Corn Saves America
Episode 3 – Chosen One

**Sarah Mock:** This is Corn Saves America, a podcast exploring agriculture's environmental solutions, from ethanol to carbon markets. I'm Sarah Mock.

Remember Dr. Hanna Breetz? That was her at the end of the intro. She's the Arizona State University researcher that we spoke to last episode, the one who posed the question about what policymakers do in moments of crisis. Well while America as a whole was struggling through the crisis of the early 2020, Hanna was dealing with her little corner of the disruption, and the choices she made then are still reverberating through her life and career.

**Hanna Breetz:** A little bit of personal background - I always did also have a really deep and abiding interest in land use and ag. Actually, even as an undergrad, like that's the direction I thought I was going to go in. I wanted to go into the Peace Corps and be an agricultural volunteer. My grandfather was a farmer. Like, I grew up in the city, but I spent summers in Vermont in the country and I just, I love land. And I really - I was a member of the organic farm in college. Like that's the direction I wanted to go in. And then a month before I had to apply to the Peace Corps, September 11th happened and just one of these like sliding door moments where I didn't go in that direction and instead ended up staying in academia and in research.

**Sarah Mock:** Hanna says studying biofuels was her way of bringing together her personal response to the national crisis and her interest in agriculture and how we relate to the land. In other, more economic words, she found a career in an area of interest that balanced the tradeoffs between her competing interests.

Hanna spent her early years in academia figuring out how the White House and Congress strived for a similar balance of trade offs, at the same time she did, and as a result of many of the same pressures.

**Hanna Breetz**: So, I was interested in looking at transportation and I wanted to understand, how do we pick? We have a whole bunch of different alternative fuels. We could do hydrogen. We could do methanol. We could do different sorts of electricity. We could do synthetic fuels. We could do biofuels - out of all these different alternative fuels what wins and why?

**Sarah Mock:** Answering this question and tracking how Congress ended up with the Renewable Fuels Standard, versions one and two, would earn Hanna her PhD. To complete this work, she spent countless hours interviewing just about every single person involved in this process, from White House advisors all the way to the lowliest Hill staffers.

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Hanna's question - how do we choose a policy to meet a goal - and more specifically, why did we choose the Renewable Fuel Standard, will be the thrust of our conversation today.

But in the wake of our last episode, you're probably thinking, we already know why biofuels "won" the alternative fuels battle, and we know it's because of MTBE. And that, Hannah says, was indeed a big part of the story for the first Renewable Fuel Standard, or RFS 1, the Energy Policy Act, which was passed in 2005. In terms of fuel usage, the bill was an amendment to the Clean Air Act, which mandated that gasoline blenders should blend a minimum amount of ethanol into the fuel supply, effectively displacing MTBE.

**Hanna Breetz:** The original RFS was actually something that came out of the EPA, but it was something that obviously I was very happy to support. It was something that the refiners were happy because they got some deals cut out of RFS 1 too.

I mean, I had one ethanol lobbyist who told me RFS 1 was a straight deal on MTBE. Where what ended up happening in the legislation is that certain other regulations on fuel quality got dropped in exchange for switching over to the Renewable Fuel Standard. Certain fuel oxygen requirements got dropped and instead they said, "Oh, just blend biofuels." And if you look at what the RFS 1 levels were, it was such a modest mandate. It basically was just institutionalizing what was already happening in the industry as they were substituting ethanol for MTBE and that it had pretty much no effect whatsoever on driving ethanol. Because if you look actually the use of ethanol almost immediately exceeded the statutory levels of RFS 1. So, it was pretty much ineffective because the industry was already going in that direction as they were searching for a biodegradable alternative to MTBE.

**Sarah Mock:** Hanna's use of the word ineffective here is not to say that RFS 1 was a waste of time, it implemented a demand floor, a minimum level of biofuel to be utilized. Though the refining industry immediately surpassed the floor, ensuring that they could not go below these levels added significant certainty to biofuel markets. but the first RFS was just a preview of what was to come.

The leap from 2005's RFS 1 to 2007's RFS 2, or the Energy Independence and Security Act, was enormous. And it wasn't simply a quick rewrite, it was a massive expansion and in the history of energy policy, it's extraordinarily rare, Hanna says, to have two such pieces of policy passed within such a short window of time. What drove all this political focus? Anxiety at the pump. Here's Brent:

**Brent Gloy:** One of the bigger issues was energy security. So, we're on the 20th anniversary of 9/11. That was a gigantic shift in the perspective of people in the United States. So, before that, I don't think the average person thought hardly at all about where their energy came from, how they got it. They just knew they went to the gasoline pump, and it was cheap. And then that changed, as we had all the conflict in the Middle East and people started realizing,

I remember going to seminars at Cornell and people are talking about like, one of my colleagues - he's kind of a wild man, but he was a real interesting character. And he just kept saying, you know, something like, at that time, 70% of the world's proven reserves of petroleum were in the Middle East. And he's like, that region will be unstable forever because of that. That was what people were talking about was this kind of geopolitical risks associated with crude oil.

And then we have this kind of culture or this feeling of limited resources. I remember watching a documentary and there's this guy standing there and he's standing out on this runway and these giant planes are taking off and he's like, "And the reality is my children, who are two and three, will probably never ride on a jumbo jet because, the world was going to run out of oil." And that guy was kind of a quack, but it was on TV. So, people were talking about these ideas that we were going to run out of everything and maybe ethanol could play a role in helping us be self-sufficient. And then now a whole kind of nationalistic thing was really at kind of its peak after 9/11, where, people, didn't want to be dependent on somebody else for their energy.

**Sarah Mock:** While these events and sentiments were still percolating through the U.S. and global zeitgeist, for context, the Google search term "peak oil" was most prominent in August 2005. The changes to the Clean Air Act embodied in the RFS 1, were already largely agreed upon, in part because they were so modest. But between 2005 and 2007, that meager policy action didn't seem like enough. In each state in the union between 2005 and 2007 then-President Bush argued for alternative fuels – you heard that sound clip in the intro. That sentiment was popular on Capitol Hill or beyond.

**Hanna Breetz:** And what that really captured is just this growing sense of crisis around energy and it came from lots of different directions, which is how we ended up with such a diverse coalition of people who ended up supporting in many cases, reluctantly, but they still supported RFS 2.

So, what happened between 2005 [and] 2007? Well, we are deeply entrenched in war, energy prices - gasoline prices specifically - that's what a lot of people care about, are going up. So, there was a lot of public attention and concern about this, but because gasoline has such a large impact on the economy as a whole, you ended up also with many people who were concerned about oil prices from the perspective of macroeconomic stability. So, you had people who were concerned about national security [and] addiction to oil for foreign policy reasons, all of those national security hawks, people concerned about the economy, people concerned about rural economies, particularly, as well as environmentalists who were concerned about how do we figure out a way of getting off oil?

And because this is before the advent of – this is before fracking so; we didn't have cheap natural gas at the time. We didn't have cheap solar at the time. We didn't have cheap wind at the time. We really are looking at a very significantly different set of circumstances in terms of what is even a viable energy alternative at the time? There really weren't five alternatives for transportation fuels. And so, if you're thinking, "Man, you got to have something that's a liquid

fuel," because there are no EVs on the road and anyways, electricity is not decarbonizing that fast. You have pretty limited options – you've got biofuels, maybe you do some hydrogen, but that's really difficult to have something that's a completely new infrastructure that you have to build in totally new vehicles. You can potentially do synthetic fuels. But that's pretty much your menu of options. It's very, very limited. So, it was like this quite unusual little window of time where everyone was highly concerned about oil prices for all these diverse reasons, and we didn't have the alternatives that we have today.

**Sarah Mock:** Taking this sweeping context into account, and the diversity of players involved, Hanna wanted to know, who specifically was behind RFS 2? With all the different options on the table, who was making the calls about which direction the policy needed to move?

**Hanna Breetz:** At some point I started doing some interviews with biofuel lobbyists and that's where the first really interesting "ah ha!" moments came from because I was approaching it initially as a very traditional stakeholder politics perspective where you kind of assume coal wants one thing and corn wants another thing, and oil wants a different thing, and you have these material interests and everyone's just fighting for their piece of the pie. And that those interests are really predetermined. And I started to do interviews with some biofuel lobbyists and the things that they were telling me kind of blew my mind because they were saying, "Look, don't blame us for the RFS. We didn't want the RFS." And I thought, if you guys didn't want it, who did? And that was my entry point into saying there's a much more interesting political puzzle here than I had realized. This isn't some kind of just static stakeholder negotiations, but there's something really interesting about how these interests are getting constructed and how we end up with outcomes that maybe nobody actually wanted.

**Sarah Mock:** The idea that agriculture, environmentalists, or rural developers didn't want the RFS that ended up being passed, doesn't jive with the idea that this diverse coalition came together just to get it across the finish line. So, what happened?

A lot of horse-trading, closed-door meetings, and 11th hour negotiations, happen with most policymaking on Capitol Hill, but Hanna wasn't satisfied with the "Congress will be Congress" explanation. She hoped that in understanding where the specifics in the measure came from, she could gain some clarity on how RFS 2 became a policy nobody wanted. She started with the most specific parts of the legislation, the total volume numbers, which were huge, right from the beginning. RFS 1 mandated about 7 billion gallons of ethanol be blended by 2012, the RFS 2 more than tripled that figure to 36 billion gallons by 2022. Notably, this new number seemed totally out of step with the production or demand estimates that had informed the RFS 1 blending levels.

**Hanna Breetz:** The idea of 35 billion gallons a year, that was the Bush goal. The final RFS was 36 billion gallons a year, but the, where did the 35 come from? Where did that scale come from? That came out of the White House. And it was never intended to just be about biofuels and trying to track where the number came from. I mean, this was fascinating.

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**Sarah Mock:** I don't think it's an exaggeration to say that Hanna absolutely lights up telling these stories. Despite doing this research as a grad student many years ago, she can rattle off verbatim quotes and take you beat by beat through every part of the decision-making process. She was a dogged detective understanding these figures, leaving no stone unturned, and you get the feeling talking with her the importance of what every player knew, and what they didn't. She ended up discovering that in the intense game of telephone happening on Capitol Hill, some key information had gotten lost.

**Hanna Breetz:** So, you have to understand what's happening within the Bush White House at the time is that he gets reelected. Things are not going well in the war. Things are not going well with the economy. Things are not going well with oil prices. So, he decides to do something big on trying to figure out how do you displace petroleum for all these different reasons, but predominantly because of national security and economic security reasons. And because of those two things, what they were really interested in with displacing petroleum, it had nothing to do with environmental benefits whatsoever. They didn't care what alternative was actually used, they just wanted to get rid of petroleum. So, his whole famous, "Addicted to oil" speech was really, I think, capturing that as a sentiment.

**Sarah Mock:** So, this next bit gets pretty involved, but here's the broad strokes. According to Hanna's research - the Bush administration had a clear need to get out from under the economic and security risks of petroleum dependency. Plainly, the administration wanted to reduce gasoline usage in the U.S., and fast. White House economists recommended the simplest solution - a gas tax. But for a Republican president, and one from the oil giant that is Texas, a tax on petroleum was a political no-go. So White House economists offered a second, less direct approach that, in theory, should have had a similar result. they recommended a mandate, requiring oil refiners and importers to use an oil alternative, while at the same time, offering a pay-for-compliance option, in this case, a dollar per gallon fee. Blend or pay - either way, the result should be less oil production.

This was preferable to a tax for the obvious reason, that it wasn't a tax. It gave refiners a choice. They could either figure out how to get a bunch of alternative fuels in their portfolio, or they could simply pay the fee and skip the hassle. The White House calculated that, if the aim was effectively to double the federal gas tax, that effect could be achieved with a 35-billion-gallon alternative fuels mandate. That's where the number came from, not from the capacity of the biofuels industry, or from the demands of agricultural or environmental interests, but from the theoretically desired size of gasoline usage reduction. Critically however, without the pay for compliance option, this whole policy would likely not work as intended.

**Hanna Breetz:** The critical part of the White House plan was this dollar per gallon compliance option that functioned as a gas tax. But that got yanked when it got over to Congress, because, in part, the White House didn't sell it. It really didn't explain what it was. And so, everyone was like, what is this? Let's get rid of it. You don't really have any rationale for it, why would we

include this? So, as you saw the transition of the RFS to going from the White House to Congress, you had these like gigantic, overinflated goals that were impossible, but were almost on-purpose impossible to reach. So that, that dollar per gallon would bite. If you could easily reach those volumes, you wouldn't have a dollar per gallon biting. So, you have these like crazy on-purpose impossible goals with the dollar per gallon compliance option goes over to Congress. Congress gets rid of a dollar per gallon compliance option because nobody's explained it to them.

**Sarah Mock:** From this vantage point, it makes a bit more sense why Congress passed a biofuels mandate, requiring not only the production of an incredible amount of ethanol when that industry was still nascent, but one that also planned to explode a cellulosic ethanol sector that literally didn't exist yet. It's because these figures were not built around what was possible in the existing biofuels sector. In fact, it wasn't based around biofuels at all. It was based on the assumption that many, if not most blenders, would simply pay the compliance fee.

Congress, as it so often does, took the White House's proposal, and ran with it, gutting it of its original functionality while at the same time shaping it to make it more likely to be passed. And critically, reformatting it to make it an expansion of the existing RFS rather than a new program.

**Hanna Breetz:** The other big thing is that it gets turned from a fuel agnostic alternative fuels standard, which is what the White House had proposed into an expansion of the Renewable Fuel Standard. So, it becomes all about biofuels. Why? Well, it's a lot easier to expand an existing program because you have the precedent of RFS 1. It made it so much easier just to expand RFS 1 instead of trying to write something new. There were jurisdictional battles within the Senate where they're saying, "Well, based on who do you think is going to oversee that? Is this a DOE thing? Is this an EPA thing? "And so, they wanted to keep it as an RFS instead of an alternative fuel standard, partly as a way to keep jurisdiction within certain committees. And then also, "Hey, here's the White House admitting is probably going to be biofuels anyway, because they don't have the analysis to suggest where the actual volumes are going to come from."

So, all those things made it very easy for Congress to turn it into bio-fuels mandate, but it was never intended to be a biofuels mandate. And that's the crazy thing about it. And they had the one-up the White House, so they needed 36 instead of 35. And that's how you end up with this mandate that nobody wanted.

**Sarah Mock:** It wouldn't be long after the RFS was instituted that people started to point out the political and logistical headache of mandating the use of something like cellulosic biofuels - see the phenomenally titled 2012 *New York Times* story: "A Fine for Not Using a Biofuel That Doesn't Exist." But that's getting ahead of things, because there's one other major group of players, that influenced the turn of the White House's pseudo-gas tax into a biofuels bonanza – that's Silicon Valley clean tech investors, who were heavily interested in alternative biofuels in this era.

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**Hanna Breetz:** Vinod Khosla was one of them, I was delighted when I was able to find a PowerPoint of his, that was posted online. They actually had an embedded Excel spreadsheet in it. So, I could see here he is standing in front of Congress and making claims about here's how fast we can ramp up cellulosic biofuels. Here's how cheap it's going to be. And thankfully, because of the embedded spreadsheet, I could see where those numbers came from, and they were just totally back of the envelope. This is the worst type of crummy projections that you can imagine. "Oh, we assume linear growth in yield, and we assume linear growth in this and put it together. And wow, we're going to have cheap cellulosic biofuels and tons of it." But because he was willing to say that, and no one was willing to counter him because they didn't want to look bad. They didn't want to look like, "Wow, Vinod Khosla is out there saying he can do these things. And we're saying no." And so, everyone just validated that. I had an advanced biofuels lobbyist tell me it was, "A race to keep up with the bullshit," and what he was really capturing with that is that everyone was trying to say, "Oh yeah, we can do it," because these numbers had been introduced and nobody wanted to look bad. And so, they just had to keep validating these numbers. "Yes. We can reach those production levels. Yes, it's going to be cheap." Even though they knew they couldn't.

**Sarah Mock:** All of this, the contrary motivations, the backdoor approaches, the things that were lost in translation, the political posturing, it all seems like, well, a big mess. And this is where Hanna actually answers that question we posed last episode - What do we do in moments of energy crises?

**Hanna Breetz:** We ended up looking for quick fixes and making really, really bad policies. And that's what we saw in many ways with the Renewable Fuel Standard. It was not a well-crafted policy. When these crises happen, that's when you get these windows of opportunity to actually do something big and really move the needle on alternative fuels. And the only problem is when these opportunities come are usually the worst times to be crafting good policy, because things are happening very fast. There isn't always enough time for good analysis. There isn't always enough time to really think about how do you craft effective policy instruments? So, crises are the best of times in terms of creating those opportunities, but the worst of times for actually making good policy.

**Sarah Mock:** I'll stop Hanna here briefly, to let David and Brent chime in. Because it's important, when understanding this particular history, that it is not necessarily a unique one.

**Brent Gloy:** I'm not surprised that a researcher, an academic would say that the policy was done too quickly because, they're in the business of trying to find the last little detail of everything. But the reality is I don't know that policy ever gets made not quickly or slowly because it's like it gets made when a confluence of events occur that allow something to get pushed forward. And those points in time don't often last that long. And so, policy has to kind of, I mean, I would think, and I mean, I'm not a policymaker, but I would think that if I were, when you get that right mix of conditions, you make the policy because if you wait to try and figure it out to just be perfect, those events won't be there and, you won't have any policy to make because the whole

rationale for it will probably be gone or the, or at least the public will for it will be gone. So, I think, I don't disagree with what they're saying that, yeah, it gets rushed. But what policy doesn't? The health care policy we pass the United States certainly was probably rushed through; all the stimulus measures we passed recently were rushed through. Maybe I'm overly cynical about it, but I think that's just the way policy happens.

**David Widmar:** Well, it's funny, right? Because we celebrate tech entrepreneurs who take on mottos, like Mark Zuckerberg, "Move fast and break things." Right? So, it's sort of, if you want to disrupt things, you've got to move quickly, but if you're government, you got to find the perfect solution. And I think that one of the things that we have to recognize is that every bill that Congress passes is kind of an experiment, and they can always go back and change things if enough people agree that this is flawed or this needs to be improved. And there's sort of never the perfect answer that Congress is ever going to come to. And it's all about, debate and compromise. And so, even if we could have quintessentially said, "This is the perfect solution for RFS," I guarantee you not everybody would vote for it. They would still bicker and debate, and they would still compromise and arm wrestle or whatever they do to get a different policy. So even if we knew the perfect solution, that's probably not what Congress would end up passing, for a host of other reasons. I think that's just part of the decision-making process.

**Sarah Mock:** Despite the RFS's imperfections that doesn't necessarily mean it wasn't a successful policy. Perhaps the more important question becomes - "Did the RFS work?" We'll sink our teeth into the debate. After the break.

[[COMMERCIAL]]

**Sarah Mock:** Before we dive into the question of whether the RFS was a successful policy, it bears discussing - what was actually in the final bill?

It's important to remember here that the final version of the RFS was not about what the White House wanted, the idea of a backdoor gas tax was gone – and it was about what Congress wanted, and what Congress wanted by 2007 was more biofuels.

So, the Energy Independence and Security Act of 2007 built on the existing mandate in the Clean Air Act, requiring a certain percentage of the U.S. fuel supply to come from biofuels, with a long-term goal of reaching 36 billion gallons annually, Note - this was not a blanket requirement. It didn't say, for example, that every refiner had to blend x%. A refiner could blend well below the required percentage if they wanted, and instead purchase a tradable biofuel credit, from another refiner who blended more than their obligation. They could then use these credits to meet the Renewable Volume Obligation that EPA set for them, or their RVO.

You might be wondering how, exactly, did Congress expect to enforce this flexible blending requirement? It's a bit in the weeds, but bear with me, for refiners to prove compliance, they would have to track or buy Renewable Identification Numbers, or RINS - those tradable biofuel

credits. I'm going to bring an expert back in, Dr. Aaron Smith from UC Davis, to try his hand at explaining the RIN Market.

**Aaron Smith**: The RIN system is complicated, and I find this every time I try to explain it or even it's even more fun actually, when I watch someone else try to explain RINs to a person who doesn't know, and you can just see the confusion.

The way that system was set up, as they said, well, rather than just require that before gas station sells you gasoline, they have to put a certain amount of ethanol in it. We'll just say across the entire system, we need to get a certain amount of ethanol to be in the system. So, if you are an oil refinery and you're producing oil, then if the requirement is 10%, you need to show evidence at the end of the year, that 10% of your oil was replaced by ethanol. And so, whenever ethanol gets used, it generates these RINS. And if I'm an oil company that's not using ethanol myself, I can go to someone who using ethanol myself. I can go to somebody who did use ethanol and I can buy a RIN from them.

**Sarah Mock:** Did you get that? Put another way, a RIN, or Renewable Identification Number, is basically, a unique number assigned to a gallon of biofuel. I like to think of RINs sort of like a certificate of authenticity, which is created when a gallon of biofuel is made, and it's removed from the biofuel and filed away when it is blended. At the end of each year, every blender goes into their files and turns in a set number of credits to meet their obligation. So, a blender can either create credit themself, by blending biofuels or purchase RINs pre-made from someone else who blended extra.

Given how complicated the system is, it's worth asking - did it work? Aaron says, yes, the RIN market largely functions to achieve the goals of the RFS. But for him, the way it happened suggests another, much simpler alternative.

**Aaron Smith:** What that tells us, I think is if Congress had just made a law and said, "We're going to phase this in, but over a period of six years, we're going to go from our current sort of average of 3% of gasoline is ethanol up to 10% and you have to do it." We would've gotten to the same place. Because I think those kinds of tradable credit market systems work better potentially when there's a lot of heterogeneity, is a lot of different, maybe different types of fuels, different companies with different costs, where you want to try to, to move the compliance to the place where it's least expensive.

So, for companies that can comply with the regulation cheaply, you let them do it. And then they sell credits to the companies for whom it's more expensive to compliance. So, the overall system it can achieve compliance at a lower cost. When you have a setting where basically everyone's going to do 10% and it's unnecessary.

**Sarah Mock:** Aaron hints here at the explanation for why EPA opted for this relatively complicated compliance option, but it's worth digging deeper into the theory of how exactly this

system was meant to reduce the cost of compliance for refiners, and thus cushion the impact on consumer gasoline prices. To explain more about this theory, here's Seth Meyer, the U.S. Department of Agriculture's Chief Economist:

**Seth Meyer:** The RFS and the RINs system and these tradable credits, I mean, it's almost elegant in its theoretical bates, right. It's almost elegant. You've got the Environmental Protection Agency creating a currency and this currency is how everybody tracks the obligation. And the truth is this elegant system of trading credits makes it cheaper to achieve this goal that we want to achieve, right. There is definitely a different cost to get folks in Iowa to consume ethanol then there is to get folks in Maine to consume ethanol, right?
And so, if you did a straight up 10% blend, and then you incrementally said, "Okay, 10.5." Not to mention the fact that EPA has to make those rules to allow more blending. It's going to be more expensive in Maine than it is in Iowa or Minnesota. So, it's better off for both of these places if the Minnesotans do the greenhouse gas savings and the folks in Maine don't have it to pay as much to achieve their share.

**Sarah Mock:** The mention of greenhouse gas savings here might seem a little out of left field, but the 2007 RFS did include some greenhouse gas reporting requirements.

**Seth Meyer:** So, really the mandate is, again, quite elegant in that if you drive. You're the one that helps achieve the reductions in greenhouse gases. It's on the people that are emitting the greenhouse gases that are saving the greenhouse gases. When you do it this way with making RINs, if you didn't make RINs tradable again, again, meeting the obligation in Iowa would be cheaper than it is in Maine. When you make the obligations tradable, you lower the overall costs.

**Sarah Mock:** Seth argued that this system, however complicated it seems at first blush, could be less complicated, politically, than the kind of straight forward, "pay for compliance option" the White House first imagined.

**Seth Meyer:** Now you're saying, "Well, okay, but let's set a standard and let people get out of it by paying." Well, what do you do with the money? Right? I mean, there are other objectives. Do you put it in another carbon sequestration program? What is it that you're trying to achieve? And does it result in the kind of greenhouse gas savings that you want?
So, you're right. You could envision saying, "Okay, we're going to have this standard. And if you don't meet that standard, you pay this fine." The other part of that is how much do you charge for the fine? Right. In some ways the RIN system does take those people who don't want to blend and gives them a chance to get out of it by having somebody in Minnesota blend it at the lowest possible cost. So, I also would say, targeting that fee of what's the penalty to be, is a trick.

**Sarah Mock:** We'll talk about the RIN market much more extensively in a few episodes, but it's important to understand that it was imagined not simply to make things more complicated, but in an effort to make the mandate cheaper for the refining sector. In a broader sense, the RFS ended up providing three critical tools to the ethanol sector, intended to accelerate its growth.

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Here's David to explain.

**David Widmar:** There are three ways that policymakers here in the U.S. have to prop up an industry or to get an industry to grow the first one is subsidies. The second one is you protect it from the imports, through tariffs or you mandate its use. And I think when we step back and look at the ethanol situation, we used all three of those. And ethanol is one of the few products that as a country, we decided to use all three levers to try to help this industry get started.

So, we wanted to subsidize the blending of it initially, of course, that tapered off. We wanted to protect, ethanol imports mainly from Brazil. So, we had these tariffs and we wanted to mandate the use of these, of this ethanol into the fuel supply.

**Brent Gloy:** That was a big issue, right. So, you know, the Brazilians can make ethanol pretty cheaply and they saw this market with its high prices as a big potential market.

**Sarah Mock:** The RFS was a powerful accelerant for the ethanol industry, and you might have noticed, marked some heavy intervention by the federal government into the energy marketplace. That might ring odd, given how dedicated agricultural voices often are to the idea that the government stay out of markets. But it's worth noting here that biofuels are certainly not alone in the energy space in gaining the financial support of lawmakers.
Here's Scott Sklar - the alternative energy expert - on that.

**Scott Sklar:** We subsidize all our energy markets and they're all fake markets. Yes, there's an economic model with petroleum. Yes, but that's because we subsidized it to death. We still subsidize it period. And we subsidized natural gas and we subsidized nuclear like crazy. So, and then we're subsidizing some of the renewables and creating regulatory ways to, to allow them in the market. I don't think that makes it a phony market. It just makes it a way to make sure markets are competitive and that the customer has lots of options. Why would you want a monopoly on single resource markets? I don't see that that helps anybody. They become wasteful, they become polluting, and they become more susceptible to terrorism and failures of infrastructure and everything else. You want as many options in the market as possible.

**Sarah Mock:** Scott makes a good point here, as the fossil fuels industry in the U.S. receives about $20 billion in direct subsidies annually, so for ethanol to survive in a market against the politically favored, it needed special treatment. But for me it seemed at least a bit like a "Two wrongs don't make a right" situation. Rather than create the RFS, why not just remove the subsidies from other energy sources, and let all the fuels compete equally? Politics is clearly a part of that answer, as are entrenched interests, but in a more fundamental sense, the answer is that all policies, even the lack of policy, creates trade-offs, and those sub-optimal outcomes almost always create winners and losers.

To break that down a little farther, I want to talk briefly here about a key term, the idea of economic rent. We aren't talking about the kind of rent I pay to my landlord every month -

instead, economic rent is the amount of money earned beyond what is socially or economically necessary, and is generally considered "unearned," because it is not created as a result of adding value. It is created simply by what we'll call an imperfect market.

The example that matters for our purposes are the rents created by the RFS in the ethanol market. The rents accrue to ethanol producers, who, by virtue of the RFS, have a captive market for their product, namely, refiners who are required to purchase a certain quantity. Consider that, in the early 2000s, before the RFS, the refining industry was blending about 3% ethanol. By the time 2009 rolled around, they were obliged to blend more than 10%. This forced demand creates a market imperfection where ethanol producers experience more demand than they otherwise would have, and financial gain is transferred from their customers, the refining industry, (and by proxy, from consumers of gasoline) to ethanol producers, and by proxy, farmers. This transfer of gains is economic rent. More ethanol was sold not because the product had improved, or become more competitive, or popular but because customers were forced to buy it.
In a perfect world where resources like oil and the Earth's ability to absorb pollution are infinite (which is certainly not our world), the more optimal outcome, according to economic theory, for the whole economy would be instead for there to be no obligation, for refiners to blend the amount that makes sense for them economically, and for consumers to enjoy lower oil prices as a result. Instead, under the mandate, consumers have access to less petroleum fuel and pay more for what's there. Economists call this lost value a "deadweight loss" to the economy as a whole.

The thing is, all policies that interfere with markets have some kind of effect like this. It's often not possible for policymakers to avoid these effects, and in fact, in many cases, these are the exact effects that lawmakers are hoping to see. Remember, the Bush administration was hoping for reduced petroleum usage, which is achieved by increasing the price of gasoline in part for non-economic motivations, like global geo-political concerns. The challenge for lawmakers from a policy fairness perspective (A perspective rarely taken), is to determine from whom the rents will be taken, and to whom they will be given.
Here's Brent:

**Brent Gloy:** And so that kind of gets into the debate of what is the proper policy? And how much policy and intervention should we really have in general? An interesting debate there too about, you know, people that in general are against policy interventions more broadly, tend to favor them, especially when they're going to benefit from them.

**David Widmar:** Isn't there a quote that policy is best decided whenever no one knows who's going to benefit? There's an inherent flaw to policy making is that we know who's going to be the winner. We have an idea of who the winners and losers are going to be. And if we could make these decisions in a vacuum, that'd be a completely different process. But I think that's just worth pointing out there. It was clear RFS was going to, you know, have winners and losers and they're just happened to be more winners at that time in history who could get around the argument and move forward. And that's not where we are today. And that's what we weren't there at any other time in history.

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**Sarah Mock:** So, if the RFS was going to make political or economic losers of the refining industry why did that sector offer even grudging support to the 2007 bill? We've talked about replacing MTBE as a motivator, but the volumes being displaced in the policy far exceeded the scope of simply replacing a pollutant. So, what changed for the oil sector?
David offers one theory:

**David Widmar:** The refiners wanted more fuel, right? They were okay with this because they wanted more fuel to be supplied to the economy because they were worried about peak oil. And how are we going to continue to have an economy in the U.S. that grows when we're very heavily linked and reliant on gasoline and energy and oil? And so, not only did they get mandated, but they were sort of okay with this, they saw a bigger goal that they were trying to accomplish.

It was this idea that we are going to be consuming so much gasoline in the future. Like the pie is going to get so much bigger, that everyone's going to be able to benefit. Everyone's going to get more pie, because this entire pie is going to grow. So, it wasn't really a debate about market share at the beginning. In fact, it was this idea that the rising tide is going to lift all ships.

**Sarah Mock:** When policymakers are faced with the likely results of intervening in a market, those economic rents and deadweight losses, this idea - of growing the economic pie - is a popular one to point to. Sure, a policymaker can say to the refining industry, you'll need to pay those rents to the ethanol sector, but that won't affect the reality that you'll be making more money tomorrow then you are today. In other words, the argument goes that the growth of ethanol demand won't inhibit the growth of oil revenues.

The problem was, of course, that the underlying assumption, that oil consumption was on an unstoppable and unending upward climb, was not correct. We'll pick up from that point in a few episodes, but for now, I want to return to the debate about the RFS and specifically RFS 2.

Now that we know what it did, or tried to do, I want to know whether our experts think it - well – worked? You might be surprised to hear that Hanna, despite her reservations about what an ideal energy policy would look like, and how the RFS 2 fell short, believes the RFS was successful.

**Hanna Breetz:** I'm a little bit rare among people who would identify themselves as environmentalist in that I don't have a black and white perspective on biofuels. I think one thing that's important is that from where we're standing today in 2021, many people look at the RFS 2 and say it wasn't that successful because we're looking at it from the frame of thinking about climate change only.

But if you are thinking about it as a policy that had these multiple goals, in terms of an alternative fuel policy, I think it was a pretty remarkable success in being able to displace oil faster than any other technology has ever been able to. Biofuels are by far the largest source of

alternative fuels going into the transportation sector. And electricity is like a tiny, tiny little line. It provides almost none of our transportation energy today and biofuels produce a lot compared to anything else. And they were able to ramp up so quickly in part because they were building on existing supply chains. And that, I think, is one of the really important lessons is that if we're only looking at it as a climate policy, then it doesn't look like a success and it's really hard to figure out how do you derive lessons from it?

If instead, you're thinking about it as an energy transition policy and saying, "Wow, we have these entrenched infrastructures. We have entrenched energy sources and vehicles." And like, that's really hard to figure out how to displace anything and biofilms were able to do that. Ethanol was able to do that. So, from that perspective, it's actually a pretty amazing success story.

**Sarah Mock:** Hanna's point here is really important, it further reinforces the idea we talked about previously, that a so-called "environmental policy" can be unsuccessful in achieving its environmental goals, while still being technically successful in other ways, in particular, in creating markets and fueling demand. Remember, too, what David said earlier this episode - "Every bill that Congress passes is a kind of experiment," and even when legislation fails to meet its stated goals, that doesn't necessarily mean it's a waste of time or should be repealed. We can learn from failed experiences and successful ones alike and policy can always be changed.

Alternative fuels expert Scott Sklar agrees - RFS 2 did what it set out to do, and he argues that the policy does represent a solid strategy for transitioning the energy sector to more environmentally friendly options.

**Scott Sklar:** It was very successful. It got ethanol as a national realized, used additive to our gasoline. And I went to a Shell station today and it says, it has ethanol in it, and it feels, I feel great.

So, yes, it, it mainstreamed, it showed that it didn't destroy car parts and didn't destroy fuel pumps and didn't destroy America as we know it. And that's great. And then of course the industry keeps on pushing for an increasingly amount. All good. And that's how you do it. They use sort of an ease your - you can compete with them and that's one way, and there should be that. But the other way is you ooze in with them and you play your strength and ethanol is an octane enhancer, and it's a lot safer than most of the other octane enhancers made from petroleum are.

**Sarah Mock:** But Scott made an even broader point to me about the success of the RFS 2. Because from his perspective, the 2007 policy was not just about energy transition or reducing demand for petroleum - it had other, more familiar goals that were equally as important.

**Scott Sklar:** Remember the federal intervention in this market was not just energy policy. It was ag policy. And I teach these interdisciplinary courses because I want us to get away from this

myopic, single throw the ball into the basketball hoop and we've solved the problem. Actually, the extraction conversion of use of energy is the single largest use of water, fresh water. The extraction conversion use of energy is the single largest cause of pollution. The extraction conversion of energy is the single largest emitter of greenhouse gases. The extraction conversion of energy, particularly fossil, is the single largest contributor to terrorism. So, yeah, there are a lot of different issues here and you don't want a status quo at all. So yes, we've intervened to build this up as an agricultural policy and an energy policy. And, and this professor is saying, and you also ought to think about it as a resiliency policy and we've, and it has been used and is an economic development policy, the jobs policy.

**Sarah Mock:** We'll return to these themes, of the RFS as ag policy and resiliency policy often throughout this podcast, but the takeaway at this point is, there were many stakeholders, with many goals, angling to make the RFS work for them. And the reality was, even internally, within the ag industry, there was disagreement about what an ideal biofuel policy would look like. Here's Hanna:

**Hanna Breetz:** And, in fact, even in the very early days of ethanol, so when you're looking at like even RFS 1, different factions, I guess you might call them within the ethanol industry, had different perspectives about whether their interests were best served by making the market as big as possible versus how do we get the most money per gallon? Because when you have the RFS get so big, that created the political opportunity to take away some of the volumetric tax credits that were there before. So, there are certain segments of the original ethanol industry where if you're looking at, I mean, I'm thinking about like ADM here, but where their purpose wasn't to sell lots of ethanol. Ethanol was a side product from the wet mills that they were producing high fructose corn syrup in. So, they didn't care about selling more ethanol. They just wanted to make sure that whatever ethanol they sold, they got the most for. And that's why having this volumetric tax credit was great.

Where there were other factions within the ethanol industry. That their goal was growth, and that they wanted to make the market as big as possible. And so even within the ethanol industry, it wasn't monolithic, but you have certain segments that were saying, "We want to go for volumes," and certain segments that were saying like, "We're okay keeping it small. We just want to get the most dollars for whatever we do sell."

**Sarah Mock:** The tax credits that Hanna is talking about here have long since been phased out of the RFS, and so, in the end, those who wanted to maximize biofuel production won out.

The "other factions" within ag included corn growers and their representatives, who were hungry for a market to sell grain into. Remember, this was an urgent issue because in the late 1990s and early 2000s, government spending on the new farm direct payment program was skyrocketing, while U.S. farmers grew more and more every year, overproduction was getting out of control.

So where does that leave us? What lessons have we learned from the passage of back-to-back renewable fuel standards? There's a lot in here, but I'm going to focus on a few highlights:

1. When it comes to policymaking, it's easy for an idea to morph beyond recognition, and in ways even counter to its original intent, as it moves through the policymaking process. Think of how the White House's pseudo-gas tax became Congress's biofuels mandate.
2. Complicated market structures for compliance, like the RIN market, theoretically help reduce costs to the whole system by empowering the actors who can achieve the change most efficiently to do more and allowing less efficient actors to pay a fee instead.
3. Government intervention in markets almost always creates deadweight losses, leading to benefits for some and losses for others.

That last one is vital when we think about ag carbon markets, because inevitably when we think about the federal government wading into ag carbon market policy, lawmakers' actions, or their inactions, are likely to benefit some at the expense of others. Good policy, I think, aims to maximize the benefits, and minimize harms, while ensuring that benefits, whenever possible, accrue to people in society who need them while losses are borne by those who can afford them.

So. Is any perspective ag carbon market policy on track to take these realities into account? It's unclear, because very little ag carbon policy has been proposed. Instead, the forward movement for ag carbon markets is coming from well outside the policy realm.

**Brent Gloy:** One of the things that I think is different with carbon versus ethanol is that right now the carbon efforts, at least in the United States, are being led primarily by private enterprises, corporations, not a federal policy mandate, whereas ethanol was mandated by federal policy. And they're in my opinion, being driven primarily, by companies wanting to be able to market themselves as, carbon neutral or, least being concerned about the environment. So, they're going out and buying, carbon offsets or things, through a kind of non-federally regulated market. And I think there's a big difference to how those would evolve. A federally mandated market for carbon is a huge lift because from a policy standpoint, it was so big. I mean, it's just, it's such a big commodity in that it would take a lot, I think, to get federal policy through. So that's, I think one of the big differences between the two, not to say it won't happen, but it's a big commodity.

**David Widmar:** And when you look at some of these other carbon markets the market is not as defined as a mandate. A mandate not only created the market and made them participate, but the RFS gave us guidance effectively since 2005. There's been 17 years of clear guidance as to how this was going to be mandated. And I think in addition to questions about the technology and, you know, uncertainty about the financing side, there's just not the market there for the carbon side. There are active participants, but that's very different than a government mandating you show up and you bring your RINs or your dollars every year. And you actually reconcile the books, so to speak.

**Sarah Mock:** Again, it's notable that Congress has not stepped in to create a carbon credit mandate, which would give ag carbon markets the same boost that the RFS gave to ethanol. There is one proposed policy out there - the Growing Climate Solutions Act, which has been introduced in the House and in the Senate, where it was approved. That bill, however, falls far short of the scope of the RFS, and is aggressively about voluntary, rather than mandatory, participation in the ag carbon markets.

What might we predict from this bill, and other proposals, given what we know about policy making around the RFS? We'll spend all of next episode, breaking it down.

Next time, on Corn Saves America.

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