

Environmental Insights

Guest: David Keith

Podcast Episode Date: February 7, 2020

David Keith: Now, it may be the thinking about solar geoengineering for some people should mean a permanent moratoria, and for other people it should mean pathways towards deployment. I'm open minded about what the right answer is, but I think it is one of the big climate policy instruments and we won't do sensible policy if you pretend it's not there.

Rob Stavins: Welcome to [Environmental Insights](#), a new podcast from the [Harvard Environmental Economics Program](#). I'm your host, [Rob Stavins](#), a professor here at the Harvard Kennedy School and Director of the [Harvard Environmental Economics Program](#).

Rob Stavins: Just this month, the [Earth Systems Research Laboratory](#) of NOAA, the [National Oceanic and Atmospheric Administration](#), announced that it had received authorization to study what they characterized as plan B for climate change, namely to examine the science behind what is typically called geoengineering, including the possibility of injecting particular aerosols into the stratosphere to help shade the earth from sunlight. NOAA emphasized that this and other techniques of geoengineering are recommended in a forthcoming study from the National Academies titled [Climate Intervention Strategies that Reflect Sunlight to Cool Earth](#).

Rob Stavins: As I understand it, until now, neither Congress nor the administration has moved forward with such work. But NOAA pointed out to the press that quote, "The closest thing to testing is a Harvard University project called [Stratospheric Controlled Perturbation Experiment](#)." That project is co-directed by my guest today, [David Keith](#), who also directs the closely related [Solar Geoengineering Research Program](#) at Harvard. David is the Gordon McKay Professor of Applied Physics at the Harvard John A. Paulson School of Engineering and Applied Sciences and a valued colleague of mine here at the Harvard Kennedy School where he's a professor of public policy. Welcome, David.

David Keith: Thank you very much. Thanks for having me.

Rob Stavins: So before we talk about your current research and your thinking about geoengineering, and for that matter, climate change policy more broadly, I'd like to go back and sort of learn about how you came to be where you are and where you've been. And when I say go back, I mean go way back. So where did you grow up?

David Keith: I grew up in Ottawa, Canada, and I went to undergrad in Toronto, physics and philosophy, and then grad school at MIT.

Rob Stavins: And before all of that though, presumably you went through primary and high school in Canada, then?

David Keith: Mostly. Yeah, Canada. I was in Britain a little bit. [crosstalk 00:02:46] Academy.

Rob Stavins: You were in Britain?

David Keith: Yeah.

Rob Stavins: And when you were in high school, so sort of what were you into? Were you a science geek, or not yet?

David Keith: Well, I was actually dyslexic and slow to learn to read and write. So I'd say that I wasn't one of those people who was a star in high school for sure. And I would say I love doing outdoor stuff. So I was pretty active in doing wilderness activities and outdoor things. And my father and stepmother were environmental professionals, and I did stuff with them a bit.

Rob Stavins: I see. And then you said you went to, for college, to the University of Toronto?

David Keith: University of Toronto. That's right.

Rob Stavins: And there you studied?

David Keith: Well, I came into physics mostly, but then I ended up taking some philosophy courses. They have a very strong department. [Ian Hacking](#) was teaching history and philosophy of science. And so I really ended up... I forget if I got a double major, but I did quite a lot of philosophy courses as well. I wasn't actually that happy with the physics teaching, but I lucked into a laboratory job in a national research center in Ottawa with a guy called [Paul Corkum](#). And in hindsight, I could not possibly have had a better advisor of all this kind of life-changing things. And so I worked for Paul for three summers in the end of high school and the beginning of undergrad, and that was really what got me going in physics.

Rob Stavins: So that's interesting. I had a path that was vaguely similar, and then in college I started out majoring in physics, actually astrophysics, but then evolved by the time I graduated in philosophy instead. So I didn't stay with the physics as you did. Now, from there, did you go directly to graduate school, or did you do some other things in between?

David Keith: I took a year off in between. I really wasn't sure what I wanted to do. I actually thought I might want to be a mountain guide or something, and I ended up getting this job working in the high Arctic, just sort of as a field assistant in a camp way north of the Arctic Circle working on walruses.

Rob Stavins: I could see you as a mountain guide, definitely.

David Keith: So I actually went from that experience to MIT, and I was climbing a lot that year, I guess.

Rob Stavins: And now at MIT, you were in experimental physics, physics generally? What's the right way to characterize it?

David Keith: Experimental physics. And that's very much a craft, and it's very much... I mean, people do theory, but it's very much about kind of hands-on skills of doing things in a lab. And that's what I first learned under Paul's apprenticeship, and then I'd say Paul's recommendation got me into this guy [Dave Pritchard's](#) group at MIT, and I was really lucky. I mean, those are two of the biggest superstars. They are... I think Dave's had four advisees who won Nobel Prizes. It was an amazing group to be part of. So that wasn't really... I really loved it, and I was a part of short, fun PhD doing an exciting project.

David Keith: But even at the beginning, I remember even when I was admitted, in fact, I got that admission when I was in the high Arctic, I was pretty sure I didn't want to keep doing physics. I didn't know what I wanted to do, but I wanted to do something that was more policy relevant, more relevant to everyday life.

Rob Stavins: But what was your dissertation on?

David Keith: I built the first what's called interferometer for atoms.

Rob Stavins: Tell us... explain it to us, at least to me.

David Keith: So interferometer is something where a beam of light or a beam of electrons or, in principle, a beam of trucks is divided in a quantum sense into two beams that are then recombined, and they interfere. And that was first done for light by Newton. And it became... In the rise of modern quantum mechanics around the First World War, it's clear that that should be possible for matter, and there were interferometer standards demonstrated for neutrons and electrons in the test my memory, the '60s, let's call it. And then there was a bit of a race, I'd say, to do the first interferometer for an atom, and we were the winners.

Rob Stavins: And now, you went from MIT after you got your degree, did you go to [NCAR](#), or-

David Keith: Sort of via Carnegie Mellon. But I'd say the big interaction was really here. So Ted Parson, who was here at the Kennedy School, who was a student of Bill Clark's, Ted organized a group of grad students in between Harvard and MIT working on what we must've called global change. Basically climate policy. I think it's fair to say that many of us were sort of a bit ahead of our professors and that it was a very active group of maybe 20 or so students between the two, very much split between science and social science – so a bunch of people from MIT meteorology and then a bunch of social scientists from both institutions. Weekly meetings and really engaged. And that was really what got me going on what I do now, and it was terrific.

Rob Stavins: And that was probably within the [Belfer Center for Science and International Affairs](#), or no? I'm thinking of Ted.

David Keith: Well, Ted definitely led it, but it was interesting, there was very little faculty involvement. I do dimly remember that Bill Clark had somehow encouraged it, but this was a meeting of us as students. And I do think it's fair to say... I sometimes say this to young students now. This is a case where students sometimes get the message of what's important a little bit before the faculty do. And so I'm not saying... Obviously there were faculty thinking about this, but I think that group was more in fact dynamic and interested in climate than was the faculty.

Rob Stavins: What years are we talking about now?

David Keith: I think from about... the group probably formed about '88 or something, up until... So I graduated and left in '91.

Rob Stavins: I see. Okay. And now, you went then from that, where did you go next?

David Keith: So I actually... So during that, I actually wrote a first overview paper on solar geoengineering. Not that I was particularly an enthusiast, but nobody was working on it, and I thought it'd be interesting. There was sort of a hole in what that group was doing. And kind of on the basis of that, I ended up being offered a postdoc with a guy called [Hadi Dowlatabadi](#) and this group at-

Rob Stavins: Yeah, I remember him.

David Keith: Yeah, we're sort of family in a-

Rob Stavins: Carnegie Mellon.

David Keith: Yeah, that's right. At Carnegie Mellon. And Carnegie Mellon had this very unusual department of engineering and public policy, and they had won several of the biggest early grants from NSF social science to do kind of integrated assessment of climate change and build some of the, I think early interesting integrated assessment models. And that was really the kind of intellectual core for me as a faculty, was that department, engineering and public policy.

Rob Stavins: So by the time you were at Carnegie Mellon, were you really focusing on geoengineering?

David Keith: No, geoengineering was sort of a side project. I'd say the main work I did early on at Carnegie Mellon was working with [Granger Morgan](#) on a formal expert judgment protocol to understand uncertainty and climate sensitivity. And that turned out to be very influential. I think it's one of the most highly-cited papers I've been part of, and it helped to, I think, push the IPCC process to think about uncertainty more seriously, and it's really led to a lot of changes. And that was

really the early '90s. And then I did some work on the analytical methods for how to combine uncertainties and expert judgments, so a bunch of stuff on uncertainties in the energy systems.

David Keith: So I always kept some interest in solar geoengineering, but for the middle of that decade of the '90s, I was really doing electricity, electricity dispatch modeling, energy policy-related stuff, all connected to climate.

Rob Stavins: Right. And from there you went to Calgary, or am I missing something?

David Keith: No, from there I came back here, actually. I was a postdoc. I had an NSF Global Change Fellowship postdoc where I was one year at [NCAR](#) and then came for one year of that postdoc to work for Jim Anderson at Harvard, coming really back to the hard sciences, trying to work with Jim to lead a climate effort in his group to try and build a satellite, ultimately, that would measure temperatures accurately from space, which quite shockingly, we basically don't do very well even now. And so then I ended up spending five years or so working as a postdoc for Jim, and it was really fun. I learned a lot of how to manage big projects. We flew in instrument on what you'd call the ER-2, the U-2 aircraft to high altitude, high accuracy measurement, and we did actually put together a big satellite proposal. I even negotiated a launch contract. It didn't fly, but I think it was influential.

Rob Stavins: Didn't fly in various senses.

David Keith: Yes, it didn't fly in either sense, but it was influential and interesting. So, yeah.

Rob Stavins: Now, and then from here, then you went back to-

David Keith: Then I went to Calgary. Yeah. Or no, I guess not. It's complicated actually. No. Then I went back to Carnegie Mellon. So I got offered a faculty job at Carnegie Mellon, and I went back to Carnegie Mellon as faculty, but I'd always been adjunct faculty. So all during that time, I had been kind of back to Carnegie Mellon; I think I was part of some of their NSF grants. I was publishing papers with them on CO2 capture and storage and the energy system and a geoengineering paper or two as well. So I did all that, sort of... That was the policy side, if you like. And then I went there as a faculty and then from there to Calgary.

Rob Stavins: So you're a full time faculty at that point at CMU.

David Keith: Yes, that's correct.

Rob Stavins: Then you go to Calgary.

David Keith: That's right.

Rob Stavins: And at Calgary, what department were you in and what was sort of the scope of your work, your teaching, your research?

David Keith: Yeah, so I was hired as part of a very ambitious effort to build up a major climate and energy policy effort. And the kind of... You know, in a university that's in the heart of the oil patch with potentially a lot of money and a lot of high power people. And I think it's kind of really a tragedy that didn't work, because I think Canada needs that kind of analysis. And I think that analysis needs to be intimately... in the energy system side, you need to work with the industry. If you're going to change it, you need to understand it. And there were some really thoughtful people who helped to drive it. Some other interesting people there. I was one of the leaders of that effort, but it failed. I think it was actually technically pointed at chemical and petroleum engineering, but that's kind of irrelevant.

Rob Stavins: What do you mean that it failed? In what sense?

David Keith: More than you want to know, but let's just say that one of the lead figures I think is now maybe in jail, and-

Rob Stavins: I guess that would characterize that as a problem.

David Keith: Yeah. He was called Bruce Carson. He was the lead insider to the former Prime Minister for climate, and he didn't go to jail for anything that directly happened with that program, but he did manipulate some issues about kind of insider and industry access. And there was money that flowed from one of the big oil companies into some policy work at the university in a way that was kind of corrupt and hidden. And I ended up calling that out, and there was a pretty formal battle that played out on national media between me and the university president. So it was... it's sad.

David Keith: And basically, almost everybody who was there has now dissipated. This is a town that depends entirely on the oil patch. A thing like this needs to be delicately balanced. It needs to be integrated enough into the real world of that politics that it can be useful. On the other hand, it can't be just the play thing of the oil patch, or it's doing no good. It needs to I think help Alberta think through seriously what its choices are over the next decades, and my heart is still there in some ways.

David Keith: I mean, I love my job here, but I live partly in Western Canada and I care a lot about what happens to Alberta. Right now I think it's making some pretty thoughtless decisions about what that transition has to look like. So I think we need a thing like that, because here we think a lot about global climate policy, and I'm completely in favor of very radical policy that would actually put very high effective carbon prices on. And I think we have to do that and we have to drive some of those fossil fuel businesses, well, all of them ultimately, out of business. But I also have friends and a brother-in-law and whatnot in Calgary.

And the reality is that that economy would be crushed, and those are real humans and you need to really think through what the policy could look like.

Rob Stavins: So that sort of balanced perspective that you have, the incredible importance of climate change, and certainly from your point of view, I've heard you talk about this before, of very aggressive carbon pricing, aggressive policies to deal with it, but balanced by recognizing that there is the human downside, whether or not it's Appalachian coal miners put out of work, or this time it's the oil patch in Alberta, that balance, there's a sense in which that would seem to go, be very consistent with, to correlate with, attention to approaches such as geoengineering. Is that a coincidence?

David Keith: I think it is coincidental. I would say during the time I was there, I basically did almost no work and no public work on geoengineering. So the central concern about solar geoengineering is a concern about moral hazard or mitigation threat. Basically, the concern that the forces that want to resist emissions cuts, the oil patch, would seize on it as an excuse to further delay emissions. And so in a sense, actually to the credit of some people in the oil patch, I interact with a lot of people right up to the CEO level in that world, and none of them really asked me much about it, and I never volunteered much or talked about it because I think it's really important that that work be really separate.

Rob Stavins: I understand and appreciate that. So let's delve now into geoengineering, both your research and policy surrounding it, and everything else. But what I'd like to do is to start out with asking you to offer us some simple definitions, because you know, we've got thousands of listeners, but a lot of them probably are not familiar with geoengineering. So there are three terms and phrases that occur to me, and there may be others that you want to offer that it'd be great to have definitions of: geoengineering, solar radiation management, and carbon removal.

David Keith: So let me try. I think there's two underlying things, and they have different names, but so one of those things is solar radiation modification, actually is now the IPCC's formal term, or solar geoengineering or solar climate intervention. And that thing is the idea that humans might deliberately alter the radiative balance of the Earth, say by putting aerosols in the stratosphere or some such, in a way that would offset some of the risks of accumulated carbon dioxide. And a general fact about that thing, which I'll keep calling solar geoengineering, but I'm not wedded to that, is that it's... All of those methods seem to be fundamentally high-leverage in the sense that they're potentially very cheap to do, offer really hard governance challenges, offer potentially high risks, and offer the possibility of really, really substantial reduction also in climate risk over the century.

David Keith: So the other bucket is carbon removal, which you could also call it carbon geoengineering, and it has a whole bunch of technologies inside it. But actually, I'd say carbon removal or negative emissions are, I'd say, becoming the standard terms there. And my view is that there's no particular relationship between

those things. That is, if you step back and ask what are the things that we do about climate, it's de-carbonization or emissions cuts. Most of all, it's carbon removal, it's solar geoengineering. We may or may not do it, but it's a thing we could do, and it's adaptation. So if you'd like, those are the broad policy instruments, and I don't think carbon removal is particularly more related to solar geoengineering than it is to any of the others. Indeed, the opposite. I think, in fact, carbon removal is intimately tied to mitigation or to emissions cuts and hard to disentangle, whereas solar geoengineering really stands pretty separately, for better or for worse.

Rob Stavins: Now, when you use the phrase carbon removal or when you think about it, are you including what I would refer to, I guess, as carbon sequestration, like from afforestation, trees, expanding land use in terms of more trees growing, because that's carbon removal. But you're referring to something-

David Keith: No, I'm definitely including that, but-

Rob Stavins: Okay.

David Keith: But this language is very fuzzy. So what I would count as carbon removal is all the ways that we could potentially for short or long term actually remove carbon from the atmosphere and put it in some kind of reservoirs. That absolutely includes modification of trees or soils. It includes adding alkalinity to the ocean; it includes mechanical means of taking CO₂ from the atmosphere and injecting it underground. But I think it actually doesn't include carbon sequestration from power plants. So I think if you build a natural gas or coal-fired-

Rob Stavins: Because that's less... that's sort of mitigation.

David Keith: Yeah, to me, that's just another way to make low-carbon electricity. So if you have a plant that takes in fossil fuels and sells electricity and puts the CO₂ underground, that plant, you could... We can all argue about its cost and environmental risk, but fundamentally it's like wind or solar or nuclear in that what it's supplying to the economy is carbon-free electricity.

Rob Stavins: And in fact, your research, in addition to a lot of work on geoengineering, has also included substantial work on carbon capture and storage, has it not?

David Keith: So I did for about 10 years, especially during the '90s and early 2000s, lots of work on the policy and economics and regulatory policy of CO₂ capture and storage in the power sector. I did a whole lot. And then... But I really haven't done that for a long time. And then pretty separately from that, while I was at University of Calgary, in fact, because things weren't going very well and I wasn't busy enough, I did found this company called [Carbon Engineering](#), which develops technologies for direct air capture, for removing CO₂ directly from the atmosphere and making a pure stream of CO₂. And that's been very exciting,

because I mean, start-ups are high risk things. They mostly fail. For the first five years I really ran it. It was sort of up to 10 or 15 people. It's now... we must be close to 80 employees as of today, and we've raised more than a hundred million, are in the middle of trying to raise billion-class money for the first million-ton-a-year plant. But I'm pretty lightly involved.

David Keith: So you know Harvard formally sets a limit of 20% external time, and I think I'm well under that. I'm somewhere, I would say between 10 and 15. I'm a board member, and I do technical work for them, but partly because of concerns about conflict of interest, and also the sense that as a founder, you sort of have to be 100% in. I mean, I could just quit the Harvard job and go back to do that, but I don't want to. I think what I'm doing here is more important, and I'm better at it, and I don't think I'm good at running or trying to run a company of that size.

Rob Stavins: Tell me if I'm wrong. My understanding is that partly because of the fact that your private sector engagement is on this carbon removal company, that your scholarly research and your activity at Harvard has not included carbon removal policy or whatever. It's been focused on the solar radiation management, et cetera. Is that fair?

David Keith: Very much. Actually, I'm quite concerned about conflicts of interest and I think academics sometimes aren't concerned enough, especially in the biomedical fields. I think there's too many examples of people both being academic leaders and having people, grad students, postdocs, in tight interaction with companies that are... where they have a clear conflict. And so I pretty much decided when we founded Carbon Engineering to stop doing any academic work on that topic.

David Keith: And so what I try and do, and you can't be perfect, so I definitely do no academic work at all in that topic. Of course, I'm involved in policy on the topic, but when I am involved, I try to be involved very clearly with a Carbon Engineering hat on. So I mean, Carbon Engineering, like any company like that, has lobbyists at this point. We're trying to push for policy in D.C. When I'm involved in that, I identify myself as Carbon Engineering. I've made it very clear to people that they should think of me as that and not a professor at Harvard. And so I really try to divide the two things pretty sharply.

Rob Stavins: Now before we get into policy, I want to stay with your academic research, and when you look back at your CV or try to in your mind's eye, look back at your long, long CV of scholarly publications, and for that matter, working papers, whether they're carbon capture and storage, geoengineering or whatever, what's some of the work, like one item, if you can choose one of your children as they say. Can you choose one thing that you're most proud of?

David Keith: I think I'm most proud of work, maybe starting with this [big review article](#) in *Annual Review of Energy and the Environment* in 2000, in trying to really place solar geoengineering in a kind of rational context inside climate science and policy. So my view is that... I mean, this is a thing where people have extremely

strong opinions, and I don't think that solar geoengineering necessarily makes sense as policy. I think it might well make sense to ban it. What I do think is that it deserves serious study and that we won't make better decisions about it by kind of maintaining a taboo where nobody talks or thinks about it. So I think a lot of my scholarship and my outreach activities have been around trying to get it taken seriously, to get it taken analytically seriously, to get climate model analysis that actually gets at the core questions about risk and performance in a sensible way, and to really think through how it might fit into sort of the economics of climate change in a sense, what optimal policy might look like if there was any single global optimizer, which obviously no, there is not.

David Keith: And then in the actual world we live in, to think a little bit about how you might manage the divergence of interest between countries and actors. So I've done some work recently on thinking about how indexed insurance schemes might be used between countries to manage some of the unequal risks of solar geoengineering. So that's kind of one example. It's very kind of applied policy. And I've done some work technically on actually trying to figure out how to potentially reduce the risks of these technologies. So you know, for example, the possibility that we might use a calcium carbonate aerosol instead of sulfuric acid aerosol in the stratosphere, which could significantly reduce some risks.

Rob Stavins: Now you mentioned, I think you used the word "controversy," and in fact, geoengineering has been certainly amongst certain interest groups and certain individuals quite controversial. When I reflect back, I'm interested if this resonates with you, when I reflect back, I remember a time when within the whole realm of climate change policy that talking about adaptation was considered to be inappropriate, because that was throwing in the towel. And then subsequent to that, maybe fast forward 10 years, I remember when carbon capture and storage was thought that was inappropriate. But now environmental advocacy groups are doing work on that. NRDC, for example. And now we seem to be at that point with geoengineering. Is this likely to go through the same phases?

David Keith: I think so. Though there's a way in which I think the end point is deeply different. But I think that the analogy to adaptation is really fair. And it's some of the same people. I've actually ended up having a formal kind of a, well, back and forth, almost debate, with Al Gore at the last of the weekends with Charlie Rose. And Al Gore, of course, had been dead set against adaptation. People talk about it as "the a-word."

Rob Stavins: I remember.

David Keith: And used many of the same arguments, that it was a distraction. And I think in hindsight, that was wrong and maybe even immoral in the sense that people, especially some of the poorest people... I've actually just come back from a trip in Bangladesh talking with some people who make dollar-a-day incomes. Some of the poorest people surely deserve to do what they can and to get support in protecting themselves from climate risks.

David Keith: And even if that does in some way reduce some political pressure to cut emissions, that's not really a justification for withholding from them their ability to cut risks. And I think the big thing we've learned is it's both. That sensible climate policy is not one thing and a kind of monomania around emissions cuts doesn't make sense. Of course, we have to do emissions cuts. It's the single most important thing. If we don't do it, nothing else does it, but the idea that it's only emissions cuts, I think, is just now clearly wrong with respect to adaptation and my guess is it will become clearly wrong with respect to at least thinking about solar geoengineering.

David Keith: I think what's less clear is whether we'll ever or should do it. My view is that at this point, you simply can't talk sensibly about long-run climate policy unless you think about the big instruments. Adaptation, I'd say mitigation broadly, including both emissions cuts and carbon removal, because they're kind of linked, and solar geoengineering. Now, it may be that thinking about solar geoengineering for some people should mean a permanent moratoria, and for other people, it should mean pathways towards deployment. I'm open minded about what the right answer is, but I think it is one of the big climate policy instruments, and we won't do sensible policy if you pretend it's not there.

Rob Stavins: And it's certainly come much more into the mainstream, as you said, in terms of becoming more accepted, that research is certainly warranted, and that research per se is going to lead to better decision making down the line, not worse decision making. And you, I'll tell you, it's not just because you're sitting here, but you deserve a tremendous amount of the credit for that having happened.

David Keith: Well... I mean, I guess the big question is, is it really... I mean, I sometimes do wake up at night and wonder whether there will be some huge disaster, and may not be something I should credit for, but I do think it feels to me now like there is a very quick shift in willingness to talk about it.

David Keith: So, I mean, just anecdotally, I've come from meetings in New York City last week with a group that is very engaged with the UN, and you know, Belgium is now serious about injecting this into some dialogue in the Security Council. You know, in the last little while I've had meetings with senior people and a call with 10 Downing Street. I've had meetings with senior people in Singapore, in Canada, in Japan, and in Bangladesh just in the last months. And I think the sense that this is something that governments and big NGOs need to look at really feels very different than a year ago. And I think in a way that's healthy. So some of the big parties that are engaging have a diversity of views, which is the right answer. But the idea that we just shouldn't talk about it I think is disappearing pretty fast.

Rob Stavins: And finally, if people want to find out more about your work at Harvard and the project, I assume there's a website. What's the best guide to give them?

David Keith: So what we've set up at Harvard is in principle a Harvard-wide program. So I raised money. We raised about \$18.5 million, we'll get to 20. And the idea was to put that money not in my pocket, but in an entity that is called [Harvard Solar Geoengineering Research Program](#), which is a child of the [Harvard University Center for the Environment](#). And it's a committee of about five of us. And that committee really is the final power for giving away that money, and that money's flow to lots of different groups around campus. And actually, we're very keen to make sure we find some groups that have much more critical views, and we're doing a little bit of that now, but we funded several such, and so that's the structure, and that overall program is that geoengineering.environment.harvard.edu if I remember correct.

Rob Stavins: Okay. And I suspect that even Googling Harvard geoengineering will get one the website very quickly.

David Keith: It'll get you there pretty quickly, yeah. That's right.

Rob Stavins: So thank you very much, David, for having been with us today.

David Keith: Thanks a whole lot.

Rob Stavins: This was just great. Our guest today has been [David Keith](#). He is the Gordon McKay Professor of Applied Physics at the Harvard John A. Paulson School of Engineering and Applied Sciences and a professor of public policy here at the Harvard Kennedy School and the faculty director of [Harvard Solar Geoengineering Research Program](#). Please join us again for the next episode of [Environmental Insights: Conversations on Policy and Practice from the Harvard Environmental Economics Program](#). I'm your host, Rob Stavins. Thanks for listening.

PODCAST OUTRO: [Environmental Insights](#) is a production from the [Harvard Environmental Economics Program](#). For more information on our research, events, and programming, visit our website, www.heep.hks.harvard.edu .