

# U.S. EPA Heat Island Reduction Program

## Cool Fixes for Hot Cities Part 1: San Antonio

Webcast Questions and Answers

August 1, 2018

### Questions Answered During the Webcast:

#### **What advice would you have for other cities that want to do this? What might be applicable to other parts of the country?**

Roberto Carlos Treviño: Well, I think it's like with most anything that's never been done before. It can be – it could be a little difficult. Most people can have a hard time understanding how something may work.

So, we took an existing program that was called Let's Paint and I felt that the program that we had for painting houses, while a good program, was not impacting people's ability to stay in their homes for a long term. And so, I converted that – those dollars. I was able to do that and create a pilot program.

And so, I would encourage other municipalities to use our data – use the pilot program that has, as of now, 184 roofs. Is – it's not magic; it's science. And, you know, we have shown the success of this program. And, most importantly, we've also shown that you don't have to do an entire house to make up the impact.

One of the most important components of a home is your roof. And we first got to address the problem of home maintaining. One of the – one of the biggest issues that people have with their homes is simply maintenance and roofs are a big part of that. And so, a lot of people just simply live with a leaky roof and not realizing that there is – that, you know, there are some serious health (counting) issues when letting that go.

So, lastly, just contact us, obviously, for more information. Partner with folks like the University of Texas at San Antonio (UTSA), Dr. Hazem Rashed-Ali, who has done a great job on handling the science behind this and, most importantly, start working on identifying funds that you can use for this, but get started.

Barbara Ankamah Burford: If I may add to Councilman Treviño's comments, so something that he also did that I think just continue to support the success of this program and his other colleagues really wanting to be part of it, was he was out there just marketing and talking to other partners. So, our CPS Energy, our local utility company here, Councilman Treviño spearheaded an energy rebate program based off of the Under 1 Roof Program.

So, they created this program which they didn't have. And so, anybody doing a cool roof can now get a rebate. On top of that, our other – our parks and recreations department, we partnered with them because Councilman Treviño had a conversation with them.

So now, all the – all the homeowners that we have assisted through the program can receive, if – should they want – a one to two free tree planted at their property to provide for more canopy cover.

And then, in addition to that, we also have a partnership with AACOG, Alamo Area Council of Government. They have a weatherization program, as well as CPS Energy. And so, we refer people to get their home weatherized if they haven't, so we've done that.

So, we've got – so it's really nice (layer, in fact,) with, you know, partners to, again, make that house even that much more energy efficient and safer for that homeowner to live in. And he initiated all those – I would just get calls – I would just get a call, "Councilman Treviño was just here. You know, we need to meet." And so, it really kind of helped a lot. But I just think, again, it just, like, solidified the importance of the program.

I mean, when he, you know, ask for people money, it just reinforces there is a need. Our residents are taking advantage of it. We have partners on board. It all helps.

Roberto Carlos Treviño: I would just like to add before I end, so that – I've seen – I feel this program, this high-reflectance (third) program is a solar program much like when we talk about the solar panels (is) in a way because it does not dissipate the heat and it doesn't create a consumption of more energy. I believe this could be one of the most affordable solar programs this country can see, so we apply it in areas where we can find it can be most utilized.

**We've seen some studies that seem to suggest that cool roofs, particularly on taller buildings, don't necessarily cool the air as the street level. Could you try to address this?**

Jeff Steuben: Yes. So, this is an interesting question about the environment in a – in a city where you might have, you know, shorter buildings and taller buildings and how they interact together in the cool roofs. So, I don't have a – necessarily a concise answer about this. I think it sort of gets into the physics of air currents and sort of how you are interacting with the sort of immediate local environment above the roof surface.

But, what I wanted to plug in here for is the next presentation – the next heat island program is going to be talking about pavements, cool pavements, and sort of street-level cooling efforts, as well as cool walls, which is sort of the new area of looking at do we continue to address sort of the urban heat island.

So, it may be true that, you know, it's not having – a 30-story building might have not had a huge impact at the ground level. But there are other ways to have those impacts through other cool surfaces as well.

Victoria Ludwig: Thank you, Jeff. I would agree with that. That sometimes it takes a combination of cooling strategies to have a measurable impact on the ambient temperatures.

But I would add that I think there – and I believe there are some studies that I can look up – there are – if you have several cool roofs in a – in a – in small area concentrated, that just gives you economies of scale and I think does help to reduce some of the ambient air, as well as the fact that, when you have a cool roof, you have less energy use in the building which means the air

conditioner that's on the top of the building is not putting out as much waste heat into the surrounding area which also waste heat from air conditioners and cars as you – also contribute to heat island effect. So, thank you for that answer.

**How did you get buy in from the stakeholders and residents? You mentioned that – some of the ways that you were able to get residents to join the program. Were there any other sort of skeptics or that you needed to bring on board and, if so, how did you do that?**

Barbara Ankamah Burford: Well, really kind of like – I think the biggest skeptics were just the residents. I mean, our partners are – they are always looking to provide more to who they serve. And so, I think we've done a really great job in San Antonio that we really kind of understand the benefits of partnering.

But what helped us is, once we got (back), you know, the first few houses done and a neighbor – a couple houses down could see it and actually speak to the neighbor and say, “Well, are you – are you sure you're not paying anything back to the city?”

You know, oftentimes when we do housing programs, people – the fear is that the city is going to acquire – take this person's home from them. That is constant fear that we're always fighting against where we have to always make that clear that we're here to keep our residents in their home.

And so, what we just helped was the few – the few first houses we did were just the best testimonial for us because the neighbors could see that. And again, we initially did a lot of block walking, so we left applications and flyers and it was just – we visited those initial homes to, you know, gather testimonials of how the homeowner was feeling about the new roof.

We would get accosted by, “Why haven't done my house?” “Well, we put out a flyer.” “Yes, you did. I ignored. I didn't believe it.” Well now, they see it and so we were able to go back and help other people who initially kind of turned down the assistance who didn't think it was true.

**Did humidity vary a lot during the study and could it affect the results? Did you measure that; could you talk about humidity at all?**

Dr. Hazem Rashed-Ali: We did measure humidity. So, all our data loggers were measuring both temperature and humidity. We didn't see a major impact on the humidity before and after. We did look at it and we didn't – we don't expect that to have an impact on the (building) energy use since, in most cases, the air inside the attic would not actually make its way inside the home. So, we don't expect that to impact the results of the study, no.

**Does the council work with local builders to advance and advocate directly for cool roofs and new buildings? Could explain some of your members what – who they represent in the industry.**

Jeff Steuben: Yes. So that's a good question. I'll start with the second there. So, the members and the participants of the Cool Roof Rating Council (CRRCC) program really span the breadth of the roofing industry. So, we have representatives from all different kinds of manufacturers and manufacturing sectors, as well as a lot of members of sort of interested parties.

So, the EPA is a member of the CRRC, as well as consultants and contractors and sort of a lot of independent city officials and things like that. So, there's a – there's a huge range of interest being represented by the CRRC membership.

But, yes, so the question about advocating and sort of working with local builders, we don't take too active of a role in this area because our role is to be an independent third-party rating agency. And so, we want to avoid taking a – too strong of a position in favor of any one product or solution.

So, we provide educational resources, we help people make decisions. So, obviously, you know, we work with – with a variety of local governments and folks just to give them the information they need and help them make a decision about the policies they want to set. But we don't actually set policy or advocate for a particular policy. We just try to help people understand all the options that they have and sort of get to that solution.

**How is the program funded and did you look at any other way to fund it or how did you decide to fund it the way that you did?**

Barbara Ankamah Burford: So, the program, the funding comes from our general – our city's general fund budget. So, these are non-federal funds again, and so, that is how it initially started.

This fiscal year, through our housing – through our San Antonio Housing Trust, our housing agency that the city has oversight over and our councilman also sit on a board, they allocated some funding that the housing trust had to this program as well.

And again, these aren't federal funds, so we have the flexibility to utilize it with the program. So again, the recommendation is if, you know, the – as a city, if you can look in your own budget and come up with just even that initial \$200,000 to start, that's an awesome thing.

**The different phases of the project, was there any kind of learning curve that you developed, meaning, did you analyze any improvements that you could make in the impacts but, you know, as you went from one phase to the next? If that makes sense?**

Dr. Hazem Rashed-Ali: Yes. It does, and it's a good question. And, yes, obviously, as with any other projects or activity, you learn things as you go through the project. So, I think our biggest learning point on the research side is with homeowners and being able to get our equipment in there at the right time, to make sure that they are not interfering with them.

In a couple of cases at the beginning, we had to ignore some results because there was some interference from the homeowner, they went up into the attic, got to find out what's going on and so on. So that part we kind of got a process for working with them, what to tell them to do and not do and so on. So that certainly was a learning curve.

On the data analysis side, it also took us a couple of tries to figure out what exactly is the data that we're looking for and how to represent it in a way that makes the most sense to the audience which I think is very critical.

You can have a lot of information out there, but if you don't represent it in a way that makes

sense for the – to the policymakers and that gets them the results that they can benefit from, then the data is much, much less useful. So, I would say these were two areas in which we learned as we progressed with the project.

**How do you deal with any potential unwanted glare that may come from cool roof as it applies commercial buildings?**

Jeff Steuben: Yes. I think that's a – an important question is that sort of – it is a possible side effect of a – of highly reflective product and I think that gets to some of the new technologies like I mentioned, the cool colors and there are other types of products such as reflective materials which look, you know, dark or look a certain color from the street level, but are highly reflective from the sun's perspective. But if you – if you do have a very bright white coating that is going to result in a lot of the light reflecting off that.

There are also other technologies – retro-reflectors is a term for something that reflects back at the same angle of the incident sunlight. So, it's not going to bounce – it's not going to bounce at a different angle and, you know, hit your neighbors. But it is going to keep the energy out of the building and sort of reflect it back up into space.

**Questions Not Answered During the Webcast:**

**I was wondering if you have any information which compares a cool roof and a solar panel roof, including heat reduction performance, costs, and benefits?**

Jeff Steuben: Even if you want to put solar photovoltaic (PV) panels on your home or building, you're still going to need a roof under it, so there's still an opportunity to make a choice about what product you install. Additionally, PV panels aren't going to cover the entire surface, so your roof choice is still going to be a factor in keeping your home cool.

Exploring the relationship between cool roofs and solar PV is definitely an area that is worth further study. As I understand it, PV works more efficiently at a lower temperature, so cool roofs could theoretically help improve PV output.

**I've only seen cool roof ratings of 0.48 and lower. Are there roof solutions with even higher solar reflectance and thermal emittance? And how do these cool roofs compare in solar reflectance and thermal emittance to green roofs?**

Jeff Steuben: If you check out the [CRRC Rated Products Directory](#), you'll find products with solar reflectance values above 0.48.

From my experience, living "green" roofs with plants like sedum have a solar reflectance around 0.15–0.20. However, living roofs are quite different from conventional roofs and have other impacts like evaporative cooling and rainwater retention. Typically, living roofs have a very thick substrate (the medium that holds the plants) which also has insulating effects on the building.

**Some analysis found that white roofs actually contribute to global warming rather than reducing it. Could you evaluate its impact on climate?**

Jeff Steuben: Science is complex, and subject to different interpretations depending on the kind of modeling and assumptions used in any particular study. A 2011 study from Stanford University raised some questions about the impacts of cool roofs, but was also rebutted by scientists at Lawrence Berkeley National Laboratory in a paper titled "[Cool roofs and global cooling: a response to Jacobson & Ten Hoeve \(2011\)](#)."

**Do you see a benefit in terms of roof replacements on homes that don't go through the City's program? In other words, how do you scale up cool roof replacements given the size of the building stock?**

Barbara Ankamah Burford: Yes, there is a benefit because other residents who have not come through our program, because they may not qualify or may not feel they need our assistance, are being inspired by the work being done by the program. The program was featured in several news stories and our department received calls from individuals who wanted the specifications for program so they could utilize the same materials for their home's roof replacement.

**Have you considered a similar program for commercial buildings, especially to mitigate the urban heat island effect?**

Barbara Ankamah Burford: Typically large commercial buildings have a cool roof because they have employed an architect and they are looking for maximum building envelope efficiency, but this rarely is seen for residential properties. In San Antonio, many commercial buildings are utilizing cool roofs. The Under 1 Roof program was designed to focus on residential property for our most vulnerable populations, such as seniors, veterans, disable residents, and low-income residents.

**Each roof costs about \$17,000. Saving \$100 per month will take 170 months to recover the cost. This takes 14 years to recover the cost. Is this economical?**

Barbara Ankamah Burford: The City of San Antonio is always looking for economical approaches for our program and currently we are developing a Request for Quotation (RFQ) which will allow the City to procure a larger pool of contractors to assist with the construction delivery of our Under 1 Roof Program. The current cost of each roof includes construction costs, materials, and administrative costs. This RFQ process will allow the City to deliver a more economic program; and the City has made some administrative changes that will lower the average cost.

**What are the other programs available that can help low-income owners with structural repairs needed?**

Barbara Ankamah Burford: The City of San Antonio's Owner Occupied Rehabilitation and Reconstruction Program provides assistance to income eligible homeowners to bring their housing into compliance with local codes and provide safe housing. The Minor Repair Program also provides assistance with structural repairs as well to low-income homeowners.

**Do you have any major concerns moving forward?**

Barbara Ankamah Burford: A major concern is ensuring there is adequate staff to handle the

increase in demand for the program since it will now be offered citywide and the funding allocation has significantly increased.

### **What kind of computer models do you use to run your energy models?**

Dr. Hazem Rashed-Ali: We primarily use the Integrated Environmental Systems Virtual Environment (IES VE) performance simulation software. IES VE is an in-depth suite of integrated analysis tools is used by leading sustainable design experts around the globe.

### **In general, did the homes with central air conditioning have ductwork in the attic space?**

Dr. Hazem Rashed-Ali: Yes. All phase 1 homes with central heating, ventilation, and air conditioning (HVAC) monitored in phase 1 of the project had their ductwork located in the attic. This is typical for homes in San Antonio. This is one of the reasons that a reduction in attic temperature will reduce the cooling energy use in the homes.

### **Why in winter was attic air under the cool roof warmer at night than that under the conventional roof?**

Dr. Hazem Rashed-Ali: We did not investigate the reasons for this difference, but in general it was very small (1-2°F). Also, while the average results did show a small increase in temperature at night, not all homes showed this, which makes it difficult to identify the reason given the current sample size. The additional 30 homes in phase 2 may provide us with more information about this issue.

### **Can the EPA save the Energy Star program for roofing?**

ENERGY STAR Program Staff: The ENERGY STAR label and specification played a critical role at the time of its launch in 1999, jumpstarting demand for cool roofs; however, a recent review performed by EPA indicates that it has been surpassed, in many instances, by commercial building codes and that the range of considerations relevant to the residential purchase decision mean homeowners would be better served by a different kind of resource. As such, EPA has proposed and is taking comment on sunseting the program EPA will consider all comments carefully before finalizing plans for the ENERGY STAR Roof Products program. For more information please visit: [ENERGY STAR Roof Products Specification Version 3.0](#).

### **Cool roofs can cause these surfaces to set off a chain reaction that increases the amount of sun cities receive. These surfaces reduce the vertical transport of moisture to the atmosphere, which in turn limits cloud coverage. That means less rain and an increase in drought conditions—the opposite of the intended effect. Do you have any plan how to reduce any adverse effect on climate?**

Victoria Ludwig: While there has been research on the link between cool roofs and cloud cover, scientists have differing opinions and recognize there is uncertainty in the nature of such research and believe more verification is needed (see three studies below). However, cool roofs remain a proven method for reducing energy use in buildings and lowering temperatures of roofs and the immediate surrounding air. References:

- [Revisiting the climate impacts of cool roofs around the globe using an Earth system](#)



model

- [Cool Roofs Really Can Be Cool](#)
- [Effects of Urban Surfaces and White Roofs on Global and Regional Climate](#)