ANDREW K. PERSILY

ASHRAE Vice President 2007-2009

Tim Dwyer: This is the ASHRAE leadership recall interview for Andy Persily, the Vice President from 2007 to 2009. My name's Tim Dwyer. I'm from the ASHRAE Historical Committee, and this has been recorded at the ASHRAE Summer Conference in Denver, Colorado, June 25th, 2013. Andy, perhaps you can tell us a little bit about your growing up in Chicago.

Andy Persily: I'd be happy to. I grew up, uh, as you said, in Chicago, on the south side of the city, which was pretty much a working-class neighborhood. Attended public schools, and, um, you know, it was kind of the baby-boom era when there were a lot of middle-class, middle-class communities built, you know, to house the new generation of young families, and, uh, had, uh, two older brothers, a younger sister. My father was a printer. I think he was really an engineer at heart, but he didn't have the opportunity to pursue the education. But I didn't realize it until later that he was really, um, you know, very hands-on, and he, uh, he wanted to make sure I understood a trade because he thought that was very important, so he taught me how to do hot type, hot-lead type, which became an obsolete technology about three or four years after he taught me.

Tim Dwyer: Okay, and as part of your education, did you go to a private or public school in Chicago?

Andy Persily: I went to, uh, a public elementary school and high school, where I always liked math and science. I just liked the consistency, and there were generally definitive answers, and I really enjoyed that, and then moved on to college, went to a small liberal-arts college, which didn't have engineering, where I did physics and mathematics, and got a teaching certificate from, for kindergarten through high school, which I never used. But, uh, like, I was very interested in pursuing education at that time, and never thought about it 'til now, but in some sense, my ASHRAE activities, you know, are to a large degree educational. And that's why I never pursued education an educational career formally. You know, I think, uh, in terms of ASHRAE, I did do a lot of education work.

Tim Dwyer: And, uh, you had those interests at that stage, but, uh, then you moved into higher education and-and university, and where did you spend that time?

Andy Persily: Yeah, well, when I finished college and-and decided I didn't want to do teaching of young children because I didn't feel capable of it, and I studied physics and math, I didn't feel

like I knew anything that was useful to anybody. You know, I could do homework and take tests and, you know, prove mathematical theorems, but it didn't seem, I didn't think I could get a job doing that. And I think, you know, if all else hadn't transpired differently, I might have gone to graduate school to study theoretical mathematics, but that didn't seem very important to the problems the world was facing. And in the late '70s, you know, there were a lot of, you know, energy issues that started to become, um, more important as prices increased and environmental concerns. So, I thought, well, I should go do something in engineering and applied science. So, I took a year off after college and pursued applications to graduate school in engineering and applied science programs. And I went to Princeton University where they had the Center for Environmental Studies, which became the Center for Energy and Environmental Studies, and they were doing home, you know, energy studies, retrofits, you know, trying to understand why homes are using so much energy and how they could use less energy. I was there when the first blower door in North America was designed and built, which was used to pressure test buildings, and I got a great appreciation for how important it is to actually test buildings. You know, design is good, but without going to the buildings and making measurements, you know, that's really where you really learn something.

Tim Dwyer: I'm still maintaining a very much an academic background throughout the early years.

Andy Persily: You know, while I was in, you know, graduate school, it was academic, but, you know, I was in a mechanical and aerospace engineering department where they were doing supersonic airfoils and lasers and combustion, you know, flame spread, and I was doing residential energy consumption. So, I did not fit in very well with the kind of the hardcore, high-tech engineers. You know, so certainly an academic environment, but a very, you know, practical research focus.

Tim Dwyer: And did that involve field work, going out to houses?

Andy Persily: Yeah, we, you know, we were measuring air tightness in houses, I had a little hut on the roof of our building where I was measuring infiltration rates and energy consumption, and, uh, Most of the work was done in the lab, most, or on this hut on the roof or in some of the homes in the area that we were doing energy studies in.

Tim Dwyer: And is that where you stayed, or did you move on from there?

Andy Persily: I, uh, I finished there in, I think, four and a half years or something, and I was at an energy conference, probably a very early energy conference in the grand series of such conferences that have since taken place, and I bumped into someone from the National Bureau of Standards, whose name was Press McNall, who, I think, subsequent to that, became a vice president of ASHRAE. He told me, you know, "Oh, you're finishing your PhD. We have a postdoc program," and I, that sounded like a good idea, so I applied and was accepted to this postdoctoral research associate program, and, uh, at the National Bureau of Standards in the early '80s.

Tim Dwyer: So that's in your late 20s, then, you would have been then. Yeah, and, as an engineer in your late 20s, what challenges you saw in industry at that time?

Andy Persily: Yeah, well, I, you know, I wasn't that, you know, really exposed to industry. You know, I was, you know, again, we were looking at most in graduate school, I was looking mostly at homes, and... The issue of air tightness and energy consumption and how to modify or retrofit a home so it would use less energy. So, I really wasn't that connected to the industry side. But I appreciated from my colleagues at this research center the whole issue of energy costs and the policy concerns about different fuel types and environmental impacts and there was a there was a very interdisciplinary group. So, there were, you know, people doing, you know, nuclear policy and nonproliferation and nuclear power safety, people doing research on coal as a fuel and its environmental issues, and psychologists trying to understand why, you know, you put insulation in your attic, and I wouldn't put it in mine. So, it was a really good exposure to the fundamentally interdisciplinary nature of energy use in buildings.

Tim Dwyer: And so, uh, I guess it, that really gave you an interest in the connection between perhaps building intent and the actual building use.

Andy Persily: Right. I mean, I quickly gained a real appreciation for the, again, as I said earlier, for the importance of measurement and measuring building performance and then relating it to the design intent, the standard or code that it should have been complying with.

Tim Dwyer: Interesting, of course those areas are areas that ASHRAE has expanded into since those years. Sure. And, of course, when you were in your late 20s, you weren't actually actively involved in ASHRAE.

Andy Persily: No, I'm not, as a member. There wasn't a student branch where I was. There were, excuse me, other researchers who were participating in ASHRAE, so I started to see these big orange books, these Transactions with papers that I needed to read, and subsequently met the people who wrote them. This was before I could, you know, get the articles online. So when I needed an ASHRAE Transactions article that might have been a little old and wasn't in our library, I went to the engineering library in New York City, which was about an hour train ride, which was the building where ASHRAE was located before it moved to Atlanta, just kind of across the street from the United Nations. So, you know, little did I know that I was kind of starting a relationship with the organization that was going to develop quite a bit in the years to follow.

Tim Dwyer: So, as with many people, you started as a consumer of ASHRAE information. True, true. And how did that develop into, uh, into you actually contributing to the ASHRAE information?

Andy Persily: Well, shortly after I graduated and started the postdoc, I, you know, when you get your PhD, you try to turn your thesis chapters into publications, so I had one such, uh, chapter converted to a publication that I went to an ASHRAE meeting in Toronto, I think in June of

1982, to present it, and I went with my then supervisor, or research advisor, was the title when I was a postdoc, who, you know, dragged me to sessions and technical committee meetings, and he was at the table. I wasn't at the table yet, but, you know, when they needed somebody to write a work statement for a research project or review something, he would go, "Oh, yeah, Andy can do that." And I learned the joys of volunteering or being volunteered.

Tim Dwyer: So that was a positive introduction, I'm sure.

Andy Persily: It was, I mean, you know, and, you know, starting to meet people and realizing I can contribute, and people I had heard about or read their papers, and it was a little intimidating at first, but I didn't let it bother me too much ′cause they seemed to know so much more than I did.

Tim Dwyer: And possibly areas that you thought weren't actually industrially, uh, based would have great influence in terms of the development of ASHRAE?

Andy Persily: Yeah, I think I, yeah, I had no sense of the bigger picture. You know, I did not know, you know, when I went, I didn't know there was a president and a board. You know, there were these people, and one night, at every meeting, they got all dressed up in tuxedos, and I'm like, "Who are these guys? What are they doing?" You know, ′cause I was going out with my friends, very informally, who I knew as research colleagues from technical committees, and it was just a very, you know, I didn't know this bigger world existed.

Tim Dwyer: So, at that stage, you wouldn't have any knowledge of the so-called "grassroots committees" in ASHRAE.

Andy Persily: Not at all. You know, I didn't know there were chapters, and I didn't, you know, know that side of the society until much later.

Tim Dwyer: Andy, the term "grassroots" is used in, uh, in ASHRAE to talk about some of the committees that really underpin the activities of ASHRAE. Were those, uh, committees that you were involved in early on?

Andy Persily: Not early on. I wasn't aware of that side. You know, I was active in the technical committees and then some standards committees. I really wasn't aware that there were these chapter meetings, and I, and if I was, I'm not sure, you know, why I would have gone, you know, because they might have been talking about how to design chilled water systems, which I wasn't doing. You know, later on, I got a better appreciation for that side of the society. You know, for I mean, I'm a researcher, and research can be a lot of fun, you know, to learn new things and write papers and go to conferences, but fundamentally, you do research, I think, you should do research to solve real problems. And I've always, you know, as I started going to chapter meetings and speaking at chapter dinners to, you know, to learn the real problems that people, that practitioners are facing has been very useful to me as a researcher and as a member of the society because, you know, we're going to develop a standard, we want people to be able to use

it, we need to understand the world in which they work on a day-to-day basis. So, again, I got a much better appreciation later on.

Tim Dwyer: You got further involved in ASHRAE through such things as the handbook, and I think you were involved in rewriting elements of that.

Andy Persily: When I was on TC 4.3, I rewrote the chapter on infiltration and ventilation in 1989, and that was a lot of work. I didn't realize what I had volunteered for, but that was a good experience. And, you know, I became more and more active in that technical committee. Eventually I chaired it. Eventually I found out that a chair's tenure was only supposed to last three years, so, and I had exceeded that, so I got the opportunity to stop chairing it, and I moved on into a couple of different standards, committees, started going to other technical committees. I think the big... Change for me was the getting involved in Environmental Health Committee and Standard 62.1.

Tim Dwyer: Which standard is that one?

Andy Persily: Standard 62.1 is the, uh, ventilation for acceptable indoor air quality, first published in '93, I'm sorry, '73, and there had been a big revision of the standard in 1989 that was very controversial for a number of reasons, and ASHRAE realized that they better start the next revision right away. So, a new committee was formed in 1992, and I participated in that for a number of years. Several years later, I chaired it, was chairing it for a four-year term, and, you know, I started out as a non-voting member, feeling a little green and not totally comfortable. Some very tough issues, you know, came before the committee, and I was like, "Yeah, I'm sure glad I don't have to vote," you know, 'cause I don't know what I would do. But you grow, and you learn how to, uh, partake in the debate, listen to the debate, and form opinions. Later on, on that committee, and sometimes on the board, when the vote would finally be taken and they would, you know, say, "All in favor, raise your hand," I would look down and raise my hand so I didn't see what other people were doing. And sometimes I was the only one who voted yes. But, uh, you know, you're there to offer your opinion, and that's what, you know, that's what you're supposed to do.

Tim Dwyer: And, of course, as chair of a fairly important committee, you had responsibilities. What did being a chairman actually entail? How did you have to change your role in the activity of that committee?

Andy Persily: Right. I mean, it was a real learning experience. You know, as a member, I could really argue from my perspective, but as a chair, you need to step back. You're about making sure the process moves forward and not arguing for your opinion, making sure people, other people's opinions were expressed and making sure that other people had an opportunity to express their opinion, and getting an appreciation, you know, that we'd heard from that talkative person for the last half hour. I know that that person has some worthwhile things to say, and I tried to draw them out. And while, uh, another thing that I would do is, The debate's going this

way, but, but Tim isn't in the room, and I know if Tim was there he would say something different, and I don't want to offer that opinion, but I, you know, we're gonna have problems later on with Tim if somebody doesn't say, you know, so as chair, I would say, you know, I know if Tim was here he would say this, so let's talk about that perspective, because, you know, we need to hear, hear from everybody. And I it's really a balances chair. You want to give everybody, you know, the opportunity to speak their mind, but you also have to get things moving. So, there's a balance to be struck between, you know, inclusiveness and talking to death every issue, but making a decision. And once that debate has really run its course, helping the committee actually go one way or the other. And in that committee, there was a lot of controversy with a number of different areas that was, could be somewhat delicate at times. And I kind of, you know, five years before I did that, I couldn't imagine how I would handle it, but I handled it one way or another. And that's when I started to get involved, uh, more with the chapters, because I was invited as 62.1 chair to give talks on the standards.

Tim Dwyer: And was that, and did that really show you a different side of ASHRAE once you went out to the chapters and put forward the case that you'd been making with your committee 62.1?

Andy Persily: Yeah, I mean, absolutely. I mean, for me, it was an opportunity to talk to them about what we were doing and why, and to hearing from them, you know, what they, what their challenges were. Because there were a lot of people who had negative opinions about how the standard was being revised, and, but not all those opinions were based on fact. So, it was an opportunity, here's what we're doing, here's why we're doing it, you know, if you've got a better idea, speak up, you know, we want to hear. And that was, uh, I think was, yes, it was in some sense a public relations effort, but it was also me learning, you know, the challenges that practitioners had in applying this standard and in the building industry in general.

Tim Dwyer: And one of the committees that you worked on at that stage was the Environmental Health Committee, I believe.

Andy Persily: Right. And as my research, um, interest evolved, you know, they were focused primarily on energy, but they grew into indoor air quality issues. I then learned of the Environmental Health Committee and started to go to their meetings. And that was, I guess, probably in the late 80s. It was some of the leading indoor air quality researchers in the world who, you know, medical people and scientists who otherwise wouldn't have attended an ASHRAE meeting. They were there in some sense to serve as consultants to the society on environmental health issues. And it was, it was very intimidating for me because I knew these were world famous people and that was the first meeting I went to where they're, you know, they're making motions and amendments and I'm like, wow, you know, and, and, but I, you know, over time I learned how to do that and several years later I chaired the committee. Uh, hopefully we had got some good things done that year and I think all of these activities that I participated in and these roles I assumed, you know, just got me more comfortable that trans-

transition from the periphery of the room to sitting at the head of the table and helping things happen.

Tim Dwyer: And I guess at the table you became the DAL.

Andy Persily: Right, right.

Tim Dwyer: So, that's a whole new world of activity, surely.

Andy Persily: Oh, absolutely. I mean, I didn't, you know, I didn't know what the board did. I, you know, when I was chair of 62.1, I would go to board meetings just in case something we were. I would go to board meetings just in case something that we were putting forward for publication was a little bit controversial and questions arose. So, I started to go to the board meetings and rarely had to say anything, but I think it was helpful at times. So, but what I went, became a DAL, and I was assigned to

Tim Deyer: Director at Large, of course.

Andy Persily: Yes, yes, I'm sorry. I didn't know what that meant until I was one. And I, you know, was assigned to the ASHRAE Learning Institute. It was one of my roles, and one of the predecessors to, I think it was called Chapter Programs Committee then. I didn't know what the ALI was or chapter, what chapter programs were until I was put in that, those chairs. And it was great because I went to the Chapter Programs Committee, and it was a whole room of people I had never met before doing things that I didn't know the society was doing. And I- I really enjoyed that experience. That's, you know, I think just a- a- a taste of my experience, and I'm sure the experience of others as a DAL, to just learn about things going on in the society that you didn't know about otherwise.

Tim Dwyer: And from being a DAL, just, uh, a year or so later, you were elected, uh, vice president of ASHRAE from 2007 to 2009. And again, was that was that as much as a change as you- you've seen in the progression from a chair of a committee to a director at large, and now to vice president? Was that- was that yet another major change in the way you saw ASHRAE?

Andy Persily: I mean, at that, you know, the vice president experience, which was just really a great, great experience, a great honor to serve that role, you know, I just got the complete sense of what the society is doing, and the relationships it's pursuing, and all the activity, almost on a day-to-day basis. Because by then, we had plenty of email, and I was getting it, and I, and I just had this, it was just a great opportunity to find out how the society functioned, and all the important things that were going on, and to be part of it. I served as vice chair and then chair of Technology Council, which is where the TCs and the research and the standards happen, so I was familiar with that side, though, you know, leading that council is a whole other thing than serving on the council, but all the other things that happened when you're an officer with the executive committee and, you know, all the tough issues that they deal with, again, on a day-to-day basis, was just a big eye-opening experience.

Tim Dwyer: What were the major issues facing ASHRAE at that time?

Andy Persily: I think, you know, there were a few things happening. You know, I think ASHRAE was trying to be more, um, more serious about its global commitments. You know, we- we called ourselves an international society, but at that point, you know, a variety of efforts were being pursued to make that more real, which led to all sorts of challenges and opportunities, you know, as you well know, to make that happen. So, the whole global role of ASHRAE was a big issue. You know, the other one was, um, energy standards and where the energy standards were going and how much more stringent, they would become over time and sustainability. What was ASHRAE's role in sustainability? And a lot was happening in the wider industry that some folks in ASHRAE feared or viewed as, "That's our, that should be our issue. How come all these other people are, you know, making this big splash with sustainability? We should be the sustainability people."

Tim Dwyer: And was that a major shift, do you think, in ASHRAE's thinking process?

Andy Persily: I think so. Um, in some ways it was, in some ways it wasn't. I mean, we've been doing energy efficiency and indoor air quality and a lot of building sustainability issues for decades. But now there was this new label and this new green umbrella where the action was. It was exciting. You know, lots of people, especially younger people, were the, are the future of the organization. And it was a real challenge for ASHRAE to kind of, um, define their identity in that world. And like any big organization, you know, ASHRAE doesn't move terribly quickly at times. This was a field that was moving quickly, and we had to, you know, try to be a bit more responsive than we might be otherwise, you know, to be a player. So, sustainability was another big issue facing society when I was on, was an officer.

Tim Dwyer: And as an officer, you all prior experience or your prior training in teaching, is that coming to useful practice in terms of helping your fellow board members to take on issues and develop themselves?

Andy Persily: I hope so. You know, I, you know, I think, um, um, you know, explaining things to people in a way that they can understand it is a skill, and I'm not saying that I, you know, I'm not very skill, necessarily very skillful in that area, but I understand, you know, when you talk to people, you need, they need to understand you. It's not about what you say, it's about what they hear. When people start to get glazed over or look confused, you need to pick up on that and try to help them understand better. And I think, um, you know, when I was doing my teacher training for children, I learned you gotta have everything set up when those kids show up, 'cause if you're fuffering around with the slides, they're gonna get distracted, and that's true about adults as well. You gotta be ready when you're speaking to children or adults, 'cause if you're not, you know, ready when the, bell goes off and it's your turn to speak, they're gonna get distracted, and so I think some of my teaching training, um, was useful in speaking to my colleagues on the board and other, venues.

Tim Dwyer: Training's so important in ASHRAE. Has it always been a strength?

Andy Persily: Of the society? Yeah, you know, I think it's a mixed bag. You know, some very good, um, training efforts occur, and others not so much. I mean, in my experience, specifically on the board, you know, when I was trained to be a board member, it was just, you know, hours of PowerPoint. You know, at the end of the day, we went to some stuffy restaurant and sat in a dark room for more hours, and it was just not that. Stimulating, I must admit, and then I had the opportunity to help train future, you know, board members some years later, and I kind of remembered, talked to some of my other colleagues who were involved in training that we gotta spice this up, you know: limit the PowerPoint, sit in a circle and talk. And we, uh, we didn't go to dinner in the back of a restaurant; we went bowling and had pizza, you know, and it's, you know, you're going to work with these people. And, um, another thing I realized is when I got to the board and I went to that great big table, I didn't know who these people were. It was very intimidating, and you feel very lost. And we, I think, under Jeff Littleton's suggestion, we were starting to read these governance magazines about how nonprofit-governing bodies work. And that, reading that, reflecting on my experience, I realized, again, I didn't know who the board members were, and as part of the training, we had every board member write a one-page bio, which had photographs and a little story about their ASHRAE life and their personal life and their family, and we had all the existing board members do that, and then we had the incoming board members do that, and, you know, I don't know if that helped the board become a more human, social, socially interactive, positive experience for people, but I hope so, you know, that you had some sense and you found out you, you know, had some commonality outside of ASHRAE. And it was, uh, Sheila Hader and I, we would have a little game, you know, who could come up with the most interesting, you know, when you go around the introduction, um, at the table at the beginning of a meeting, you know: "I'm Andy Persley, I work at the National Institute of Standards," and the same old thing. We would come up with interesting questions, you know: tell who you are, where you work, and who's the most famous person you've met, or something like that, and it's just, you know, we're here to do work, but we're also here to have fun, and the relationships that you develop with your colleagues in society are one of the most positive aspects of my experience, and I think that's true of so many other people I talk to in ASHRAE. So, enjoy it, get to know people, enjoy the people, and it's gonna be good, it's gonna make the work more fun, and the whole experience, um, more enjoyable.

Tim Dwyer: Andy, what advice would you give to a young person who's thinking of entering the HVAC world?

Andy Persily: One piece of advice, if I may be so bold, would be, you know, to find people, mentors, if you want to call it that, and peers that you can talk to, that you can relate to, ask questions. You know, you'll get a sense of who you're comfortable with and who has something to offer. So, when you go to committees, you know, or whatever, or chapter meetings, you know, find some people to talk to, and, uh, you know, be a little bold. Get outside your comfort zone a little bit, you know. You can, um, when you go to a chapter dinner, sit at a table with people you don't know. And, you know, that's hard. That's hard for me now, but it isn't that bad, you know.

You introduce yourself and you meet some interesting people, but, you know, um, finding people, mentors, peers that you can talk to, you know, can be very helpful ′cause any, fears or anxieties or questions you have, very likely they're having the same ones, and they can help you out. Uh, you know, get involved. You know, this is not so much your work job, but your, you know, your kind of ASHRAE opportunities to find a place for yourself. I've not met an ASHRAE committee that didn't need willing volunteers. You know, every committee's looking for a volunteer. If they don't know you, that's no issue. And all you have to do is tell them that I'm going to review and comment on this document in the next month, and then actually do it, and you will be a hero. It's all you gotta do is commit, follow through, and that's all, you know. It's a big start, and it is very much appreciated, and you will get jobs; you'll get more jobs than you probably want, so you also have to learn to say no, and there's nothing wrong with that. If you don't have time, it's much better to say no, I don't have time, than to say yes when you don't have time.

You know, another similar is measuring, actually measuring ventilation rates, comparing them to the design ventilation rates. You know, people spend a lot of money designing ventilation systems to bring air into the building, and that's very important. But once they're installed, commissioned, operated, maintained or not maintained, how much air is actually being brought into the building? And these measurements can be very challenging at times, but that's why you spend all that money on that ventilation system, you know, you really ought to check on how much air is coming in. I think that's kind of, uh, an overall thrust that I've pursued is building performance measurement relative to design intent, because there is often a gap. And when I was on 62.1, I often said, remember, you know, we're all assuming there's a connection between what we write in the standard and what happens in the building, and that isn't always a one-to-one correspondence. So, I think those were some of the technical areas I like to think I had an impact on.

You know, in terms of the kind of the process on Standard 62.1 and the Indoor Air Quality Design Guide and other committee activities to produce something, I—I′d like to think I contributed towards, you know, kind of taking a very, in some cases, tumultuous situation on 62.1 and kind of managing the opinions and the energies to move people forward towards actually revising that standard so that it was fully in code language and addressed, you know, some of the key issues that were facing the industry in the field of ventilation and indoor air quality. So, I like to think that I was able to, you know, manage diverse viewpoints and, you know, valid technical issues and help this smart group of people get to the other side and finish, you know, produce a product that was useful to people.

Tim Dwyer: And you've got fantastic experience in indoor air quality and drivers which determine our internal environment. Where do you see future problems or future challenges in indoor air quality?

Andy Persily: That's a very interesting question. I, in this day of, you know, energy efficiency, you know, fighting for energy efficiency, it's so important because of the limited resource and

concerns about climate change and other environmental impacts of building energy use. We need to remember that buildings don't exist to use less energy. Buildings exist for people to work, to learn, to heal, to enjoy life, and we need to remember that. Now, you know, that said, we have to reduce the amount of energy that buildings use, and we may need to, you know, think about indoor air quality in different ways, or thermal comfort, you know, what are our targets, you know, and I think in the case of thermal comfort, we may need to be a little more flexible in the temperature ranges, and the clothing that people wear to work, so that they can be comfortable there, comfortable and productive, and still use less energy. You know, the difference in the application of engineer of, I'm sorry, the difference in the application of air conditioning in North America compared to the rest of the world, the room temperatures in North America compared to the rest of the world, you know, I think just has to be addressed in terms of the cultural expectations. I think probably need to be relaxed a bit in North America ′cause we can′t cool the entire world′s buildings to 70 degrees. It′s just, it′s not necessary, and we probably can′t afford it. But we need to figure out that balance between, you know, the indoor environment and the energy consumption, and it isn′t an either/or. You know, we need to do both.

Tim Dwyer: Andy, thanks very much for giving up your time today. This has been an excellent opportunity to hear your viewpoint and your experiences of being a vice president of ASHRAE.

Andy Persily: I′ve really enjoyed it. I mean, it gave me the opportunity to kind of reflect a little bit, which we don′t always take the time to do. So, I thank you for, uh, inviting me to participate in this.