

U.S. EPA Heat Island Reduction Program

Cool Fixes for Hot Cities Part 2: Los Angeles

Webcast Questions and Answers

September 12, 2018

Questions Answered During the Webcast:

Could you go into a little bit more detail as far as any issues with glare when you increase the albedo? And with respect to some of the coatings, there's a potential issue sometimes related to traction particularly for bikes and motorcycles, has anyone looked into this impact quantitatively or can you address that in any way?

Kurt Shickman: Sure. So let me start with the first one which is glare. So I guess there's two things here. The first is in the supplies for both roofs and for roads, but – these are not mirrored surfaces. You're not getting direct reflection which is where you would normally get a glare like you get, you know, on a car window when you're behind the car in the – in the sunny day. This is more diffused reflection. So the issue of glare is not as great for that reason.

And the second issue here is that the changing – the changing color from a dark roof to a light roof is significantly more than a dark road to a cool road. So we're not – you are already experiencing a lot of cool color roads when you look at the difference between most sidewalk colors and the street. So it's not a – the issue of glare has not been one that we have seen come up all that often on most of the installations that we've – that we've been aware of. So – and that's for those two reasons.

And then, the second question was around traction. Well, it's a great question. I think, actually, Greg mentioned in his – in his presentation that the city of L.A. actually did an analysis of the – of the traction and deemed it safe and we've actually seen that. I think, I believe, Chula Vista also did that down in – near San Diego.

So those – from those points, I think we've seen that for the most part these are – these are – these are safe at least from what I've seen. And, in fact, interestingly enough, a lot of the original cool pavement applications were to highlight bike lanes to either have them stand out and the sort of side-by-side lanes or to – or to have those sort of boxes at the front of the – of the – at the front of an intersection. So, in many cases, these technologies came out of – out of that – out of that use conditions. So again, I can look into that further, but my experience has been that that has been a great deal of issue with the safety of the pavements as it relates to traction.

Greg Spotts: Yes. Just to add a little more, the state of California has a minimum coefficient of friction. It is quantifiable and the test we did ensure that it meets that minimum coefficient of friction. And we do those tests every time we do an install.

So we haven't just decided it's safe from the beginning. Every time we do an install, our GST standards lab comes out and I get a written report on that and we haven't had a single installation yet. I guess we've done 30 because we did 15 and then 15 with the revised coating. We haven't

had a single one that failed that test.

Victoria Ludwig: For traction?

Greg Spotts: For traction.

Related to the reapplication that you did, has that affected the cleanliness of the road, wear and tear, how long the pavement lasts, and did you include any of that in your requirements for the pilot? Any minimum requirements for the vendor on those issues of lifespan, cleanliness, and wear and tear?

Greg Spotts: Sure. So the reapplication has only gone down in the last 90 days. So it's too soon to tell how clean it's going to stay. In the beginning, when we were looking at the products, one of the tests are – General Services Asphalt Lab did for us was a test on how easily it might abrade off. They had an expectation for how many years it should last. And I guess they have a test where they scrape it over and over and over again and it – and it met that test.

But a very – a different question on whether the material stays on for three years, say, is do you get a cooling benefit at the end of the three years. It's possible the material stays on, but it's so dirty that you don't get a cooling benefit.

So really one of the most important next steps is to figure out how – what is the longevity of the cooling benefit in a very dirty outdoor environment. L.A. is particularly dirty because it doesn't rain for six months. So there's no natural, you know, cleaning of the pavement. And so, we really – you know, one reason why we're taking a – slow on taking this to scale big time is we'd really like to know more about how many years of cooling benefit are we going to get.

When you were considering the coating, were you just looking at different things you could do asphalt-related or did you consider a variety of other options like concrete substitutions or maybe doing vegetative pavers? Explain a little bit about the process for how you narrowed down on an asphalt coating, specifically.

Greg Spotts: Yes. Absolutely. So in Los Angeles we have so many subterranean utilities that get accessed all the time for new service or repairs that concrete streets really don't work for us here. They get trenched to hell, they aren't repaired properly back in concrete. We just don't have the right environment here for a concrete street to get the kind of 50-year to 70-year-service life that you need for how much it costs.

Also, concrete takes a while to cure. L.A. residents are really into driving and they want to be able to drive on the new street day of. You know, the concrete streets we have in L.A., the street was built before the subdivision opened. So no one had to live through the construction of a concrete street in front of their house.

So for all those reasons, adding to the – you know, about 5 percent of our streets are concrete. We do not want to add to that population. We're having a hard time maintaining the concrete that we do have.

We looked at, you know, additives to asphalt. We own two city asphalt plants and we were really

concerned about the ability to batch produce cool pavement. You know, the inside of the drum in an asphalt plant is an extremely sticky place. And we thought, you know, how are we going to produce some black asphalt and then produce some grey asphalt and then go back to producing black asphalt? We also felt that the titanium dioxide lightening agent, the pigment, we would be spending a lot more money to lighten 2 inches of asphalt than 100 microns of coating.

So, for all those reasons, for us we thought that the coating was the most cost effective way to begin. We don't feel that vegetative pavers are appropriate in a public street with heavy trucks, trash trucks, delivery trucks that might go on them. You know, we didn't feel we could guarantee we could maintain that. So we went with what we thought was sort of the lowest pain point to enter and explore the space.

Is the tree program targeted at businesses or is it just residential citizens? And how did you engage them to have them want a tree? Did you do any education to help them learn how to maintain the tree and some of the stewardship issues that come with having a tree?

Craig Tranby: Yes. It is both business and residential or – can qualify to get free trees. In terms of the education, I would say, we provide, you know, guidance, handouts and have some things on the web. Those nonprofit outreach grantees have been important in reaching harder-to-reach communities within Los Angeles. We also have our nonprofit planting partners which seek out locations particularly with the street trees.

We have, kind of like, three types of distributions we do or plantings. We have street trees along the parkways that gets planted and permits are pulled and pavements cut. And there's a whole sort of agreement with the business owner or the residents, so they're very much involved in that.

There are also tree adoptions that at a public event where people pledge to take care of a tree and go home and plant it in a certain location. And then, there's delivered trees which are in that similar mode of taking a tree out to a resident or a business and then they would continue on with the planting.

Victoria Ludwig: OK. Thank you.

Craig Tranby: Did I – did I answer ...

Victoria Ludwig: So the cool – I think so.

Craig Tranby: OK.

Now that it's been – it's an ordinance, of course, but how have the residents reacted to it?

Again, have you done – what – a lot of outreach and education? I thought it was great how you said there's been market transformation from the vendors. But the actual homeowners, how have they reacted to the whole thing, either positively or negatively?

Craig Tranby: I think initially there were concerns about reduced choice, the consumer choice of products. Of course – I think maybe many people on the call are familiar with cool colors and there are – there's actually a fairly decent spectrum of roof products. Those – that choice tends to

diminish a bit when you get into the asphalt shingle product area. And so – and as you get into the darker colors with asphalt shingles, the cool color is just a little bit more of a price premium. So I think that was the difficult spot where we were hearing some concerns.

That has largely gone away in the last, you know, year or two, a couple of years. And I think a lot of that has to do with the outreach that we did and the rebate that we offer and the – just the acceptance of the products and the increased product diversity coming on to the marketplace.

For the next phases that you're going to do, Greg, is the funding going to again come from your part of the city or are there any other agencies, public health or otherwise? And the same question for you going forward, Craig, if you haven't already answered it, is the funding source for the tree program.

Greg Spotts: Great, yes. So there's really kind of three different ways we can get funding here at the Bureau. We can seek funding during the annual budget process for the city of L.A. and the mayor proposes a budget every April 20 and then the council sometimes, you know, edits it or add to it. And that's how we funded the cool pavement pilot.

We can also seek external grants and that's how we funded the public study for a multifaceted cool pavement or cool – urban cooling project, the planning grant that we got from the state. And then, the third way is there's a mayoral innovation fund for small-scale activities and we've used that for other things, but we haven't used that for this. But I think we're going to seek money in the regular budget process for the neighborhood cooling project – the neighborhood – the neighborhood-wide cool pavement project.

Victoria Ludwig: Great.

Craig Tranby: And for the cool roofs, I guess that's the incentive funding. So both with the cool roofs and trees these are part of our energy efficiency budget. So we have a – sort of a decoupling in our utility where we're ensured a certain amount of funding for energy efficiency and our – the revenues of the utility would not impact that.

So things are looking good for continued funding or maybe even increased funding for the incentives. Of course, the ordinance is a big, you know, kind of driving factor that the rebates pair with – on the roofs – cool roofs part.

And then, on the tree part, again, this is considered to be one of our energy efficiency programs. It's actually quite cost effective relative to the entire portfolio, in the residential portfolio in particular. So we would – as much as we can find those matches to get new trees out, we would love to spend the money to get those energy savings. So I think the barrier is more penetrating in finding all those locations rather than just not having funding to pay for the trees.

Questions Not Answered During the Webcast:

Does evapotranspiration from porous pavement increase heat index temperatures?

Kurt Shickman: There can be some increases in humidity with evapotranspiration that increase heat index. If the pavement is also lighter in color, the temperature reduction from that almost

always outweighs the increase from humidity. Evapotranspiration, in general, is not as effective of a cooling method in very humid climates as surface reflectivity.

Please elaborate on lifecycle global warming potential (GWP). Please elaborate on the global warming potential of reflective vs. standard pavement.

Kurt Shickman: This deserves more than a short response, but the general issue we see is that embodied GWP in the production phase of some concrete and coatings products outweigh the GWP reductions from urban heat island mitigation in the use phase. The lifecycle analyses thus far have not fully studied all of the cool pavement options (e.g., concrete with slag added) nor have they quantified all of the possible benefits. The biggest missing global warming benefit is the one-time cooling effect of switching from dark to light colored surfaces – this alone would significantly outweigh the GWP from the production phase.

How often does urban runoff reach bodies of water containing fish?

How often urban runoff reaches water bodies containing aquatic life is highly dependent on the waterway. To learn more about the impacts of stormwater runoff on water bodies and aquatic life generally, please visit EPA's [National Pollutant Discharge Elimination System Stormwater Program page](#). This page includes several resources, including the following:

- [National Research Council Report on Urban Stormwater](#) (Review the section on Biological Responses to Urbanization on page 176)
- [EPA's Preliminary Data Summary of Urban Stormwater Best Management Practices \(1999\)](#) (Review section 4.3.2 on Habitat Impacts)

In what ways did the cooler pavement surfaces benefit the residents?

Greg Spotts: In our initial pilot, the goal was to measure the temperature differential on the road surface. We didn't have the ability to measure ambient temperature changes, either outdoor or indoor.

Without a slurry buggy, is the product applicable by hand? We will need to find an applicator and I'm hearing there is reservation from asphalt applicators that the material may funk up their current equipment.

Greg Spotts: Most of our applications were applied via hand squeegee. A tank was brought to the site as a trailer behind a pickup truck. Long-handle squeegees were used to spread a pool of material across the asphalt road surface.

Did you research the difference between a coating over finished asphalt vs. a reflective product within the asphalt sealcoat itself?

Greg Spotts: We researched three options: (i) using pigment to lighten the color of asphalt concrete, (ii) slurry seal, and (iii) seal coat. We ended up going with a commercially-available seal coat which appeared to be the most cost effective, because the amount of pigment is limited to a 100 micron thick layer (two coats, each 50 micron).

Were any of the cool pavement applications selected based on proximity to transit stops to encourage more 1st/last mile pedestrian activity?

Greg Spotts: We focused on single blocks in residential neighborhoods. We weren't installing on arterials.

Did you look at the other sustainability aspects of the slurry seals (e.g., global warming potential) or only look at the cooling aspects?

Greg Spotts: For our pilot we were simply looking for a cost-effective, commercially available coating that met our wet traction standards and reduced surface temperature of the pavement.

What are the best ways to identify the right tree that will survive heat and drought?

Craig Tranby: City Plants connects those interested in free trees to Select Tree information about low water use, hardiness and other characteristics. In creating the free trees list, we have a team of arborists who try to balance environmental factors with potential availability of the trees through local nurseries. Also, City Plants, in coordination with the U. S. Forest Service, is evaluating the performance of a new set of climate-ready and drought-tolerant trees in eight local parks.

How important is it to select a tree that will achieve a street canopy vs. orienting trees for cooling buildings?

Craig Tranby: Street trees in Los Angeles on the whole actually provide good building shading benefits for buildings due to the generally smaller front yards and the stature and growth of street trees selected. Ideally, trees can be positioned to provide multiple benefits. As a utility, we guide tree placement to the west, east and south of buildings respectively to maximize energy savings.

Can you speak to how cool roofs has been applied to public or Department of Public Works buildings?

Craig Tranby: City buildings generally have flat roofs, so as part of the City policy to maximize energy efficiency in municipal buildings, cool roofs have been a standard practice for a number of years now.

Have trainings been held for the public, staff and for contractors?

Craig Tranby: We co-fund regular building code trainings for our Department of Building and Safety compliance staff to ensure they are up to speed with the latest requirements. For contractors, we held a few meetings around the time the ordinance was adopted and would like to do more soon. We outreach to the public through our fact sheets, public events and social media, plus we have non-profit outreach grantees who reach additional audiences that we cannot.