

TRANSCRIPT

Environmental Insights

Guest: Severin Borenstein

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- Severin Borenstein:** Electrify everything really is the pathway to making huge gains on reducing greenhouse gas emissions. And that means a lot of renewables on the system. And that raises this challenge, which California is way ahead of almost anyone else in the world on of keeping the system in balance.
- 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 Harvard Environmental Economics Program. When thoughtful people consider policies to reduce carbon dioxide emissions to help address climate change, substantial attention is frequently given to one sector, and that's the electric power sector. Partly because of its standing as the first or second largest source of emissions in many countries, and partly because it frequently presents low hanging fruit – that is low-cost abatement opportunities. Today we're very fortunate to host for this conversation, an economist who has spent close to four decades studying the electricity sector, making important contributions both to scholarship and to the design of public policies, and who also has great expertise in the broader realm of regulatory economics and industrial organization. I'm referring to [Severin Borenstein](#), who is Professor of the Graduate School at the [Haas School of Business](#) at the [University of California, Berkeley](#), where he is the longtime director of its highly regarded [Energy Institute](#). Welcome, Severin.
- Severin Borenstein:** Great to be with you.
- Rob Stavins:** So, before we talk about your research and your current thinking about environmental energy policy, I always like to go back to how you came to be where you are. So, where did you grow up?
- Severin Borenstein:** Thanks, Rob. Yeah, I grew up in Berkeley, actually.
- Rob Stavins:** Oh, wow.
- Severin Borenstein:** ...worked my way back across the country after graduate school to eventually land back here again.
- Rob Stavins:** So, did that mean primary school and high school in Berkeley?
- Severin Borenstein:** Yeah, I went to Berkeley High School. I then went off to college for a couple of years to Carleton College in Minnesota, and then I came back and finished at UC

Berkeley. I worked at the Civil Aeronautics Board during airline deregulation in 1978 and '79, which was a really formative experience for me before I went to graduate school at MIT.

Rob Stavins: Would that be Fred Kahn days?

Severin Borenstein: Yep. Fred was my boss's boss and Bob Frank at Cornell University was my immediate boss. It was basically a bunch of economists trying to figure out how to reduce regulation in the industry in a way that would benefit consumers, and it was just a fabulous experience. So, I started studying airlines and went off to graduate school. And that was where the primary thing I focused on in my dissertation.

Rob Stavins: So that was a very significant time at CAB in terms of deregulation of airlines, wasn't it?

Severin Borenstein: Yeah. So, when I got there in the summer of 1978, Fred Kahn had just committed to deregulating the airlines and the Congress had not actually passed the Airline Deregulation Act yet, which they did a few months later. And during the time I was there, we basically instituted the process of deregulation which was a very complex process in terms of opening up entry of airlines to new routes, reducing and eliminating regulation of pricing, figuring out how to set rules like denied boarding compensation. And so there was just a huge amount of regulatory change going on, and with an economist at the helm of the organization, a lot of that was based on economic reasoning. So, the economic group that I was in played a big role in it.

Rob Stavins: Indeed, it was. But I should tell you at the same time as you were there, I was at Cornell finishing up my master's degree in agricultural economics before I moved on. And Fred Kahn was not a popular fellow among the Cornell faculty because all the direct flights, the uneconomic direct flights that existed from Ithaca, New York to Washington DC and other places were eliminated. And at that time then you had to begin to drive to Syracuse, which I think you still do in order to get a significant flight out.

Severin Borenstein: Yeah, that's right. There were a lot of uneconomic flights that were being cross subsidized by the airlines in order to maintain other routes that were highly profitable and one of the things airline deregulation did is it reduced, and in some cases eliminated, nonstop flights on some less traveled routes.

Rob Stavins: And eventually what we got is this hub and spoke system that's evolved.

Severin Borenstein: That's right. And much lower prices and higher load factors. And I spent a significant part of my career for the first six years of my career studying the evolution of competition in the airline industry, and continued after that, but the beginning of my career was doing the industrial organization of airlines, including studying price discrimination, which of course if you studied airlines

you had to. And that's how I evolved into studying energy because one day in Ann Arbor, Michigan where I was teaching at the University of Michigan, I talked to the owner of a gas station who was charging the same price for leaded and unleaded gasoline, which was very unusual.

All the other stations were charging more for unleaded. And he explained to me that they actually paid the same wholesale price for the two types of gasoline, but they could charge more for unleaded so the other stations did. And that got me interested in pricing in the gasoline market, which eventually led me to working on oil markets, which led me to being appointed director of what was then called the University of California Energy Institute in 1994. By then I had moved to UC Davis and that happened to be the year when California started down the road of electricity deregulation.

Rob Stavins: Now before we jump into electricity deregulation, let me back you up a bit because you mentioned about going on after your time at college and at CAB to graduate school. That was a PhD at MIT, I believe. What was your dissertation topic and who were your advisors?

Severin Borenstein: Dick Schmalensee was the chair of my dissertation committee.

Rob Stavins: Great. He's been a guest on this podcast

Severin Borenstein: And I have stayed close to him throughout my career as well as Paul Joskow, who was also on my dissertation committee.

Rob Stavins: What a dynamic duo you had there.

Severin Borenstein: And Garth Saloner, who was an assistant professor then and went over to Stanford shortly afterwards. So, I had an all-star team on my dissertation committee, and that was great, and I learned a huge amount from them.

Rob Stavins: So, as you said, you finished up there. you went to the University of Michigan; you're an assistant professor there. Then you went on to be, I think, an associate professor, then full professor at UC Davis, but eventually you did return home to Berkeley to the Haas School of business in 1996. So what brought you back from Davis to Berkeley?

Severin Borenstein: Well, I was actually at that time splitting my time, because I had been appointed the director of the UC Energy Institute, which was at Berkeley, although it was a system-wide university institute but the other half of my position was at Davis. By that time, my wife and I had moved to the Bay Area, so I was doing a long commute back to Davis. And when I got the opportunity to move my academic position to UC Berkeley to the Haas School of Business, I jumped at it. It was a great move. And I have been very happy here. And returning to the Bay Area was really a dream of mine. Not one I really thought would ever happen, but it was great to be able to come back.

Rob Stavins: Now, were you the founding director of the Energy Institute or did that predate you?

Severin Borenstein: No, it actually was created in the late seventies as part of the energy crisis of the seventies. And it was originally directed by an engineer and then by another economist, Rich Gilbert, an industrial organization economist, and then I was the third director of it.

Rob Stavins: Now I have to mention that speaking of the Energy Institute at Berkeley, that people that are listening to this podcast may also be readers of blogs. And to all of our listeners, if you are interested in electricity policy, particularly an economic perspective on electricity policy, there is no better source than [the blogs](#) which come out with remarkable regularity from your institute. Is there a way that you could tell us how to access that blog?

Severin Borenstein: Sure. If you basically type in Energy Institute at Haas in any search engine, it will take you to the [Energy Institute's website](#) and there at the top there is a link to go to [our blog](#). It comes out every Monday, and we have a rotation of six or seven energy economists who are all affiliated with the Energy Institute at Haas. And we cover a variety of topics. We cover a lot of electricity policy, both wholesale and retail policy, climate change and greenhouse gases and tradable emissions markets and also gasoline and oil markets and competition in gasoline market. So, it's a pretty broad spectrum and we try to keep it very readable. We have an internal editing process that seems to smooth the posts out pretty well. I think in many ways the most impactful writing I've ever done is those blog posts. They are much more widely read than one of my journal articles.

Rob Stavins: You mentioned that you have an internal editing process that shows. Those are extremely well-written. So my kudos to the person, persons or process who does the editing.

Severin Borenstein: Well, it's a team. It's all of the bloggers. We send it around a few days before it posts and we get feedback from the other bloggers. And we're really a team on the editing front.

Rob Stavins: So, let's turn to your work, Severin, in the world of environmental and energy economic research. Over the nearly four decades since your PhD degree in 1983, you've presumably seen some significant changes, not only in the policy world. We've already talked about some of those changes both in terms of airline deregulation and then in terms of introduction to competition and restructuring in electricity. But you've also seen changes within the scholarly world. Can you comment on one or two highlights? What really stands out to you about the changes that you've seen in the scholarly world during your career?

Severin Borenstein: Well, I think the biggest change that I've seen, and maybe it's just going from an assistant professor to more senior, is the real openness to doing work that has

immediate policy implications. Which is so many of us, particularly in the area of environmental and energy economics, got into this not just to do economics, but to really have an impact on policy. It was a tool to help address so many problems that the world faces. And I think that the openness to doing work on issues that are of immediate policy relevance. [One of the most recent papers](#) I published was on cap-and-trade systems in California that ended up coming out of the *American Economic Review*, even though it basically started out as a stress testing exercise to see whether California's design of cap-and-trade markets would really be able to stand up.

Rob Stavins: I know that paper well, and I assign it to my class.

Severin Borenstein: Thank you, Rob. And so, I think the advice I give to my graduate students these days is work on things you're passionate about because whether it gets published in a top journal or somewhere else, you'll still find it satisfying that you wrote the paper and you can often have a real policy impact even if it's not published in one of the top journals.

Rob Stavins: Speaking of your papers though, let me ask you -- when you reflect back on your very long CV of published work, other than that very recent paper, what's one that stands out that you're just most proud of?

Severin Borenstein: Well, I'm going to cheat in name two. One was in 1989, I published [a paper in the Rand Journal of Economics](#) on hub dominance and airline pricing that pointed out the phenomenon that when airlines are able to dominate hubs, it develops a lot of market power, and that had a lot of policy impact. And then in 2002, we published a paper... Frank Wolak and Jim Bushnell and I published [a paper in the American Economic Review](#) on competition in electricity markets, and this was right after the California electricity crisis, that pointed out not just that there were real potential problems, which Jim Bushnell and I had published in an earlier paper through some simulations, but that California had really followed exactly the sort of problems that we anticipated. When you have very inelastic demands and you hit a supply constraint, even players with very small shares of the market were able to exercise market power. And that paper had some direct impacts on the way the Federal Energy Regulatory Commission and the various ISOs and market monitors changed the way they evaluated competition in electricity markets. So I found that very satisfying.

Rob Stavins: You mentioned ISOs, and I take note of the fact that you are a member of the Board of Governors of the California Independent Systems Operator or ISO. Probably not everyone, particularly those from other parts of the world who are listening, know what an ISO is. So, can you give a very brief definition, and also very briefly, tell me what's your role on the board of governors?

Severin Borenstein: So historically, before we deregulated electricity markets, every utility controlled the flow of power on its wires in its service territory, but when we started opening up those markets, you got to have a traffic cop who controls the flow of power across all of the wires within the market, and that's what ISOs do.

Independent system operators, sometimes called regional transmission operators. And so, the utilities that become part of those ISOs commit to basically letting the ISO run the transmission system and being responsible for balancing the whole system because of course, electricity has to be constantly keeping supply and demand in balance. So, that's what ISOs do. They run markets for electricity, but they also do the engineering to make sure the power system is physically in balance.

Rob Stavins: And what does the board of governors do?

Severin Borenstein: Well, the Board of Governors is the board is like the board of any corporation. We're not involved in the day-to-day operations. We meet seven to ten times a year. We oversee the CEO and the leadership team. The big decisions of the corporation come to us, and because of FERC regulation, some of the not so big decisions that are still required to be approved by boards. The biggest surprise I've had... I joined it thinking this is really going to be great. We're going to talk about policy all of the time and how to structure electricity markets and issues of expanding the market. A lot of being on a corporate board is HR basically. It's hiring the CEO and setting compensation and doing reviews and stuff that's more mundane than I appreciated. It's part of the everyday oversight of the corporation.

Rob Stavins: Well, we can turn that away from the mundane and instead, I want to ask you to think more broadly in regard to energy and climate change policy, either of those. And what's your single greatest concern today?

Severin Borenstein: Well, I'm going to go a little narrow and think about electricity markets because of course, electrify everything really is the pathway to making huge gains on reducing greenhouse gas emissions, and that means a lot of renewables on the system. And that raises this challenge, which California is way ahead of almost anyone else in the world on, of keeping the system in balance when you have a lot of intermittent non-dispatchable generation. You can of course do it with batteries, but batteries are extremely expensive if you're talking about long-term storage and having enough power to get through cold winters and so forth. You can do it with more trade with other areas that have different production patterns, and that's great. We aren't doing nearly enough of that, and we're really not doing nearly enough of that in the west where California is an ISO, but the rest of the west is the old model where each utility controls its own balancing authority.

Rob Stavins: Now, you didn't mention transmission lines. I don't know if that's an issue in California, but in other parts of the country that certainly is. What's the-

Severin Borenstein: Oh, yeah. No, the two big challenges I would say in making this all hang together are building more transmission [lines] in order to accommodate more long-distance trade because there's just such huge gains from being able to trade power. It's not like trading most goods where the means of production can be replicated pretty easily. Once you start using renewable energy, there are places

that are fabulous for producing wind power and places that really aren't. And so, we need to build more transmission [lines]. The other piece is demand response, and here's a place I think we are just doing an awful job, not just in California, but in the US generally.

We have not gone down the road very far at all of using demand response to help balance the system, and I think that's just a huge waste. There's plenty of electricity demand that is absolutely critical, but there's also plenty that's not and if we can send the signals, now's not the right time to charge your car, or it would be better if you could shift your electric dryer to later in the evening or middle of the day when we have plenty of solar, we could make this a lot easier. And no one that I'm aware of has gotten very far in doing that. And I think that's a real disappointment and challenge.

Rob Stavins:

Now, a lot of these changes that have taken place or might take place have not only implications for efficiency or cost-effectiveness, but distributional implications. And as you well know, Severin, in the policy world and in the scholarly world as well, there is a lot more attention than there was a few years ago, although I know it started quite early in California, to environmental justice and just transition. Those are those two phrases, frequently in the context of climate change policy. What's your reaction to that increased attention?

Severin Borenstein:

Yeah, this is an area when I was in graduate school in economics that just got almost no coverage at all. And I think that was a real mistake. Economic theory tells you that you can just maximize efficiency, make the pie as big as possible, and then deal later with redistributing it fairly, and that's just not how the world works, both in political process but also in actual implementation. If we never get to the redistribution, then those policies have huge impacts that we're neglecting. I actually got interested in this about 15 years ago, and started working on distributional consequences of electricity rate design, which I think there are specific political players who get involved and try to push the policy, but the economic analysis has really been lacking.

The more recent thing I've been involved in is working with Meredith Fowlie, who I think has been on your show and talked about this, and Jim Sallee, on looking at the rates in California and how regressive it is that we are paying for all sorts of policies through higher electricity rates, which first of all, it's very regressive. We're laying the cost of wildfire damages and climate change adaptation and mitigation disproportionately on low income. But secondly, those incredibly high rates are discouraging things like heat pump water heaters and heat pump space heating and electric vehicles and induction stoves. And so we're trying to really, with that research, influence the policy. And we have had a bit of influence in California, and we're starting to see more nationwide on the way we set rates and more sensitivity to the impact it has on disadvantaged communities.

Rob Stavins:

So, thank you for that. And we're coming to the end of our available time. And so I'd like to move at the very end here from scholarly work, policy work to

really what's the world of activism. And in particular, I'm interested in your reaction to the youth activism that has increased so dramatically over, perhaps it's the past five or six years, most prominently the leadership of Greta Thunberg but much more broadly than that, particularly in Europe and the United States. I suspect that you experience it in what has for many years been the focal point of youth activism in the United States, Berkeley, California. What's your reaction to this?

Severin Borenstein: I find this incredibly heartening. It's so clear that the response we need to climate change is going to take a lot of paradigm shifting, and it's also clear that the older you get, the harder it is to shift paradigms. So, the youth activism is really forcing us old fogies to think of the world differently. And one of the directions, of course, is the one you just raised about environmental justice, the need to incorporate environmental justice into the transition, but more generally in the way we use energy, the way we think about consumption and so forth, and the ability to get off fossil fuels.

These are things that when you ask someone over 50, you're likely to get a very different answer than when you ask someone under 30. I think the youth movement is really important. Now, I don't agree with everything I hear, of course, and sometimes it seems unrealistic or idealistic, but I think that we're not going to get there without some pretty major paradigm shifts. And I don't think that that's likely to come from the older set. I think younger people are the ones who have the creativity and openness to new ways of the world being that they are going to be the ones who can point in directions that really can change the world.

Rob Stavins: Well, that's a great point on which to bring this to a close. So thank you very much, Severin, for taking time to join me today.

Severin Borenstein: It was great to be with you, Rob. Thanks for inviting me on.

Rob Stavins: My guest today has been [Severin Borenstein](#), Professor at the [Haas School of Business](#) at the [University of California, Berkeley](#), where he directs the [Energy Institute](#). 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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