

THE MIKE ALKIN SHOW

TALKING STOCKS OVER A BEER



Announcer: Free and clear of the chatter from Wall Street, you're listening to Talking Stocks over Beer. Hosted by hedge fund veteran and newsletter writer Mike Alkin, who helps ordinary investors level the playing field against the pros by bringing you market insights and interviews with corporate executives and institutional investors. Mike sifts through all the noise of mainstream financial media and Wall Street to help you focus on what really matters in the markets. And now, here's your host Mike Alkin.

Mike Alkin: It's Tuesday February 19th 2019. Hope you had a nice President's Day if you're in the US. If you're not, hope you had a good Monday, hope you had a good weekend. Kids are on Spring break now, so my house was chaos and bedlam with a bunch of 12, 13 year old boys running around. Those are my son's friends. And my daughter who's 15, is completely different. But even when she was 12 and 13 and had her friends over, you could hear a pin drop, they played so nicely. They're kind, they're polite.

My son's friends are cavemen, and my son is too. He's a caveman, and we're constantly all over him. Hold your fork correctly, get your head out of your plate. When you go somewhere you always say think, you look somebody in the eye, you shake their hand. You say "Hello Mr. Smith. Hello Mrs. Smith. How are you?" And if you eat there, you eat with your manners and you say thank you and you get up and you clear your plate. We're constantly reminding him.

I'm a stickler for manners, my wife is a stickler for manners and we have actually heard from several parents who say, "You know, your son is so polite." That makes us feel good. But he also ... we see him around the house and we know that he has caveman tendencies. His friends, I mean, it's chaos. My wife ... in our house we have a big pantry and my wife stocks it to the gill with snacks, so over the years the kids know that it's ... they come here and it's got snacks galore. You want Oreos, you want chocolate chips, we have healthy snacks, we have a little bit of everything. Chips, you name it healthy stuff, not such healthy stuff. Reese's peanut butter cups, that's in the not healthy category.

And we don't use our tap water, Long Island doesn't have great tap water. There's high rates of cancer, nobodies pinpointed it, but a lot of people believe it's the water, and in the kitchen my wife didn't want to put a filter on the taps, she didn't want to get one of the five gallon jugs that could sit in the pantry. So we have water delivered to our house. And it looks like, I can't even begin to tell you the delivery that comes from Poland Spring.

They plop it on the front step. I don't know, 25 cases a week, 20 cases a week, who knows. And you got to carry it in and put it away. My son and I alternate on that. I complain every time, as does he, and I tell him to stop complaining. I complain to myself and then to my wife. About why we can't have filters on the taps. But we do that and it's 12 to a case, and they're 16 ounce waters and so on and so forth.

I can't even get my head around what disappears out of that pantry and our refrigerator. It's as though I'm a busboy. I'm constantly stocking it up. And look, we love being the house that everyone comes to, it's great. And good families, good kids and stuff. But it's a never ending stream, and it's one thing after the other, after the other, and as the week goes on, and I have an office 15, 20 minutes from my house, but I rarely ever go, because I have a pretty good set up here in my house. I like working from here and if I need anything I can go into the office, but it works very well here.

But so darned damn around sometimes. The kids don't want to play or go outside and shoot some pucks or shoot some hoops or whatever it might be. And yesterday I ... my son needed new ice skates so I took him, he and four of his buddies to the hockey store to get some new skates, and two minutes into it, I thought "Oh my God, what did I do?" They were running around like they've never been let out before. These are 12 year old boys. Loud. I'm constantly having to be all over them, to tell them to stop, to behave and they calm it down. Two minutes later, I turn my back to go look at a new pair of hockey gloves. Next thing I know there's chaos going around, they're shooting pucks throughout the store.

It's a never ending stream, so winter break is always interesting, so we'll see what the rest of the week brings. My daughter's friends, they're here. They'll have dinner, they'll have lunch, and they play music and they play whatever games they play. Whatever 15 year olds do. And you don't even know they're there. It's just such a dichotomy. But it's great, but by the end of the week my wife's ready to pull her hair out.

Our entire pantry is emptied out, and then our waters are, you know everything's gone. My wife said to my son, "When you're in other people's houses, do they have this?" and he said "Not really." There was one kid actually who, we're driving home from sports and the kid said, was talking about snacks, this kid's at our house all the time and he eats us out of house and home, and I heard him saying ... one of the kids said, "I don't like going to so and so's house because he never shares snacks. He'll have a snack in front of all of us, and doesn't even offer anything to us." And this one kid, who's always at my house, he said "Well I don't see a problem with that. If he's hungry, it doesn't mean you have to offer somebody something".

I just thought, and normally I don't say anything, I just keep listening, I turned around and I said, "You're joking right?" And he said "No, why?" If I'm hungry and I eat something, and again you don't want to get into a whole thing, I'm not his parent. And I said, "I seem to recall you're always at our house eating everything." And he said "Oh well, yeah".

It's interesting to see how kids think and how some kids are raised, it's kind of funny, so I'm learning as I go. Anyway sitting atop of the metropolitan division with a three point lead and two games in hand are the 2018, 2019 New York Islanders. We're 58 games into the season, which by my math would give us 24 to go.

Had some bitter sweet news this week, oh by the way, for those of you who don't like my hockey talk check out for the next three minutes. We had some bitter sweet news, because as those of you who ... most of you who don't care and most of you who don't know, the New York Islanders had moved from the Nassau Veterans County Memorial Colosseum, which is a dump, but it's our dump. They moved to the Barclay Center in Brooklyn, which is made for basketball. I mean it's a ridiculous hockey venue. But they moved there three four years ago and they would draw 8,000 people. I mean nobody wants to go to Brooklyn from Long Island, which is the fan base to go watch a hockey game.

It's a pain in the ass to get there, plus the scoreboards over the blue line. It was made for basketball, everything's wrong. The ice sucks, the whole thing. They have half the rink has no stands behind it. It's got a car. You feel you're watching the Charlestown Chiefs, watching slap shot.

Anyway, this year they decided they were going to build a new arena at one of the race tracks, horse tracks around here,

have some extra land. They put a number of games back at the Colosseum, so it's been spectacular. I live five minutes from the Colosseum, so it's a home run. But the place seats only 13,900 people. The lowest in the NHL, before they moved to Brooklyn and the Colosseum revamped, it used to seat 15. But it is small. But it is deafeningly loud, the energy is just off the charts, you get goose bumps in the place.

And it's a dump. You got to go to the bathroom, you miss half a period because the lines are so long. But it's our dump, as I said. But for the play offs they just announced that they will play the first round of the play offs at the Nassau County Colosseum if they get there. They're in first place right now, but the NHL is so damn tough, you never know what's going to happen. I'm trying not to bite my nails as the season winds down. But then if they advance they will wind up playing at the Barclay Center.

So kind of bitter sweet, because you get a first round series here, and if it advances where they would have all the energy and everything, they're going to place, why because it seats 3,000 more people and the Colosseum has 10 luxury suites and there's a hundred sitting at the other venue.

Anyway, enough talk. We have an interesting guest today. We are, you know I run a nuclear power uranium slash slash uranium investment vehicle. I talk a lot about nuclear power and uranium mining and today one of my guests is one of the leading nuclear advocates in the world. And really excited to have him on.

I spoke at a conference that he spoke at in October held by the Nuclear Energy Institute. We didn't get a chance to meet. I reached out to him afterwards. And we've gone back and forth and he's going to join us. His name is Mike Shellenberger. He's just a fascinating guy and he's got a great story to tell. Not only about nuclear power, but he used to be an environmentalist, he is an environmental activist, but he used to be an anti-nuke guy, and he turned. So without further ado, Mike Shellenberger, welcome to the podcast.

Mike S.: Thanks for having me.

Mike Alkin: Oh my pleasure. I was telling people before you jumped on, that you really are just a fascinating story. I mean you were at one time an anti-nuclear activist and now you are pro nuclear. For those with don't know you, for our listeners. Mike is the president and chairman of environmental progress. And he really is a leading,

just an energy and environmental researcher. He is the guy in the world when it comes to nuclear advocacy.

He's been really fighting for the environment, for social justice, if you look back 25 years now. Earlier on in his career in the 2000s he was advocating for the new Apollo Project in clean energy. That resulted in \$150 billion public investment in clean tech, which they lobbied President Obama, and I think that was between '09 and 15.

If you look anywhere, Mike is known as the climate Guru. He's the high priest of the atomic humanist movement. You've written books, you've helped save reactors in Illinois, New York, South Korea, Taiwan you name it, you're out there. You are the voice, the advocate for nuclear power. So it's a treat to speak with you. Thanks for spending a little of time. Why don't you tell the listeners, Mike, give us your background. How did you get involved in activism to begin with and then, how did that lead to the renewable space and how'd you morph into nuclear power?

Mike S.: I'll bring you back to my childhood now.

Mike Alkin: I'll get the catch.

Mike S.: It started as a, yeah. I come from a long line of Christian pacifists known as Mennonites, which is also the tradition that President Dwight Eisenhower came out of. My parents were very progressive, very left wing kid. I also had a desire for adventure. So I convinced my high school principal to let me take my senior year in Nicaragua and central America, because I wanted to see the action up close. Was also very concerned about the national environment. My parents took us camping. A lot of us kids. And just loved nature.

I always knew I wanted to do something that would both help people and help the natural environment. I was never the kind of environmentalist that thought that the problem was too many people. I always thought that there was something wrong with that way of thinking.

Mike Alkin: You left that up to the Sierra Club.

Mike S.: Yeah. I was definitely anti-nuclear. In fact, in California I helped to stop a proposed radioactive waste repository for the desert. Over time like a lot of people my concerns shifted from nuclear war to climate change, both seemed really catastrophic and it seemed obvious that the solution would be renewables. I didn't really think very deeply about it. This was in the late 90s.

Then we started, as you mentioned, this new Apollo project which was basically identical to what is being proposed as a green new deal. And the idea was let's do a win-win for workers and the environment. Make a big investment in Cleantech. There was some controversy around it because everybody at that time was focused on carbon trading and carbon taxes, and we said better to just directly invest in the technology.

Long story short, Obama picked it up, he did these big investments and as soon as it started, they started pushing our renewables, we saw there were huge problems with the technology. The intermittency, the unreliability and then in particular, and this is the subject of my most recent tech talk, just the huge amounts of land that is required for renewables. We started to wonder, are we destroying nature in order to save it.

Mike Alkin: Yeah, talk about that. For those who aren't aware. I mean, you could put a nuclear power plant on probably 20, 30 acres. Talk about the land required for wind and solar and what it does to the environment.

Mike S.: I always encourage people to look for themselves. It used to be that these energy people would think, "Well, I have to go and read academic studies." But the truth is, if you go into Google Maps, go find a solar farm near you. Go find a nuclear plant near you. Draw, there's a function on Google Maps, draw the line around it and then you can compare them.

When we do this in California, it takes 450 times more land to generate the same amount of electricity from solar, as it does from nuclear. And that number varies a bit around the world, but basically that's the orders of magnitude you're talking about. So if your goal is to save the natural environment, you gotta ask why are you covering so much of it with solar and wind. Lot of misinformation as well, about the impact of solar and wind.

For example, I used to repeat this lie which I'm embarrassed about now, which is that "house cats kill more birds than wind turbine, so you don't have to worry about them." But house cats don't kill eagles and hawks and owls and kites and condors. Wind farms are the only technology the Federal Government has given private investors and entrepreneurs permission to kill condors with. Only wind farms can kill condors. And you gotta kinda go, "Well why are we doing that?" The reason we're doing that is because the people that want to do renewables, they hate nuclear.

I read this column from Forbes last week which was the reason that they hate nuclear so much is that, if you do nuclear, you don't need to do renewables. As soon as you figure out that nuclear is good not bad. Good for the natural environment, good for public health, then you have to go, well wait a second, why are we doing all these renewables if we can get all of the benefits of renewables with none of the downside. And that, it turns out, has been something that renewable advocates have been aware of for a very long time, which is the reason why-

Mike Alkin:

Let's talk about this, because one of the questions I had when I started looking at this space about four years ago is as I started to peel the onion back, because I was a lay person. I didn't really know about nuclear power. As a matter of fact, as a westerner living in the US I wouldn't have realized it was 20% of the electric grid. It was 12% of world electricity generation. As far as I knew, nuclear power was a dying industry. Then I started to get educated on it.

Three things I came away with, one is it's the safest form of electricity generation. Two, it's got a very controlled waste stream versus any other form of generation and there's documented proof that it prevents the growth of nuclear weapons by those countries who use it. And so, I look at that and I say, well how did it become such a pariah in the main stream.

I saw a tech talk that you gave, and you talked about the history of it, and you talked about, where we both spoke, at the Nuclear Energy Institute, but the tech talk really went into how the Sierra Club and other green organizations were really pro nuclear power, and then it all kind of shifted. Can you talk how we've wound up to where we are today, the genesis of that?

Mike S.:

Yeah, I will, though gosh you know, I'll admit to that. You know, I keep peeling this onion, which is the onion of "If nuclear is so great, why are people so afraid of it?" I keep peeling it and I keep discovering more layers. The first thing is, you kind of go, people associate it with the bomb. Right. Same word, in fact what's funny when you look through the history of it, people have always gotten nuclear reactors mixed up with the bomb itself. Nuclear reactors can make bomb material-

Mike Alkin:

The China syndrome helped that, right. The China Syndrome. The photo of the mushroom cloud in the background. You saw that right.

Mike S.:

Yeah, and you see that everywhere. It's funny, I was just in a debate in the Philippines and the anti-nuclear guy gets up and he shows a picture of what he thinks is the Fukushima accident, in fact it's the LNG terminal on fire. One guy said to me, is it because the nuclear accidents are so dramatic, I was like, "But they're not". Three mile island is like, you're filming there, there's nothing going on. There's nothing exciting about it. The only way it becomes exciting is that our brains imagine all these things and the imagination of course comes from this huge amount of literature, visual imagery and the literature of nuclear war.

So clearly nuclear weapons is a big part of this. And the more you learn about, and of course it's a bigger issues for baby boomers, who grew up in the 50s and 60s. It's much bigger for them than it is for Gen X'ers who grew up in the 70s and 80s. And for millennials, who really they just grew up with climate change as a big concern not nuclear.

But if you grew up in the 50s and 60s you were bombarded with terrifying images of nuclear war, nuclear apocalypse, it's hard to blame people for having such negative, unconscious views given that the US government itself was participating in terrifying people about this technology.

So that's a big part of it. What you then get also in the 60s is an anti over population movement. People that think that there's too many people destroying the natural environment. There's some truth to it, obviously if there were fewer people there would be less environmental damage, so it's not untrue. But a very radical version of it, a very anti human version of it takes hold and the connection to energy, I should mention, is just that their view is, energy is too cheap. All this cheap energy will allow the human cancer to spread and devour what's remaining of the natural world. Nuclear, their criticism at the time, was that nuclear was too cheap. They were afraid of it because it was too expensive.

The Sierra Club in particular, but also Ralph Nader and Friends of the Earth, decided deliberately, there literally is a secret memo, they say we're going to make nuclear expensive by making people afraid of the technology and demanding more regulations. And that's basically what happened, incredibly successful campaign. The most successful anti-technology campaign in human history. I don't think anything compares. Not the campaign against vaccines, most people get vaccines.

But here's this incredibly promising energy technology that

everybody gets it and goes, it's so much better than everything else that we should scale it up to be 50 to 80% of our electricity and that was the plan in the United States in the late 60s and early 70s and of course we only got to 20%.

I think those two things, the anti-bomb people, the anti over population people and then I guess if you add a third element, it was just this sheer love of renewables of this idea that renewables will harmonize us with the natural environment. And I think, more crassly, politically renewables give an institutional vehicle to fund various interest groups.

Mike Alkin:

Because your early days this year was very pro-nuclear, and you had other advocacy groups that were pro nuclear, and you've just seen this evolution. And you mention at that talk, which I thought was fascinating, was that the China Syndrome movie came out and it really brought terrible images of what a nuclear meltdown could be at a power plant. And then 12 days later, Three Mile Island happened. And the press covered it with people who had seen the China Syndrome and, you brought an interesting point up in that talk, where you said "They really went after the mothers. Played the fear of the mothers and their children." And that seems to have really gotten legs.

Mike S.:

Absolutely. And of course, the roots of that too start with the bomb. The start doing these nuclear tests in Nevada in the 50s and they're getting radioactive fall-out. They later changed how they built the bomb, so you had less fall-out. The early bombs had a lot of fall-out, and it was also before we knew a ton about radiation science, most people believe that the radiation from the fall-out was too little to cause any harm. We now are very confident of that. But at the time it was very scary. And what they discovered through psychological research, interestingly enough, was that people displaced their fears of the bomb and nuclear war, onto the fall-out itself. I see this as psychological concept of displacement.

It just is a way of saying the boss is yelling at you and so you yell at your spouse and then your spouse yells at the kids and the kid kicks the dog. Everybody displaces their negative emotions onto a weaker. It's sort of like scapegoating. You kind of go, that is horrible, nuclear weapons, well we can't really get rid of them for a variety of technical and political reasons, so I'm going to try to stop the local nuclear plant.

If you try to get too rational about it, it doesn't make that much sense. Well so, if you get rid of the nuclear plant, do you really

think you're going to get rid of weapons? No, but it provides some kind of emotional satisfaction.

And I think we saw that with the women and the mothers in particular against the fall-out from the testing. Along with world famous scientists and the Pope and it was major celebs in the 1950s and 60s. They finally stopped the outdoor test, and it was really around when they stopped the testing and all of that anxiety about nuclear weapons has nowhere to go and it then goes on to nuclear power plants.

So if you look at attitudes of women in particular, they're basically identical when it comes to nuclear weapons and nuclear power plants. I think it was manipulated, quite cynically, by people, but on the other hand Jane Fonda who made the China Syndrome was herself quite afraid. Understandably, of the technology. Our hope is that we have enough distance now that we can start to get a more mature view of what this technology is and what it isn't.

Mike Alkin:

So let's talk about the technology, when you bring up nuclear power. People mention one of three things. Three Mile Island, Chernobyl or Fukushima. And there's a lot of non-factual information in people's psyche in their mind, and what they read and hear. People would think that you've had meltdowns and tens of thousands of people have died. What do the statistics show?

Mike S.:

The interesting thing is one of the worst nuclear accidents occurs in 1957 and nobody ever heard of it, in Britain. At a place called Windscale. It was a dual use reactor, used to make electricity and to make plutonium for the British weapons program. Major fire and accident sprayed radioactive materials over the countryside. Not at levels that could increase cancer rates. But significant. Certainly much more than Three Mile Island. And yet hardly anybody knows about it. There wasn't an outcry. So that's your first sense that the reaction to the accidents is being created by political campaigning.

When you go from 1957 to 1979 which is the ... what most people think of as the first bad nuclear accident at Three Mile Island in Harrisburg, Pennsylvania. Everything changed. The political context, the cultural context has changed. There's an anti-nuclear movement that's very powerful at that point.

The Three Mile Island accident is this amazing event. In the one hand it basically proves the inherent safety of nuclear power. It's the worst accident you can have happen to your reactor. The

entire core melts, the cooling water is cut off through human error and the core melts. It's a full meltdown of the reactors. Basically all of the radiations contained by the containment dome as was promised by the industry. Nobody was exposed to dangerous levels of radiation. The most if you were standing right next to the containment dome was the equivalent of one x-ray.

So incredible event and it was viewed absolutely apocalyptically. The cover story of Time Magazine, or it might even have been News Week, was nuclear nightmare. I mean, really, that. People voluntarily evacuated. It was headline news. You can't look at that event and say well that's because it was so spectacular. There's nothing spectacular about it. You look at that plant and nothing's going on outside. Of course inside, it's melting.

I think it's proof that journalists constantly get this wrong. They say things like the anti-nuclear movement began with the Three Mile ... no it did not, it began in the 60s long before Three Mile Island for reasons that had nothing to do with the accidents.

So Three Mile Island. At this point when we talk about bad accidents, I don't include it, because I think it's just a case of a meltdown which improved the safety-

Mike Alkin: And the technology design, what it's supposed to do, contain it.

Mike S.: Yeah, exactly. With massive human error, we can talk later about technology, but basically the story of nuclear is humans learning how to use it. It's just very basic, it's a brand-new technology. Of course we're going to make a bunch of mistakes in using it. Just like when we started flying airplanes.

As we get more experienced, we become better operating them, and the problems go down. In fact the response of Three Mile Island, from both the industry and the government, but a lot of it to the credit of the industry, very voluntary. Was to improve its human machine, basically the human performance side and the efficiency of nuclear power plants. Meaning the percentage of the yield that they operate, went from around 55, 60% to over 90% today. So great testament.

And by the way, a statistic that completely debunks the idea that nuclear operators should seek lower levels of safety in order to have higher process. In order its by seeking higher levels of safety that you get better performance and higher process. So, the two things are related, but totally opposite to the way the anti-nuclear people imagine.

You get to Chernobyl it's an accident we know a lot about. Heavily studied. We know 20 firefighters were killed putting out the fire from acute radiation syndrome. Something like 51 total have died since. No increase in any cancers other than thyroid cancer and thyroid cancer is 100% treatable. All you have to do is remove the thyroid gland and take a synthetic substitute called Thyroxin. The only people that will die of thyroid cancer from Chernobyl are people that don't get the medical treatment, for whatever reason.

So, at this point, the best estimate from the scientists that studied it, is maybe 160 premature deaths from thyroid cancer plus those firefighters, that's it. We're looking at 200 total deaths from Chernobyl. A lot of radiation was sprayed over the area. The area was still inhabitable, you just didn't want to grow food and eat it there. Like Three Mile Island which kept operating the second reactor. They kept operating the second Chernobyl reactor. Most people don't know this. Literally workers would keep going to that plant every day and produce electricity.

Chernobyl is the worst accident of all time from a nuclear facility. There was no containment dome, it sprayed radioactive particles all over the countryside, all over the world and there was no increase in cancers other than thyroid. And the thyroid cancers were totally treatable. And it would, by the way, have been completely avoidable had the Soviet authorities prevented the kids from drinking milk, and eating foods and giving them iodine tablets to prevent the uptake of radioactive iodine.

People go why did I change my mind. They asked me why I changed my mind. One of the big things I did is I read the reports about Chernobyl and I was shocked by how few people died. The flip side of it is, that there is a lot of harm caused by the anxiety and stress. People sort of go, there's always anxiety and stress. Yeah, but is the anxiety and stress, do you blame the technology for the anxiety and the stress, or do you blame the people that promoted the anxiety and stress.

Mike Alkin: Yeah, that's fair.

Mike S.: There's a moral issue here. Which is that anti-nuclear advocacy isn't just about preventing the building of plants or trying to get them shutdown. It's contributing to real world mental health problems. We all know the experience of having a lot of anxiety and stress, you can't sleep at night, you don't eat right. We now know that the cortisol levels in the body inflict real physical harm. This paranoia, the neuroticism, the anxiety, the fears all have an

objective physical reality. In some ways I look at my work and I go, we save lives and we run nuclear plants, because they don't create the harmful air pollution that kill 7 million people a year. But, boy, if we can just get people less anxious about the technology we'll have done a lot of good, given how much harm is created just but that anxiety.

Mike Alkin: You just said something right there, and Fukushima I mean similar, from a deaths perspective, right?

Mike S.: Right, similar to Three Mile Island.

Mike Alkin: Three Mile Island, exactly. But you just said something, which leads me to the next thing, about a lot of people fear the waste, right. I mean it's constant. Whenever somebody says something to me, they say "Well what about all that nuclear waste?" And again, just reading, like you did. And I read and you talk to people and you realize. And you've said this and I've seen this written before, that all the waste generated would take up a football field, 20 feet high. And it sits in steel, concrete reinforced casks on the properties. And it's a controlled waste stream, versus the waste stream of coal and natural gas and others that are in the air, killing seven million people a year.

Why is it such a hot topic, and how has that evolved and how do you educate people on that?

Mike S.: Wow, great question and a huge mystery. I mean, the waste from nuclear plants is why nuclear is the safest and best form of energy. In other words, all of nuclear safety benefits come from the fact that it doesn't emit harmful waste into the natural environment, either as air pollution or water pollution or toxic waste in landfills. That's why nuclear is the best. And yet it's best quality is viewed as one of its worst qualities. Including, by the way, many of the idiots in the nuclear industry, and there's many, who once they've joined the chorus of concern about nuclear waste which is a problem that's been solved. There's also a lot of companies that want to make money scaring people that way. So they can do something different with it. Move it somewhere else, put it somewhere else. It's really quite sad and cynical.

Here's this great waste, it's exactly, from an environmental point of view, you should want from your waste. Tiny amounts of it perfectly contained. Literally never hurt anybody. We haven't even been able to find somebody that had a canister dropped on them. Much less irradiated. Literally never hurts anybody. Meanwhile 7

million deaths a year from air pollution. What's going on. I haven't quite figured it out yet to be perfectly honest. I think there's a couple of different things. The first is that people just believe stuff that's not true about it. We think, because we watch the Simpsons, that it's liquid and green. Well it's not liquid. It's just the old fuel rods, just these old metal rods. It's not green, it's metallic covered, grayish black. It's not in barrels it's in these cans that sit on site.

As soon as what we believe is wrong we project something onto it that's not there. But that doesn't explain the anti-nuclear leadership, which knows perfectly well what the waste is. What are they scared of? Here again I can only understand it by thinking about some potential relationship to weapons and interestingly enough, I think some of the blame falls on the nuclear industry.

Right now it looks to me like what occurred was, there was nuclear waste and the industry in the 50s and 60s, just out of a geeky engineering sensibility, said, "Well look, that waste has 98% of the energy left in it, we need to reprocess it and use it in advanced reactors or in today's reactors." They're reprocessing it, as you know, as your listeners probably know, as a way of transforming the waste into fuel again. Well that process allows for the creation of plutonium which of course can be used in nuclear weapons. What we find in the 60s and 70s is extraordinary opposition to reprocessing the waste. In France an anti-nuclear advocate actually fired a rocket propelled grenade at a fast reactor, declaring that, that that reactor was a super phoenix, that that reactor would create plutonium.

We saw Ralph Nader raising a lot of ... Ralph Nader basically just attacking power plants as bombs. He did not mess around. He described them as bombs, he described nuclear accidents as the equivalent of Hiroshima and Nagasaki. He literally would say if there's a nuclear accident, the survivors will envy the dead, which was something that was said about Hiroshima and Nagasaki. Clearly there's some fear mongering. And then on the scientists side one of the most humanistic and lovely, very progressive nuclear scientist, named Alvin Weinberg, who was part of the Manhattan Project, and ran Oak Ridge Labs. But very kind of geeky, kind of poor social and political intelligence I would say. Very low awareness of how what they were saying affected people.

He would say, "Well, we may have to make a Faustian bargain," which is a deal with the devil by the way, "to have a plutonium economy so that experts would have to be involved in making sure that none of the plutonium is diverted." So the nuclear industry or

establishment in this case, painted a picture of these robotic like scientists, that we, the humanistic masses, would have to entrust with our safety. And I think that that triggered all of the fears and the anger about nuclear weapons.

Here's a group of people who we don't really like very much. That are now telling us that we have to let them be engaging in processes that are just constantly involved in making large amounts of plutonium. And I have to say I've come down on this issue on the side of not reprocessing. Because the only argument, as I can see for reprocessing that waste, is because you don't have enough uranium. But we have plenty of uranium. We're awash in uranium. So we don't need it.

Then the other argument would be they go "Well it will reduce the amount of waste." Yeah like what, reduce it from a football field worth of waste to three quarters of a football field. Or nine tenths of a football field. As an environmentalist it doesn't matter. The waste I'm concerned about is the gigantic islands of floating plastic waste in the oceans. I'm worried about the 7 million people that die a year. I'm not worried about-

Mike Alkin: Talk about solar, solar panel waste. I think people-

Mike S.: Ah solar panel waste, well yeah. I got so tired of answering the question, what do you do about the nuclear waste. I said to my interns, go calculate how much solar panel waste is made. On Twitter if you look, people say there's no solar panel waste. As though the solar panel on your roof, just gets thrown on the compost heap at the end of its 20, 25 year life span.

If you calculate the numbers on a pro energy basis, solar panels create two to three hundred times more toxic waste than nuclear. And solar panels contain lead, cadmium, chromium, heavy metals whose toxicity never declines. Most of those panels join the electronic waste stream, are shipped to poor countries where they're used a few more years, then broken apart, usually for the copper that's inside that's of some value. But leaving some of the poorest people in the world exposed to heavy toxic metal dust.

Clearly, the society is not up in arms about solar panels because they have some background idea that solar is natural and they're freaked out about nuclear waste because I think they have some idea that it's somehow and someway connected to nuclear weapons or some kind of contamination.

Mike Alkin: Which leads ... when people worry about the nuclear weapons, because if you get nuclear power, you're going to turn into a nuclear weapon maker. Talk about that, because you don't see that happen.

Mike S.: No, and the record is wonderful. I just read another study on this. Countries that get nuclear power plant have to get inspections from the International Atomic Energy Agency and none of them have turned those reactors to make weapons. Most countries don't need a weapon. Countries don't get weapons because they can make them. It's a funny way to think of it, right. The idea would be that everybody wants a weapon. Most countries don't want or need a weapon. Only a small number of countries that feel very threatened by an outside force need a weapon, and even there, nuclear weapons have spread to nine countries over the last five years. During that time the world has become a far more peaceful place.

There's a consensus among historians that nuclear weapons prevented the United States and Soviet Union from growing to war, and there's a consensus among scientists in Asia, that nuclear weapons prevented India and Pakistan from going to war. Even the underlying fear of weapons as this horrible apocalyptic thing we have to get rid of. Turned out to not be true.

And it's something we should celebrate. Here everybody in the 50s, everybody, Einstein, Oppenheimer, the inventor of the bomb, Presidents of the United States. Many, many people believed that it was just a matter of time before nuclear weapons were used in war. Turns out that people with nuclear weapons are very, very careful around each other, which is great. It means that we're not going to invade North Korea and have a terrible war like we did in Iraq.

So nuclear is this revolutionary technology. It's a blessing that we all thought was a curse for a really long time. It took 75 years, I think for human consciousness to evolve. We needed that time to see what the impact would be. But the impact has been incredible. It's been peaceful, it's saved lives. It's really demanded something of the human race, that fossil fuels don't demand, that ordinary weapons don't demand. There's a kind of care, a kind of craft, I'm always so impressed by the best part of the nuclear industry.

They're very focused on excellence, and I hear people that work in coal, natural gas and oil and I don't know in general, there's excellence there too, but with nuclear it's a culture that's quite

admirable in its dedication to excellence and quality. I think it's really a Cinderella story in a sense that it's a technology that it's evil step sisters have made do so much work, in terms of protecting the natural environment, keeping the house clean and yet they demonize it as the dirty one. When in fact nuclear is the cleanest, she is the best.

I hope before I die anyway, I don't know how long it will take, that the rest of humankind will see nuclear for the blessing that it is.

Mike Alkin:

Let's talk about the rest of humankind, it seems, does see as the savior being solar and wind. And if you look at those numbers, I think I saw numbers that you put up. That in the last decade alone more subsidies have gone towards wind and solar than in the history of nuclear power, if my memory serves that in one of your talks you talked about that.

So you live in a state, you live in a city where it's a round zero for you not being liked, living in Berkeley and being in California, talking about nuclear power. But let's talk about solar and wind as generation sources. And the intermittency of those. Let's talk about California and Germany, because those are two good examples. People look to California as a leader in renewables and I think it's by 2030 they want to be, is it half renewables or something like that?

What are the experiences that you have seen in terms of solar's ability to generate consistent power to the grid and replace a Diablo Canyon when that goes down and replace other nuclear plants when that goes down. How do you think about that?

Mike S.:

I think the easiest way to think about it, is to do a real world comparison. We have this incredible, what economists will call, natural experiments, France and Germany. So France is about 75% nuclear. 92% of its electricity comes from sources that don't release emissions. France spends about half as much for electricity as Germany. Germany's electricity prices have gone up 50% over the last decade, during a time when everybody -

Mike Alkin:

And that is when they decided they wanted to get out.

Mike S.:

What's that?

Mike Alkin:

That's when they decided to get out of nuclear.

Mike S.:

Right. Well they did two things at once, so it's not the easiest

thing in the world to disentangle them. Germany decided to do a lot of renewables and phase out its nuclear. But we can see the consequences of it. German emissions have been flat since 2009. It will have invested \$580 billion dollars by the year 2025 in renewables and the supporting infrastructure. And it gets less than half as much of its electricity from clean energy sources and its electricity is ten times more carbon intensive than France.

So you hear all sorts of propaganda, solar panels are cheaper than ever, nuclear is so expensive. Sure if you fail to measure costs accurately, if you just measure the cost of solar when the sun is shining, rather than measuring the cost of a solar heavy grid, which is required to produce power when the sun's not shining. You come up with really different numbers. That's [inaudible 00:50:10] between France and Germany. The interesting thing about France, Germany pressured France to follow its lead, do less nuclear, do more renewables. That's what France did, so over the last 10 years, France has provided another experiment. It's invested \$£30 billion in renewables over the last 10 years, its electricity prices went up, and the carbon intensity of its electricity went up.

Why, well because if you're going to do less nuclear, you can't just replace it with solar and wind. They're too unreliable. They only generate electricity 10 to 40% of the time, depending on where you are. So what you're really doing, what France really did is they reduced the amount of electricity from nuclear plants and increased the amount of electricity from natural gas and a bit of solar and wind.

You may say don't we need a mix, don't we need nuclear and renewables? Well, no. France shows, in fact that it's better not to have a mix. A little bit of a mix in the sense of having some hydro, the perfect grid, every engineers perfect grid is something like 80% nuclear and the rest is hydro. Because hydro is so easy to store. It can ramp up and down very easily. It's like 100% ... I mean this idea that climate change is this really complicated, "Oh climate, it's really complex". It's only complex if you try to solve it with renewables. Because no country has been able to do that and they twist themselves into pretzels, with modeling suggesting that there is a way. It's very simple, just build nuclear plants.

That's it. The only part of the puzzle that we really have any control over is energy. This stuff about land use, it's just impossible to change your land use significantly to effect emissions. All you do, is you just build an electrical grid that's 100% zero emissions, mostly nuclear. And then you electrify

transportation with trains and electric cars, and you electrify cooking and heating with electric stoves and furnaces. That's it. Super simple. There's no radical breakthroughs required, you just build nuclear plants.

Once that became clear to us, I did sort of relax a little bit, in the sense of well at a certain point humankind will figure that out. We might spend a few decades wasting money building bird killing wind turbines and solar panels that create tons and tons of toxic waste. But eventually we will understand that solving climate change is pretty simple, it just involves building nuclear plants.

Mike Alkin:

What you see is when those solar and wind plants are built, because the intermittency and the cost to store that energy isn't near where it needs to be. You're putting in these natural gas plants as backups. And these natural gas plants are emitting emissions into the air.

I think people think it's a big lobby, the natural gas lobby talking about clean natural gas. It's not as clean as people think, is it?

Mike S.:

I'm a huge fan of natural gas if its replacing coal, bio mass, burning dung. It's certainly better than those things, but yes of course, it's much worse than nuclear. Energy in some ways is so simple, it's just that there's a hierarchy of energies. Nuclear is the best, because of all the things that we've been talking about, it's energy dense, doesn't create any dangerous waste, either as pollution or some other form. Natural gas is next best, oil after that, then coal, then wood, then dung.

It basically follows the pattern of human development. I would never, ever, in fact I strongly support the right of poor countries to burn fossil fuels to lift their people out of poverty. That's just basic human ... it's a basic human rights issue.

But if you're a rich country, rich and technology capable like Germany or Japan. What are you shutting your nuclear plants down for, other than some superstitious, religious reason. It doesn't make any sense.

Mike Alkin:

When I'm asked a lot about technological advances in nuclear power technology, I talk about the SMRs you've got the small modular reactors that are coming. And then people ask me a lot about, what about the thorium molten salt reactors. What I've learned over the years is that technology in the nuclear space really works at a snails pace. It just doesn't go anywhere. And I know

you had mentioned you were in China with Jim Hanson on a trip to China and you were looking at new technologies. And in one of your talks I saw that you were very excited about the thorium molten salt reactor, and share with the listeners where they are in that stage of development.

Mike S.:

The first thing to know about nuclear technological innovation is, like what you said, it's super slow and it's super slow just because the turnover of capital is so slow. A good nuclear plant should run 80 years. You're talking really slow turnover.

I interviewed three South Korean nuclear construction managers, all late in their career. I would say mid 60s maybe late 60s. They had been nuclear plants since their late 20s, over about a 40 year period. Maybe 35. They had built about five reactors, which is more than anybody in the world. And they got better at it. The cranes were very good, they didn't change the design very much in between iterations. They made them a little bit bigger. They made the water intake a little bit better for the fish. They made the containment domes thicker and some other safety stuff. But it was very, very slow and steady because that allowed them the experience they needed to be able to build faster next time. So 70 to 80% of the cost of nuclear is in the construction.

The main event when it comes to the economics and the speed of building and the cost is the construction manager's being experienced and building a design that they're familiar with. The worst thing, if you want to make a really expensive nuclear plant, then you get inexperienced construction managers and workers building a brand new design.

That's what the United States and France have done in recent years. If you want to understand why the US and French nuclear plants have been behind schedule and over budget, that explains all of it.

In the engineering community, and technical people in general and men more than women, they tend to be design focused. There's a kind of arrogance to it, I find, which I sort of like, I know that my nuclear plant will be better because I can just look at the design. Well it never, ever works that way. The nuclear plants that are the cheapest, safest, best run are just the ones that we have a lot of experience with. It's still a highly complex machine.

This confidence with which people describe some new design is a kind of arrogance born from really not understanding the history

of nuclear. We have locked in a particular water cooked design. It's great. It's a great design. People say well we only chose that because that's what the military used. That's great, because all that military experience provided all this additional experience in terms of supply chains, and operations, and safety.

What about smaller reactors? There might be some places that smaller nuclear reactors are a good fit. Like island nations, places that don't need very much electricity, but they're always going to be more expensive than the larger reactors for a very simple reason. Which is that it requires just as much staff to run a small nuclear plant and sell far fewer electrons, far less electricity than a big one. And that's why the industry always built these bigger plants.

Sometimes when they build bigger plants, like in France, they take longer to build, but then they pay for themselves because they produce so much cheaper electricity. But other places like Korea they build bigger plants and the cost has gone down.

I'm not against any of those designs, but I do think we have an obligation to the public and policy makers to just say it's going to be more expensive for really well understood economic reasons.

The radically alternative designs, molten salt, which is basically taking a combination of chemicals which is salt, usually beryllium, fluoride or lithium. Combining them and then sticking the uranium in it so that you've got this liquid fuel that's really, really hot and really, really radioactive. And then running it through these tubes to generate power. It's a beautiful idea, it's like fusion in that sense. Everybody looked at it, they loved it. In fact if you read the old histories from the 50s and 40s even. People loved the idea back idea in the 40s and 50s. Because you can't have a meltdown, because the fuels already melted.

Does that mean that there's no problems. Oh heck no. Now you've just introduced another complex dynamic which is chemistry and chemicals. I've heard people say molten salt will be easier in terms of waste clean-up, and I'm like, how exactly would that be. I mean with the rods, there's these rods. You got to keep the water on them, yep so there's that. You got to keep the water on them. After they're done you dip them in pool cool water. They sit in these pools for 18 months to a couple of years. And then they dry out I you put them in these cans on site, and they're fine. That's it.

With the chemicals, you've got to somehow extract the uranium

from it. So you're basically talking about, taking the existing nuclear industry and nuclear power plants and adding a chemical fabrication and disposal mechanism to it. And, maybe that'll work, but I don't think you can suggest that that's a low risk slam dunk.

The scientists that have looked at it for decades, they've all been that is hard not easy.

Mike Alkin: I thought that on your trip to China, when you said hey this is pretty cool technology to the guy running the program and you asked when can this be available, what was his answer to you?

Mike S.: 2040 at the earliest. I'm not an engineer and I think it's been to my advantage, in the sense that I was trained as an anthropologist, so I'm very good at interviewing people, and I like long, long interview. So in China we had this long, it was one bus ride in particular. But there were dinners and stuff. One long bus ride so boring and I just went into the back of the bus, because all the Chinese and the Americans as we do, we split up and we just hang out [inaudible 01:02:25].

I found the young Chinese engineer, he told me everything. All the gossip, all the technical problems. It was like the scales fell from my eyes and I just thought "Oh, of course". Of course this is way, way harder and more complicated and more expensive and slower.

The thing I've realized as I've done this, particular the last three years is that wishful thinking is such a powerful, it's so powerful and in some ways it's good, it prevents us from losing hope, but wishful thinking, it can just lead us so astray into believing things that aren't true. So I find that huge amounts of wishful thinking among pro nuclear people and engineers in particular, who have these really wild fantasies about thorium or small reactors or the sodium fast reactors. And it's just wishful thinking. This idea that basically all of nuclear's problems will be solved with a new design. I just ignores everything that's happened with nuclear over the last 75 years.

The idea that nuclear would not have the problems it has today if it were some other design is just a fantasy. Nuclear was destined to have the social resistance that it has because it's such a revolutionary technology. And some little change in how you cool the uranium would not have made a difference.

Mike Alkin: What I find interesting, you talk about things being ignored, is what seems to get no play is there have a been a number of anti-

nuclear scientists, activists, it's mainly scientists like yourself an activist who switched over, who have now thrown their hat in the pro nuclear ring. You're seeing more and more of them. How come that doesn't get discussed more. You don't see that. Does it go back to the whole, you come from a liberal background, you come from Hollywood and the media and everyone just having this liberal bias against nuclear power, and they squash this, or ... why don't we know more about that. You have to go find it.

Mike S.:

That's a great question. We got some attention when this movie, Pandora's promise came out. It was aired on CNN, but I think the sort answer is just most progressives for reasons they don't understand themselves, just really don't like nuclear. For all the reasons we talked about and even we changed our mind, it's just not enough. I think it's other people that have a financial interest, a political interest and they view nuclear as competitive with renewables, as they should because you don't need renewables if you have nuclear.

In other countries it's even worse. When I go to France or Taiwan, Japan, South Korea, Philippines, Germany there's not that many pro nuclear environmentalists. The good news is there's a lot ... there's more coming. There're many more pro-nuclear environmentalists that have shown up now, in Europe for example. But it is amazing, group think. Sometimes it was always you can't go ... one or two pro nuclear environmentalists in a place like South Korea, but it's hard to find them. Mostly if you have pro nuclear people they're either scientists or working for the industry. I think it's a matter of time. I think the fact that this is a slow moving technology. It's taken us 75 years to get over the hysteria, honestly, around the technology and we're still hysterical about it, but you kind of go, it might take 100 it might take 200 years for people to get used to it, because it is, it's that revolutionary, it's that weird and different.

Humans evolved with wood and fire and smoke. It's literally, like fire was created by our pre-human ancestors, it's not even a human creation, so it's understandable that it's taken us such a long time. But I think that the other thing, we haven't talked about is the power of social media.

at this point all of my comrades around the world that are pro nuclear environmentalists, I've met them on Twitter or Facebook. It's an extraordinary tool to just find ... I just announced today we're doing a pro nuclear pride fest in Brussels, Belgium at the end of April. I announced it on Facebook, Twitter and it's been an

incredible way to find people that we wouldn't have had just 10 or 20 years ago.

Mike Alkin: If you were sitting down with one of your counterparts on the other side, who is a renewables fan and anti-nuclear, yet you were having dinner with him or her. And you laid out your case for nuclear and they laid out their case for renewables. On your ride home, in thinking to yourself, what would be the things that you find frustrating about not being able to get your message across.

Mike S.: And of course that happens a lot, as you might imagine.

I'm older now, it's been a while and so I'm much more, I'm able to figure out much more quickly when people are open minded and when they're not.

I was at a friend's birthday party, about a year, a year or two ago, and he introduced me to somebody, Michael this person, she also works on energy and the environment, and I was kinda like, "Oh no, this is not going to be good." This is going to be. It was like, just not open at all and I just found myself, there's no point. She's made up her mind, so have I. So [crosstalk 01:09:00] -

Mike Alkin: What's the strongest argument you hear. What are those strong arguments you hear. Because the pro nuclear case is very scientific based, right? The amount of deaths, the safety per terawatt hour per unit of energy generated. The waste. It's -

Mike S.: It's fear, pure fear. And pure fear ... it's fear that doesn't want to be reassured, so what you get is not reasons, often it's kind of a word salad. Well but something really bad could still happen. Okay sure.

Mike Alkin: Try and disprove that, yeah.

Mike S.: I mean but you're not really. That's what I mean about like, if you're really not ... one time I was with somebody in the Philippines. I was trying to be very nice, I was trying to understand her fears about nuclear, and she didn't have anything to say. It's a mistake to view it like a debate over evidence. Finally she just goes, well we all have our right to our own opinion. And I was kind of like, sure. That was her way of saying, I can't explain why I am so scared, and I don't want to be asked anymore to do so. And you have to respect it because there's an honesty to it. I don't think well walk away from this, these interactions saying well I made some good points, and he made some good points. I think

they walk away from those interactions being like that guy really wanted me to support nuclear and I don't. And I'm not going to change my mind.

And I know enough politics that you just go, that's fine. There's just a hardcore 20 to 30% of the population, you're never going to change their mind, and in trying to focus on them, just makes everything worse. First of all, it's a distraction from the time you should be spending on the third that's undecided. Not the third that's already in agreement with you or the third that's never going to be in agreement. It just makes everybody feel bad.

For the most part I try to get out of those conversations pretty quickly because they don't go anywhere and it just makes everybody unhappy and if I'm going to have a conversation with somebody who really is going to be anti-nuclear, I'd really rather just talk to them about movies or music or books.

Mike Alkin: Totally. We mentioned earlier when we first started, the Apollo project, about clean energy and \$150 billion public investment. You said it was like the new green deal, what did-

Mike S.: It is identical.

Mike Alkin: I saw when Alexandria Ocasio-Cortez, the freshman congresswoman from New York, who has got more press than any freshman congress person I could recall. When she posted that, you came out and went on a Twitter tirade. What do you think of her new green deal?

Mike S.: I was frustrated because, you know, how is it you can say that the world is going to end in 12 years from climate change and then actively support increasing emissions that cause climate change. That should cause you cognitive dissonance. That's the definition of cognitive dissonance.

I wanted to created that cognitive dissonance when I started going ... I've written now four columns about the green new deal. On the one hand there's this rational issue which is that you can't solve climate change without nuclear, without a lot of nuclear. And then I think there's the other, which is like okay, what's really going on. If this is really about climate it would be heavily nuclear, so maybe it's not really about the climate. Maybe it's really about just doing a lot of renewables.

Why would you want to do a lot of renewables? It gives you a lot

of, you can control funds that go to creating jobs and it creates a fantasy of harmonizing with the natural world. Some of it is that dumb. Some of it is just ... you go to the supermarket and you have a choice between buying something labeled natural and something that doesn't have that label on it, and you buy the natural one. That's called the appeal to nature fallacy.

If you ask people is everything in nature good for you? I guess people will say, okay no. But it works subconsciously, so we go, well why are renewables good for environment, well because sunlight and wind are natural, but are sunlight and wind more natural than uranium? I don't know, but they're safer. Well yeah, sunlight's safer, when you go outside, it's certainly safer to be in the sun, than it is to stand next to a nuclear reactor at full power. But when you manufacture the solar panels, spread them all over the environment, recollect them, break them down, is that safer than just having a nuclear power plant? Well no.

Obviously nuclear requires a Spock like commitment to reason, for sure. And rationality. And it requires ... there are going to be losers. If you are heavily invested in fossil fuels, oil and gas and renewables it makes good plain sense that you would be anti-nuclear. There's just a lot of different interests and reasons behind being anti-nuclear that I've tried to bring out in my pieces.

I've been trying to sort of ... when you read these last few ones, which some people have said they thought it was the best I've ever done, the pieces that I've been excited about, because they've been basically trying to do two things at once. The first is to actually address the actual real world, empirical, scientific evidence and lay it out. But then the other has been trying to understand psychology and the sociology and the history of this, because I don't think we can just explain away anti-nuclear folks as ignorant. There's something much more profound going on than that.

Mike Alkin:

One of the articles you wrote that I thought was really fascinating was what happened in Vermont in 2005, the legislatures had promised to reduce emissions 25% below 1990 levels by 2012 and 50% below 90 levels by 2028. And they closed down Vermont Yankee nuclear power plant. Talk about what's evolved as they tried to go towards the renewables.

Mike S.:

Well, their emissions instead of going down 25%. They went up 16%. Which is twice as much as they went up in the rest of the country since 1990. So there you go. Vermont was the test case for the green new deal. It's Senator Bernie Sanders, it's the

most famous climate activist is Bill McKibben, they all live there. They all created that plan. So if you do what the green new deal founders and advocates want, our emissions are going to go up. How much more do need to know. Germany, Vermont, same thing in California.

It's a funny story, I actually wrote that piece before the green new deal was announced. I was getting ready to publish it that day. And then they announced the green new deal, I was like okay, either I don't know what to do. So I ended up just re-writing the opening and saying, and point out that Vermont was an example of the green new deal. Which actually worked out very well.

Again though, there's something going on, where I write that piece and I didn't get a lot of emails from climate activists in Vermont to me saying, boy you're right, I've changed my mind, we should have kept our nuclear plant open. Nope, they're just out there calling for all the same stuff they called for before.

Mike Alkin: Did you get a lot of hate mail.

Mike S.: Of late I have gotten, you know, you always get ... when you get a lot of mail, you get a lot of mail. So when you get a lot of mail, you get a lot of hate mail but you also get a lot of fan mail. So I've been getting a lot of fan and hate mail lately, in the last week, week and a half. Obviously the green new deal was national news, and so whenever this stuff is in the national news and I'm publishing my stuff, my stuff gets read a lot more and comments. I'm on Fox tonight and then I'm on Bloomberg TV later this week. I was on NPR on Friday.

People are definitely listening again that hard core anti-nuclear, 100% renewables folk, they're never going to change. My encouragement for folks that care about nuclear is to give up on them. Not as human beings, but as people that might be converted to the cause.

Mike Alkin: Tell us about how you spread the word because the renewables lobby is gigantic. You've got the natural gas lobby that's huge.

Mike S.: Primarily the same thing.

Mike Alkin: Yeah. And you're one guy with a few interns. How do you survive. How do you raise your capital. How do you get your money to go do your stuff. How does environmental progress get the word out to the world? Because you're in a lot of places, you're very high

profile and that's grass roots, that's the stuff you grew up doing, so how do you complete with that.

Mike S.: By the way, we have three full time employees which is great. And you know it's funny, I had, I started a think tank in 2003 called Breakthrough Institute. Left in 2015, started Environmental Progress in 2016, we're smaller. Just four full time people, but it's been great. Actually I got to say, small teams less management. In fact I just read this article in the Times where somebody was saying that real creative, innovative work has to be done by small teams. And I was like that's so true, because there's less people to manage.

Somebody said, how do you do it on such a small staff, I'm like I don't know how you do it on a bigger staff.

Mike Alkin: That's a good answer.

Mike S.: Too many needy employees that want mentoring and support. I'm very fortunate to have a small number of donors. Everybody's always very curious or suspicious if they're anti-nuclear of our donors, so we just put them on the web page.

Mike Alkin: There are no energy donors are there?

Mike S.: What's that?

Mike Alkin: No energy industry donors?

Mike S.: We don't take any money from any industry, and the reason is probably obvious. The first is just that's a big part of our credibility, and the second is. I have to be this person, just as a human. That's who I am, I have to be free to say what I want. If I don't like a particular nuclear technology I have to say that because I think that's my obligation.

We're nonprofit so we benefit from the tax laws, our donors get a tax deduction, that means that we have an obligation to serve the public interest, and that means that if I find something out, and this has always been my promise to people that work with plants. If I find out that their plant is going to close. You know if you're a nuclear plant operator sometimes you don't want people to get all riled up about close the plant. You want it to go smoothly. The nuclear industry they don't want me to know those things in advance. But if I find out I tell the workers because I think it's their right to know if I know.

If I think the technology is no good, the public should know that. So, I'm actually in a very fortunate position of having a small group of donors who believe in climate change. One of my loyal and largest donors is Frank Batten Junior whose father started the weather channel. Frank is just a really lovely human being who is concerned about climate change but also understands that we need nuclear. So it just tends to be folk like that. They're not super demanding or needy. We meet them once a year. We talk them through our work. And they've been really happy with the progress that we've been making and, we certainly have ... I have also been encouraging the industry to just do more engagement. We started a ... we felt like there was some public demonstration, public support for nuclear needed, so we started something called the Nuclear Pride Fest, with pro nuclear people around the world.

We did our first one in Germany, one is coming up in Brussels at the end of April, and we've always encouraged the nuclear industry to send your people to attend. Don't be scared. I think sometimes the nuclear industry, they say well we want that to look, we don't want it to look like an industry event. I think that's an excuse they sometimes give. Because it's an industry that's not very used to being out there publicly.

We always want to invite them in. The nuclear industry is full of beautiful people that care about the planet. They need to be out there, demonstrating their support in person. So we've always wanted to encourage the nuclear industry to get more involved, even as we've made it clear, that, certainly for our activism, it's going to be directed by civil society rather than by the industry.

Mike Alkin: Great stuff. Mike I can't thank you enough. I really enjoyed our chat and I'm sure my listeners will.

Mike S.: Great thanks Mike.

Mike Alkin: Well I hope you enjoyed the chat with Mike Shellenberger of Environmental Progress. He really is, he's one of the world's leading nuclear advocates and he is quite the activist. I enjoyed speaking with him, I hope you enjoyed listening to him and I hope you learned a bunch. I did. He gives a lot of TED talks, so if you want to go on YouTube you can look at his TED talks and he's interviewed in a lot of places. It was a lot of fun, I hope you enjoyed it. And I hope you have a good weekend and I'll see you next week. Thanks.

Announcer: The information presented on Talking Stocks over Beer is the

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