



ISAET '21

7th International Symposium on Asphalt Emulsion Technology

Application of emulsion technology to the
development of cost efficient clear surfacings

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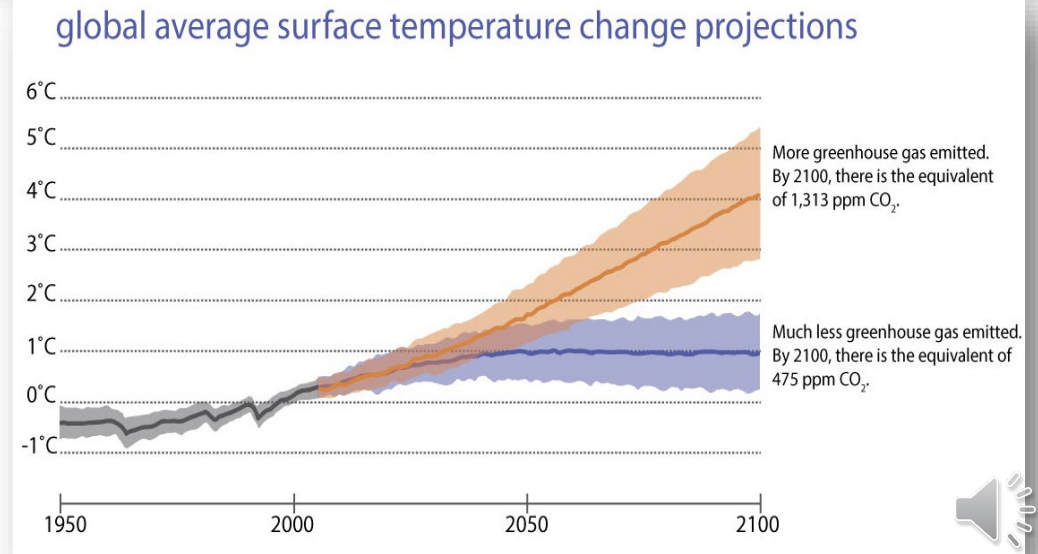
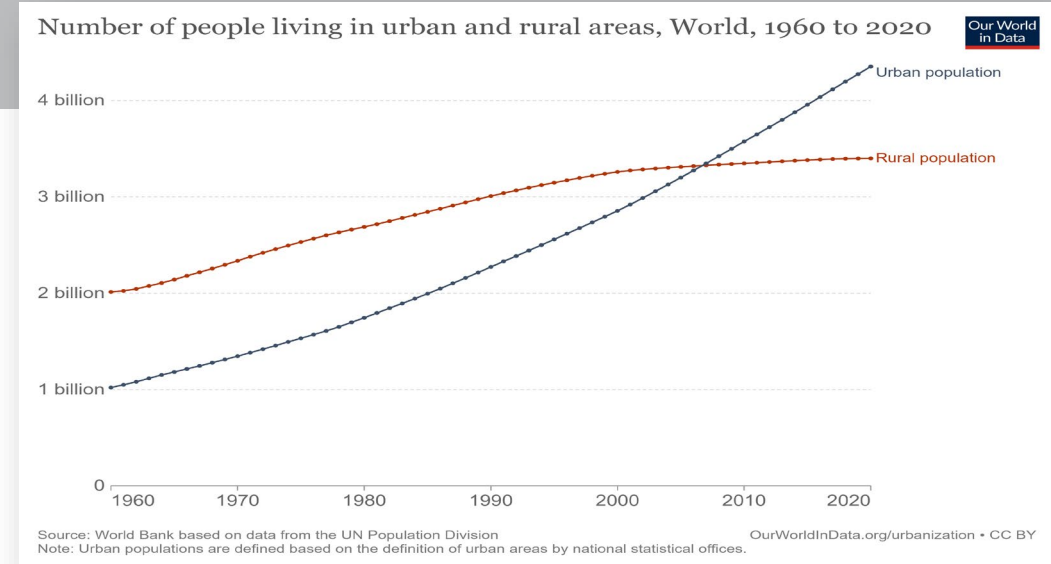
Two of the challenges facing roads in the near future

1. Growing urbanization: *today more than half of the world population lives in urban areas, and growing*

- Traffic congestion > Multimodal transportation
- Dedicated lanes > Road user's safety
- Preserving esthetics and historical sites

2. Climate Change: *average temperatures could be from 2 to 9.7°F (1.1 to 5.4°C) warmer in 2100*

- Urbanization and climate change compound to create even warmer "Urban Heat Islands" where the majority lives....
- In colder latitudes , permafrost degradation



Road Surfacing functions shall evolve

Traditional functions:

- Provide rideability and skid resistance for road users
- Protect the road from traffic wearing and moisture ingress.

New requirements:

- Positive identification of dedicated lanes for safety
- Esthetical and Historical identity
- Thermal performance



Technical Solutions

- Modular paving systems
- Colored hydraulic cement concrete
- Epoxy and Methyl Methacrylate (MMA)
- Colored Asphalt Mixes

→ Costs of those colored materials and their installation are a limiting factor

→ All properties are surface related → thin colored wearing resistant overlay on top of an existing pavement is more cost efficient.

→ Emulsified Clear Binders + Pigments → Colored Cold Applied Surfacing



Clear Colorable Binders

Clear binders:

- Synthetic binders formulated from resins and oils of petroleum origin
- Or with renewable constituents of plant origin
- They meet traditional binders' specifications (PG, SP, Pen...)
- They can be emulsified and are easily pigmentable



Pigments:

- **Red Orange Yellow** : iron oxides
- **White**: Titanium Oxide
- **Green**: Chromium Oxide
- **Blue**: Cobalt Oxide



Case Studies:

1. Surfacing for identification of dedicated lanes for safety

2. Surfacing for Esthetical and Historical identity

3. High Reflectance Surfacing (Albedo)

3.1 Stabilization of the Permafrost in northern latitudes

3.2 Mitigation of the Urban Heat Island effect



1. Identification of dedicated lanes for safety

Shoulders are used for bicycle traffic and emergency stops

→ The application of colored microsurfacing allows positive identification of driving lanes, channelizing motorized vehicles traffic, reinforcing **ALL** road users' safety.

Microsurfacing produced with clear binder emulsion can be colored in red...



Libourne By-pass



RD 106 Bordeaux - Arcachon Bay



1. Identification of dedicated lanes for safety



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2. Surfacing for Esthetical and Historical identity

A specific DBST formulation, was developed by Colas as part of the restoration of 25 miles of roadways and paths around the Palace of Versailles, with two imperatives:

- Respectful of the site's architectural heritage: preserve the original appearance of the sandy alleys
- While maintaining a cohesive surface under pedestrian traffic (7 millions visitors every year) and utility vehicles traffic



2. Surfacing for Esthetical and Historical identity

1. Existing Pavement



2. Coat of Emulsion



Clear DBST Application,
Chambord Castle



3. Chips application



4. Rolling the Choke Sand in



2. Surfacing for Esthetical and Historical identity



2. Surfacing for Esthetical and Historical identity



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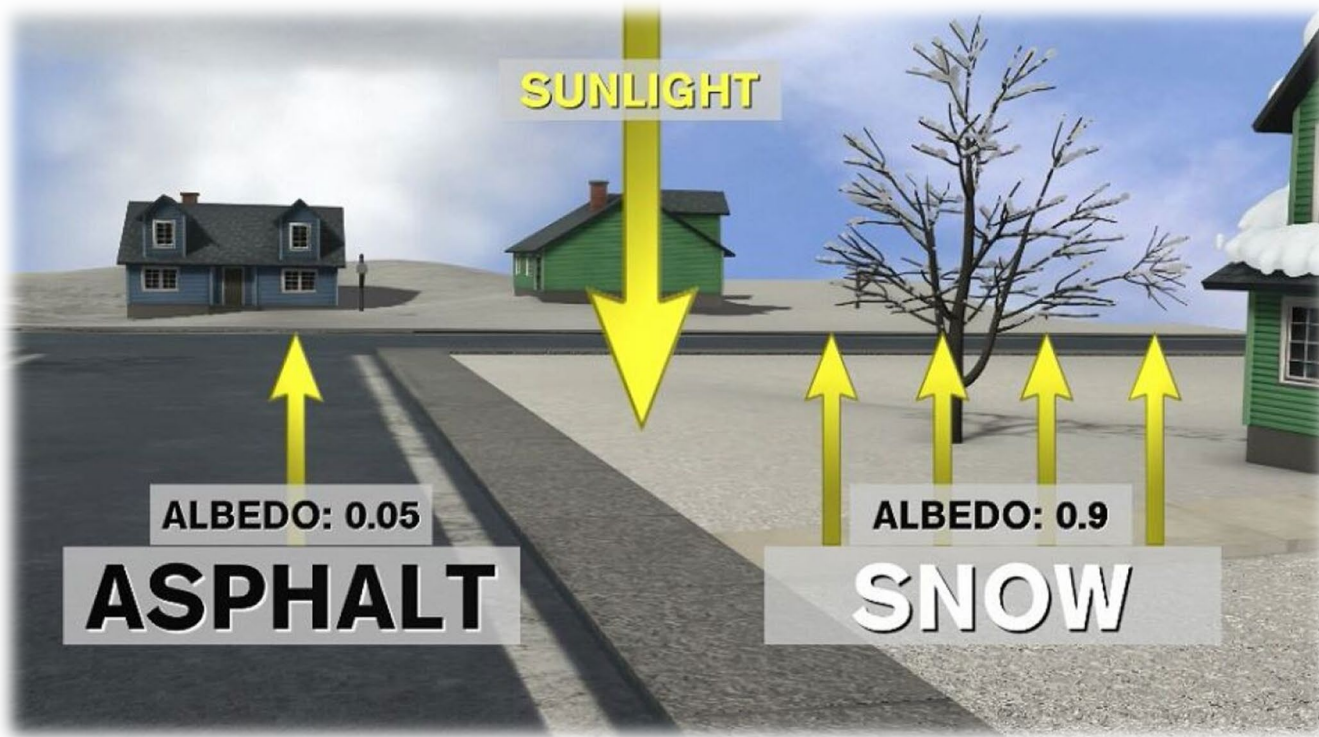
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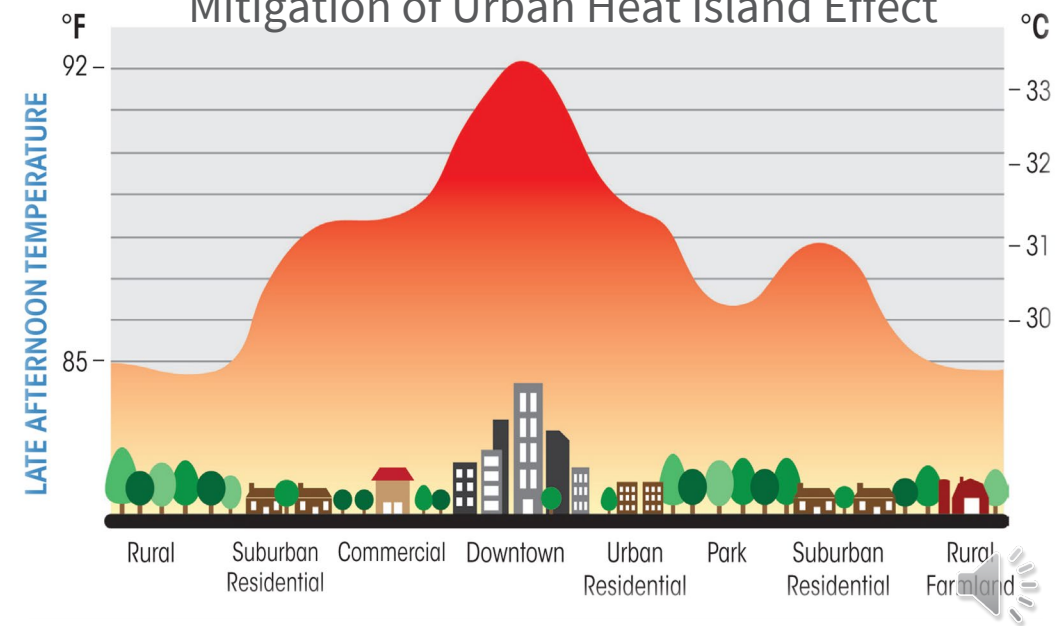
3. High Reflectance Surface Treatments

Stabilization of Permafrost Thaw



Albedo is the portion of Solar Energy reflected.
Higher Albedo surfacings result into **LOWER HEAT ABSORPTION**

Mitigation of Urban Heat Island Effect

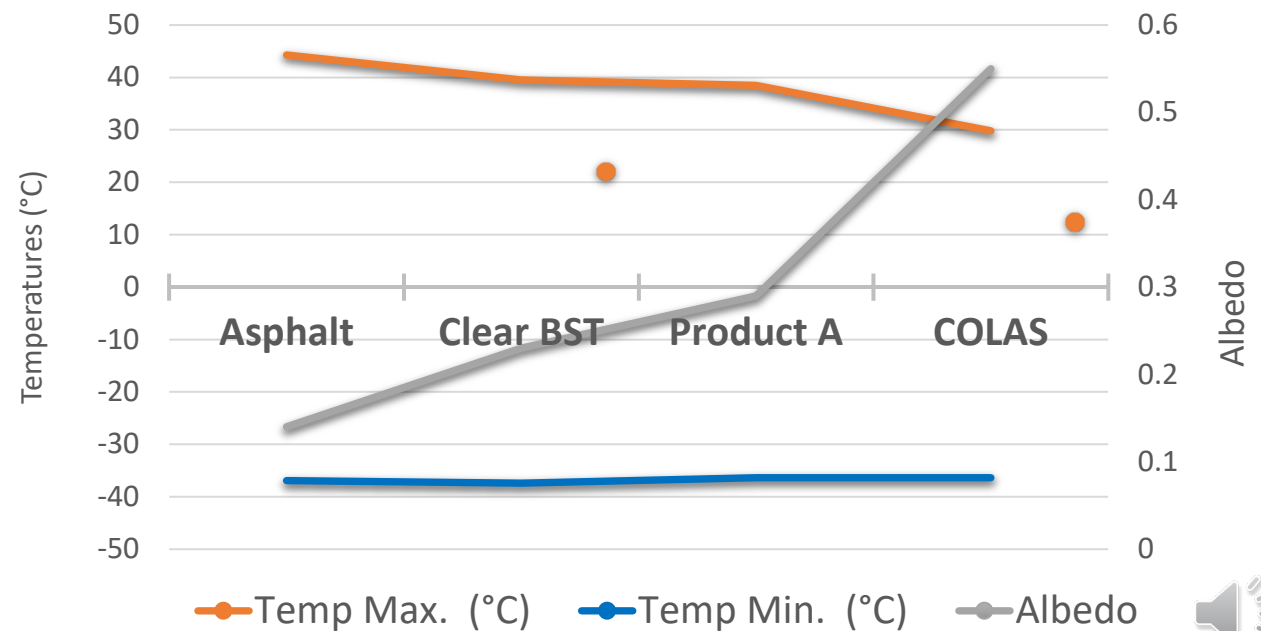


3.1 High Albedo Sealcoat for Stabilization of Permafrost



ASTM E 1918

	Asphalt	Clear BST	Product A	COLAS
Albedo	0.14	0.23	0.29	0.55
Temp Max. (°C)	44.3	39.5	38.5	29.8
Temp Min. (°C)	-36.9	-37.4	-36.4	-36.4



Alaska Hwy, Yukon - 62° 22'N



iberf
International Bitumen
Emulsion Federation



3.2 High Albedo Surfacing for UHI Mitigation

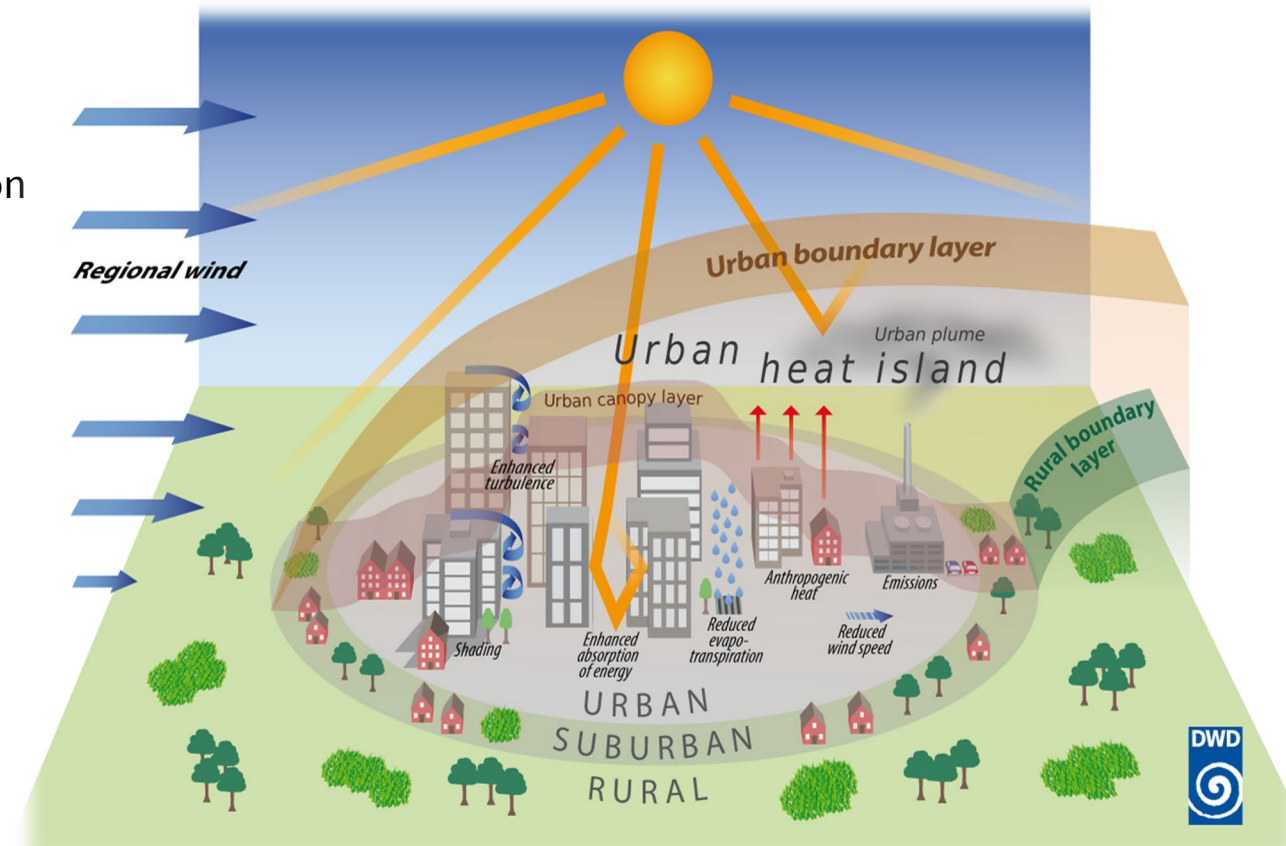
Urban Heat Island is a complex phenomenon in which pavement albedo is one of many factors .

- Climate, man-generated heat...
- Urban planning and geometry: urban canyons, streets orientation vs. dominant winds...
- Materials: buildings and pavements, thermal properties, *albedo*
- Evapotranspiration: presence of grassy areas and trees, water bodies, water retention in porous pavements ...

→ Unintended consequence: high reflectance surfacings in urban canyons can have an oven effect.

→ High albedo pavements are efficient on open roadways (ROW width to buildings height ratio > 1.5)

→ Need for large-scale field evaluations / modelization

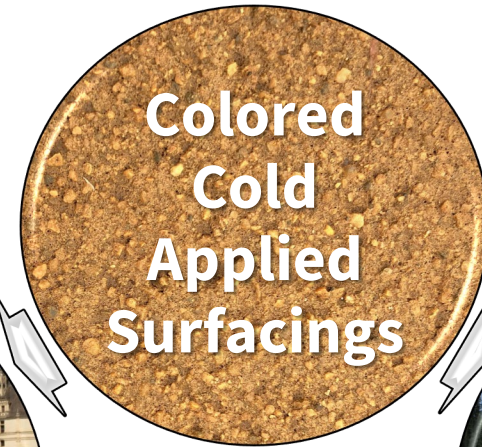


Conclusions

Colored Cold Applied Surfacing:

- Pigmentable, Emulsified, Clear Synthetic Binders
- Whether Petroleum or Plant based
- To produce Chip Seals, Seal Coats, Microsurfacing

Cost competitive alternatives to pavers, colored concrete, epoxy...



THANK YOU

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