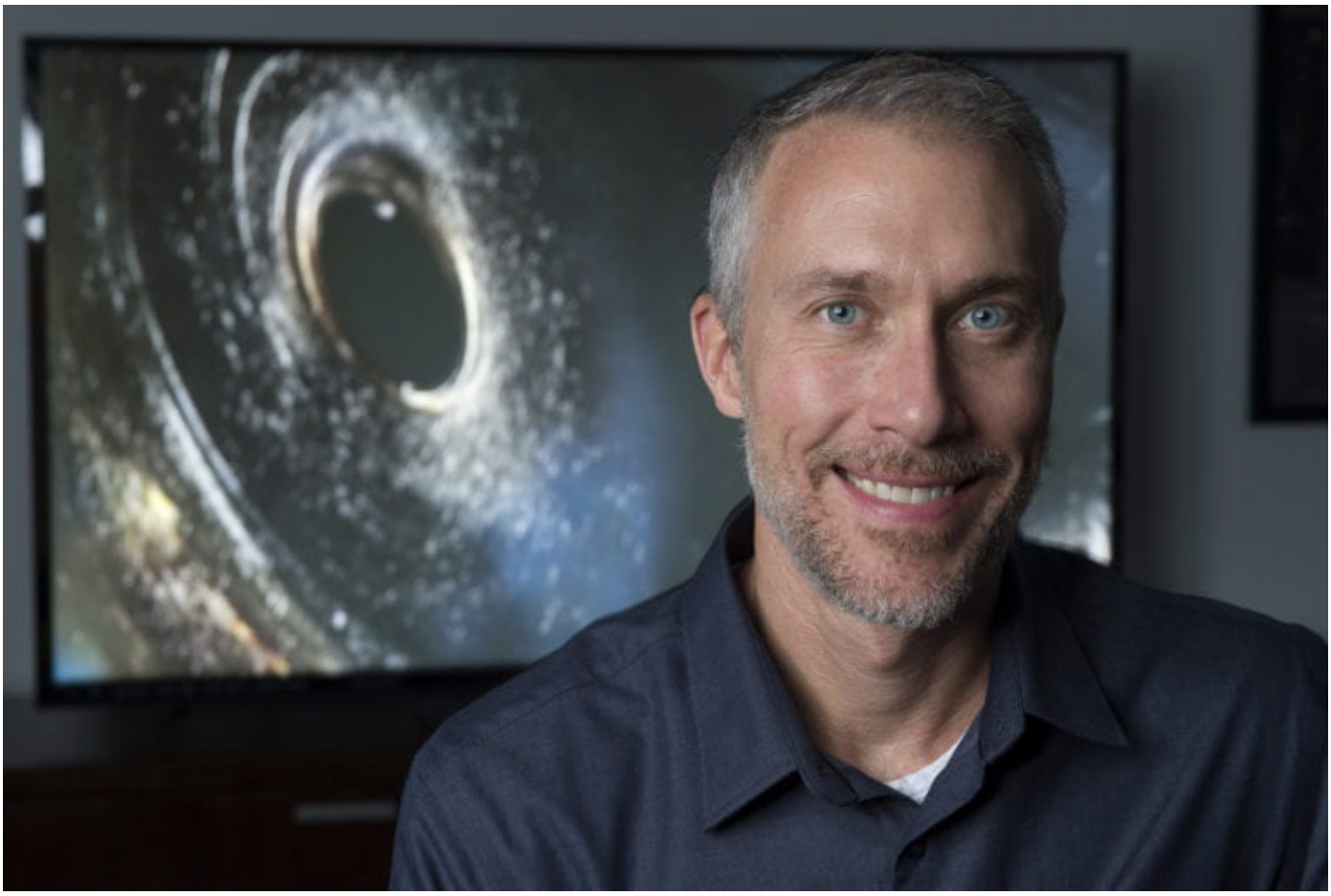
UCI Podcast: Solutions That Scale

James Bullock discusses multidisciplinary organization working to counter the impacts of climate change
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Brian Bell
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James Bullock, dean of UCI’s School of Physical Sciences.

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James Bullock, dean of UCI’s School of Physical Sciences, was one of the earliest proponents of a multidisciplinary initiative called Solutions That Scale. The project was created to bring researchers from nearly every academic unit on campus

together to come up with ways to mitigate the effects of climate change. In this episode of the UCI Podcast, Dean Bullock discusses the origin of Solutions That Scale, what its researchers are doing now, and what they plan to do in the future.

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PODCAST TRANSCRIPT

Brian Bell, UCI Podcast:

From the University of California, Irvine, this is the UCI Podcast. I'm Brian Bell.

It's hard to open a newspaper or watch the news on television these days without seeing reports of our planet's unfolding climate crisis. From increasingly severe wildfires and drought to supercharged hurricanes and more frequent floods, the effects of global warming are being felt directly by people all over the world.

Scientists at UCI have been studying and publishing papers about these impacts for decades. And now, an interdisciplinary group of researchers has united around the cause of doing something to help reverse the worst effects of climate change.

Solutions That Scale is the name of a recently formed UCI organization that involves researchers from nearly every academic unit on campus. Its goal is to bring the best thinkers together to come up with alternatives to our fossil fuel-dominated past and present. They're exploring ways to use hydrogen in our cars, homes, power plants and factories. They're creating new methods for removing carbon dioxide from the atmosphere and improving our agricultural practices to curtail the release of methane and nitrous oxide into the air.

One of the key figures in the formation and ongoing operation of Solutions That Scale is James Bullock, Dean of UCI's school of physical sciences. Dean Bullock joined the UCI Podcast recently to talk about the origin of the program and what we can expect from it in the future. Our discussion is up next.

Dean James Bullock, welcome to the UCI Podcast.

Dean James Bullock, UCI School of Physical Sciences:

Hi, it's great to be here.

BB:

Today, we're going talk about Solutions That Scale which is a big interdisciplinary initiative on the UCI campus to address climate change. Give us a little information about the background of this project and where it all began.

JB:

Well, absolutely. You know, this really grew organically among folks in my school, Physical Sciences, departments like Earth System Science and other schools on campus, where there are just a large number of faculty who understand that climate change is so important and had very specific skills they wanted to lend towards solutions. And importantly, we recognize from the beginning that we wanted to be involved to enable things that really scaled to the size of the globe. We have a global problem, and problems that are global require global solutions. That's where the term Solutions That Scale comes from.

BB:

And scale, meaning you can start small and really replicate it across large industries or around.

JB:

Yeah, exactly. So the idea is, you know, you might have some things that in principle could contribute to helping to solve the problem, but in reality, if you try to amplify it and duplicate it over the whole globe, it really it's really impossible. There's no way to sort of scale it up. One idea that sort of like that is buying offsets. I mean, to some extent you can buy carbon offsets, but if everybody was buying carbon offsets, you just can't buy your way out of the problem. So here we're really talking about solutions that in principle, if implemented broadly, could tangibly move the needle on climate change.

BB:

What are some of those specific technologies that you have in mind that fit into this project?

JB:

Well, to some extent, that's kind of the goal. We sort of wanted to identify solutions that in principle could scale. And so, the idea is work with people who study systems sort of Earth systems together with people who are thinking about various kinds of technologies and figure out what kind of technological breakthroughs could really change, things that could fix the hard problems.

So, an example of this that UCI is really well known for is the use of hydrogen as an energy storage device. If you produce hydrogen in a clean way, say from wind or solar, you can store energy in hydrogen molecules then could be used for later. One of the real problems with intermittent energy sources like wind and solar is it's there when the wind is blowing or when the sun is shining, but it's not there at night or when the wind's not blowing. And you really can't run an economy efficiently on power that's like that. You gotta figure out some way to store it. And hydrogen is potentially a really useful way to store that energy excess and use it when you need it.

BB:

Some of the other sectors that would be that would need applications from this approach would be agriculture, energy, production manufacturing. So do you have researchers who are addressing all those different sectors?

JB:

Absolutely. You know, one of the amazing things about this project, Solutions That Scale started with a small group of really passionate faculty members who cared about this subject from a few different schools and in almost a friends-of-friends way, it's now grown to include researchers from every academic unit on campus. And if you look broadly at the whole campus, we have people on this campus really that are touching every single important issue when it comes to climate sustainability and solutions.

BB:

I think you mentioned earlier something about even the Paul Mirage Business School has some people involved in this project.

JB:

Oh, absolutely. You know, one of the things that's amazing about the Paul Mirage School is that they have faculty are really at the cutting edge of modern business. And I was talking with Dean Ian Williamson, and he was telling me that, in fact, every single subunit in the Paul Mirage School is thinking about climate change. In fact, if business isn't thinking about climate change, they're already behind on this issue. And so there's a lot of people trying to think about how do you interface with business effectively as we partner to try to figure out what solutions are not only going to be important for saving the climate but economically viable and maybe economically profitable for the companies that get involved.

BB:

And then other entities on campus, the School of Physical Sciences, the Henry Samueli School of Engineering, all have researchers who are involved in Solutions that Scale. So, let's start with School of Physical Sciences, maybe give me a couple of examples of researchers in the school, Department of Chemistry, you mentioned department of Earth System Science. What are some of the activities going on that fit into this project?

JB:

Well, you know, there's so many different ways in which we're contributing to this important problem. Of course, let me start with the Department of Earth System Science. This is really the core of the physical science of climate change. We were the first department in the country dedicated to studying the Earth as a system this way and understanding how human impacts and human contributions to climate are really affecting oceans and land and even economies, et cetera. And so thinking about that Earth system is sort of core to understanding not only what's happening, but as we begin to sort of extrapolate into future what may happen in the future, if we do X, Y, or Z.

In the Chemistry Department, we have a lot of folks doing electrochemistry and electrochemistry lies at the core of a lot of the technological solutions. We hope to implement ways of making this hydrogen efficiently in an green way, new ideas and battery technology, making greener batteries that that are made out of more sustainable metals is going to be really, really important as we try to sort of have many more batteries, for example, to power electric cars, the, you know environmental impact of mining for the metals that it takes to make these batteries is non-trivial.

So we want to figure out how to do this better, more efficiently, et cetera. And finally, in the Physics Department, as you may know, the most advanced privately funded fusion company in the world was spun out of the plasma physics group at UC Irvine, based on the research ideas of, of the late professor Norman Rostocker. And this company is really going like gangbusters to produce clean, efficient energy that comes from fusion and fusion is really a great potential source of energy because it doesn't produce all this radioactive waste. And so we're really sort of looking in all different directions about how we can move forward towards climate solutions in physical sciences.

BB:

Now, I know that Henry Samueli School of Engineering is not your school per se, you're the Dean of Physical Sciences, but you are involved with collaborating with some folks in the School of Engineering. So, tell me some of about projects going on there.

JB:

Well, sure. There's so much excellence in the School of Engineering and there's a lot of collaboration between especially folks in our Chemistry Department and Physics Department and even Earth System Science and the folks in engineering. So, as I mentioned, you know, one of the areas that the School of Engineering at UCI is known for is clean tech, hydrogen power, fuel cells, and more generally just sort of clean power. And there's a lot going on there, the work of folks like Jack Brouwer, but there's a tremendous amount of work, just more generally in electrochemistry, where again, they are also at the forefront of thinking about how to move the needle in, in these new technologies that are gonna be so important for climate change. And there's a bunch of folks there who are also working on just sustainability,

understanding what's happening with fires and floods, and they collaborate a lot with our folks in Earth System Science. So it's, it's really an amazing group people over there. And they're very close to the faculty here in, in Physical Sciences.

BB:

You know, I first started hearing about Solutions That Scale around the same time that the Interdisciplinary Science and Engineering Building was opened. So, is there a connection there between the building and the Solutions That Scale?

JB:

There's definitely a core group of folks who were from the very beginning participating in Solutions That Scale and who also now inhabit the sort of core of that Interdisciplinary Science and Engineering Building. There's a group in there that call themselves CLEWS, climate energy, water solutions group, and this is a folks of both engineers and physical scientists who are focused on thinking about how do you approach this problem in an interdisciplinary way to move towards solutions. And the amazing thing is, since they've been in that building new things are happening every day. You know, the people are talking about collaborations that they otherwise wouldn't have talked about. And it, it, there seems to be a tremendous amount of energy there. And I'm really excited about what we're gonna see in the next few years.

BB:

I hear a lot of pessimism around the world. I'm on Twitter all the time, looking at all the climate doom messaging going around the world. But when I come to campus and I talk to researchers here, I hear a little bit of optimism about what we are capable of doing to help solve this problem. Do you share that optimism?

JB:

Absolutely. You know, I think that the situation is not as dire as a lot of times people are led to believe. I think about it this way. You know, there's no law of physics that says that we're doomed to keep doing this forever and to have a ruined climate. I mean, that's just patently false. We probably should be the most optimistic about this situation today than we've been in the last 30 years. And that's because people are really paying attention. The price of electric cars and batteries is dropping like a

rock. The, the price of solar panels solar energy and wind is as low as it's ever been. And it's probably gonna keep getting lower. And we kind of know what we need to solve. We know that we need to think hard about implementing these technologies. It's not true that you can just cover every square inch of the city with solar panels and will all be good.

We really don't have the infrastructure to handle that right now, or to store that energy, but we know how to move forward. And there are a lot of really smart people who have thought about ways to implement this and we can get there. Absolutely. And I see a lot of optimism among the people who know the most about the subject. They seem to be more optimistic than ever keeping in mind, 20 years ago, we kind of knew where we were headed and the folks who knew where we were headed were looking around and nobody was listening to them. No one was paying an attention right today. Everybody's paying attention. And there's just a bunch of people who've known about it for 20 years who are finally like, oh, wow. Finally people are listening to me and we're moving in the right direction. Industry board, a lot of governments are on board. Certainly the campus is on board. And I think not only is the world moving in the right direction on this subject, but UC Irvine can be the global leader in finding solutions, implementing them and demonstrating that they work right here on this campus.

BB:

Well, I want to thank you for your time today in this discussion about Solutions That Scale and and look forward to hearing what's going to happen in the future.

JB:

Fantastic. Thanks a lot, Brian.

BB:

You can learn more about Solutions That Scale on the UCI website at https://sites.ps.uci.edu/solutions, and for the latest climate research news, visit https://news.uci.edu.

The UCI Podcast is a production of Strategic Communications and Public Affairs at the University of California, Irvine. I'm Brian Bell. Thank you for listening.

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