

Questions and Answers

Neelam Patel: We actually have a lot of interesting questions that range from technical – the availability of technical models and also to the social and psychological benefits of Green Roofs. So before we go into the question and answer session, I would like to take a moment and go back to a comment that I made in my presentation earlier about the Climate Showcase Communities grant.

Slide 25 of First Presentation: Heat Island Funding - Climate Showcase Communities Grant

Neelam Patel: On the screen now, you should see the slide discussing the Climate Showcase Communities Grant. I mentioned that the grant was going to open very soon. I want to announce to our webcast participants that the grant has just opened. So if you are interested in applying to the Climate Showcase Communities Grant to receive funding to implement projects that reduce greenhouse gas emissions, I suggest that you check out the website. And to get ideas about existing projects, we have the web address for our grant program listed on this slide.

I'm going to take a moment to take you to the website. This is our state and local homepage (<http://www.epa.gov/slclimat/>). And if you look in the "What's New" box to the right, you will go to the announcement, "June 8 - EPA announces \$10 million for communities to combat climate change".

You come to the climate showcase communities homepage and here, underneath the title, you'll see the request for proposals. So once you click on this link, it takes you to the request for proposals and describes the exact requirements for applications. And I will also take you to the EPA homepage.

Here, if you go to the newsroom and then go to news releases, go down to sort by subjects and go down to Climate. You will see the press release that has just come out for this grant program. So now I encourage you to check this out if you're interested in combating Climate Change through mitigation.

And for those of you who are interested in cool roofs and have already done some legwork in your communities – excuse me – Green Roofs, and have already done some legwork in your community, this is an opportunity for you to integrate Green Roofs into projects that can be part of this Climate Showcase Communities Grant Program.

So what I will do now is hand over the question and answer session to Nikhil. Like I mentioned, we have had many questions, great questions. We don't get to all of them, but we will provide written responses to all the questions that we did not get to. So, Nikhil, if you'd like to start off with the questions?

Nikhil Nadkarni: Sure. Yes. Thanks everybody for sending in questions and also for including a name of the panelist. That definitely helps to make sure your question gets answered by the right person. I will start off with some questions for David.

So our first question is one of the attendees is curious to know whether the cooling penalty described is counterbalanced by the lesser demand in the early morning hours. Does this effectively flatten the demand load by shifting the demand to low peak periods?

David Sailor: OK. I assume that the question is in regards to early morning cooling penalties for Green Roofs. Yes. So definitely there is an element of sort of shifting the load, but at the same time, there is just more energy that is entering the building over the evening hours. And so when you first turn the building on in the morning, it will take extra energy to do – to cool it off. So I think there might be an element of shift, but I think there's also a distinct penalty that generally is more than off-set by the reductions in the load during the day itself.

Nikhil Nadkarni: OK. Second question for David Sailor. When will your simplified U.S. GBC Green Roof Model be available for use?

David Sailor: We should have that ready by the end of the summer. We currently have a beta version that we're testing out. We have run several thousand simulations with our initial model. We are finalizing some small modifications to the model and then we'll be running another couple of thousand simulations to repopulate the data base. But again, probably by the end of the summer, it will be available. And it would be available on our website. You can either find me directly at Portland State. Our Green Building website is greenbuilding.pdx.edu.

Nikhil Nadkarni: OK. One last question for David Sailor. How much roof surface must be greened or cooled in order to see measurable or meaningful impact on Urban Heat Islands. Specifically, are there feedback effects of Urban Greening on Urban Heat Islands at large geographic scale? For example, is the impact of 1000 green roofs 1000 times the impact of one?

David Sailor: OK. That's actually a very complicated question and it – it's mirrored by the same sort of question with respect to white roofs or street-level vegetation. And, you know, there are definitely non-linearities in the Urban Climate System to start with. And so, you can't necessarily expect a linear scaling.

At the same time, these complexities yield very surprising results at times. For example, if you look at some of the heat island mitigation scientific literature, you'll find that, you know, widespread mitigation in the city or to just in a region of the city has a general sort of city-wide impact of reducing air temperatures but tends to have complex interactions with the vertical mixing in the urban environment so that you actually have spots where you perhaps have increases in temperature or increases in photochemical smog.

So when you look at – at in the aggregate, you know, it all looks great. But the complexities or the devil is in the details and that you do have – you do have sort of this very spotty non-linear response in the city.

Nikhil Nadkarni: OK. Thanks a lot. We'll move on to some questions for Jason Berner. First of all, does the retention of heat in green roofs increase or decrease based on the amount of water in the roof, is this impact different depending on whether it's day or night?

Jason Berner: I'm sorry. Could you repeat that just one time?

Nikhil Nadkarni: Sure. Does the retention of heat in the green roof depend on the amount of water in the roof and is that affected by whether or not it's day time or night time?

Jason Berner: That is a question that I can't give a definitive answer for, but I can say that the amount of – the amount of time the water is retained in the green roof will affect like the reduction in heat in that water. And when it's released to – if it is released to the storm sewer system that – it's the retention time that will have the greatest effect on the amount of heat or the reduction in heat when that stormwater is discharged. Yes, that's – yes.

Nikhil Nadkarni: OK. A second question. You mentioned that there are possible stormwater utility credit programs for Green Roofs. Would you be able to identify them? Also, has the FEMA community rating system for flood protection recognized the benefits of green roofs?

Jason Berner: Sure. Well, a couple of the incentive programs with utilities; one would be out in Portland, another is in D.C. And in general, with both of those programs, there is a – there's a monetary incentive for the use of green roofs or other LID techniques over conventional practices. And so – and that monetary incentive will – it will range in a lot of the times the type of practice that is used and also what type of property that, say, like a retro fit is put in place for.

For the FEMA flood protection program, I do know that FEMA is looking into having different green infrastructure and LID practices such as green roofs be used for providing monetary incentives for communities to use those practices to lower their flood protection insurance rates. But I believe that that change in their program is relatively new. So I'm not sure if it's actually been enacted nationwide yet. And there was one other question about – was it the NPDES program?

Nikhil Nadkarni: Yes, that's right.

Jason Berner: OK. Can you repeat that one? I'm sorry.

Nikhil Nadkarni: Yes, just have the NPDES programs recognize green roofs for credit?

Jason Berner: Definitely. But I guess it depends on how you view that. So, different localities have turned with their NPDES permits have been actually requiring or having as an option green roofs for meeting their discharge requirements.

So right now, with the NPDES permits, it's really based on if a certain city is just – if their city engineers are educated about these practices and they have confidence that, you know, green roofs will meet, you know, their discharge limits. But, yes, it's definitely – green roofs have been put into NPDES permits.

Nikhil Nadkarni: OK. Let's move on to some question for Sara. Thanks, Jason. So the first question for Sara, how do the incentive programs ensure that Green Roofs are designed and constructed to meet performance standards? Is the performance of a green roof linked to the incentive program?

Sara Loveland: I've never seen a case yet where the performance of the green roof was linked to the incentive program. And mostly I think this is sort of a legislative challenge because you want to get the money out the door to get the projects funded and it would be very difficult to rate the performance over time and tell people that you don't want to pay out incentives until you've proven performance.

And so, as a result, that's why you see some of the things like growing medium debt or specified plant list or gone to the point where some jurisdictions specify particular materials and you hope that that gets it most of the way there. But we do also hope that they're doing research or you know, sort of retroactively.

Nikhil Nadkarni: OK. Second question, would a green roof in an arid area, such as Los Angeles – you know, this is an example from one of our attendees – would a green roof in an arid area require a higher maintenance given the low rainfall and to prevent it from becoming a dust roof? Specifically, would it require irrigation potentially increasing water usage?

Sara Loveland: You know, even if it required irrigation I've seen some interesting studies about what the “net water value” is for that when you talk about the cooling effect that it has on the building and how much that reduces the HVAC demand. So I think the number about whether – there's no straight, you know, black and white answer about whether or not it actually increases the overall water usage, even if you use irrigation. But again, I think getting the right plant types for your climate region and, you know, designing the right system. If you're just doing an extensive system, I don't see why projects would necessarily have to have irrigation.

Nikhil Nadkarni: OK. Third question, could you provide examples of eco-districts around the country?

Sara Loveland: Portland and I believe Seattle will become eco-districts and then there are other smaller grant programs that approach eco-districts but are not quite as

comprehensive. So, for example, the green roof for environmental and economic north east revitalization that I spoke about is an area targeted by the deputy mayor and part of the program called the Neighborhood Investment Fund and there are 20 of them in the city. And I think a lot of cities have these where you've already identified commercial corridors that where the city is, you know, trying to promote business growth. And so we – I guess as an eco-district as a general term, would like to see some of these areas that have already been targeted for economic development also targeted for green improvements.

Nikhil Nadkarni: OK. Thanks, Sara. Let's move on to some questions for Michael. Could you talk about green roofs made from containerized plants and how the cost compared to other types of green roofs?

Michael Berkshire: Yes. Well, there are some really interesting new green roof systems out there. There's Roofscapes down at Philadelphia, they have – it's a built up system. I believe it's, you know, three to four inches in depth. If you – if they can place it on a building that's less than three story, then it has at least 10,000 square feet. I've heard quotes as low as \$7 a square foot, which is the lowest cost that I've heard of.

You know, we see both modular and built-up systems in Chicago. The modular systems are not always less expensive. It depends on the depth, of course, and, you know, where they are in the building, how high the building is, et cetera. And then you also have the hybrid systems such as zero floor, which is more like a mat that is laid out almost like sod, it's kind of rolled out.

So there's really, you know, interesting, new technologies out there. But in general for an expensive roof, so a pretty simple, you know, three to six-inch roof, I would say that the, you know, the average is \$10 to \$12 a square foot and that includes a very simple palette of plants as well. But you know, they range anywhere from \$7 a square foot, like I said, all the way up depending on, you know, if you have water features or et cetera you can get in to, you know, \$30, \$40, \$50 a square foot.

Nikhil Nadkarni: OK, second question, has the city of Chicago experienced any negative results from its green roofs, any unanticipated results?

Michael Berkshire: No, I can't think of any. You know, I mentioned during the presentation that when we were holding the focus groups back in 2003, you know, people were threatening that they wouldn't build, you know, some development with LEED in the city, et cetera. I've never heard of a project where that was the breaking point and they ended up moving out into the suburbs.

And, you know, this whole movement has changed so significantly since 2004 and it's, you know, a couple of anecdotal stories. I work with, you know, quite a few attorneys that deal with the large scale projects that we work with and review. And he said that,

you know, back in 2005, 2006, his blood pressure always went up every time he saw me because he would, you know, he knew I was going to talk to projects about, you know, receiving LEED certification and green roofs and he thought, you know, that the price of every development was going to increase after they talk to me.

But I was talking to him about a year ago and he said that now he's always so proud to bring projects into us because developers are, you know, designing buildings that are already LEED certified, you know, that are going to which that are designed to achieve LEED certification, have green roofs, and then you just realize that it's the cost of doing business in Chicago.

And also what's really interesting is that potential buyers or renters are now asking and demanding sustainable elements in buildings. And one developer in particular that I remember him yelling at me right after we implemented the policy, he came up to me and he said, "You know, if you build a non-LEED certified building at this point it's not going to be worth anything today." So I've just really seen the change in the attitude and I think it's for a variety of reasons. There's more national exposure to all of these things but it just has really become important part of the discussion for any development in Chicago.

Nikhil Nadkarni: OK.

Neelam Patel: OK, great.

Nikhil Nadkarni: And Neelam, I guess, looks like that's all the time we have for questions?

Neelam Patel: Yes, that is all the time we have for questions. We didn't get to all of the questions. So I apologize to our listeners about that but in order to make sure that we have answered all the questions, what we will do is take all the remaining questions and provide a word document that will be posted on the website that was in the presentation. So in addition to accessing the presentations, the audio files, and the audio files on our website, you'll also be able to access a word document, and a PDF document that has answers to all the questions.

I would like to thank everybody for joining today's webcast and taking time to listen in on the potential of Green Roof and what they can do for your community. We heard about many different benefits and the factors that need to be considered as well as the process and considerations that need to be addressed by communities when implementing Green Roofs.

So I want to thank all of our speakers this afternoon and remind all of our listeners that the climate showcase communities grant has been released and we are accepting applications until July 26th. And also remind you that our next webcast will be the last week of June hosted by the local climate energy program on the topic of Transportation Control Measures.

So, on the same website where you can access these presentations from today's webcast, you will also learn about our upcoming webcast. I would like to thank to everyone for listening in and look forward to having you join our future webcast from both the local government climate energy program as well as the heat island reduction program. Thank you.

Operator: Thank you. This concludes today's conference call, you may now disconnect your line.

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