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Lori Bennear: We are in the process of, it's not even a once in a generation, but once in many, many generations, transition in our energy system, the likes of which we can't, in some sense, not even really imagine.

Rob Stavins: Welcome to Environmental Insights, a 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 Environmental Economics Program. Today, we're really fortunate to have with us Lori Bennear, who is the Juli Plant Grainger Associate Professor of Energy Economics and Policy, at the Nicholas School of the Environment at Duke University, where she also serves as Executive Vice Dean. Welcome, Lori.

Lori Bennear: Thanks. Thanks Rob, for having me.

Rob Stavins: So, before we talk about your research and your current thinking about environmental and energy policy, let's go back to how you came to be where you are. So, let's go back, in fact, to where did you grow up?

Lori Bennear: I grew up in Gillette, Wyoming, which for folks who follow environment and energy policy topics is in the Powder River Basin. So, it is coal and natural gas country.

Rob Stavins: Was your family engaged in the industry?

Lori Bennear: Nope. They were not. They were both schoolteachers, so we just ended up there.

Rob Stavins: Interesting. Does that mean you were there for primary school and high school as well?

Lori Bennear: The whole thing. First grade through high school. Yep.

Rob Stavins: Then from high school, then you went a long way from there to go to Occidental College. Do I have that right?

Lori Bennear: Yeah. So, I was one of the few people who really did not want to go to the University of Wyoming, which was where pretty much everyone went. I wanted to go to the big city, which when you're west of the Rockies is Los Angeles. So, I

applied, and was accepted to this little school, Occidental College in Los Angeles, and off I went.

Rob Stavins: What did you study there?

Lori Bennear: I ended up double majoring in economics, and the brand new major at the time, which was environmental studies, but I actually went there to study diplomacy and world affairs. I wanted to do foreign relations and work for the State Department. But I got there, and I took an intro microeconomics class and loved it, loved, loved, loved it, and then took the intro diplomacy and world affairs class and didn't love it so much. So, I switched over to econ.

Rob Stavins: So, does your professor from that microeconomics course know what a profound effect he had on the course of environmental economic scholarship?

Lori Bennear: Well, I don't know about that. That's very flattering. But certainly, he's long since retired now. But yes. We stayed in touch over the years. He was aware of the change that he made in my life.

Rob Stavins: So, you also then, while you're there, you move into economics. But then how did the interest in environment come up while you were at Occidental?

Lori Bennear: Yeah. So, same professor was teaching a brand new class in environmental economics, and I was a sophomore. I was looking for an economics class that only required principles of micro and not intermediate micro. This class, because it was part of the new major in environmental studies, only required principles of microeconomics. I literally had no idea what it was, Rob.

Rob Stavins: Yeah.

Lori Bennear: I was like, "Whatever. It only requires principles of micro." So, I took it, and it explained pretty much everything that was in the news when I was growing up in Wyoming, that I only vaguely paid attention to and didn't really understand. Controversies over energy extraction, but also reintroducing the wolf into Yellowstone happened while I was there. The Let It Burn Policy in the national parks, and environmental economics helped me understand and frame all of those. Yeah. That was pretty much it for me.

Rob Stavins: So, when you went home on school vacations to Gillette, what kind of conversations did you engage in with people who were, I assume, you were friends from high school, who hadn't gone away?

Lori Bennear: Well, so my parents moved to Arizona in the interim, so I didn't go back to Gillette lot.

Rob Stavins: Okay.

Lori Bennear: But yeah. I continued to hang out with those folks from time to time, and certainly our views on some issues related to oil and gas and climate change differ. But I've actually found that to be a helpful framework. 50% of the country doesn't share necessarily my political views on the world. Having grown up with folks, I shared a locker with Amy Enzi, who is the late Senator Enzi's daughter. I feel like that's been helpful for me in trying to understand other points of view, and how my training can maybe help form a bridge between people with different political persuasions.

Rob Stavins: So, I think that's extremely important, and potentially, as you suggested, very valuable, particularly at these times now of such incredible political polarization both within the Congress, but also as you're suggesting, demographically and geographically in the general population.

Lori Bennear: Agreed.

Rob Stavins: So, then from Occidental, you went directly to Yale?

Lori Bennear: I did. At some point in those four years, I realized... Well, I was doing research as my work study, both in economics and in environmental science. I actually had a couple of papers that came out of that research, even as an undergraduate, on environmental justice and the location of hazardous waste treatment storage and disposal facilities in Los Angeles County. So, I caught the research bug there too, and I was encouraged to apply for PhD programs, and I got into Yale and Berkeley, and I went to Yale. I can't even tell you really a good reason why. It was across the country, and I wanted another adventure, so that's what I did.

Rob Stavins: Right. So, that's really a change, going to New Haven at that point. Now, you were there for, is it just one year in the program? Do I have that wrong?

Lori Bennear: I was there for two years.

Rob Stavins: Two years.

Lori Bennear: Yeah. So, I left after my second year. I decided I wasn't so sure if I wanted to get a PhD after all, and it was time to leave. So, I took my MA, and moved up to the Boston area to work at Abt Associates in their Cambridge office. That was the next step.

Rob Stavins: Tell me about what did you do at Abt Associates?

Lori Bennear: So, I worked in their environment group, and at the time their work was almost exclusively under contract with USEPA. So, I did benefit cost analysis for the office of, what was at the time, Office of Pollution Prevention Toxics, OPPT, and the Office of Water and the Office of Air and Radiation. Those were our biggest clients.

Rob Stavins: Right.

Lori Bennear: So, that was great because it took all this theory that I had learned, and then I actually had to do things. Like I had to build a supply and demand model in Excel or whatever.

Rob Stavins: Right.

Lori Bennear: So, I felt like that was a really good step for me.

Rob Stavins: Yeah. Typically benefit cost analysis is not something which is taught, certainly not in a PhD program, and frequently not for undergraduates. Yet it's a methodology, or a set of methodologies, that are just the bread and butter of economic consulting.

Lori Bennear: Exactly. So, I mean, I just spent first, I don't even know how many months, just reading other regulatory impact analyses, and going through other people's analysis in SaaS and Excel to figure out what I was doing, because I had never been taught that stuff. I knew the theory of it, but not how one actually does it.

Rob Stavins: Right, right. So, what made you apply, which I assume was the next step to the PhD program in Public Policy at Harvard?

Lori Bennear: The first year at Abt, I felt like I was just drinking from a fire hose. I was learning so much. I think it's fairly common in consulting, you sort of get pigeonholed, and you're going to do a bunch of stuff. I was doing that same stuff over and over again, and it was no longer quite so new and exciting. I was thinking back to the original motivations I had for getting a PhD, and they mostly still applied. I just wanted a more applied program, less theory. Yale was very theoretical. So, I started looking around and applied to the Kennedy School, where I ended up working with you. But I also applied to a variety of ag and resource econ departments.

Rob Stavins: I see. Right, right. Now, I always ask, what was your dissertation topic and who was on your committee?

Lori Bennear: So, my committee was chaired by this guy you might know, Rob Stavins. I also had Nolan Miller, who's now at the University of Illinois at Urbana-Champaign in the Business School. Cary Coglianese, who's at U-PEN, is on my committee. My dissertation focused on the effects of regulation on environmental performance at the facility level. I looked at what I've called nontraditional environmental regulations. So, information disclosure requirements and management-based regulations, which are regulations that require firms or facilities to engage in some sort of pollution reduction planning, that's the required activity. But they don't then actually have to follow through on anything. Everything that they end up doing in response to that planning is voluntary.

Rob Stavins: You did quite a bit of work on that going forward, didn't you?

Lori Bennear: I did. Yeah. I mean, for years after I was working on both of those. I'm serving on a National Academies panel now for the Transportation Research Board on pipeline safety. This is the second one I've done. They call me because of the management-based regulation work.

Rob Stavins: I see.

Lori Bennear: Because that's the approach that we're taking to a lot of these oil and gas safety programs now.

Rob Stavins: Now, for our listeners who don't know, I'll mention that Nolan Miller is an economic theorist, unless I have that wrong.

Lori Bennear: That's correct. Yes.

Rob Stavins: Yeah. Cary Coglianese is a dual scholar. He is both a political scientist and has a law degree. I've kept up with his work, mainly through the internet at Penn Law School, in terms of his regulatory programs. You probably have as well, I suppose, Lori.

Lori Bennear: I do. I actually still see him quite regularly.

Rob Stavins: Great.

Lori Bennear: We actually served on the first of these National Academies panels I was on with him. He's invited me to be a collaborator on a couple of his books that he put out through the Regulatory Policy Program at Penn. So, yeah. I've been in touch, regular.

Rob Stavins: Yeah. He's doing wonderful things there. Now, your first job out of graduate school, was it indeed to the Nicholas School at Duke?

Lori Bennear: This is where I've been. Yeah.

Rob Stavins: Like me, you're a lifer.

Lori Bennear: I'm a lifer.

Rob Stavins: So, what made you go to the Nicholas School at Duke? What were the big attractions, besides the fact they made you an offer, of course?

Lori Bennear: Yeah. So, right. That is usually a big attraction. It was a dream job in a lot of ways, because I wanted to stay at a place that focused on applied research and was interdisciplinary, so I had ideally wanted to go either to another public policy school or a school of the environment. The Nicholas School at the time,

they were hiring for two positions, broadly in environmental policy. So, this is not that interesting, but the political science market moves really early. So, I actually had an offer from them before the holidays.

Rob Stavins: Right.

Lori Bennear: So, that made it hard because it was like the dream job, and I had an offer really early. It was exciting, but it also meant it was a little bit weird to go do other interviews after that. But I've been extremely happy there. Obviously, this is my 18th... I've been there for 18 years now.

Rob Stavins: So, you share something then with your friend and co-author Sheila Olmstead, because Sheila also went to what I think was her dream job certainly at the time. Although she actually didn't even go on the full market, rather than just getting a job offer early, she got a job offer and then didn't really go on the full market. In her case, it was going to Yale.

Lori Bennear: Yeah. So, I've explained this to some of my PhD students over the years too. The job market often seems very terrifying for folks, but it really is a matching process.

Rob Stavins: Right. Yes.

Lori Bennear: You only need one good job.

Rob Stavins: Yes.

Lori Bennear: So, I can't tell you how many times people will be like, "This is my dream job." I'm like, "Yeah. You're their dream candidate actually." So, the odds of that working out are not trivial.

Rob Stavins: Yeah. But it does happen. It's a wonderful part of your story and Sheila's story. Actually, I'd say my own story, because the Harvard Kennedy School for me, coming out of the Economics Department at Harvard was really my dream job at the time. It's remained so, for more than 30 years. So, let's turn to your work in the world of environmental economic scholarship. I assume that over these nearly two decades that you've seen some significant changes in the scholarly world of environmental economics, since your 2004 PhD degree. Do any of those changes stand out to you?

Lori Bennear: In the broader scholarship, I feel like a lot of those decades were spent really diving into the weeds of how to try to get climate policy right, from an economic standpoint. That wasn't a huge area of my own research, but that's where I feel like the field was. Really smart people trying to tackle issues as they came up. Like some of my good friends and colleagues who were at Duke at the time. We have price uncertainty if we use a permit system. So, what if we have a permit reserve and we issue permits from that reserve, if the price hits a certain level.

Lori Bennear: Your own work and Sheila's work, and lots of other peoples, focusing on as issues keep being brought up in the political sphere or whatever, doing our best economics to try to address those issues. I feel like the positive side of that was tons of brilliant people went to work on that. The downside was things got more and more and more complicated. We have to have border adjustments. We have to have this; we have to have that. It became far less straightforward to explain to grandma at the Thanksgiving table, how a cap-and-trade program would work for carbon dioxide.

Rob Stavins: So, one of the things that I've noticed validates what you just said. When I think back over the 30 years, in terms of the changing focus of environmental economics, is that in the class I teach, which you were a teaching fellow in I believe, in that course, probably back when you were a PhD student, of the 26 class sessions of a 13-week course, meeting twice a week. Of those 26 sessions, one half of one session was dedicated to climate change policy. The other half of that one was stratospheric ozone depletion. That was the international or the global class. Now, that class has essentially evolved into a course in the economics of climate change and environmental policy. Sometimes that's been a gradual change, but it's also accelerated over the last few years. Let me get back to your research, your own research and writing. I know this is asking you to identify your favorite child, but what's the one publication of yours that you're most proud of?

Lori Bennear: Can I have two favorite children?

Rob Stavins: Take two, yeah.

Lori Bennear: Okay. I only have two real children, so that helps. In the purely economic space, I think the work that I'm most proud of is actually a paper with Sheila, looking at the effect of information disclosure on drinking water quality on violations of drinking water standards by public water utilities. That was published back, I think, in 2008, in *The Journal of Environmental Economics and Management*, and ended up having, I think, a fairly outsized impact in terms of getting calls from EPA's enforcement office wanting to understand how they could better use information disclosure as an enforcement mechanism, which I think was really interesting. Post-tenure one of the things that Duke is known for is its interdisciplinarity. I was involved in a community of practice at Duke on rethinking regulation that had faculty from all over the university. Through that, I already knew Jonathan Wiener, who I think was on your show just a while ago-

Rob Stavins: Yes. Yeah.

Lori Bennear: ... from the law school. But I got to know Ed Balleisen, who is a history professor, and Kim Krawiec, who's also at the law school. Through that, we were brainstorming different research ideas that resulted in a book project called, "Policy Shock, Understanding Regulatory Response to Crises." It looked at a variety of different environmental crises, including oil spills and nuclear incidents, as well as financial crises, which is what Ed Balleisen studies. That was

a multi-year project across a lot of disciplines, with mixed methods that I found just personally very rewarding. Again, I think Ed has had quite a bit of impact in terms of some of the recommendations that came out of that book.

Rob Stavins: So, what you've highlighted are situations which the scholarship was significant. You're proud of the scholarship, and partly you're proud of it because it was actually useful in the policy world. So, something I've noticed, and you have, is that in the policy world, there's increasing attention, and in the scholarly world as well, to what we previously would've just referred to perhaps as the distributional impacts of environmental problems and environmental policies, and now are characterized and examined under the labels of environmental justice and just transition. This includes your own work. Can you say a bit about it?

Lori Bennear: Yeah. So, I mean, I said earlier, but the first two papers I had that were published were actually from my undergraduate days and were in environmental justice. We actually drove around in a vehicle with a giant GPS receiver because back in the day you didn't have those on your phone, to geolocate hazardous waste treatment storage and disposal facilities. So, I've been in this for a while, but just not super active. My current research is looking at the justice impacts of the clean energy transition. So, we are in the process of, it's not even a once in a generation, but once in many, many generations transition in our energy system. The likes of which we can't, in some sense, not even really imagine. But it's going to involve significant land use changes, and changes to the way electricity is generated.

Lori Bennear: A lot of that is exciting from an environmental standpoint because they're lower carbon. But we have this opportunity to do this in a way that extends those benefits more evenly across the population than the fossil fuel-based energy system did, and potentially doesn't centralize the costs of that energy system in particular communities in the same way that the fossil fuel energy system did. But we have to do that consciously from the beginning. So, one of the things we're looking at is different definitions of what constitutes an environmental justice community. There are a bunch from states. The White House is working on this now. If we use these different definitions, what does that say about the concentration of solar, wind? Then in North Carolina in particular, what are known as renewable natural gas from hog farms and also the wood pellets that are used and exported to Europe, what does that mean in terms of our understanding of the distributional impacts of that renewable energy?

Rob Stavins: In terms of just transition, the fact that there will be losers surely, both in geographic areas and in particular sectors from the clean energy transition, presumably your experience back in Gillette, Wyoming, must come to play in your thinking. Even if it's in the background of your thinking, I assume it's, as you said earlier, it's affected you.

Lori Bennear: Yeah. Certainly, one of the issues of course, is what's going to happen to communities that were heavily dependent on fossil fuels, and that's Gillette.

That's also North Dakota. That's West Virginia. There's a whole bunch of these. So, that's one issue. There are likely to be losers [inaudible 00:22:44] on this dimension. What do we do about that? But then also, as we increase these other renewable sources, who gets a seat at the table in terms of discussing what the potential impacts of those things are? Because while they're good for carbon, they're not perfectly great along every environmental dimension. There's waste associated with them. There's mining associated with them. We need to take that in holistically from the beginning.

Rob Stavins: Now, speaking of that, outside of academia, you mentioned before, your service on panels of the National Academies, and you've worked on safety issues surrounding offshore oil and gas development and extraction. That's now an increasingly important topic because of the war in Ukraine. In some cases, pushes for increased oil and gas development in places such as the United States. Are there any particular insights, in particular, really, any surprises that arose for you from your work at the National Academy's panels?

Lori Bennear: I don't think there were surprises, except for that we keep answering the same question over and over again. So, Congress or agencies, whoever's commissioning these reports, always wants there to be a silver bullet. They want one thing we can do that will ensure that we never have another Deep Water Horizon, or that we don't have pipeline explosions. And in these high-risk industries, there just isn't such a thing. We need a series of both safety systems and safety processes that are tied to a safety culture, only some of which regulation can actually really dictate. That's a hard pill to swallow, because on the one hand, as you pointed out, we're still dependent on these industries in many ways. That dependence might increase at least in the short term, due to issues going on in Russia and the Ukraine.

Lori Bennear: But we don't like the downsides of them. Whenever anything bad happens there's a lot of hand wringing about why regulation didn't stop that from happening and trying to get people to understand that inspection regimes can only go so far. You're only out on the rig once a year. That the other 364 days a year there has to be a safety culture. There have to be processes in place that reward people for valuing safety. That's a harder thing. There's a huge role for industry in that, which also gets some folks in the environmental community, gets their backs up because they feel like industry has too much say over what these regulatory processes should be. But they also have the expertise and the experience to actually make them happen.

Rob Stavins: So, more broadly, what's your assessment of the current US administration's environmental and energy policy, either domestically or internationally, whatever you'd like to comment on briefly?

Lori Bennear: Very briefly. So, up until [President] Biden, I think the US through multiple different presidencies and different parties had an all of the above energy platform. One of the things that we were curious about with the Biden Administration was whether there was going to be a marked deviation from

that. I think initially it looked like there was going to be. A stronger focus on climate change and decarbonization, but geopolitics has a way of messing up these plans. I think we're back to an all of the above sort of approach, at least in the medium term, which creates some political issues of course for President Biden with the progressive side of his party.

Lori Bennear: But trying to balance all of these competing values, people don't like that the price of gas, I'm told, is four something in North Carolina, and six something in California. They want gasoline to be less expensive. They want electricity to be less expensive, and they also want decarbonization. By the way, we don't like nuclear. So, it's really a challenge. I think realistically the all of the above strategy that has a plan for a transition, but without promises of a miraculously rapid transition, which the grid cannot accommodate, that's where we're going to be at. But it's not politically appealing to any party to say that.

Rob Stavins: So, that's very interesting. I take from what you just said that it's not just that it may be the politically feasible route, but that economically that might be a sensible route. Or did I misunderstand what you said?

Lori Bennear: Yeah. No, economically it's a sensible route, and technologically it's a feasible route.

Rob Stavins: Yes.

Lori Bennear: I mean, the people who do energy technology at the Nicholas School will tell you, we can't transfer, the grid can't absorb that much renewables that quickly. So, there is going to be a longer pathway. I mean, as an economist, I wish we could go back to the nineties and get it right there. What we were saying in the nineties was slow and steady. Put the carbon price in now; we'll have lots of time to adjust. We didn't do it. So, now things seem more urgent, but there's still, both from an economic and a technical feasibility standpoint, it's going to be a longer pathway.

Rob Stavins: So, although it would be wonderful if we could reinvent history and go back, I want to bring things to a close by asking you about the going forward-

Lori Bennear: Sure.

Rob Stavins: ... part of the story. In particular, something that it seems to me is just really a quite dramatic change. Were these youth movements of climate activism that we saw become quite prominent in 2019, then a bit of a hiatus because of the pandemic in 2020. Then back again in 2021, such as in Glasgow at the annual Climate Talks. So, I'd like to know, what's your reaction to these youth movements of climate activism? I know it's most prominently Greta Thunberg, but it also is much broader among students and young people in general.

Lori Bennear: Yeah. I live this every day in my role as Executive Vice Dean at the Nicholas School because the students, they have changed since I got there in '04. They are far more activist oriented. I think they were always passionate about the environment, but the way in which they express that passion and the expectations they have for change and their relationship with what they view as power hierarchies is completely different. It makes me feel old, Rob.

Rob Stavins: Yes.

Lori Bennear: I mean, I feel like I'm the old person who's like, "back in the day, we solved problems." But it's here to stay. It's required adjustments on all of our parts and trying to help harness that passion and that creativity, while also helping to educate them that there are these constraints in the world that are real, and learning to operate within those constraints might actually be beneficial to them. But I think it's a challenge and we'll see what happens. There's almost no trust in government to make progress. A lot of traditional institutions, they don't have much trust in. Interestingly, amongst our students, there's a lot more trust in the private sector to make a difference. So, it's transformative. It often makes me feel like the old person.

Rob Stavins: Well, if it makes you feel like the old person, it makes me feel like the older person. So, listen, thank you very much, Lori, for taking time to join us today.

Lori Bennear: Thank you so much for having me. This was a lot of fun.

Rob Stavins: So, our guest today has been Lori Bennear, who is the Juli Plant Grainger Associate Professor of Energy Economics and Policy at the Nicholas School of the Environment at Duke University. 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.

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