TRANSCRIPT
Environmental Insights Episode #4, 2025
Guest: Elaine Buckberg
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Elaine Buckberg:

The amount of research that's happening on batteries, public and private, around the globe will really continue to drive down battery costs and get us to that point where buying an EV is actually cheaper than buying an internal combustion vehicle, even on the upfront costs, and that will be very compelling to people.

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 program. In this podcast series, I've had the real pleasure of engaging in conversations with some remarkable individuals who have worked at the intersection of economics, energy, and environment, and have backgrounds and experiences in multiple sectors such as academia, government, the private sector, and NGOs. My guest today is no exception because I'm joined by Elaine Buckberg, my colleague at the Harvard Kennedy School where she is a senior fellow in the Salata Institute for Climate and Sustainability, and previously served as Chief Economist at General Motors. Before that, worked at a number of economic consulting firms and investment banks and served in the US Department of the Treasury and the International Monetary Fund. Welcome Elaine.

Elaine Buckberg:

Thank you so much for having me, Rob.

Rob Stavins:

So, as regular listeners to this podcast know, I always start our conversation by asking my guests about their personal and professional background. So, before we turn to your observations on energy and climate change policy, including of course, your current focus on electric vehicles, let's go back to how you came to be where you are. So, where did you grow up?

Elaine Buckberg:

Outside Washington DC.

Rob Stavins:

And that meant primary in high school in Washington?

Elaine Buckberg:

From when I was born all the way through high school.

Rob Stavins:

Oh, wonderful. And for college you went on to Yale University, am I right on that?

Elaine Buckberg:

That's right.

Rob Stavins:

And where you jointly studied economics and English.

Elaine Buckberg:

Indeed.

Rob Stavins:

So graduate school then, did you immediately go to graduate school after you graduated college or was there time in between?

Elaine Buckberg:

No, I went straight to MIT.

Rob Stavins:

You did? That's quite unusual today where you studied for a PhD in economics. So, who was on your committee?

Elaine Buckberg:

Paul Krugman, Stan Fischer, and Rudi Dornbusch.

Rob Stavins:

Wow, what a stellar group. That's incredible. And what was your dissertation? What was the topic?

Elaine Buckberg:

It was three papers on capital flows to emerging markets. So, my job market paper was actually about market integration of emerging stock markets in an era where countries were just starting to open their markets to portfolio capital flows. Many were very closed and my really cool data was monthly.

Rob Stavins:

So what year was your PhD?

Elaine Buckberg:

1993.

Rob Stavins:

1993, which is not long after mine. Mine was 1988 if I recall correctly. So, what was your first job out of graduate school?

Elaine Buckberg:

I went straight to the IMF, and you might laugh at this, but if you asked me when I was in high school what I wanted to do when I grow up, it would be to be an economist at the IMF. So, I did exactly what I wanted to do.

Rob Stavins:

Wow, that's very impressive. And after the IMF, what came next? I mean I've got a whole list of locations, but you know them better than I do.

Elaine Buckberg:

Well, I went next to Morgan Stanley, and you remember I said that this is like an era where portfolio capital is starting to flow across borders. So, I went there to become a currency strategist. It was really clear to me at the IMF that not understanding the financial markets was a real gap in my ability to think about policy for countries that had bigger financial markets.

Rob Stavins:

And so, is it correct that after Morgan Stanley, you went to NERA?

Elaine Buckberg:

That's right. I went to NERA and spent a dozen years there.

Rob Stavins:

And where was that? Which office?

Elaine Buckberg:

I was in New York City.

Rob Stavins:

New York City. And then from there to the US Treasury.

Elaine Buckberg:

Right. I went back home and went to work at the Treasury Department in the second term of the Obama administration where I actually ended up working with one of our close colleagues, Karen Dynan.

Rob Stavins:

Of course. And then after that to the Brattle Group…

Elaine Buckberg:

I went back into consulting for a while before I had the opportunity to go to GM.

Rob Stavins:

So, let's turn to that. So, you went to General Motors where I believe your title was Senior Economist. Do I have that right?

Elaine Buckberg:

Chief Economist.

Rob Stavins:

Chief Economist. They both sound pretty good, but in any event, so what's the responsibility? I know this is a long story. Give me the thumbnail of the responsibilities and the scope of activities of the Chief Economist at General Motors.

Elaine Buckberg:

My scope was really broad. I think it may have varied over time, but first of all, I was responsible for all of macroeconomics, which goes into all kinds of forecasting, but also means advising the CEO and other C-suite executives and people throughout the company on what's the outlook for the economy. And that's not just the U.S. we followed. We really followed closely ten major markets and more markets in Latin America.

So, it's being the economic advisor to the top of the company. I also ran our long-term forecasting and industry analysis. So, that's thinking about in 2030, how many vehicles sold in, say the U.S., are going to be pickup trucks and how many are going to be Chevy Silverados versus GMC Sierras, Ford F-150s, or Dodge Rams. But a lot of really interesting questions that actually economists like… because I had super micro data and I also built a data science team that served the entire portfolio planning department, which portfolio planning, think of it as strategy for GM's vehicles business.

Rob Stavins:

So how long were you at GM?

Elaine Buckberg:

I was there for five years.

Rob Stavins:

Five years. And then you came to Harvard, joined the faculty in 2023. So, you've had a remarkable career already and you're still young. We've got a career ahead of you, but you've had a remarkable career already spanning both public and private sectors. I'm picturing ranging from Morgan Stanley to Harvard University and then GM along the way. But somewhere along the way you developed this focus, at least that you've been exercising at Harvard on electric vehicles. So, what drew you to that?

Elaine Buckberg:

Oh, that really came from my time at GM where GM remains very ambitious about being a leader in electric vehicles and leadership there, especially Mary Barra, the CEO, really believes that the future of industry is all electric and is planning for that pathway. So, thinking about EVs was a big slice of my work there.

Rob Stavins:

I see. So, now that you're at Harvard, has your perspective or how has your perspective on the EV transition evolved looking at it from a seat in academia rather from the inside of a major automaker?

Elaine Buckberg:

I point to two things. One, here my focus is a bit different in that my core work here at Salata is about working on improving outcomes and charging, especially public charging, to remove barriers to EV adoption for getting the climate benefits. So, to some extent my focus is different, but to the extent to which my outlook on adoption has changed, that's not a function of changing seats as much as a function of intervening developments.

Rob Stavins:

Oh, that's interesting. So, let's turn to that. Let's turn in fact to the substance of your work. What do you see as the most significant economic barriers to widespread EV adoption today? And I guess it's different in different countries. So, we could start with the United States, and I'm thinking both from the consumer perspective and also the economic barriers from the automaker side.

Elaine Buckberg:

So, the two biggest things I'd point to, supported by the research, number one is availability of public charging. Everyone, even if they can install home charging, they want to believe that if they buy an EV, they can do a road trip and it won't be a challenging or frustrating experience. So, having highway charging that works, that's widespread, that's reliable, is huge for adoption. And that comes through in JD Power surveys of vehicle buyers too, for the top five reasons why people just bought, don't buy an EV in recent quarters are about charging. The other one's about price differentials. That's the next thing I'd put in line, that people have a limited willingness to pay more for an EV. They often understand that owning an EV is cheaper than owning an internal combustion engine vehicle, but they're not doing a long-term just kind of cash flow on this and working that in their thinking. I can maybe think about the savings I'd have on gas for one or two years and accept that price differential.

Rob Stavins:

So, speaking of the first of the two barriers, you mentioned charging infrastructure. In your mind, who should bear the cost of investments in EV charging infrastructure – is it the public sector, electric utilities, automakers, or other elements bottom up of the private sector such as what we nowadays call gasoline stations, but private sector charging stations?

Elaine Buckberg:

So, first if we want more charging, I don't think there's one answer. I think if you take the perspective that mitigating climate change is really important, then you can argue that there are public benefits and there's a reason for government to invest as the investments are laid out in the bipartisan infrastructure law, the 7.5 billion for charging and the tax credits in the IRA that this is in the public interest because it helps mitigate climate change and then having that network of charging is catalytic as our research showed.

Rob Stavins:

I was just going to ask you, since you mentioned the IRA and infrastructure. So, what's happened to that since Inauguration Day? Is that still in place or is that gone?

Elaine Buckberg:

It's still in place. However it is in the 'Big Beautiful Bill.' So, in the 'Big Beautiful Bill,' it would take away the EV tax credits of up to $7,500 to the buyer. It would take away the tax credits for businesses and consumers who invest in charging infrastructure, whether at home or at their business, whether for workers or for consumers. It would also add a, or at least the House bill would add a $250 per year additional fee for EVs, which is, you can debate whether or not it actually matches, but the idea is that if you're not buying gas, you're not paying gas taxes. And so, this would contribute to highway funds. I would say that on typical mileage, this is more than a one-for-one replacement.

Rob Stavins:

Could you explain that about more than a one-for-one replacement?

Elaine Buckberg:

I think that that's more than the average household, the average vehicle would pay on gas based on average mileage.

Rob Stavins:

I see. Okay. So let me apply some of that and think about the automakers themselves. And I'm interested in what your judgment is, your assessment of, how well prepared are the legacy automakers compared to these new entrants like Tesla, Rivian, and I guess the Chinese EV makers? Are the traditional firms transforming? Are they just hedging their bets or maybe there isn't even a difference between the two?

Elaine Buckberg:

So, the all EV makers, so think about Tesla, right? They're all in. They received, it's important to note, received a lot of initial catalytic government funding. They are wholly trying to make EVs and they've also made a lot of money historically by selling credits to other automakers to help them meet their greenhouse gas requirements. The other automakers are, I would say, overwhelmingly believe that EVs are the future and are ambitious about getting into the market and want to be early winners in the EV market, but also need to achieve profitability along the way in order to satisfy investors and be able to make those very substantial investments in their EV program. I think there is some difference among automakers. Automakers that are heavily in Europe or in China have to shift over their portfolios faster and maybe more bought in. I think GM and Ford are very ambitious. The Europeans are very ambitious. Hyundai and Kia is doing very well with EV models in the U.S. market.

There are a few exceptions. The Japanese automakers have been more hesitant, and I'd really point to Toyota as one that continues to take a position of sort of hybrids will be enough. And Stellantis, although having a big European footprint and being European headquartered, is much more gradual in their introduction of EV models.

Rob Stavins:

So, what's at the heart of a lot of this of course are the EV technologies, I guess particularly batteries. Do you have some insights regarding the cost trajectories that you anticipate for those technologies? In

other words, are we on a path, are the auto companies, are they on a path to reaching cost parity with internal combustion engine vehicles?

Elaine Buckberg:

That is the golden objective. And I think I can say with a lot of confidence that the traditional legacy automakers are not as profitable on their EVs as they are on the average of their internal combustion engine programs. And believe me, there's probably a spectrum in every automaker about the profitability of those. And that's what everyone's trying to get to. And there's been really rapid progress in battery cost compression as well, as at the same time, reduction in the physical volume of any given amount of battery or battery density. And the recent years CAGR is about, if I recall correctly, 13 percent. So, we are at lots of different research points. The fact that you're probably on battery cost on a path for battery cost equivalence by later this decade and also potentially on actually price equivalence between EV and ICE. However, the price to the consumer would definitely be affected in this country by the availability of the tax credit, and that would affect the timing of what the consumer actually experiences.

Rob Stavins:

So, a number of times you've brought up a global perspective in terms of the U.S. market, European automakers, European market, and of course China. How would you compare the U.S. EV market with Europe and China in terms of their progress, the policy design, and for that matter, consumer behavior or any or all of those?

Elaine Buckberg:

Okay. Yeah, that's a lot of things. So, let's take them in a few parts. So, first of all, let's talk about where the different countries are. So, China is farthest along if you look at battery electric vehicles, so I exclude plugin hybrids. China's been selling around 30 percent battery electric vehicles as a share of new vehicle sales.

Europe's been hanging in for a few years around 15 percent. Some incentives went away, the share held but didn't advance the U.S. hit 8 percent as a share of new vehicle sales in 2024. In fact, last year was the first time that the overall share of internal combustion engines versus the combination of hybrids, plug-in hybrids, and battery electric vehicles that internal combustion engine share fell below 80 percent. So, that's one part. So, then some of the things that are different is that the U.S. use case is somewhat different as well as we have probably a stronger preference for larger vehicles. And a big thing is that we are just a less population dense country. People drive longer distances. And so that means that the amount of range someone's going to find acceptable to buy an EV for is longer here than it is in Europe or China.

So that means you need to put more battery in a car to make it marketable. So, say 300, 350 miles of range is what a large share of would accept. And so that means that it's harder to close that price cap in the U.S. because you need to put more battery in the vehicle. In addition, there's that longstanding American preference for bigger vehicles, partly because we have more highway driving. And so, people like larger vehicles for highway safety. And that also means it just takes more battery to get the same range on a bigger vehicle than it would be on a smaller vehicle. And another reason for that long standing preference is of course that our gasoline prices are relatively less expensive than in either China and Europe, vastly so less than Europe.

Rob Stavins:

And so, what about what we haven't talked about, or maybe I missed it, are trucks, and I don't mean local delivery trucks, but long-distance trucks, the ones that I see all the time on the interstate highways. Are there movements there in terms of electrification or is that for another generation?

Elaine Buckberg:

Semi means and tractor trailers, which I think as you mean is much farther out. California was really a leader. They had created a variety of requirements that would've driven a lot of California trucking to move two EV and created investments and they pulled back on that very early in the Trump administration in relation to some signals. But again, if you're thinking about the amount of battery and the cost and the weight of battery versus state of the freight you're pulling, it's a more complicated equation. I am doing some research with a great postdoc, Yang Zhao, about exactly this, about what sorts of routes would be suitable for electrification, assuming different possible ranges of the trucks, including the easy case – trucks that do a couple hundred miles or less and come back to base at night and do one shift a day and could slow charge overnight.

Rob Stavins:

So, there are possibilities there, but it'll be a different sort perhaps of trucking fleet and routes that we typically see today with the internal combustion engine.

Elaine Buckberg:

Not necessarily, but it's just a slower process that battery cost compression is more essential. The cost differentials are more essential. The amount of power to fast charge a battery that's going to pull a tractor trailer in any given amount of time is more. It's a more advanced level of moving towards electrification.

Rob Stavins:

Now, stepping back from this a bit, there's concern that EVs are only as green as the grid that powers them. So, how do you think about the environmental impacts or the future or the role of EVs in regions with fossil-heavy electricity?

Elaine Buckberg:

So, at this point in any region of the country, the studies show that running an EV charged off the grid with the regular mix is less emissions intensive than running an internal combustion engine vehicle. And what I think is the master study is one led by Argonne National Labs with a couple other national labs, but also GM and Ford and Chevron, and they say that lifetime emissions from sort of mine to scrappage of an EV compared to an internal combustion engine vehicle is about half. It varies on the range of the battery, and they've also projected this forward, and the gap only widens going into the future. So, no question in any part of the country produces less emissions every day it's in use and over its life than an internal combustion engine vehicle.

Rob Stavins:

So, that's a very positive assessment. That's good to hear. So, looking to the future, what developments excite you the most, Elaine, in the EV space over let's say the next decade or so?

Elaine Buckberg:

So, first of all, I have to acknowledge that given the direction of policy under the Trump administration, it's going to be a slower process.

And there's one other thing I wanted to note, which is there is the 7.5 billion dollars in charging from the bipartisan infrastructure law. The Trump administration has delayed. In fact, GAO did an analysis in response to requests from members of Congress and said that the funds are being impounded and OMB directed DOT to continue not to disperse. Interestingly, it's not taken off the table in the 'Big Beautiful Bill,' but because of the importance of charging and highway charging to adoption, that's a real pullback. We've got a White Paper that analyzes this, and depending on what combination of policies happen, EV adoption will be substantially lower at 2030 than under pre–Inauguration Day policies. And with what seems to be the most likely scenario, including the removal of the California waiver that enabled it to set tighter emission standards, you're likely down about 11 percentage points. So, if you were previously looking at 48 percent EVs as a share of sales in 2030, you're now looking somewhere around 36ish percent.

So, that's the challenge. But I'm a really big believer in the technological progress that the amount of research that's happening on batteries – public and private – around the globe will really continue to drive down battery costs and get us to that point where buying an EV is actually cheaper than buying an internal combustion vehicle even on the upfront costs and that will be very compelling to people. I also think that some of the other challenges around charging and speed of charging are improving with continued rollout of chargers as well as improvements in the batteries that enable them to take in faster charges. You may have seen that there were a couple of breakthroughs from BYD and CATL, two Chinese companies, that where they're saying you could charge a vehicle in five minutes on new chargers that they are developing that could provide more than a thousand kilowatts per hour and vehicles that could take them in at that speed.

Rob Stavins:

Boy, that would be a game changer for sure.

Elaine Buckberg:

Right. To give you a sense, the fastest vehicles in the market can take in close to 300 kilowatts in the U.S. market. So, that's a real change in the vehicle technology as well as the kilowatts coming out of a charger.

Rob Stavins:

So, a lot is happening. And it sounds like you're saying a lot will continue to happen to some degree even in the absence of public policies. But if you were advising the next U.S., and I guess I was going to say next U.S. president, but I should say the next U.S. Democratic president on EV policy, what's your first recommendation?

Elaine Buckberg:

So, even if I were advising the current president, I would say this is the future of auto, and if we want the U.S. to continue to compete in auto, if you want us to have jobs in auto and be a producer, we can't fall further behind the rest of the world. Even without the emissions requirement, from a pure jobs and industry requirement, you want domestic production. This is the future of the auto industry, and if we don't make them domestically, if we don't promote sales, we will fall further behind in efficiency in learning, and we may not have a domestic auto industry in the future.

Rob Stavins:

So, are there risks of over-hyping EVs such as, I don't know, neglecting alternative solutions like greater reliance on public transport or e-bikes or whatever? Or are you confident that EVs merit exactly the emphasis that's now given to them certainly by public officials, environmental advocates, and as you've said, but to some degree by the automakers themselves?

Elaine Buckberg:

So, if we had superb public transit in cities…

Rob Stavins:

Yeah

Elaine Buckberg:

That could reduce car use, but that's going to work in dense areas. And once you get out to suburbs and even less dense areas, that's not going to be a good substitute. So, it's great in an area like Boston to say I want to improve T service and get people back on public transit, and I want to make it safer to take your bike, but that's not going to work once you get to people doing greater distances, someone who drives 20 miles to work and efficiently bike to work.

And laying out transit that would be similarly efficient for a consumer in suburbs is really very challenging. So, I think that transit's a great goal, but you still need to think that Americans in particular are really going to continue to use their cars, and if you want to reduce emissions, you have to meet them where their choices are going to be. The other thing is that the U.S. has historically been terrible, at least at a federal level, in investing in transit, and so that ideal of dramatically including improving our transit also strikes me as one that is not highly realistic, that people outside of cities are not willing to invest in transit for the city.

Rob Stavins:

So, as we come to the end of our conversation, Elaine, I'll take note again of the fact that you have had such extensive and diverse experience in multiple sectors and at the intersection of economics and policy and technology. What advice would you give to young economists or if you prefer more broadly to young people who were interested in shaping the future of clean transportation?

Elaine Buckberg:

So, first of all, to young people studying economics, especially to graduate students, I would say don't dismiss jobs outside of academia. You can have a tremendous impact. You can arguably have more direct impact and you can still do rigorous work and be closer to changing minds and changing decisions. I've found that really rewarding. My goal has always been to use economics to improve real world decisions and outcomes, and I think that young people should follow their heart, trust themselves, and go work on things that interest them.

Rob Stavins:

Yeah, well, both of those are great advice. I've often warned PhD students not, to take advantage and benefit from the knowledge of their dissertation advisors in their committee, but not to necessarily adopt their personal professional preferences because professors like everyone else seem to have a biological imperative to reproduce their own kind and oftentimes denigrate working in any career track

other than academia like themselves. And as you correctly said, there are tremendous opportunities in industry, in government, and in NGOs, to have profound effects and quite remarkable careers. Indeed, you're a great example of that. So, with that, Elaine, I want to thank you so much for having taken time to join me today.

Elaine Buckberg:

It was my pleasure. Thanks for having me, Rob.

Rob Stavins:

So, my guest today has been Elaine Buckberg, who is a senior fellow at Harvard's Salata Institute for Climate and Sustainability. 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.

Announcer:

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