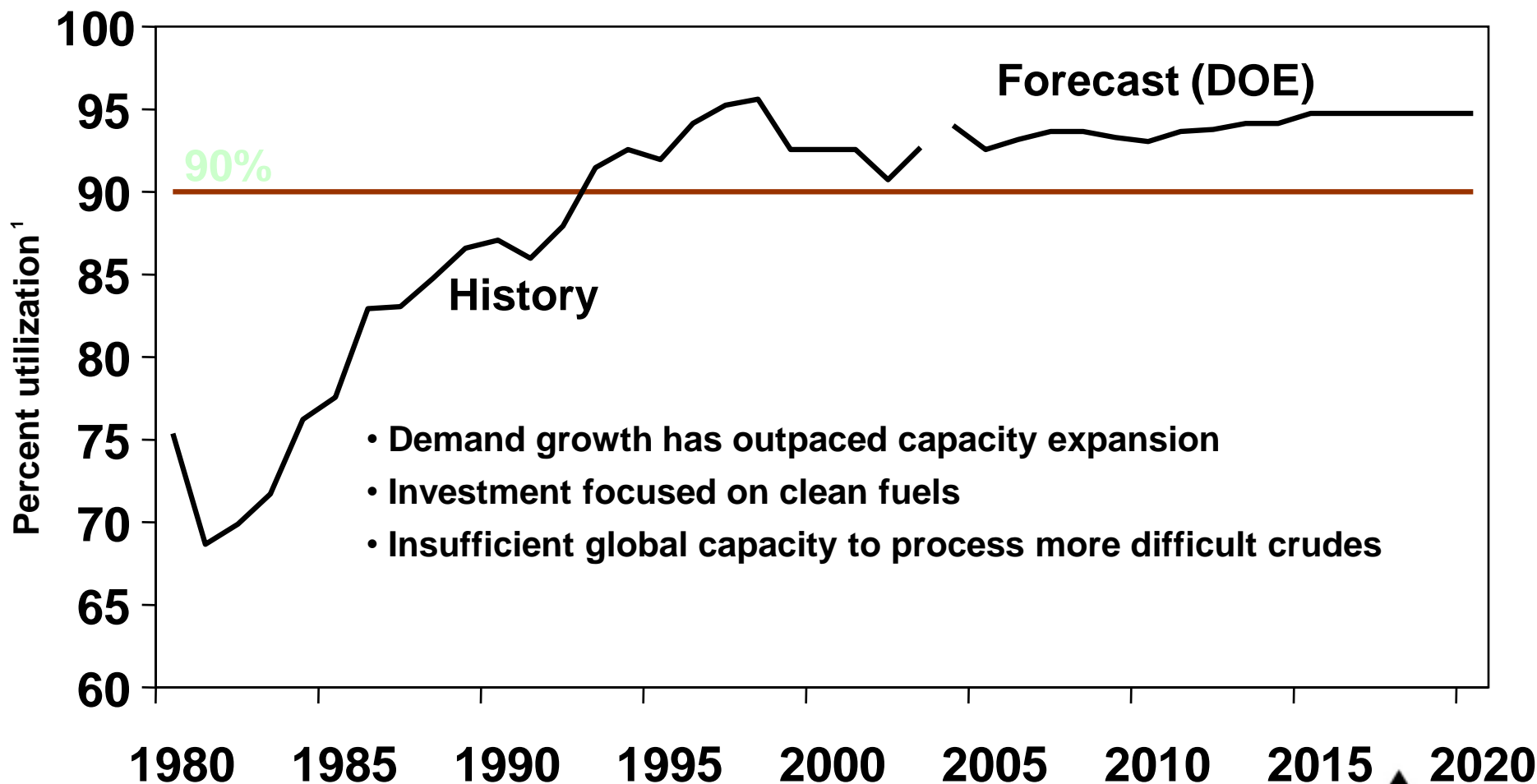
- Oil & Gas Production
 - 27% of U.S. oil
 - 20% of U.S. gas
- Refineries
 - 11% shutdown
 - 14% reduced runs
- Pipelines
 - No electricity to major crude and product pipelines feeding Northeast and Midwest

September 6th

- Oil & Gas Production
 - 9% of U.S. gas
 - 19% of U.S. oil
- Refineries
 - 7% shutdown
 - 5% reduced runs
- Pipelines
 - Colonial 100% up
 - Plantation 100%
 - Capline 88%



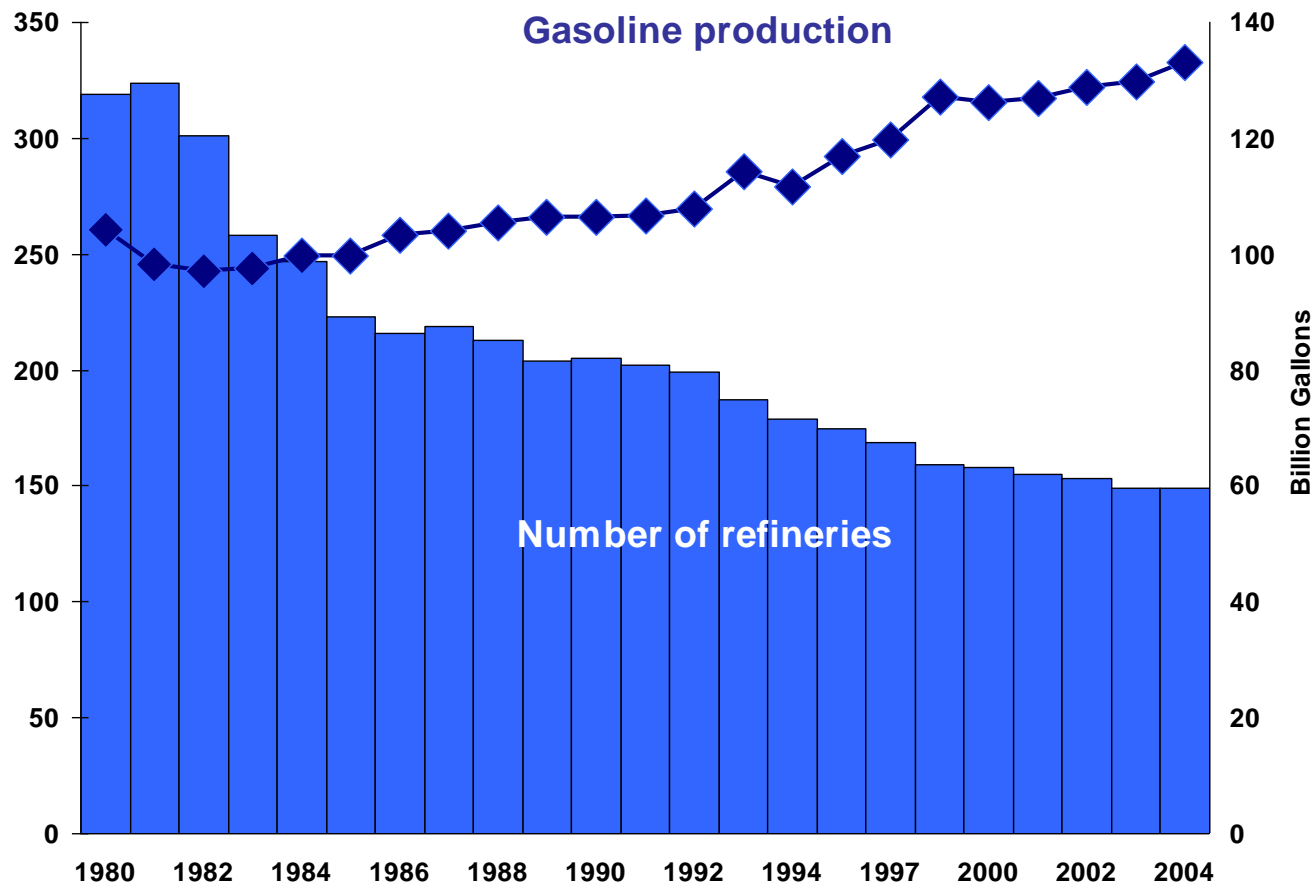
Total U.S. Capacity Utilization



Source: U.S. Department of Energy

¹ Percent utilization defined as: gross input to refineries / operable capacity.

Producing more gasoline with fewer refineries



Biofuels aren't the answer...

- Ethanol?
 - 10% replacement of US gasoline needs in 2020
 - Plant all of Ohio, Illinois, Indiana – using 1/6th of total US crop land just to grow corn for ethanol
 - Not an energy efficient nor economic alternative currently



Refiners are making progress...

- US Refiners invested \$50B over the last 2 decades to greatly improve environmental production aspects
- 1.4 b/d of new refining capacity planned
- An 8% increase from today



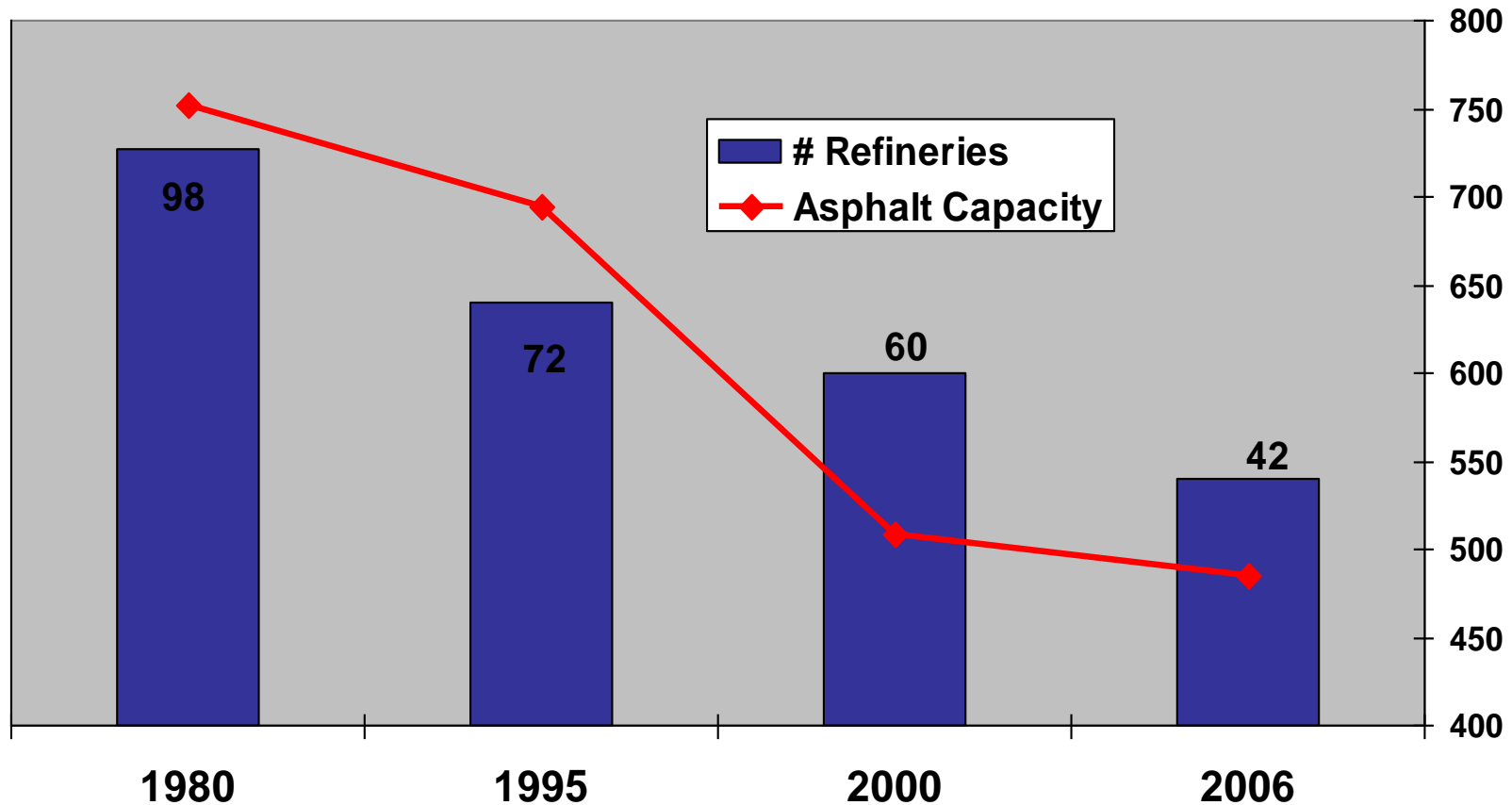
US Energy Policy Lacking

- Still living in the past
- New reality
 - Oil is a truly global resource
 - Market driven buyers of crude
 - Huge strategic importance
- Domestic production options exist
- US oil drilling at a 20 year peak in 2006
- 9% increase from the same period in 2005



U. S. Asphalt Refining Capacity

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Production Range: 600 B/D to 60,000 B/D

Source: Oil & Gas Journal

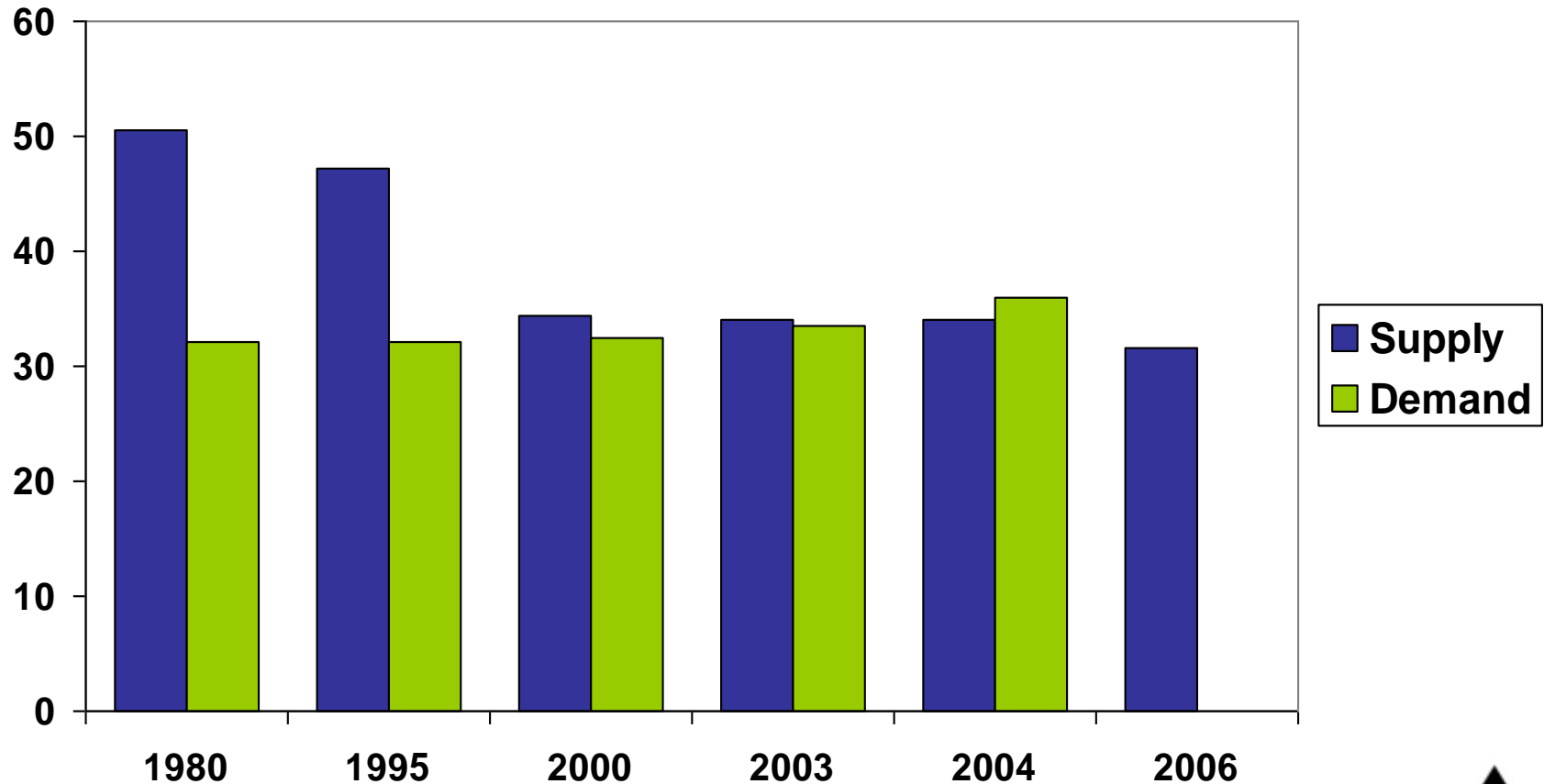
We're driven. www.asphaltinstitute.org



Historical Asphalt Supply/Demand

Millions Tons - Liquid

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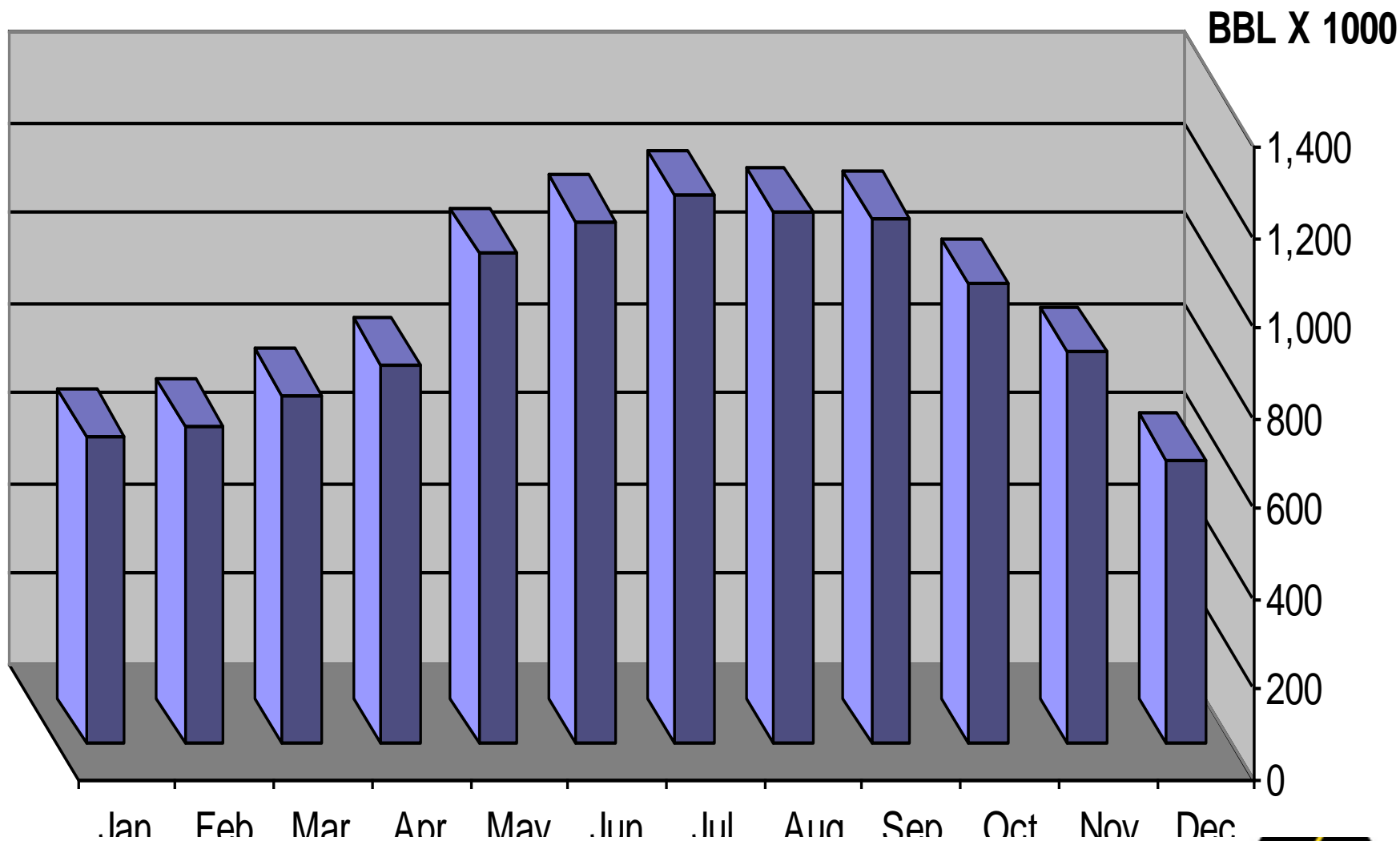


Source: Oil & Gas Journal



Average Monthly Variation in Asphalt Production

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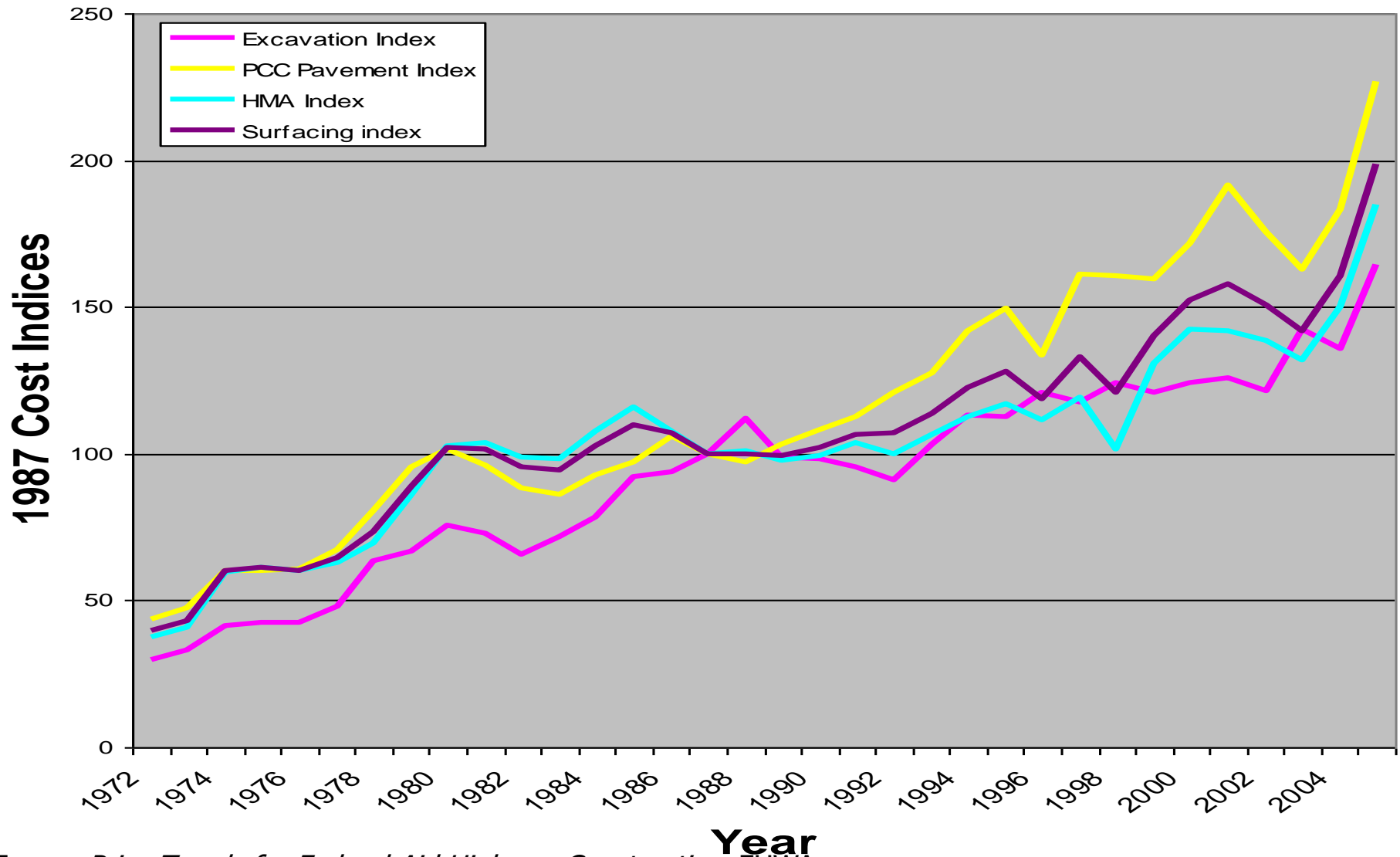
Factors that may affect asphalt binder supplies

- Logistics into and out of refineries
 - Crude availability
 - Things that are critical to refinery operations
 - Power, nitrogen, gas
- Market
 - Asphalt versus other petroleum products
 - Seasons, weather
- Imports
 - Not a significant source in the past, but what about the future?



FHWA Materials Cost Indices, Embankments and Surfaces

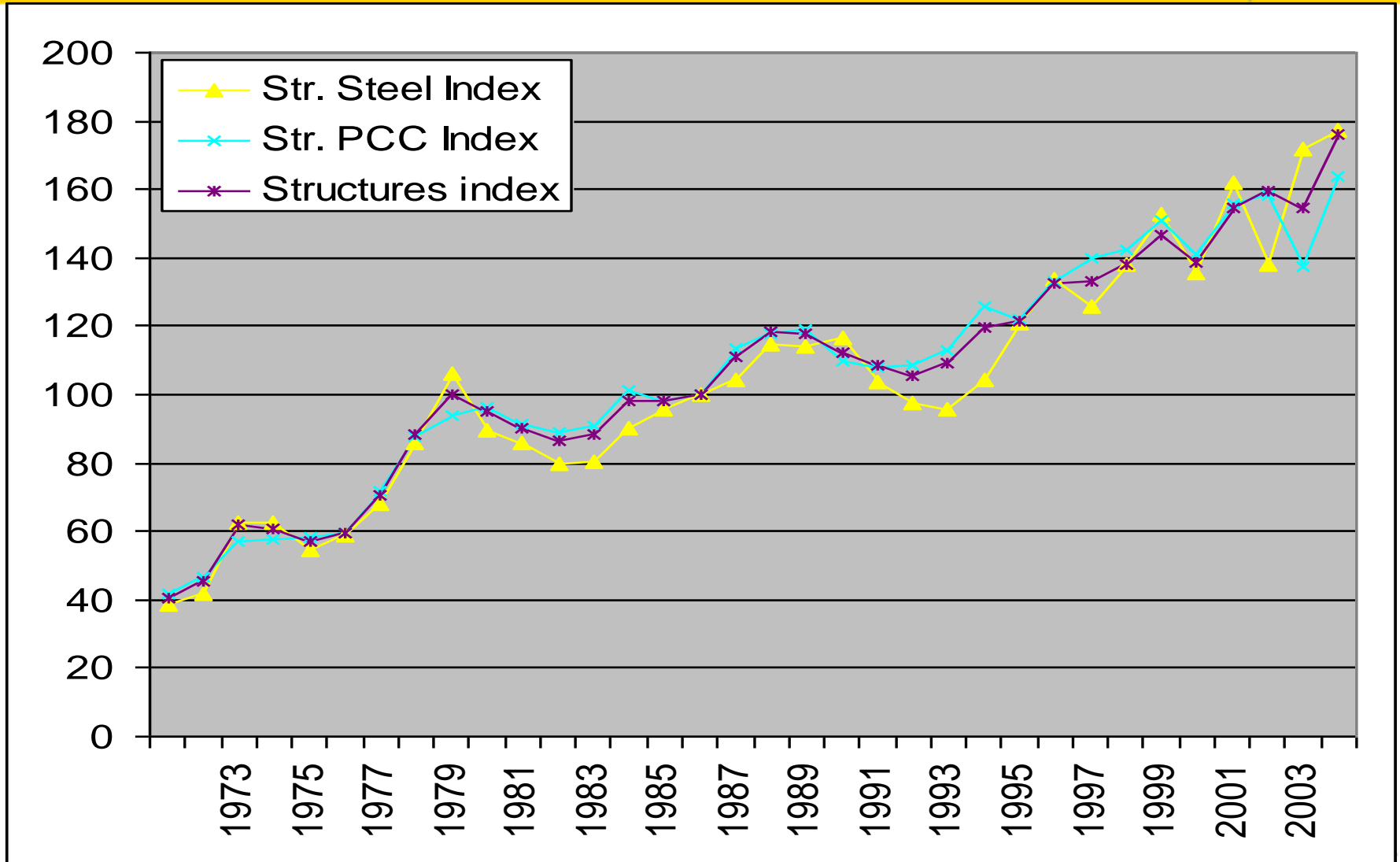
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From: *Price Trends for Federal-Aid Highway Construction*, FHWA

Structural Items-FHWA Data

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AASHTO Survey - 2006

- AASHTO Standing Committee on Highways - 44 states
- Average cost increases:
 - HMA 18%
 - PCC 22%
 - Steel 26%



Observations

- Volatility in cost and supply exists for major construction materials
- Equipment cost and availability, and the available construction labor force are emerging issues
- Funding hasn't increased to take any of this into account

How can an agency respond to these issues while maintaining or improving their network condition level?

Some things to consider...

- Pavement preservation
 - More cost-effective now to keep pavements in good condition than before!
- Efficient use of available resources
 - Reuse existing materials to their full extent
 - HMA recycling
 - Full-depth reclamation of flexible and semi-rigid pavements
- Emphasize quality materials and workmanship



Paving Industry Challenges...

- Significant run up in all material costs
- Reducing costs of in place construction
 - Efficient burners, modern plants
 - Stockpile management (paving under, slope management etc)
 - Low temperature mixes
 - Thinner overlays
 - RAP management and use (% inc, sorting)
- What is the in-place cost reality?



RAP Use Increasing

- NCHRP Report No. 452 – Recommended Use of Reclaimed Asphalt Pavement in the Superpave Mix Design Method: Technician's Manual; Becky McDaniel (North Central Superpave Center) and R. Michael Anderson (AI)



Paving Industry Challenges...

- MEPDG local calibration
 - Few DG sections included PMA
 - Few section for Superpave mix designs or SMA
 - Few constructed using modern equipment technology
- National calibration grossly conservative for asphalt (not so for PCC)
- Need a national-local process to work within the guide to improve the calibration methodology



Roads that don't wear out
One of the keys to sustainability is long life. With "Regential" treatments, asphalt pavements last an eternity (long, long!). A Regential Treatment is constructed in the base course in the top layer only. The only rehabilitation required is removal of the surface and resurfacing with a slight overlay. Just current treatment, technologies can be done on an infrequent basis every 15 to 20 years. The selected material is then recycled. Regential Treatments are the ultimate in sustainable design and construction.

Redubilitation
When chronic patients reach the end of their useful life, they must undergo expensive, time-consuming redubilitation. This process transforms patients into "resources" in addition to consuming the medical goods. They need good diagnoses and, used to go together, well-structured energy and produce excess emissions. Appleby's machine is a sustainable process called "redubilitation," which the company considers to be a value-additive process.

Public safety
Smooth asphalt roads give vehicle tires a better contact with the road.
One type of asphalt surface, known as
open-graded friction course, allows rainwater

According to the U.S. Environmental Protection Agency and the Federal Highway Administration, about 90 million tons of asphalt pavement is reclaimed each year, and over 25 percent of that total is recycled!

Recycled asphalt pavement (RAP) can be recycled into quality mix as new, or even better, quality as primary materials of virgin materials. And, the same materials can be recycled again and again; it never loses its value. The asphalt content—the glue that holds the pavement together—retains its ability to function, as good or better, so that it is reused for its original purpose. The aggregate (sand, gravel and crushed stone) in the original concrete are also recovered. Many pavements are more than 20 years old and are in a worst state than they were when originally constructed.

It is estimated that recycling of asphalt pavements saves the American taxpayer \$1.8 billion per year. It also saves hundreds of acres of landfill space each year.

Materials from other industries are routinely recycled into asphalt pavements. Instead of going into landfill, some of the most common are rubber from used tires, glass, asphalt roofing shingles, and hair furnace slag.

Lower greenhouse gases, lower

The production and poechness of asphalt products consumes less fuel and produces lower levels of greenhouse gases. According to a recent study, asphalt pavements require about 30 percent less energy to produce and construct than other pavements. Less fuel consumption means less production of carbon dioxide and other greenhouse gases.

Since 1970, the asphalt industry has decreased total emissions from plants by 97 percent while increasing production by 420 percent. Emissions from asphalt plants are so low, the EPA considers them as only minor sources of industrial

The asphalt industry is also seeking ways to reduce the temperatures at which asphalt pavements are produced and placed. Typically, asphalt paving temperatures are in the range of 280 to 320°F, covering these temperatures by 50°F or more would save fuel and reduce production of greenhouse gases and other emissions. Working in cooperation with the Federal Highway Administration, state Departments of Transportation, and other stakeholders, the asphalt industry

Asphalt moves traffic along
When traffic backs up, cars and trucks consume fuel unnecessarily and produce excess emissions. One way to reduce both fuel use and pollution is to use

Asphalt is the sustainable material for constructing pavements. From the production of the paving material, to the placement of the pavement on the road, to rehabilitation, through recycling asphalt pavements minimize impact on the environment. Low consumption of energy for production and construction, low emission of greenhouse gases, and conservation of natural resources help to make asphalt the environmental pavement of choice.

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- Carries less water
- Allows for better use of land
- Reduces runoff
- Promotes infiltration
- Cleans stormwater
- Replenishes aquifers
- Protects streams

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They also can lead to unusual solutions, such as draining down stands of trees in order to build detention ponds.

Perennial asphalt pavements allow for land development plans that are more thoughtful, harmonious with natural processes, and sustainable. They conserve water, reduce runoff, promote infiltration, which decreases stormwater, eliminates siltation, and protect streams.

A good porous pavement has an open graded surface over an underlying stone storage bed. The water drains through the porous surface and into the stone bed, then, slowly, infiltrates into the soil. If contaminants were on the surface at the time of the storm, they are swept along with the runoff through the stone bed. From there they infiltrate into the substrate so that they are subjected to the natural processes that cleanse water.

Construction and performance
Formix asphalt pavements are fast, and easy to construct. With the proper information, most asphalt plants can easily prepare the mix and general paving contractors can install it.

The stone bed, often eighteen to thirty-six inches in depth, provides a firmness

dense surface for the pavement. As a result, potholes, asphalt potholes tend not to occur, cracking and potholes formation problems. The surface wears well. Under the stone bed is a geotextile which keeps fine particles from moving into the stone bed from below and filling in the spaces.

Rubus uschalt has been proven to live for decades, even in extreme climates, and even in areas with many freeze-thaw cycles.

The underlying stone bed can also provide stormwater management for adjacent impervious areas such as roofs and roads. To achieve that, stormwater is conveyed directly into the stone bed, where perforated pipes distribute the water evenly.

Economics

Routine pavement is a sound choice on economic alone. A porous asphalt pavement surface costs approximately the same as conventional asphalt, because porous pavement is designed to "fit into" the topography of a site, there is generally less earthwork. The underlying stone bed is usually more expensive than a conventional compacted all-base, but this cost difference is offset by eliminating the detention basin and other components of stormwater management systems. On projects where costs have been compared, the net savings has been the less expensive option. Porous pavements are therefore attractive on both environmental and economic grounds.

An installation at the University of North Carolina in Chapel Hill included parking lots where some sections were constructed from porous asphalt and others used porous concrete. The cost differential was approximately 4¢/ft²; that is, the porous concrete pavement cost four times as much as the porous asphalt pavement!

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New site: *PaveGreen.com*

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ASPHALT

The Sustainable Pavement



ENERGY & RECYCLING



PERFORMANCE



WATER QUALITY



CLEAN AIR & COOL CITIES



Asphalt is the sustainable material for constructing pavements.

From the production of the paving material, to the placement of the pavement on the road, to rehabilitation, through recycling, asphalt pavements minimize impact on the environment. Low consumption of energy for production and construction, low emission of greenhouse gases, and conservation of natural resources help to make asphalt the environmental pavement of choice...[More > > >](#)

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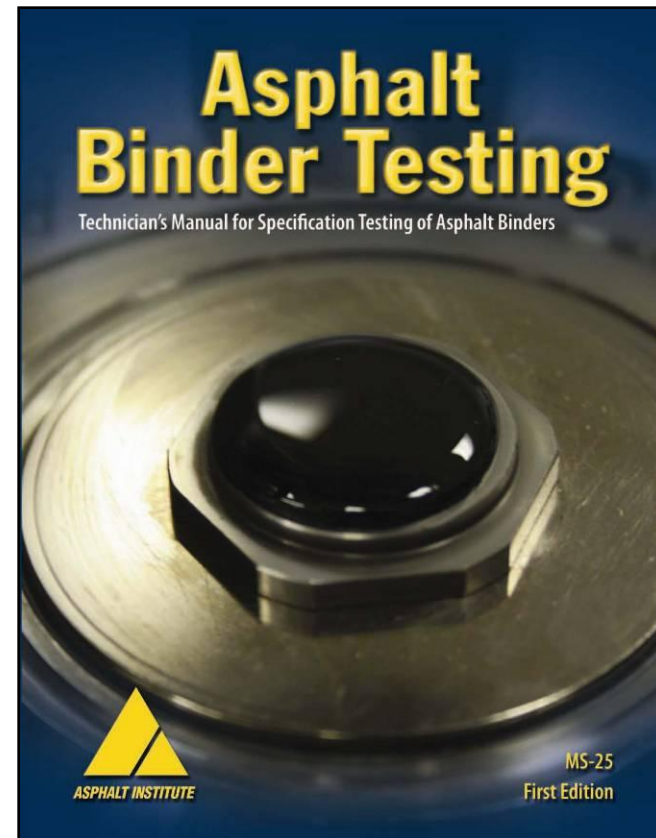
AI Publications Development Update

- MS-23 Thickness Design:
Asphalt Pavements for Heavy Wheel Loads –
now available
- MS-24 Moisture Sensitivity
- MS-19 The Basic Asphalt Emulsion Handbook

MS-25 Asphalt Binder Testing

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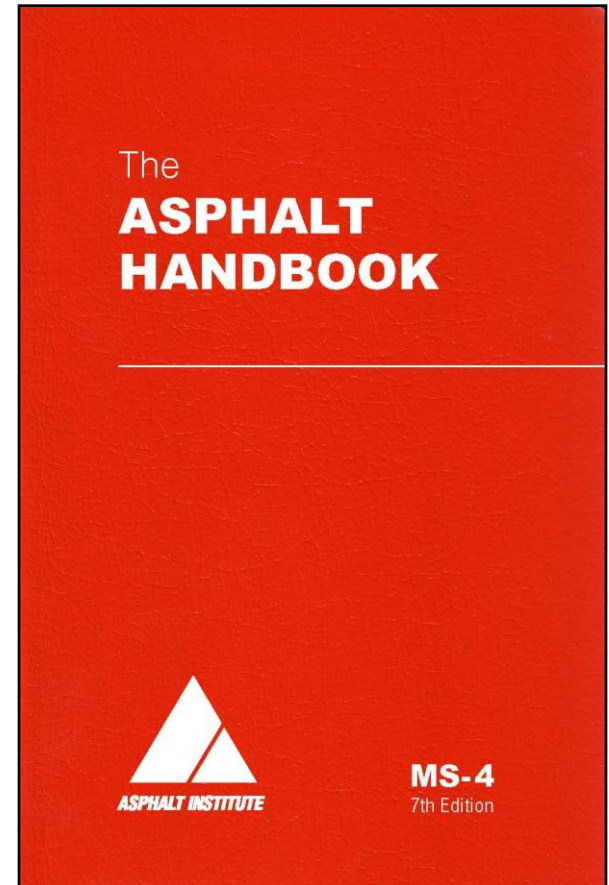
- ***Asphalt Binder Testing: Technician's Manual for Specification Testing of Asphalt Binders***
- New manual
- Available now
- *Principle author:*
Dr. Dave Anderson



MS-4 The Asphalt Handbook (7th Ed.)

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- New edition; completely revised.
- Delivery Date: September 07
- Sampler unveiled at NPE
- Also at WOA in Atlanta



A Professional Reading List

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Oil: Anatomy of an Industry

Matthew Yeomans

Blood and Oil

Michael T. Klare

Crude Awakening

Steve A. Yetiv

Twilight in the Desert

The Coming Saudi Oil Shock and the World Economy

Matthew R. Simmons

