The Truth About VOCs, Greenwashing, and Healthy Homes: Part 1 with Andy Pace

SPEAKERS
Kendra Seymour, Andy Pace

AP
Andy Pace
00:00
Because we're so used to going into the paint store and saying, I'm going to get that zero VOC paint because I just assume it's going to be healthier for me, and by definition, all it means is it's not going to contribute to outdoor air pollution inside of your home. What makes a difference is the toxicity or the hazard nature of the ingredients, and that's when we get into what are called hazardous air pollutants. That is what defines whether or not a product is truly healthy or not. So, if you look at a can of paint that says it's zero VOC but it doesn't say zero HAP, you can pretty much guarantee that it contains those unregulated VOCs that could also be cancer-causing agents.

KS
Kendra Seymour
00:54
Hello, everyone. My name is Kendra Seymour, and welcome to *Your Indoor Air* podcast brought to you by Change the Air Foundation. Now today, we are kicking off the first episode in a series focused on Volatile Organic Compounds, commonly known as VOCs, and other hazardous air pollutants that could be lurking in your home. And you might not realize it, but many everyday building materials like flooring and tile and, cabinets and paint and, furniture, and even appliances can emit invisible gases. These gases sometimes have an odor; sometimes, they don't. They're often colorless and they're impossible to attack with the naked eye, but just because we can't see them doesn't mean they're not there and infecting our health. Now, this episode, we're going to explore the history of green and healthy building movements, the science behind VOCs, how they make their way into our homes. We're also going to discuss regulation and, greenwashing and weather; natural always means healthy. Plus, we're going to break down terms like low VOC, maybe some certifications. We want to help you basically make smarter choices when selecting

materials and items for your home. Now, our goal this year, and through the you-know course of this series, is to shed a light on the science behind some of these chemicals in our home, what we know, what we don't know, and most importantly, what you can do about it. Now we're going to aim to share information that's science-based and free from fear mongering. We know it can be stressful, and we want it to be actionable so that you can take those meaningful steps to improve your home's indoor air quality and, in turn, your family's health. So, to kick off this series, I really couldn't think of a better person to join me than Andy Pace, the founder and owner of the Green Design Center. And Andy is not only an expert in this field, he's also a board member at Change the Air Foundation. So thank you, Andy, so much for being here.

AP
Andy Pace
02:39
Kendra is absolutely my pleasure, and I've been looking forward to this conversation; I think, since I got started with this, with the foundation. It's a very important discussion. I think that everybody listening is going to learn an awful lot about what they're doing right, what they might be able to improve upon, but ultimately become better consumers in finding materials and systems for their homes.

KS
Kendra Seymour
03:05
Yeah, no, absolutely. And this conversation has been a long time coming, and I'm so glad that we're finally able to share some of what we've been having, you know, conversations behind closed doors, with everyone listening, and I think too for those listening, and I am and was guilty of this, I was kind of under this general assumption as a consumer, that the products sold here in the US are safe and that they're tested and that they're regulated. And quite honestly, very little of that is true. And you know, in the US, we kind of this presumption that chemicals are safe until they are proved otherwise, which is a little bit backward, in my opinion, and maybe we can talk about that. But let's get people some context first to this situation. So, let's start with like, when did this push for green and healthy building begin? And kind of, what was the driving factor?

AP
Andy Pace
04:00
Sure, so here in the United States, after World War II, we saw an enormous boom. Obviously, it's the baby boom era, right? The late 40s, 50s and 60s, and it was also a big push for housing. You had all these soldiers coming back from the war. The economy was booming, and we needed very, very fast housing construction. These subdivisions popping up all over the country, and there was this desire to start manufacturing materials that could get houses built faster, utilizing some of the plastics that were invented during the wartime. And so we started seeing a shift, and obviously, all these years later we can, we can sort of see this. But during the time, you had the manufacturing of engineered wood products,

starting plywoods and chipboards and whatnot. You also had plastics being used in building materials. In the early 1970s, we saw the OPEC oil embargo, which caused building owners around the country and management to reduce dramatically the amount of fresh air intake into a building in order to cut down on energy costs. And that also then poured into the residential market. When we saw this growing push to improve energy efficiency. And again, nobody's thinking about this the time with cheaper, faster, more synthetic building materials being used. We saw the slow switch from houses that were "quote, unquote" breathable, not by design, but just because that's the way they were. We didn't really care about energy efficiency prior to that. To these homes that became very, very energy efficient, not realizing the ramifications of that, and we saw the ramifications of that in the late 70s and 80s, when terms such as sick building syndrome were developed, or environmental illness. With all these turned into what we call multiple chemical sensitivities. And so really, this is the the the genesis of the green and healthy building movement was way back from the 50s, 60s, 70s, and we are now in this situation where we kind of have to make the decision, how far do we take energy efficiency and how much can it affect the health of the indoor occupant? And so right now, it's kind of coming to a head.

KS

Kendra Seymour

06:43

Yeah, it was almost like, you know, in order to solve one problem, we unintentionally created another issue. And by making our homes tighter, right, whether you're not losing air, you know, from gaps and cracks and, you know, improper insulation and other areas. At the same time, we are introducing newer chemicals, chemicals that, in many cases, maybe haven't been tested for health and human safety, right? And we're introducing them at an increasingly large number, into these homes, and you know, it's not that these buildings are creating the chemicals. They're really just preventing them from escaping from our indoor environment, right?

AP

Andy Pace

07:25

Right, and you know, to what you said earlier, it's the unintended consequence of trying to do the right thing. I completely agree with trying to build our homes to higher performance, better efficiencies, better insulation. But we also have to look at what could that cause? And we're seeing that now the development of new and innovative chemical compounds to improve our lives. We need to be more mindful of what the downsides to that could be. And right now, there's about 92,000 chemicals that are used in the production of building materials and home goods. We only really know the toxicological effects of about 3% and so the rest is kind of up in the air, and it's unfortunately incumbent upon us and the free markets to decide what, what is usable in our homes. And if we're used to just assuming that a package, because it doesn't say warning on it, that it's got to be okay, we need to start to dig a little deeper before we make that purchase.

KS

Kendra Seymour

08:31

Yeah, and I don't know if we'll get in to it for the purposes of this conversation, things like the Toxic Substance Control Act and then later the Lautenberg Act. And if we don't get into it here, I promise we are going to get into it in other episodes about what laws are and aren't in place and where those loopholes might be. Because it's, it's really interesting, and I think it adds good context. But let's, let's unpack this so we bring, bring these building materials in, and they are emitting, in many cases, gases known as VOCs. So, help us understand what are VOCs and what is not included in that category? I know you sometimes use, you know, the term, like other hazardous air pollutants, so kind of define those, both those terms for us, VOCs and other hazardous air pollutants.

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Andy Pace

09:18

Sure, so a VOC, it stands for a volatile organic compound. A volatile organic compound is defined as any carbon based molecule that is readily vaporized at room temperature, that could rise to the atmosphere combined with UV and nitrogen and create low level smog. This is the EPA definition of what a VOC is, and this is why VOCs are regulated. Go back to the mid 90s, when VOCs essentially became the the hot commodity, I would say, in building. The EPA decided that paints and finishes and flooring materials and adhesives and a whole host of building materials had to reduce the amount of VOC release because of outdoor air pollution.

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Kendra Seymour

10:14

It wasn't even an indoor air quality concern, really at the time, it was about outdoor air pollution. Okay

AP

Andy Pace

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That's correct, 100% because of outdoor air pollution. Now it is true that many VOCs can be very harmful to humans. It's also true that many of the harmful materials found in building materials are not classified as VOCs, and this is where it becomes a little difficult for a consumer, because we're so used to going into the paint store and saying, I'm going to get that zero VOC paint because I just assume it's going to be healthier for me, and by definition, all it means is it's not going to contribute to outdoor air pollution. Inside of your home, what makes a difference is the toxicity or the hazard nature of the ingredients, and that's when we get into what are called hazardous air pollutants. That is what defines whether or not a product is truly healthy or not. And so when VOCs became regulated by the EPA, manufacturers had to prove the emissions based upon certain EPA test protocols. And those test protocols were developed so that all manufacturers

sort of had the same sheet of music that they'll be reading off of, and we could all sort of discern what meets the regulation, andwhat does not. But the EP, EPA also said, if you're in, let's say the paint industry, for instance, there are some carbon based molecules that are not actually regulated by the EPA. There's about, I think, 37 or 40 chemicals that the EPA says you can still use them because they're not photocatalytic. They don't actually create smog, and so if you use these ingredients in your paints, you don't have to disclose them at all. Now, many of these items are completely harmless for humans as well. Some of these chemicals, like acetone or ammonia, are not regulated, and so they're used extensively in the paints and coatings and stains and adhesives industry. So this is where we have to look at what are called hazardous air pollutants. And I hazardous air pollutants by the EPA definition, is a chemical that, when evaporated into the air, is actually classified as a carcinogen, a human cancer causing agent. So in there's only about 188 chemicals that are actually deemed to be an HAP. It does include acetone, which is interesting. Acetone is an HAP, but it's not a VOC. So if you look at a can of paint that says it's zero VOC, but it doesn't say zero, HAP, you can pretty much guarantee that it contains those unregulated VOCs that could also be cancer causing agents.

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Kendra Seymour
13:36
So if I'm understanding you, the regulations that are in place around VOC has to do with the amount of emission of what is coming off and not like its impact on human health. However, hazardous air pollutants does take into consideration the cancer causing or like carcinogenic properties, right? But even still, saying that some of this stuff doesn't have to be disclosed. Some of this stuff, we don't even have health data on.

AP
Andy Pace
14:04
Correct in order to sell certain materials, most building materials, you have to be able to show a that you are meeting the EPA's VOC regulations, and so they have to prove that they're either zero or under a certain amount, depending on the product category, but you don't have to, there's no regulation in place whatsoever for HAPs, and so this is where being a an informed consumer really helps. Looking for products that are both low or zero voc and free of HAPs will be the absolute best way to ensure that you're at least getting a product that is healthier than what is commonly used.

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Kendra Seymour
14:49
And we promised listeners Andy, we are going to get to some specific product recommendations and things like this in this episode. So hang in there with us. I want to, I want to go a little bit further so we have this VOC umbrella, and under that there are actually different types of VOCs. Now, if you've been listening to some of our podcasts, you've heard us talk about microbial VOCs, and those are produced by bacteria and

mold and things like that, and they can have potential health impact on human health. But there are other kinds, like people may have heard semi volatile organic compounds. Can you talk to us about, just in case people see that language, the different types of VOCs, and then kind of unpack, you know, how long these materials are off gassing for, and what that means,

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Andy Pace
15:39
Certainly so, MVOCs, this is a great segue into this MVOCs are are considered biogenic VOCs. Biogenic VOCs would be the this actual chemical release, natural, but it's a chemical release from the the natural environment, whether it's mold, pine terpenes coming from a pine forest, limonene coming from oranges. These are natural sources of VOCs that that humans really have no, no impact on and this will happen

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Kendra Seymour
16:22
Citrus smell, right? When I peel an orange for my kids or like you, or a Scotch or a Brandy right. Those are VOCs, right?

AP
Andy Pace
16:31
Those are biogenic VOCs, naturally occurring VOCs, and those was called anthropogenic VOCs. Anthropogenic VOCs would be chemical release, the carbon based molecule release, due to man made activities in manufacturing. So this is where we find what are the regulated VOCs from the production of of oil and gas and its derivatives and things that would are occurring, the chemical releases that are occurring directly because of man's involvement. And so we can't regulate VOCs coming from pine forests. We can't regulate VOCs coming from volcanic eruptions. You know, it's, it's actually been estimated that when Mount St.Helens erupted in the early 1980s it released roughly 40 times the amount of VOC pollutants into the air than the United States since the Industrial Revolution, 40 times more from one eruption. So if you look at all of the data from around the world, the majority of VOCs actually the vast majority of VOCs just just classifying it as a VOC, not a anthropogenic or biogenic. The vast majority are coming from natural sources. And so when we discuss VOCs, we're really talking about just those items that are occurring or those emissions that are occurring because of man made activity.

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Kendra Seymour
18:13
Yeah, yeah. And that's important for people to understand, right? And again, we're taking a moment to talk about some of this language so that you have context, because when you understand it, then you can do

something about it, and it takes some of that fear and that unknown away. So let's zoom in on then on the house, right? We spend 90% of our time indoors, right? So let's talk about, how do these VOCs get into our home and and how long do they stay?

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Andy Pace
18:37
It's a good question. The VOCs that are found in the air. If you do an indoor air quality test, a simple VOC test, at the time of, let's say, moving into a new home, you could find levels that are just considered wildly high, and that's because you've got VOCs coming from every building material. It's about 1200 different items that go into building a home. Not all of them release VOCs, but a lot of them do, whether it's small bits of caulking around windows or a little bit of of pipe adhesive used in the PVC drain pipes, All of this combines to create this chemical soup in our house. This the emissions that come from the VOC, emissions that come from a something that cures on site in your house. It's been estimated that it releases anywhere from three to five years.

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Kendra Seymour
19:32
So that means like, paint, right? And like, what else cures? Caulk,

AP
Andy Pace
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Paint, caulk, adhesives, any type of even like liquid applied gasketing, like butyl gasketing. So if, for instance, if you paint the wall with a zero VOC paint, let's hope we're all at least using that it can still emit for three to five. Five years now, is it emitting a VOC that's classified by the EPA as such? No, it would be releasing a hazardous air pollutants that happens to also be a carbon based molecule, but it's not regulated as a VOC. It's kind of confusing. I understand, but it's, it's, it's the byproduct of of the the off gassing, and I'll explain what off gassing is. Off gassing, by definition, is the release of unreacted chemical monomers that will never become part of the coating. So if you apply a coat of paint on the wall, the curing process is the release of the the water, maybe some solvent, and that's what turns the liquid into a film, into a hard plastic film. That's what's called curing. In today's paints it's typically between seven and 10 days it'll reach a full cure. Now, after it reaches a full cure, this is when off gassing begins. And this is very confusing for people. I think most people believe that off gassing is that smell you get as a product is is still wet and still curing. And that's incorrect. Off gassing is the chemical release that occurs after a full cure, whether you smell it or not is irrelevant. We all know that the odor of any of a material does not dictate the the toxicity or the health factor, so paints, coatings and adhesives and caulking materials can release little bits of unreacted chemical monomers for approximately three to five years. That's for site cured materials. For things like flooring, products that were manufactured and then shipped to the job site,

if they used adhesives that created or that contained formaldehyde, for instance, in the plies that can actually release for 30 years or more

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Kendra Seymour

22:04

Let's talk about that for a second, actually, can I jump in? Because I think people might think, like adhesive? Like, what is that. Like adhesive is, you know, or formaldehyde, right? Is what we're talking about. That's in adhesive is found in, you know, your plywood, OSB, which, if you go up in your attic, sometimes you can see it. It looks like the pencil shavings shoved together. Particle board, MDF, lots of furniture made out of that. And it's what holds it together. And so if you think, Well, I don't have that, it's, it's built into the material that we are literally building our homes for. And formaldehyde is, is a known human carcinogen. Mm, hmm, it's a big deal. Um, so you take, let's pivot for a second. You can talk about like formaldehyde, because I want to give people context for that. Because is that that's not a VOC, or is that a hazardous air pollutant?

AP

Andy Pace

22:55

This is a, this is a sort of a up in the air chemical. And what I mean by that is no pun intended. Formaldehyde is a volatile organic compound by definition of being carbon based. It is readily vaporized at room temperature. The thing is, it's not tested the same as other VOCs. And so when you see a VOC test that's been done in a home, most often, I would say 99.9% of the time, that VOC test eliminates formaldehyde from the from the test report, because it's not absorbed the same way by the test kits. And so there's a separate test for formaldehyde release. Formaldehyde is, we all know, formaldehyde is a natural element found in any once living plant or animal that releases during the just the phase of decomposition. What we're talking about with formaldehyde is as an added chemical, and generally speaking, we're talking about a specific type called urea formaldehyde. Urea formaldehyde is a carcinogen, and it's used in all sorts of building materials. It's been taken out of, for instance, paints and coatings, for decades. Paints hasn't paint hasn't had formaldehyde in it, but manufacturers do add what are called formaldehyde precursors, which are a whole series of somewhat benign chemicals, but once it gets applied to a surface and it starts to cure, it creates formaldehyde as a byproduct, and so it's sometimes hard to get away from. You have to be very, very detailed in your research and making sure. Sure that you're buying materials that don't actually create formaldehyde during the curing process. Formaldehyde can be a byproduct of flame retardants, a byproduct of antimicrobials,

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Kendra Seymour

25:09

Byproduct of ozone in a home as it interacts with other building materials,

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Andy Pace

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Exactly create formaldehyde during that process, correct.

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Kendra Seymour

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Now it's been a while Andy since I've been in high school, but isn't formaldehyde what my biology teacher used to preserve the frog that we had to disect?

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Andy Pace

25:26

Yes, exactly right, yes.

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Kendra Seymour

25:27

Okay, I remeber the odor, I remember that smell from high school, that's and I've been out of high school for a beat, so. I remember thinking, like, should I be breathing this. And, and honestly, like, you may have heard formaldehyde in the news. I think it was around 2015 I remember there was, like a big 60 minutes expose a on what is it Lumber Liquidators? And it was, they're the largest retailer of hardwood flooring, right? And they were found to be selling flooring that had, like, dangerously high levels of formaldehyde. And I know there's been some reform since then. I don't know if that's worth mentioning to try to regulate and minimize some of this, but it's something for people to be aware of.

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Andy Pace

26:10

Yeah, and I think examples like that are perfect for us to discuss, because it shows that a manufacturer can send materials to an independent lab to have tested to ensure that it meets either the, you know, whatever level they're trying to meet CARB compliance, which is the California Research Board, E1 which is the European formaldehyde level limit. But if not every carton gets tested. It's just they send samples of cartons and then the other million cartons of wood that get shipped to the US aren't tested. If there's not good quality control at the manufacturing plants, it's quite possible that additional formaldehyde levels or

VOCs can be added. Whether it was known or not known was kind of up in the air, but they did take responsibility for it,

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Kendra Seymour
27:06
yeah, so, so, so at the end of the day, I, you know, it really understanding that we are bringing these chemicals into our home, and, you know, they're building up, and we care, because they actually have some impact on human health, on the health of our pets and our loved ones. Can you, I know you're not a doctor, not putting you on the spot, though, but can you highlight some of the known, you know, health effects from exposure, from some of these VOCs, and we're talking about them general, the different VOCs have different known health associations. But can you kind of highlight for us what what is going on here?

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Andy Pace
27:45
Certainly, so if your family moves into a new home, and the first week that you're there, everybody in the family feels like they're coming down with a cold. They're just run down, maybe itchy throat, itchy eyes, sneezing a lot, kind of a general flu, like symptoms. Many times, this is because of either the VOCs, the HAPs, the formaldehyde that's in the air when they move into that home. I think for years, we all kind of chalked it up to, well, it's been a stressful time for the family, and there's a lot going on, and we we finally get into our home, and everybody just kind of comes down from that, and your immune system just can't take it anymore. Well, it's also because of the fact that we are inundating ourselves with all of these chemicals coming off the building materials, especially in the first, I would say, three to six months of moving into a new home is going to be your largest exposure of this. And so, yes, the the general symptom would be that flu like symptoms, that malaise of being sick, but not because of anything else than just the building materials you're surrounding yourself with.

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Kendra Seymour
28:56
Yeah, and you know what I'm going to link to in this show notes, some research that backs up what Andy said. You know that fatigue and the headaches, you know, even some irritability, and that's been linked to increase in fertility and lower testosterone and hormone issues. And so I'm going to link to some of that so that people can check out the research for themselves. Okay, so yeah. So it's building up. It's creating issues. And for some people, and I know you work with a lot of clients who have developed what is sometimes known as like MCS or multiple chemical sensitivities, or TILT right, and they actually become sensitized to the chemicals in their home and even other chemicals. And on a similar scenario, we sometimes see this with people who become sick from mold and water damage, all of a sudden now they're reacting to other chemicals in the environment. So can you just talk briefly? Because I know you

have some experience working with these types of clients. Once this happens, like, what? What is their experience? What are they going through and like, is there a solution? You know, in many cases, maybe we can control what we bring in, but in some cases, we're moving into a home that has already been the carpets been selected and the paint is done. What do we do about this? How do we navigate it?

AP

Andy Pace

30:15

Boy, it's a it's a big subject. And I will say, when I started in this business 30 plus years ago, I got sort of thrown into the fire with this. I started working with people who had multiple chemical sensitivity, and these are folks that could be what are called universal reactors, which is they react to just about any petrochemical emission that could cause all sorts of health issues all the way up to anaphylactic shock. And I learned an awful lot about that over the next 30 years of my career. I also learned that there are a lot of folks that sort of classify themselves, or they WebMD themselves into saying that they have MCS, and I don't disregard what they're what they're talking about. It's just, it's interesting that it's now become sort of a ubiquitous term in in everyday conversation. Oh, I have chemical sensitivity. I don't like the smell of perfume or paint gives me a headache. These are all chemical sensitivities. Back 30 years ago, we used to talk about how it's been estimated about 25% of the population has a chemical sensitivity, whether they know it or not. Now fast forward to today, we know that roughly 25% of the population is has a genetic predisposition to be extremely sensitive to mold. And we're starting to do the math here, and we're finding that MCS a chemical sensitivity isn't actually its own separate disease. MCS is a condition caused by another underlying disease, such as chronic inflammatory response or mast cell activation or Lyme disease or dysautonomia, and so we're learning so much about this, but really MCs or chemical sensitivity is anybody who uses a certain type of soap and gets a rash, that's a chemical sensitivity. That's actually the first one I ever had. Many, many years ago, I remember using a certain type of of soap in the shower, and about two hours later, my skin was red. Had no idea what it was. Didn't know what it was until later in life. I also know that if I'm around certain coatings that during the curing stage, it releases what are called isocyanates, I will literally get a head to toe rash that looks like my skin turned to leather. These are chemical sensitivities. I'm not somebody with multiple chemical sensitivities. I'm not a universal reactor, but I certainly understand what people are talking about when they say, I get a headache from this or that, because that is one of the symptoms.

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Kendra Seymour

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Yeah, and we're going to be doing a series of interviews with doctors who are treating patients with multiple chemical sensitivities, researchers. We're going to be talking about how, for some people, their life literally revolves around navigating and reducing exposure to this, and it is a day in and day out challenge, from walking into the grocery store to buying new clothes. So so these are very real things to be thinking about. I don't know if you want to touch quickly and you don't have to get into too much detail, but about

how you actually got into this business, because you kind of have a personal story about why you're so passionate, because you truly are. Andy, one of the most passionate people I know about this topic, and it's you know why we love having you at Change the Air Foundation and your perspective. But do you want to talk for a moment about that?

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Andy Pace
33:58
Yeah, I love to. I got involved in my family's commercial building material supply company back in 1989. Fresh out of school, I thought, I'm going to make a difference. Whatever I'm going to do, you know, I'm going to sell building materials to contractors. It was actually all commercial work. And so I actually studied architecture for a period of time, and one of my jobs was to work with architectural firms around the country to write specifications for commercial projects utilizing the best materials possible for certain situations. And specifically I specialized in concrete coatings, concrete repair materials, all the types of industrial coatings. And we were working on a project in Milwaukee, Wisconsin, where we had specified a water based epoxy floor coating for a below grade parking structure. Now, we specified water base because we knew there were, you know, 15 stories above us of all business condos and home condos, livable condos, and we wanted to make sure that the materials that were specifying weren't going to be dangerous. It was kind of a no brainer for us. After the primer coat was applied, we started getting phone calls from people living and working in the condos above complaining about the odors. And we thought, well, this is ridiculous. It's water based. There's nothing bad about this. It's not full of solvent. We learned later it was so we certainly, we took their their complaints, and we thought, well, let's just make sure that we all the return air vents are covered up. There's no way that this air can get up there. Well, we covered everything up really well. The first coat gets applied to the concrete, and three of my workers get rushed to the hospital because of inhalation complications, they literally couldn't breathe, and so we covered up everything so well. And the the curing process of the coating that was applied was sucking all the available oxygen out of the room for the cure that the workers couldn't breathe, and it literally scared me to death. And here I was, three years into my career. My family's business has been around since the 1930s here in Wisconsin, and I'm thinking to myself, I'm ruining, I'm ruining these people's lives because the workers who are getting sick and I'm potentially causing my family's business to to go under because of these materials were supplying. I learned after this project that in order to be called the water base, only 50% of the liquid component needs to be water. The rest can be all types of solvent. Well, it scared me so much that I stopped promoting the materials that I was used to, and I went on a search to try to find manufacturers who made products that were healthier. Now this was 1992 so understand that this is before the United States Green Building Council form. This is before the LEED program and and the energy efficient and green building movement really got its start. I found manufacturers as one in California called AFM, and they make a product line called Safecoat, these paints and coatings and finishes and whatnot were designed for people who had chemical sensitivities, allergies, asthma, and they were sold through these, these independent stores that focused on allergy relief. They were sold through a lot of holistic healthcare

practitioners around the country. They weren't sold through building centers. They weren't sold through paint stores. But that was my background. My background was more commercial construction and traditional construction. So I hooked up with AFM, and I told them that I wanted to mainstream their products, that if people were getting sick from this on a job site, from these, these horrible codings, people must be getting sick in their homes too. So I launched the first, what's called healthy home supply store in the country. And at the time, the word green was still a color, and so we used common sense, healthy building materials as our our tagline. And so that's really what started it for us, and it just it turned into this, this movement, and it turned into this focus for us. I mean, all we do all day long is try to find the healthiest versions of materials that are available, and what we use as our criteria of whether or not it's healthy. For the most part, we're using the chemically sensitive does, the canaries in the mine shaft, the ones who are telling us as a problem with our traditional materials. We know that if the majority of our MCS clients can use something, not everybody is going to be perfectly fine with every product that's out there, but we know that if the majority of those clients can use a material that is essentially, you know, that's a that's a check mark that that we can use to say to other customers, 95% of our chemical sensitive clients can use is without a problem. You want to do your own personal testing, of course, but we know that at least it's, it's passed that test.

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Kendra Seymour

39:42

Yeah, thank you for sharing that, Andy. And I can't imagine how incredibly scary that whole situation is, but I think you and what you've done over the last several decades is like so important, because I think people think. Well, I'm not a canary, so it's not impacting me, and we can't really say that, right? It may not be impacting you now or in the same way, but it can still affect human health in such a myriad of ways. Now you had started to to touch on this, and so let's talk about like green building versus healthy building. You know, does, does natural always mean healthy? Greenwashing is a term that has been thrown around. Kind of take us through, kind of where we are now, as this awareness has evolved.

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Andy Pace

40:33

So the term green building started in the mid 1990s really became a focal point in the early to late, early to mid, 2000s before the the housing market crash. But green building really alludes to energy efficiency, sustainability from a standpoint of of longevity or manufacturing location, the whole Cradle to Cradle concept of what can you do with a material after it's it's a past, it's useful lifespan. But in the push for green building, the the human factor was kind of forgotten about. And so I definitely do have a distinction between green building, which is going to be better for the environment and healthy building which is better for the human occupants. And so this is where we find, still a lot of confusion, and the confusion is, for a large part, caused by what's called greenwashing. And she mentioned it just before greenwashing is to over exaggerate a materials or a system's green or healthy attributes in order to get somebody to buy it.

So I'll give you a few examples. If a product is sold as being it's all natural, and they kind of allude to, well, it's all natural, so it's got to be safe. That's completely false. Asbestos is natural, Cyanide is natural, right? Tobacco is natural. There's a lot of natural things that are very, very dangerous for us. So that would be a specific form of greenwashing. If a manufacturer states that it's a green, sustainable product, because it's all made locally, you know, it's made within, you know, 200 miles of the job site, which was one of the components of of the LEED program years ago. Then it's considered a green material. Well, what if it's made from raw materials that come from China and India and Taiwan, shipped to the United States, and then it's manufactured here? Is it still green? So that would be a form of greenwashing. If a if a manufacturer says that their materials are, for instance, low in energy, low in embodied energy. That is a form of greenwashing, because you can make materials that are that are very low in embodied energy. So it's better for the environment sustainability wise, but can be made from completely toxic ingredients. So we have to look at all the aspects of the product. It's not just because if it meets one specific line item of what's considered green, therefore you can call it a green product, or healthy product. If it only meets one or two, that would be called greenwashing, if it's, if it's something that is completely healthy, and I like this example. I love the Forbo Marmoleum Natural Linoleum Flooring Material. I think it's one of the best flooring materials made. It's been made the same way for the last 140 years. It's it's naturally antibacterial, naturally anti static. There's no chemical, synthetic chemical release whatsoever, but it's all made in the Netherlands. Why? Because that's where flax plants are grown. That's what turns into linseed oil. And so some groups would call Forbo Marmonium, they would say it's, well, it's made too far away from the job site, therefore we can't use it. Well, what's more important the human occupants. Would you rather use a vinyl floor that's made down the street or a natural, non toxic linoleum floor that's made 5000 miles away. So these are the topics that people have to throw back and forth. And the greenwashing gets in the way, because we see something that we like, and you think, because it checks one box, it checks them all. Again, this is why zero VOC paints have become so popular because we look at that term zero VOC, and we just assume, well, that just means it's healthier for me, and that's completely false. It means it's better for the environment. So we have to do a little more digging. Look for different phrases to make sure that it meets that the entire set of criteria, or the most possible.

KS

Kendra Seymour

45:20

Yeah and we're going to get into that, and we're going to end with that. I want to leave a big chunk of time at the end, but before we move on, I want to, in case people are listening, are VOCs, then if I move into a new home, or I've been in my home a while, is that something that we should test for? Is testing even reliable? Is there, is there a step there that we need to take in that direction? Help us understand that?

AP

AP

Andy Pace

45:44

Yeah, I believe, so. I believe that, and this is something that I'm really excited to be working on with CTA and the building advisory committee that I formed within CTA actually a recommendation that any new home built needs to have a on record indoor air quality test showing us the VOC levels, the formaldehyde levels, just a very rudimentary, you know, mold spore count. And this gives us at least a guideline, or, you know, a ground level number. We know that after the HVAC system has been working, specifically, if you have good air purification, that the VOC numbers, the formaldehyde numbers, will come down. But if we have that baseline number to start with, now, if we have to go back in at the six month mark, one year mark, what have you, because people in the home are still having these, these symptoms of chemical exposure, we can say, Well, where was it when we started? Where we at now? And it helps us calculate how long it's going to take for that to lower enough to be healthy. Or what else can we do from an equipment standpoint, or from a sealing standpoint, of sealing surfaces to reduce it completely. So I definitely advocate for using a an air quality test, measuring VOCs formaldehyde and mold spores.

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Kendra Seymour

47:13

Yeah. So let's go there for a moment, because in some cases, we the materials are already in and they can't be picked and we test for them. What are some things that we can do, though, to minimize exposure? You mentioned, like sealants. But can you kind of take us through what some of your recommendations might be for a client, whether it's a brand new home or just a new to you home? What can you do to kind of reduce those levels?

AP

Andy Pace

47:38

Certainly, so air flow is good, and what I mean by that is just putting fans, blowing air around, helps to sort of wick away chemical emissions that come from certain surfaces, gets it into the airstream, hopefully goes through your HVAC and To be purified. It also helps to reduce moisture. Now this is something that obviously so many people this is why CTA exists. Is how to mitigate and minimize moisture because of mold exposure. But what people often miss is higher humidity, higher moisture content can also lead to higher chemical release, and that's because when moisture comes off of a surface, it'll carry with it the chemical footprint of where it was. So an example is if you were to take a piece of dry, raw wood and smell it, smells like wood. Now get it wet and smell it again. Smells like wood times 10 or 20. It's just an enormous amount of of chemical release, albeit, that's a natural chemical, terpenes and pine. But that's the exact same thing that happens with building materials. I remember years ago testing somebody's home, and she was complaining of a really strong chemical odors in the house, and I found that the carpeting in

her house was releasing in the neighborhood of 500 parts per billion of formaldehyde. Now to give you sort of a comparison, the safe level is less than 20, and I actually strive for half of that, less than 10. Her house was at 500 parts per billion of formaldehyde release coming from the carpet itself. And I did that using a very specific test system. I also found that in order to reduce the, just that chemical smell and that the feeling in her house. She had been keeping windows open 24/7 and this is the middle of summer, and her humidity level in the house was about 65%. So obviously, what else is that going to lead to, right? And so I told her to close up the windows, turn on the air conditioning, get a dehumidifier upstairs and and do this for two weeks. And I came back to the house and tested everything again. The carpet tested at less than a third of the off gassing that it had before. The air tested at I think 1/10 of what it tested before that. And so that proved to me, among many other things that I've done, that if we can reduce humidity, reduce moisture release, we can reduce chemical off gassing. Now, one thing I didn't mention is that this carpet in her house was 35 years old. 35 year old carpeting was still off-gassing toxic levels of formaldehyde, and so it's a perfect example of we talked about earlier. How long does off gassing last? Depends on the material, but when it's coming from the Styrene-butadiene rubber backing that's on carpet it can last decades, and the only way to get rid of it is to remove it and replace it with something that doesn't off-gas. So these are the types of things that I look at as a as a healthy home concierge or a consultant. I look for materials and methods to decrease the overall load. Sometimes it can happen earlier by again, air flow, air purification, even washing surfaces, to remove chemical films that develop just from the building material process. This will all help, but sometimes it's going to be a complete removal and of of the items that we know are the biggest offenders. Generally speaking, it's flooring materials, paints and finishes on your walls and ceilings, cabinetry and woodwork, and then your own personal furnishings. I had a very, very severe situation on a project with a family that was getting extremely sick because of all the area rugs in their house, their area rugs were releasing more formaldehyde into the air than anything else they had in their house. And just by eliminating the area rugs, putting them in the garage or putting them outside, within 24 hours, the entire family started feeling better.

KS

Kendra Seymour

52:25

Yeah. I mean, these are great examples, and I promise for everyone listening like you're going to want to follow, hit that follow button. However you're listening to this, whether it's on YouTube or Facebook or social media or subscribe to our newsletter at Change the Air Foundation.org because in other episodes, we're really going to dig into furniture and things like that, and selecting better materials and mattresses and things like that to kind of reduce this because Andy, you know, again, not to bring it to like a national scale. But your story reminds me of, I think it was the late 80s the EPA, ironically enough, in their headquarters in Washington, DC, you can find articles on this installed new carpet that was pretty toxic and was making people sick. And it took, I think, like, two years, and they ultimately had to remove it, but it was the EPA. I mean, it's funny. It's not funny because actually people were seriously and in some cases, developed permanent health issues, but these things matter to our health and our well being. And again, I

want to share we're not sharing this information with you to scare you, we want you to just understand what's going on in your home so you can take steps and so. Andy, it sounds like increasing ventilation, even certain surface cleaning in some cases, sealing, like sealant coatings. If you're using air purification, remember VOCs. You need something with a carbon or carbon like filter, HEPA filter doesn't remove gasses. But again, that's limiting, and it's probably best to work with a good, knowledgeable IEP or a person like Andy to help you kind of identify those specific areas. And it sounds like Andy in some cases, I imagine some of its trial and error. Let's remove the rugs, and let's wait 48 hours or week and see, is this, is this better? And again, not to take us on a tangent, but I have seen people talk about, especially for new builds, something called a bakeout recommend, and if so, can you kind of explain to us what that is?

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Andy Pace

54:29

Yeah, a bakeout is something that I 100% absolutely do not recommend. And I'll tell you why. Thank you for asking this question. Several years ago, a team put together by Hal Levin, who is a very well known scientist. Hal put together a this protocol for doing what's called a bakeout in a new commercial construction. And he found that if you raise the temperature up and kept it at that temperature involving air flush outs and so forth, about a two week period that you can reduce the the VOC levels in in the air. Now let me give you the details of that. They were increasing the air temperature to over 90 degrees, and then every 24 hours, doing a complete air flush out of the entire volume of air of the building, and then reheating it back up to 90 degrees so. And they did this for two weeks. The the overall effect was, yes, they did reduce the VOC levels in the air. However, the unintended consequences is they probably ruined most of them, they completely eliminated any warranties that were available for these materials. And if this protocol is not really followed to the T it's going to be more harmful than anything else. People think that if they can turn up the air, turn up the heat in their house to 80 degrees for a few days, it's, you know, that takes care of a lot of these things. What happens is, when you start to heat up materials, you will create new chemical compounds that didn't exist before that. And so people who have tried bakeouts but didn't really do it the correct way caused more problems. Actually caused materials to release chemicals never been released. Chemical compounds were formed that never would have happened. It is far more detrimental than anything else. It's not worth it. And Hal, in a follow up report, said, I do not recommend this to be done period. It's just It may work in theory, but you know, in real life situations, it's not going to work because it's just it's impossible. And so I think people read the first part and said, Oh yeah, bakeout, makes sense. You excite the chemicals, they come off easier, right? But what are all the other detrimental effects? And usually it's the the the building materials themselves. You're losing all your warranties. They break down faster, then you end up having to replace them sooner, causing the exact same problem again. So do not do the bakeouts. There are so many other things you can do that are more effective,

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Kendra Seymour

57:13

all right. Well, then on that vein of things not to do. I wonder if we could spend a moment, because I see this mentioned all the time talking about the use of ozone. Sometimes people will use ozone for odors. Maybe a house there is a cigarette smoker I know. Sometimes car rental places, if you smoke in your car, which you're not supposed to do, you pay a fee. They can ozone. But there are some unintended consequences. There are you comfortable speaking for just a moment kind of overview of why, maybe that is not something you want to consider and caution needs to be used.

AP

Andy Pace

57:48

Yeah, ozone is such a controversial method of air purification, and I'll say right off that there are there's a time and a place for it, but it has to be done under supervision of experts. Ozone in very small amounts, is nature's way of taking care of pollutants in the air. You know, when you get going to the most pristine forests in the mountains of of Colorado, you'll have a higher amount of ozone in the air just because of of of you know, the air quality is better. It's a natural method of purification. Inside of our home, small amounts of ozone can be helpful to keep material sanitized, to break down small chemical particles or odors. Ozone large amounts is extremely dangerous if not done properly, because ozone can react with certain chemicals, specifically formaldehyde itself. If ozone reacts with formaldehyde, it, like magnifies the formaldehyde, it turns it into this monster of a problem. And if you just incorporate the use of ozone to try to sanitize a room, and you don't exactly know what you're trying to sanitize. You haven't done the air quality test. You don't know what the VOC levels, formaldehyde levels are, and you just say, I'm going to ozone it. You might be helping for some reasons, but you might be extremely damaging the the the materials in the space, it'll constantly cause this horrible formaldehyde release. Also, ozone is extremely detrimental to things like rubber gasketing, and so if you have any rubber gasketing and any equipment in your house, you'll find that it breaks down very fast from Ozone. So I don't mind the use of ozone unless it's not done correct, if it's done unsupervised by people who don't know what they're doing, and you don't have a baseline test of what's happening in your house, first, I think you could be asking for an enormous, bigger problem that I've seen in some situations, Kendra, that people have had to move out of their houses. Because once they've ozone to space, and they've permanently changed the chemistry of some materials, it could never go away. It is horrifying to think about something that I mean, I even we sell ozone machines to professionals. We use ozone in some types of air purification systems with very small amounts. But if you just use something and you don't know what you're doing. It's just like anything else you could be causing serious harm.

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Kendra Seymour

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Yeah, and that's that's kind of the messaging we always want you to take from us, whether it's mold or building materials, or you have to understand the pros and cons of any option, of any test of any product, and do your homework first. Because, you know, to your point, I've seen people also be in the room with ozone, and that has detrimental impact on your health and things like that. The the preschool where one of my children attended before I got there, they had a problem with water and mold long before I got involved there folks and and somebody told them to put in an ozone machine. This is a lower level basement that had no windows with three, four and four year old. And they were complaining, oh, we had to turn it off because everyone was having health symptoms when it was running. I was like, no kidding, because you're running ozone in an enclosed space with humans in it and and, Lord knows you know what's going. We're going to explore this theme this year, the chemistry of your home. And so I'm so glad you brought that up, Andy, because a lot of times we test when these chemicals are tested, they're tested in isolation, in very controlled situations, in a lab, and they're not tested in the real world, where we have a mix of chemicals from hundreds and 1000s of products that are interacting in ways we don't even begin to understand sometimes. And so I'm glad we highlighted some of that. And for the listeners hanging on, I know we're long but I think this is important context. We are now going to dig into some specifics products for swaps. So if you are building home, maybe remodeling, maybe you had to remediate your building back. So you have an opportunity here to maybe change out some of these building materials, or maybe you're just redecorating. Andy, let's talk about, then a little bit more like we're gonna let's talk paints. Let's talk some furniture, carpet, flooring. Let's, let's kind of break each of these categories down for what you have found to be healthier choices for some of your clients. Does that sound like a good idea?

AP

Andy Pace

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Sounds great?

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Kendra Seymour

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Alright, let's start with paints.

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Andy Pace

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Okay, well, paint is definitely my, my, my passion. I've been selling industrial coatings, residential coatings, for 35 years, I learned early on that paints and coatings are problematic, obviously, from the story that I told with the project, understand that again, zero VOC does not mean zero toxin or zero pollutants. When I

found the brand AFM safecoat, many years ago, and it was sold to people who had chemical sensitivity. I didn't understand it at the time. I learned quickly what that actually meant. And so let's talk about off-gassing and how it relates to paint. When, when the paint is applied to a surface, and the water, the moisture, the solvent, evaporates out and creates the film. It basically creates like this mesh under a microscope. It's like uncured acrylic monomers look like ping pong balls, and as it cures, the ping pong balls come together and they touch, but it's a series of under a microscope, a series of ping pong balls, which means, you know, in the middle of that ping pong ball, it's a nice thick coating, but where they touch, it's a lot thinner, and this is where you get chemical emissions coming through. AFM safecoat developed a method to make the paint using certain types of acrylics that, when combined, when cured, completely meshed together, not like ping pong balls, but like marshmallows in a bag, so it's squished together. So you can actually use a safe code product over an existing coating that's still off gassing. And we get this all the time. You know, to your question earlier about, how do we stop off-gassing? If you move into a new home, it was just painted a couple of months ago, and that continued to off-gas for three to five, five years, you can actually put a safecoat product over the top of it to stop the off-gassing, because of those marshmallows that are stuck together and keeping that emission from coming through. So traditional paints don't have that ability to do that. Safecoat does. Now here's the downside, because not everything's perfect. The downside to this process is while safecoat paint and any other latex paint is considered a breathable paint, it's only breathable for so long. After two, three, four years on a surface, those molecules start to squish closer and closer and closer together. And now water vapor, which is the smallest molecule that we can think of, that could come through a coating can't get through. You know, it can. It's blocking formaldehydes, blocking toluene and xylene. But it used to be that the water vapor came through, it had a perm rating. Well, after a few years, latex paints lose that perm rating, and now we have a possibility that mold could develop in the cavity wall. So there is a type of product in the market, it's called a mineral paint. Mineral paints are just that they're made from water and silicates and pigment, natural mineral pigments, and that can be used as regular wall paint in your house, and for the lifespan of it, it remains breathable. I'm recommending this on just about every new construction project I do now. Breathable wall paints, so that if there is moisture in the cavity. Now I shouldn't say if there is, there is, there always is. You can, you can build a house to be as moisture resistant as possible. You're still going to have moisture in the cavity when a new home is built there's somewhere around six to 800 gallons of moisture in the air just from the wood and the curing concrete and the painting process that goes somewhere, and a lot of times it migrates into that cavity wall. And so if you have a breathable wall paint, it'll allow that moisture to come back into the house, to be then captured and taken care of by your HVAC system. If the if the moisture the wall can't get in, it stays in there, and it can do some real serious damage. And so I love the use of a mineral paint. I work with a brand called Keim. They're a German company. Absolutely love their products. So my protocol now is essentially Keim for all the walls and ceilings, Safecoat for all the woodwork. If you're buying an existing home that has existing paint, then it really using the Keim product doesn't necessarily give you any benefit. So then I just go back to the Safecoat.

KS

Kendra Seymour

1:07:09

Yeah, that's incredibly helpful. And we're going to try to link to as many of these things as we can in the show notes, so that for those listening who want to dig in and do a little bit more research themselves. So let's talk flooring. And I know, gosh, there could be a whole episode. So we're just giving high level and Andy, you're just gonna have to come back and we're gonna do more interviews. But what are some like, top performers, in your opinion, for this, in terms of flooring options for people, and they can be you can stick with just like wood or tile or carpet. I'll let you decide how you you define that.

AP

Andy Pace

1:07:40

So, generally speaking, I like to go with hard surfaces throughout the house because they're easier to maintain, easier to keep clean. Of course, people will say, yeah, but if I have wood flooring in my house, I'll see all those dust bunnies. Yes, you will, and that means you'll take care of them. If you have carpeting, those dust bunnies get hidden and typically aren't cleaned properly. I understand wanting something soft underfoot. I live in Wisconsin. It's 10 degrees outside right now. The floors feel cold. I like something soft underfoot when I get out of bed in the morning, that's where we use completely natural area rugs, but the floor itself is a hardwood floor for me. So I like hardwood. I like cork is one of our bigger products now. Cork is the bark of the cork oak tree that gets ground up and turned into backing for flooring material. It's been extremely helpful for people who not only have chemical sensitivities, but have joint issues, arthritis, because it's it's not bouncy by any means. But if you're standing on it for longer periods of time, like in a kitchen, it is far more comfortable because it doesn't impact the joints as much, and it's fully washable, cleanable, like I talked about with hard surfaces. I know with chemically sensitive clients, there's this desire to want the entire house to be porcelain tile. I understand the desire, from the standpoint of porcelain is completely inert. You can buy mortars and grouts that are completely free of chemical emissions. It can be a very, very safe floor. The downside is it's very cold, it's very hard, and so we always have to look at the big picture when we're choosing any materials for our homes. But there is no such thing as the perfect product for a house. We can just do the best we can if we if the product is extremely durable and it's really healthy, it might be really expensive. So, you know, it's kind of a three legged stool between performance, environmental considerations and health, or actually, four legged stool throwing the price. If one of these legs, I mean, is not correct, you still have to make the decision, is it the best I can do? So when I have a client approach about a project and they want my assistance with I always ask the question first, what are we trying to achieve? Is somebody in the home suffering from a from a disease, some suffering from some health issue that we're trying to protect against, or are you just trying to do the best you can within your budget. 95% of my clients these days is the latter, because they have family and friends, acquaintances that have severe health issues they don't want to get there. I have so many clients who say, yeah, a good friend of mine has chemical sensitivity. It just, it's just, it's a horrible, horrible problem. I'd never want to get that way. Nowadays, I have new families, young families, coming to me

saying, we understand there's there's toxins in the food that we eat. We're surrounded by chemicals in our lives. 24/7, can we just build a home that's sort of a safe haven for the kids and for ourselves? And so they're willing to acquiesce on esthetic or even durability. They don't necessarily care as much about energy efficiency. It's how do we just build a house that's healthier for everybody? And so sometimes you have to give a little to get a little, and with flooring, it's definitely the case. There are great wood floors that are made here in the United States that meet a lot of this criteria, but they're expensive. There are wonderful products like natural linoleum, natural cork, and I think the biggest product category in flooring right now is what's called luxury vinyl plank. This is such a hot button product. This is people come in and say this is what I want. And others come in and say, how can you sell vinyl? How can you have vinyl available? Honestly, folks for me in my career, I avoided anything made with vinyl for the first almost 30 years, and rightfully so. But chemistry has gotten better with these materials. And again, I listen to my chemical sensitive clients who are telling me that they can use certain types of vinyl flooring because it doesn't release phthalates, doesn't release formaldehyde, doesn't release VOCs, formaldehyde. It's extremely durable, easy to maintain. And here's the most important thing, doesn't have a smell. And if you or anybody you know has mast cell activation, you understand that strong odors can be very, very triggering, very problematic. And it can be a strong odor from something natural, like a flower or grass. It could be a strong odor from something extremely dangerous, like gasoline. The luxury vinyl plank floors that are that we work with have no smell. So when they compare that floor to a a completely natural wood floor, they can't tolerate the wood floor because the wood has a strong odor. So we have to take all these in consideration when we're making decisions, which is why there really is no like checklist. When people will say, do you have a list of materials I should use? Not yet. I don't know what you're trying to achieve. I don't know what's most important for you and what your triggers are. And so we really can't take this blanket approach with everybody. We have to look at things individually.

KS

Kendra Seymour

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Yeah, that is that is so important. And I think the message is, sometimes it can be frustrating, because I understand you, like people are like, I just want someone to tell me. And it's not always that simple, as as, if you've spent any time on our website or listened to this podcast, you know that sometimes these things take just a little bit more thought up front, a little bit more investigation, and you will get there, and I think you'll be ultimately happier when you take the time to to make a plan and think things through. And and Andy, we are, we are over time. I know that we were, you know, we didn't have a chance to touch on furniture. There will be other episodes. And I mean, we could talk about cabinets and countertops and things like that. And so let's just plan listeners. I'm gonna bring Andy back. And the best way to stay up to date on hearing Andy again, again, head on over to changetheairfoundation.org sign up for our newsletter. If you're listening on social media, we're on Instagram and Facebook and YouTube, click like and follow for those. You can subscribe to Your Indoor Air podcast. We're on all major podcasting platforms and even

many of the smaller ones. So Andy, though, if people had, like, follow up questions or wanted to get in contact with you, how could they do that?

AP
Andy Pace
1:14:37
Best way to contact me is actually go to our website, which is the green design center.com From there, you'll find not only contacts for me and my staff, but also links to I do a weekly show called non toxic environments. It's found on YouTube and podcasting and so forth. I actually started in podcasting back when it was just audio, and so I have several 100 episodes available on podcasts. And then you'll also find links to my consulting and some of the presentations that I do. I speak at various events throughout the year, really, anything that that you can interact with us found on that website.

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Kendra Seymour
1:15:14
I love that, and you are truly an expert and a wealth of knowledge. And your your compassion and passion for this I just so love it. So thank you so much, Andy for being here.

AP
Andy Pace
1:15:25
Thank you, Kendra,

KS
Kendra Seymour
1:15:26
and for all of our listeners, we have so much in store for you this year. And whether you're tackling mold and water damage or looking into other indoor air pollutants, whether it's radon or carbon monoxide or VOCs or other hazardous air pollutants, we have the resources to help you make a healthier home and a healthier you. So head on over to changetheairfoundation.org, sign up for that newsletter. Thank you so much for listening. We'll see you next time.