

InfrastructureUSA

Guest on THE INFRA BLOG

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Conversation with Steve Anderson, Managing Director, InfrastructureUSA

Nicholas Santero:

Research focuses on reducing our carbon footprint

We're trying to look at infrastructure and say "ok this is standard practice right now and this is how we maintain our buildings, this is how we maintain our roads, this is how we construct things to a certain code." And we're trying to take that one step further and identify better practices focusing mostly on reducing the carbon footprint. You know how buildings consume so much energy, if we construct them in a certain way using better techniques and better materials, how much can we save on a carbon footprint? And the same with pavement; pavement is a maintenance problem where we have large amounts of deteriorating roads. We need to figure out the best way to maintain those roads and what the best materials to use. We have a quite a diverse set of skills here. We have architects working on the buildings, people with construction backgrounds. I'm a civil engineer. I have a background in pavements. We also have a large team of material scientists and chemists that are working to reducing emissions and increasing sustainability from an atomic level, and trying to make materials that help durability and potentially increase property such as thermal mass. We're trying to attack this problem from multiple directions because there are a lot of areas for improvement within the building and pavement life cycle so it requires a diverse set of skills in order to fully capture all of those.

Designing for sustainability

There are a lot of things we can do incrementally to change the footprint of our infrastructure. For pavements we can just change the timing of when we close the roads down, for instance. If we start closing them down at night when there's less traffic that will save a large amount of carbon. I would consider that an incremental change, something that can be done from a management perspective. It's just using better decision-making from our environmental perspective. And when you start talking about new materials and new designs for things, this is kind of the next frontier; designing for sustainability rather than just taking what you have and trying to optimize that, but instead thinking from the initial concept phase. Saying "okay how do we design a building? How do we design a road so that it has a low footprint through out its whole life?" Rather than

trying to just take the design, build the design for cost and then try to change it from there.

Academia: thinking outside the box

I think that we take a larger scale look than maybe industry might, for instance. I don't want to speak for industry or government on their behalf, but the stuff that we're trying to do is think outside the box a little bit and identify where in the life cycle can we find improvements? And it's a good place to do this because we have access to academics; we have access to a lot of the best cutting edge science, for instance. And a lot of times when you're talking about reducing emissions, you're not talking about just taking the best materials that are out there, but we're trying to find new and better materials, and we're trying to push the boundaries of what – traditionally - was or ways to reduce your footprint. At this point we've developed the models here, as well as other people in different institutions, we take a life-cycle perspective at these issues. Looking for opportunities for impact reductions, they take a look at the entire life cycle and developing these models is a difficult process. There are so many different things you have to think about. Talking about a pavement that lasts for maybe forty or fifty years until it's finally taken out of service and rebuilt. You know, a lot of things are happening during that time and in order to fully account for all those things we have to develop models that will account for that – account for where emissions are occurring through out the life-cycle.

The "cost" factor

When we talk about sustainability we often talk about the triple bottom line, so cost is always going to be important. When we talk about sustainability here, you can define sustainability in a number of ways, but environmentally, sustainability perspective we're trying to find things that reduce emissions, but also save cost. It's important to understand that decisions are made based on how much they cost. We can develop very good technologies with good processes to reduce your carbon emissions, but these aren't cost competitive and when we can't find them ways to get into the marketplace, then they're not going to be effective because they're not going to be used. So we try to use techniques that are both cost effective and environmentally effective.

Life cycle budgeting

When I think about life cycle budgeting I'm just thinking about not focusing on the initial cost as the only cost that we have. When an agency decides to build a pavement for instance, there are costs other than just the initial cost of putting it down. If you're deciding between two different alternatives, you have to think about "okay, well this one may cost 1 million dollars to put down, and the next one may cost 1.2 million dollars to put down, but there are things that happen after we put it down. One might have a service life of 20 years, the other one has a service life of 30 years, so how do we weigh these two things together?" So we

talk about life cycle budgeting: we're thinking about "okay there are different maintenance plans for each of these. They have a different service life. How do we balance this all out? How do we balance this out in a yearly, annual budget perspective, and how do we do it from a – from a total cost perspective?" and we also look at things like user cost, our pavements are a public infrastructure and we have users that need to use them.

Everyone's goal for infrastructure is the same

Industry, government, everyone wants this infrastructure to serve our, serve the public well. We want our pavements to be there for a long time, and have good serviceability properties; we want our buildings to be very durable and safe and have them to be low-energy – low-energy buildings, working towards things like carbon-neutral buildings. This is the goal and objective that everyone's trying to reach, and everyone does it in a different way. Our research is focused on doing it from the life-cycle perspective, and focusing on the entire life cycle, not just the materials that go in and out, but everything that's happening while it's being used. And this is everyone's goal I believe, is to just reduce the amount of resources that are needed to maintain the proper serviceability for all of our infrastructure products. When we talk about improving the knowledge and making a better infrastructure, this is not something that can be done by academics alone. A lot of the improvements are done by industry and the people that are out there practicing, and this is where a lot of the revolutions are occurring. The hope is that by investing money in research and better scientific understanding of improving our infrastructure, this is adding another tool to our toolbox. And saying "okay, well we're going to try to improve all this stuff not just by incremental improvements that we might find out in the field, but also trying to look at cutting edge revolutionary science in order to help us as well." And this is not just happening in academics, you look at the cement and concrete producers around the world, they invest heavily in research as well. So, the fact that we're trying to improve our infrastructure from using multiple organizations, public organizations, private organizations, academics, this is important.

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