



Moving the Needle: An Interview with Industrial Heat's Tom Darden

by Marianne Macy

When the news broke that a startup investment group called Industrial Heat had acquired the rights to Andrea Rossi's e-Cat in January of 2014, it ripped through the internet to the LENR community and observers around the world. Industrial Heat is supported and run by Tom Darden of North Carolina-based Cherokee Investment Partners. Cherokee is a private equity firm specializing in the acquisition, remediation and sustainable redevelopment of brownfield real estate properties. Bloomberg.com specified that the firm typically made a minimum investment of \$25 million. This was not a small event.

Tom Darden and Cherokee have historically kept a low profile. Andrea Rossi, on the other hand, has done more than anyone—since Fleischmann and Pons were on the cover of the U.S.'s three top news magazines—to get the hot spotlight, pushing his LENR inventions on the front burner of the world's attention. Rossi gave demonstrations, interviews, videos and cooperated for books published about him. This made for a “substantial web presence,” Darden noted. Rossi's hard-to-ignore existence and the past several years of worldwide LENR research community reports of encouraging progress in the field have pushed what historically has been known as “cold fusion” to being a presence in future energy technology discussions.

But few things are as striking as when a successful financial entity shows up with millions of dollars and puts them down on the table. Word of other big name investors were whispered. International LENR programs were now restarted, albeit with different organizations and affiliations of some of the original researchers. In China, Japan and Russia, researchers had first worked with government and industry support, had it die down, had individual small groups carry on heroically and made good if incremental progress. Now large entities were being rebooted.

At ICCF19 in Padua, Italy, news of breakthroughs were coming from different areas. Coalescence figured out what it takes to get loading every time in hydrogen metal systems. Brillouin Energy Corp. showed an electrochemical-based system with a stimulation method that was producing large scale effects, replicated at SRI. Lagatti's switch on trigger system was resulting in good loading results. Vysotskii and Kornilova were excited about a biologic nuclear waste remediation system. It was standing room only for Parkhomov's presentation on replication of the Rossi results, with a stable system that ran for 30 days. Japan just won the bid for the 2016 ICCF meeting to be hosted by its new effort at Sendai.

The conference, held in the exquisite frescoed halls of the Pallaza della Raggione, kicked off with the Padova and Veneto Symphony Orchestra playing under a giant lavender wooden horse. There were 470 people in attendance, the

largest ICCF in history.

In the subsequent celebratory and well-wishing opening salutations, the majority of which were in Italian, there was only one person with a slight North Carolinian accent delivering a speech. Tom Darden of Industrial Heat introduced himself to the LENR community. The Martin Fleischmann Memorial Project has made the video available on their YouTube channel: <https://www.youtube.com/watch?v=kYIZxb96LXg>

Tom Darden has kindly given an interview to Marianne Macy and *Infinite Energy*. In a vaulted ceiling room at the Pallaza Della Raggione, Darden, a slender man with an aquiline face and intense focus softened by the wry sense of humor of someone who has seen a lot of the world and can be amused by it, spoke about what he and Industrial Heat are doing, why they're doing it, and in the process, gave a real insight into who he is. How he speaks is thoughtful and thought-provoking. His voice ranges into shifts that are as much a part of what he says as the words. The voice ranges from serious and compelling, emotional, cerebral and self-examining all in turns. He also is a good comic and mimic. He laughs in as many nuanced ways as he talks and thinks. One is left with a sense of awareness that a very vital person has become involved with LENR, someone with the confidence and experience to give space to brilliant and creative people. What happens next might save the world. It promises not to be dull.

Marianne Macy: It's April 13, 2015 in Padua with Tom Darden. First of all, congratulations on that speech. It meant a lot to a lot of people.

Tom Darden: I appreciate that! I asked for some guidance from people on what subjects would be of interest and got none! I thought about what had meaning to me. It is not my place to talk to this group about the importance of what they're working on, scientists who are veterans of the field, because I'm a comparative newcomer. But I've always had very emotional feelings about how close-minded some in the scientific community can be. Why can't people be nice to someone who has a strange idea and say, “Ok, that's a different idea but good luck” or “we wish you the best”?

Macy: It seemed as if what you enunciated was what you felt.

Darden: Yes! It is. I don't know the wars a lot of these people have been through. I only know them from 1,000 miles visibility and can imagine, but I don't have license to speak about it. The other thing I wanted to convey was this dis-

tion...but, there is pollution and then there is energy. Those are different things. It seems most people thinking about LENR are thinking about energy availability. I'm thinking about pollution. It seems to me you are coming from a different perspective if your focus is pollution. We have plenty of energy in America, that's not a problem. I think pretty soon they'll have plenty of energy in China, because they've learned how to release gas from shale. So energy is plentiful and cheap where rich people live. Maybe not where poor people live, so poor people need more or cheaper energy, but rich people really don't. I also don't see a lot of economic activity constrained by lack of available energy or by energy costing too much. The whole energy crisis mentality, that the energy is going to run out, isn't my focus.

Macy: You said you did your thesis on acid rain. It looks as if you've been focused on pollution problems for a long time.

Darden: All my life.

Macy: So a lot of your interest in the LENR field is the environmental consequences of energy in other forms and what you think this field offers, is that it?

Darden: Yes, very much so. I make investments in other technologies as well, such as in the medical field, but to me the biggest problems we face are environmental. And among environmental problems, the biggest is having materials in the wrong place. Whether it's this material which is probably in the wrong place [he taps the synthetic desk which stands out in the otherwise historic, lovely room] or carbon in the air. But if you went out on the street and said, "What matters environmentally," water shortages might be way higher on the scale than air pollution. But the good thing about water is that it always comes back, clean. Maybe not quite as much as you want, and maybe it is in the wrong place, but it does come back. So it is like a supply and distribution issue. What I'm most worried about is the pollution associated with materials we make things with, including energy. That leads to massive toxification.

Macy: So these issues are the reasons that motivated you to get involved with LENR. My husband and I just saw a documentary about professional environmental damage deniers, called "Merchants of Doubt," out by Fox Searchlight Pictures, so it got theatrical distribution, based on a book dealing with the same topic. What was interesting about it was that it depicted how the public's understanding of environmental issues had been affected by paid PR people posing in the media as "scientific experts." One person said he wasn't a scientist but "played one on tv." And how in the interest of "journalistic balance" these people would be booked on television next to real scientific experts. So the point of the film was that these people had been successful merchants of doubt, and if you asked the public if there was climate change and global warming, they were genuinely split on an issue that there actually is a scientific consensus that there is a real problem! So in light of this, I wondered if you anticipated that selling LENR on environmental grounds would be a tough sell for you?

Darden: There is some really interesting stuff in that ques-

tion. It may be different in Europe, but if you asked Americans to make a list of society's most important problems, the environment is always one of the last ones. I'm on the board of the Environmental Defense Action Fund, the EDF's 501c4 (not their 501c3 board). We talk about this. It's so tragic! There are a lot of wealthy people who are involved with and support environmental issues. But if you go out and talk to the average person in the U.S., they don't see it. The reason is, how many people are aware that they are being affected by the environment? You walk outside in America and the sky is blue and people are moving back near the former industrial rivers. It used to be that no one wanted to live by the rivers because they were contaminated. Now rivers are beautiful! People build condominiums on the rivers, go boating on the rivers. That's why to me, we need to concentrate more on macro, more systemic problems. Something that is going to have a long-term, big effect. In a place like the U.S., if there were a safe, readily available source of energy that cost five times as much, I can tell you with complete certainty that it would not be adopted. People would say, "Well, it's not that much of a problem." If there was safe, readily available energy that cost the same, I feel that enough people would say, "Ok, it makes sense. Why not?" But if it cost twice as much, or 1.5 times as much, I don't know! I would hope people would be willing to make some kind of sacrifice. But I'm not sure people are not willing to make almost any sacrifice for an environmental motivation.

Most environmental policy is fairly top down. Think about recycling programs, most of which are mandated. You get high recycling rates if you don't let people throw cardboard or bottles in their garbage. San Francisco is banning food waste in the garbage so people will start composting. I don't see a lot of intrinsic motivation on the part of people to do that, which is unfortunate.

If you go to areas in the Third World where pollution is really bad, such as a river in a big city that catches on fire, and if you said there is a solution, I think you'd see a lot of uptake. It's tangible. In all the surveys these groups do about the environment, that's the one area that is supported: your *own* health! That's what people will get behind! It's so sad! [He laughs ironically.] It's like, "Oh, me? Or my children? Well, in that case I'll get motivated." One of the comments about denialism that is interesting is, there's a guy at Yale named Dan Kahan. He studies cultural cognition or confirmation bias. What he has found is that the smarter you are, the better you are at finding the one piece of information that confirms what you already know to be the case. I saw Al Gore's movie "Inconvenient Truth." I talked to a guy who is a marketing statistician, a big data guy. I said, "Wow, that was really well done. That data was hard to argue with; it's a really powerful picture he painted." This guy was brutal. He said, "What do you mean? It was completely irrelevant." He told me, "It didn't move the needle. It didn't change anyone's mind." Well, how can that be? I wanted to know. "You look at all that data and you don't form any opinion?" He said, "No, people already had their opinion. If you believe there was some correlation between CO₂ and the warming of the planet and you went to see Al Gore's film, then you came away and said, 'There's some correlation between CO₂ and the warming of the planet.' If you didn't believe that, and you saw the film, you'd say, 'That's not true. It's Al Gore. I don't believe in him anyway.' Or people would say, 'Yeah,

I don't like to be involved with things where if you were successful with it, it wouldn't move the needle. A lot of things fall into that category. In life, or business, or dealing with the environment. My goal is to work on things that at least if you were successful, they matter. And so I kind of view things through a lens of does it matter, and is it feasible? I'm willing to take a lot of risk if something seems feasible.

ok, but correlation is not causation, and what about..."

Macy: So I take your depressing point that the environment is not a successful sales pitch. What was it that motivated you when you got those three phone calls you mentioned in your talk about LENR?

Darden: For me, it was more intrinsic. I look at things at more of a substantive, technical level, like, "Does that make good logical sense?" Constrained by really one thought, and I'm generalizing, but I don't like to be involved with things where if you were successful with it, it wouldn't move the needle. A lot of things fall into that category. In life, or business, or dealing with the environment. My goal is to work on things that at least if you were successful, they matter. And so I kind of view things through a lens of does it matter, and is it feasible? I'm willing to take a lot of risk if something seems feasible, from a cost or feasibility standpoint. If something might be getting in the way from a cost or inconvenience standpoint, whatever the constraint is upon adoption, you say, "Ok, it's at least conceivable." Take an electric car. You'd say, "How many miles does it have to travel to be conceivable? 180? Ok. That's conceivable. 40? You're not going to get serious uptake with that. 80? 130? 300?"

Macy: To get into this area of LENR, did you and your people do a lot of background? What were the deciding factors?

Darden: We say this is enormously important at an environmental, technical level. There is an enormous market. Therefore, if you were right, it would not have been futile. We said, there is sufficient evidence that something is going on in this space. It took much more than the coincidence of three phone calls, or a call once, then again in thirty days, and thirty days...although that kind of slapped me in the face. I talked to some really smart people who are involved in it. I was thinking, "You've got to be kidding!" and I came away and said, "There's enough reality there that I'm willing to take a technical risk." So the last risk that I spend very little time thinking about is almost a pricing risk. I guess there is a possibility if you were in the hot fusion business that this would be a very painful question. There is a possibility that it would work. The market is enormous and it's technically and environmentally a positive thing but it just costs so much that there's no way there is going to be adoption. I don't see that as being super likely, although that is a risk we are taking. We've estimated roughly the costs of construction. I guess it is at least possible you go through the math and come out with, it works, it doesn't hurt the environment, but the electricity and heat coming out of it is going to cost three times as much. And that's too much. I'd say, "Damn. That's very upsetting." [He laughs heartily.] I'm optimistic around that.

Macy: So in a way, the deciding factor to get involved was how LENR works. It's affordable.

Darden: The good thing is there has been so little in the way of resources in LENR that people have figured out how to do things very cheaply. If people are able to build successful, replicable, multiple devices that can operate for awhile, and don't appear to cost much, that was enough in my mind. They weren't made of Unobtainium, or some hyper expensive material that was impossible to deal with.

Macy: Since you got involved I would imagine you speak to a lot of other financial groups and people. Have those communities asked you a lot of questions about this? Are investors and market people coming after you to see why you are doing this?

[Tom Darden's laughter is now taking on the characteristics of Kingsley Amis' character in the novel *Lucky Jim*, whose Capitalized Face Descriptions illustrated major character orientations. Darden's laughter rings true and seem to viscerally express his experiences and reactions. This laugh would be his It's Not The Way You Think Laugh.]

Darden: We have always, in almost everything we've been involved with in more than 100 or more deals, embraced a timeframe that is not consistent with the typical way of doings with venture deals. There used to be historical venture capital and some of those people had really long time horizons, like a decade or so. I am telling you, if you get into the tech world...that stuff is fast. It's really, really inexpensive to build. I'm totally sympathetic. They have investors. They have to manage expectations. They have to respond to the expectation of investors. If you're going to invest a very small amount of money, not much capital, not many people, you create. If you can invest a small amount of capital, look at it and say, "I'm not sure if it's going to move the needle. But it's worth \$40 billion to somebody so that's what they have to do." You go to them about LENR and say, "All right, we're not really sure about the picture of the market. And we don't know what it's going to cost. And it's going to take a really long time. Come on in, the water's fine." This takes a different mentality.

Macy: I thought I heard you say something when you spoke this morning about "It's ok, we don't have that same pressure." How do you work differently financially than other VC firms? How do you have more freedom?

Darden: We just deal with people with different expectations and motivations. Historically, we lead with our chins. That is to say, we spend a lot of our own money. And so, that's comforting. I like to be at the bottom of the stack. In

other words, I want people to be safer and do better than I did. I'd rather be the first one to lose money, not the last one to lose money.

Macy: So...*Your* money is in this?

Darden: Oh, yeah. I've been the primary funder. I think there probably are a lot of people out there like me. Clearly there are. You read in the newspaper about Bill Gates, people with massive wealth and the Giving Pledge. Look at what they are doing with their resources. Some of that is in a business context. Lots of it isn't in a business context. It's philanthropy. Lots of it's not in institutional capital. It's not a large percentage of all the money out there but I think there are a lot of human beings who actually are patient and who would see the magnitude of this market. They'd worry less about the timeframe because they'd see how important this is in other dimensions. They would say, there probably is a way that capital would be rewarded ultimately. I think there are a lot of people who fall into that category. They're harder to find.

There's an added issue here as well. It's probably getting to be less of an issue. I think a lot of people have worried historically about this field. It was my reaction when I got the first phone calls. "No, I read the articles. That didn't work." Didn't work. On. Off. Switch. Answered question. That is definitely an issue of people who can't get past the first call. If I didn't get the second, and maybe the third call, that would have been me.

Macy: People think to put down real money with someone like Rossi that you must have seen something convincing. If one did a lot of background on his previous work and life it is clear he's been through enough in the past to know what he wanted from an investor. In order to hand over the kind of money he wanted, you must have seen something compelling. Did you?

Darden: Yes. We saw stuff that was compelling.

Macy: Can you talk about any particulars of the things that made up your mind?

Darden: We've seen a number of tests and we've had a lot of people looking at tests. Of course outsiders have looked at tests. I think particularly the transmutation data is very compelling. I felt very good about that, better than any outlet of test data I'd seen. We're not interested in or insistent upon perfection from a scientist. What I mean by that is, stuff might work, stuff might not work. I don't find failure to be very depressing. As I said in my talk, I'm a pilot, and if you see any airplane fly, then you know airplanes fly. If the next time an airplane takes off it crashes, you wouldn't say, "Airplanes don't fly." You might say, "That airplane no longer flies" or "Often airplanes don't fly." But you would say, "Airplanes fly. We have some engineering, management, technology issues to wrestle with in building our next airplane. Let's try to figure out how to do a better job of it." I'm sympathetic to scientists having to deal with those issues. I think, how hard is this stuff and what should our expectations be? I have the impression people have the idea that they are supposed to go up to a scientist and say, "Show me some-

thing that looks as good as an iPhone and every time I push the button everything goes swimmingly," and some poor scientist has to deal with that attitude. I don't find failure particularly depressing. I find success to be highly motivational, or evidence of success ever to be highly motivational.

We've seen some really good stuff. We want to support Andrea in his research however we best can. Which is to say, it won't be through the venue of nuclear physics. I can't add a lot to that conversation. If there are things we can fund or things we can do to help him, and we want to help him because we want him to continue to progress and evolve. He is very rapid at iterating. He is constantly coming up with new things, "Try this. Try this." I think that's a good thing. I like that attribute. I think it's society's problem to say to someone like that, "Ok, stop. Just work on this. Make a hundred things like this and let's finalize something." Well, it shouldn't be like that. He should be able to do what he needs to do.

Macy: Have you managed to work with Andrea that way? I heard he is set up with a laboratory, that you've got other people doing the building and welding and it is leaving him free to be more of a director of the pursuit of his ideas.

Darden: I feel good about that. I feel good about the work we were able to do to help him through the mundane work. We've been able to provide support to him of that nature. Not smart people resources or activity but just getting stuff done. I hope to continue doing that. In a kind of Utopian ideal you'd start to see more people working together and sharing ideas. To the extent we can make that happen, that is our goal.

Macy: You said in your speech that Rossi is not the first person involved with LENR that you have supported. That's a widespread misconception. You are also supporting good longtime researchers in this field like MIT's Peter Hagelstein, Dennis Letts, high profile newcomers like Brillouin among others. You've said IH wants to support more work in this field. Is one of your goals to get these people to collaborate? Would you approach the people you are supporting or may support and say, "We will support efforts at collaboration"?

Darden: I would love that. It's easy for me to say. These are not my children; they're other people's children we are talking about but...sure. If there is anything I can do to encourage that, I want to, but I also want to be respectful of people's emotions and people's fears and hopes and dreams. We will never say...well, famous last words. I *hope* we never say to scientists that they have to take us as we are. We always need to say to scientists that we will take them as they are, within reason.

I backed these guys at Virginia Tech in 1985. I loved their minds... [He speaks with palpable emotion and tenor as he says the words.] I loved their brains! Even more pointedly, I supported a wonderful woman at North Carolina State who had some ideas around DNA modification. She was using viruses to basically transfer DNA. So we created a business with her...Well, she created it. We just gave her money and accounting help. We did kind of the business side and she was the brains. She was going to do what she was going to do. I learned that I needed to be ok with that. If it was a tech-

nical matter I wasn't a whole lot of help in the first place, and if it was a business matter I probably won 25% of them. But 75% of the time, I lost. I had to say, "I have to deal with this. Is it good enough for her to be the way she is? She's brilliant, and she's adding all the value. I can't hope to constrain the portion of that that I want to constrain without constraining the rest of it." So who is going to bend in that case? If someone wants to work on X, who are we to say, or how successful will we be if we say, "No, you should work on Y." I just think we are crazy to try to overly constrain how inventors or creative people work. You have to take the good with the bad.

Macy: Would you go through your scientists who you are funding or others and propose collaborations at some point if one of them or someone comes to you with a project that might fit their expertise?

Darden: Sure. We would say to someone, "What do you want to work on?" If it conceivably fits with them, would we ask them to consider doing something like that? Of course. But as a background issue, do you think there is going to be one answer to this question?

Macy: No.

Darden: There are going to be so many answers to this question. There is a whole field of physics and material science out there. There's a big thing out there and I think there will be so many components of it and ways of accomplishing something. Granted, at some point Steve Jobs needed to say, "That's what the new iPhone is going to look like." So somebody, and it won't be me, is going to need to say, "Ok, we'll standardize around this a little bit." But don't you think there will be tens of thousands of different forms of that? I like being supportive of people who are doing fairly divergent forms of things. And my only hope would be that we could introduce people to one another if they don't know each other and try to figure out some circumstances under which they feel they win if the other person wins.

One thing that would break my heart would be if somebody were defined as "losing" in this realm? There are all these people working on all these great things. I think there is enormous value to that. It would be great if all those people could find some way to benefit from the success of whoever is going to succeed with this. I haven't figured that out. I see some half-ways to that. If people are frightened of losing then they might feel more liberated if they felt they wouldn't lose, so what can we do to be sure people won't lose? That would be a goal of mine. Maybe that will be a bridge to helping people come together. I don't know how much is personal heart stuff and how much is career, which is easy for me to understand.

Macy: Would you be interested in an association or the kind of planning to help inventors and scientists figure out business directions to take their work?

Darden: I'm trying to figure it out. We are trying to figure out the association of scientists and inventors. How do we associate with these people? My intention is to go to people and say, "What is your intention and how can we be useful

in the implementation of your objectives?" Not to say, "Here's a program." Their job is to be a scientist. I think to have people who care about these issues to think, what would that look like? How would that be structured? Almost like governance questions. We create an allocation pool; let's say we'd be fortunate enough to generate some revenue or proceeds to be doing something, what do we do with that? How does it work and how do people benefit from that? I'm not suggesting that everyone's motivation is to make a lot of money or that a lot of these technologies are worth a lot of money; that's a whole separate issue. But how can we say to people...Everyone feels they have to go create a company. Or a non profit. "I'm going to start a non profit and address poverty or world hunger." There actually are a lot of people working on that already and for you to say you're going to create your own little outlet may not be the smartest thing! Some of the scientists and entrepreneurs are saying, "We've formed an LLC and we're going to do this and that." We've been down this road a lot of times. There are a lot of costs involved in doing that and you see people making mistakes. To the extent we say to them, "Let's be friendly and collaborative and figure out a relationship that works so you don't have to do that. We'll be the back office and we're not greedy relative to that." It's a serious question. I've been pounding on people today saying, "Let's define that. How does it work?" I don't know how it works but we're not going to go away and define that by ourselves. That would be helpful.

Macy: There are people you are supporting in this field, most of whom have remained very quiet. The Rossi support became high profile, the others not so, at least for now.

Darden: We made investments before Rossi.

Macy: In LENR people.

Darden: Yes. I just thought there was a lot of frenetic responses to us backing Rossi. We tend not to announce anything, we try to be low key. I'm sure that you could count on less than one hand the number of press releases that have been issued about anything to do with Cherokee or anything associated with us. I can't think of one! So we would never say, "Ok, let's just inform the world," as if the world cared. I just can't imagine doing that. We also wanted to build a few relationships and see how that was working.

Macy: You mean with the people you are supporting?

Darden: Yes.

Macy: You have it out there that Cherokee Partners and Industrial Heat are putting money into this person and this person. And that's great. *But*. It changes things. Another thing in coming here to Padua we find that Russia is definitely rebooting its program. India is going to. China. Japan. I want to know if you've had involvement with that.

Darden: Not Russia and India. I go to China often. I started going there for other reasons and to this day, most of the reasons I go there are other reasons. But the people I know there are aware of what I am working on and they are very curious. They know the significance of it. You talk about pollu-

tion anxiety and you should think about China! I don't know how much time you've spent there. People think, "Obviously the Chinese don't care about pollution because they've got so much of it." No, that's not the case. Americans don't care about pollution because they have so little of it. The Chinese care intensely about it. It's a human health issue. They are worried about their children. I've talked to people who are in business and speak English and are probably well to do, but they want to send their children abroad for education. A substantial part of the motivation for that is health. There are many areas of China where people want to get their kids out for reasons of health. Think of that. That is very immediate. Pollution was the second leading cause of political protest in China. I read a report about that from the Environmental Defense Fund. Political protest! You have to register to have political protests in China but they have political protests and this is a big issue. So they are interested in anything that could move the needle on pollution. I've never been to Russia. I've been to Ukraine a number of years ago, talking to them about pollution. I went to China ten years ago. I was invited by an American Chinese guy who realized I was working on pollution issues and so he invited me to come speak there at a conference about land pollution cleanup. I went a lot and would talk to different groups. I still do. It was all pro bono; I had no agenda or business interest motivation. I just thought it was interesting. Then as I met more and more people I got involved with more business activities with them. But none has pertained specifically to LENR or any of our work. There's a solar implementation, not technology, but we've developed some solar farms. We're actually not in it. I've helped someone who is Chinese who has some solar investments think about what to do or how to work with some aspects. I'm not in that deal but I've done some business deals with the Chinese people. They know what I am working on and they're interested. They have an intense need.

Macy: Do you think that the fact you have formed a fund with a multimillion dollar investment in LENR work has had some influence on countries expanding international programs?

Darden: I think they know what it could represent. I think these other countries know the importance of it from an environmental standpoint; no question about that. I think that interest is white hot. I sensed that there were a lot of spontaneous cool things happening at the same time; this was the three different phone calls.

Macy: May I ask if these inquiries were from countries or individuals?

Darden: One was Star. In Australia. One was a wonderful guy, there really was a fourth...the other was a guy who was involved with them, a former White House Fellow, who wanted to create an institute to plan for LENR at an implementation level. I have a degree in urban planning, so I'd say it was almost like an urban planner's perspective on LENR. Like, ok, we have a new technology so how will that work. What will be the implications of that? How is the grid going to interact with this new technology? I thought it was really cool but what was so striking was that it might be relevant

to be spending time thinking about this at all! What did that imply? I mean, this is a really smart guy. I said, "What if you are planning for a party that no one comes to? Why are you wasting your time?" He spent a lot of time smacking me around and getting me up to speed on what was going on.

Macy: Even though you've distinguished that IH is different from many VC funds, I wanted to ask more about your financial thinking. I wanted to ask a bit more on why people should spend money supporting LENR and why you are.

Darden: I think there are people who will pay money for pollution reduction, it's just they're not in the United States of America. I think there is passivity in the U.S. about pollution. I think Americans care about global warming. I think they care about pollution load in the atmosphere. Even for the Americans who don't believe CO₂ is affecting global warming, if you said to them, "Do you think putting stack emissions into the air is a bad thing or if we didn't have to do it, would you flip a coin and pick the side of not doing it on this precautionary principal," I'll bet that number would go from 50% to 90% of them saying, "Sure, if it doesn't cost a lot of money." In places where pollution is at crisis level, it really is important, and I think they would immediately pay money and implement a switch in technology. I also believe they would do it for a lot less because their capital costs and infrastructure costs would be so much lower. The problem is not building stuff in the U.S., it's building in China or India or other places where the costs are 50 or 25% of our costs. I think from a business standpoint there is a business argument to be made that people will pay money for pollution reduction.

The other side is, do you come at this from a pollution side or from an energy side? I think there is not an immediate tangible difference in what you would do if you had that mentality. The primary implementation of LENR would be to produce energy. You could say that's the only implementation the LENR reaction that seems to occur, for the purpose of that is making energy so the manifestation of that would be in making energy. So are you doing that because you want to reduce pollution or are you doing it because you want to make cheaper, more plentiful energy? I'm heavily in the former camp.

Macy: Do you have goals or selection guidelines for funding that are progressive?

Darden: Very often, in the different entities we've backed, one reason I've struggled to count is, what do you count? Because this begot that. Yet they are separate but they are all the same. Bio Systems Technology begot Cherokee Environmental, which was the remediation group. So you'd look at something and say, "How does that relate to that?" I've tended to separate things like that in my world because of applications. If you have an application that is predominantly energy production, or an application that is say, soil remediation or nuclear waste processing, I would think you'd want to separate that out. But I've always been fascinated by the use of biological processes to deal with pollution. If you asked what I studied in graduate school and ask my wife because it was all I ever talked about, it was sewage treatment and it was bacteria. I was just fascinated by the

fact that these bacteria could do what they could do. I was astonished. I had no science or technical background, to anyone else in science it might have been obvious but I was like, "You've got to be kidding."

Macy: It occurred to me in terms of thinking about longer term work in this area, right now you are supporting researchers and inventors. I wondered beyond that, how far along in your thinking are you? Are you thinking what is the next stage?

Darden: No. I spend time planning at a visualization level, a far out way to think of things. I think about what's right in front of my face. I don't think of what's in the interim time. In terms of the innovation side, which is important, I can see that. I think as it gets more tangible and immediate those kind of conversations need to come up, asking, "so what does this really mean?"

What would be the efficiency or inefficiency of converting LENR energy into electricity at a small scale? We need to know more about that before we can answer the question of how distributed would you want something like this to be as opposed to how central? I can see why a more central kind of solution would be more likely because the smaller it is, the worse the efficiency of conversion is going to be. So is this something that is going to be implemented through a widely distributed system or is this going to be implemented through a centralized system? If I had to bet, I'd say more centralized. And there are other benefits to that too, like regulation, keeping control over things like safety, which still needs to be better understood. So more centralized is probably more likely until way out in the future when things start to get really small maybe. We might find the implementation is relatively simple and benign. The utility companies don't care about buying coal. They're buying natural gas. [He snaps his fingers.] How long did that take? Very quickly in the scheme of things.

Macy: So you are saying you're putting money into researchers and inventors. If it works, you would see a really fast conversion of energy companies and utilities just switching over.

Darden: Yes...Ford designs a new car and it's three years before the car comes out. It's just a little different. I think things take a long time, really, but what if it's in ten years we were making lots of electricity in big power plants from LENR? I think we'd all be ok.

Macy: How do you feel about the issue of going public, where we have someone putting his own money, and a lot of it, into something that supposedly had been discounted. That's a news story. If you suddenly started getting pickup from the *New York Times*, the *Wall Street Journal* calling, major outlets, would you want that? Do you want to come forward at this time?

Darden: [Shakes his head with great irony.] No! I don't ever want to see that. The idea of just having to work on things in a fishbowl; I don't see it. People who do that sort of thing either want to do that because they are trying to sell their product, so you can see why consumer facing companies

want to do that. Or they're going public. Or they're raising money so they need a presence in the public markets. Or they want it, ego or whatever. That's the way they are. None of those apply. I don't want it and we don't want to raise investor interest or look as if we're trolling and have something to sell.

Macy: How would you feel if you got to be a role model with people saying, "Look at this person who is putting his own money into developing a new non-polluting energy technology? He's the leader of a new movement."

Darden: Let's be successful first. Seriously. I think there is great value for younger people who are in all kinds of crossroads as their lives unfold to see windows into what can be done. I *really* think that's valuable, by the way. In my life it's almost been one to one, hearing about someone and going to talk to them. But young people, and I'd put myself in this category, when I was starting out, your vision and visibility into how people lead their lives and think about things is so limited. There were a few instances where I spent time with people where it was so revealing to me to hear how they lived their lives or saw their impact. I actually see great benefit to that. Bill Gates would be an extreme on that, maybe Gates and Warren Buffet walking around talking to rich people saying, "Would you consider doing this with your money?" Their giving pledge. How many people have they got to do it? It's a lot of people. I don't think they would have done it if it hadn't been for them. I really don't think they would have. I think there's enormous value to that kind of thing.

Macy: So if you get a bunch of phone calls coming off this...

Darden: I'm not talking to them.

Macy: After your speech, some people loved it, others expressed concerns on their minds. These are not my opinions. I'm asking about things people were saying, such as, "Oh, he's just going to make a technology. He doesn't care about science." This could be from the perspective of people who are focused on particular areas. Or, "He says he's not VC and hasn't the same time frame. That's bad! Does that mean he'll let them try everything until he or the inventor dies?" Or "Is he going to make a device?" How do you address these concerns?

Darden: A valid criticism is around the whole question of urgency. The question of urgency in settings like this is interesting. I know people feel urgent. I know I can be at the patient extreme. You don't want to have patience cause you to move slowly as opposed to having patience to pursue something longer. One form of patience is not good. The other form of patience I would argue is good. I'd accept criticism around any of those things or I'd spend too much time trying to get things set or get things ready. I've seen so many incidents of people doing that, not being thoughtful about structures or organizations. Maybe I'm legal administrative in orientation but someone has to think of legal and administrative things because so many people just are dead before they start because they didn't get that stuff right. So I *do* spend a lot of time getting that done and tolerate that those

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things take a lot of time, whereas so many people say, "Don't worry about it! Just go." In terms of what to do, I understand the distinction between science and engineering. I have a bias because I can only think about things where I can see. That is where I struggle with a lot of this because I can't conceive of things I can't physically see. Things that are tangible come down to building something. To the extent someone has something that can be used as a hopeful visual depiction or demonstration of something that gets people who are not oriented in that direction can say, "I see that." I think that translation is really hard for people. So the more we can do that, it's a good thing to do. We've done that, really building things for Andrea Rossi, for example, really helping with the physical building side of things. I think it's great and it's been important what he's done in that dimension, because people can really see things, physical structures, sizes and shapes. People want to work on things that are really different, so let's get into building those things and we can really look at. Get it into a setting where people who aren't involved can see them, get into the idea and go away and say, "How can we use that?" What relevance does it have to their particular endeavor. Meanwhile, I just love the scientists on an emotional level. I can't be them or do that but I love them on an emotional level and they need support. I don't know how else that translates on a more tangi-

ble level but I think it probably does. I think finding ways to support that is a good thing.

Macy: So you are not just supporting investors who are making something. You might also support a program or related area of inquiry.

Darden: We can do that. And more. Back to the idea I had about how this pool would work, I can see how you could have an allocation that in turn is used to fund that. Someone puts in something that has to have some value associated with it. Maybe there is an allocation that is just associated with theoretical stuff. When Walmart has an allocation for philanthropy, maybe that is almost in the same category as philanthropy. We are going to take 10% of our profits and just give it away or something. These thoughts aren't fully materialized, but I'm thinking of this.

After our interview Tom Darden returned to the conference floor to meet with more of the scientists at ICCF19 in Padua. There was much going on here, and he had a lot of people to talk to.