Eric Schiff:

Good afternoon. I am Eric Schiff, director of the New York Center of Excellence in Environmental and Energy systems and a physics professor here at Syracuse University. For nearly two decades, the center's been working with companies and universities to develop new products and understanding of the built environment. These elements have new importance since the COVID-19 pandemic reached the United States about 18 months ago. One of the largest and most important impacts has been on schools and children. We'll be talking today to two experts on COVID-19 and its effects on schooling. The Delta variant of the coronavirus, as well as the need to get our children back to school keeps these topics timely and important long after the COVID pandemic began. We'll be speaking today with Dr. Joseph Allen and Dr. Donna DeSiato. The conversation with our distinguished panelists is the first half of today's program, after which we'll be posing questions from you, our listeners. Please send your questions to us using the function on the GoToMeeting program that you're logged into.

Eric Schiff:

So our first guest is Dr. Joseph Allen. Dr. Allen is an associate professor at the Harvard University T.C Chan School of Public Health. He's an authority on the relationship of the indoor environment and health. Since the COVID-19 pandemic began, he's become well known as an expert and an expert communicator about how the disease spreads, and the measures we can take to reduce it. Just last week, his essay with Helen Jenkins on the COVID-19 pandemic was published in the New York times. Dr. Allen is also a longtime friend and collaborator of the Syracuse Center of Excellence. Most notably, he was the principal investigator for a groundbreaking COGfx study about how indoor air and buildings affects a person's thinking and productivity. The first study of this project was conducted in 2015 at the center in its total indoor environmental quality lab. So Dr. Allen, I'd like to start by asking you about whether you think the COVID pandemic will actually have any end or will become an endemic circulating indefinitely around the world. In short, are the measures we're adopting now to reduce the spread of the disease going to be needed indefinitely?

Dr. Joseph Allen:

Yeah. It's a great question. And first let me say thanks for inviting me, and it's great to be with you, Eric and end of it always. I have hold the COE close to my heart. I spend a lot of time there doing these early research studies. Terrific facility, terrific building, terrific staff and faculty. I've always enjoyed our time working with you all at the COE, Center of Excellence. Yeah, I think it's a really important question. I think the reality is we have to be planning for this in the long term. And a lot I think of the early days of the pandemic. There was hope that maybe we would get through this, get to a zero COVID scenario as some countries have done and get back to "normal." Clearly that hasn't happened. And with each new variant things get a little more complicated and complex.

Dr. Joseph Allen:

At this point we have such widespread cases happening everywhere and globally. That this virus is endemic at this point. I don't think there's any way it won't be even with the powerful vaccines that we have at our disposal. What that means really is that we need to be thinking differently about our strategies and think through this long term, like you talk about all the time with your center, and think about our buildings in particular. I know we'll get into this in more detail, but I think it's the long view. I think long view, not just around COVID and it being endemic, but also other infectious diseases, influenza, whatever it comes at us next, and these other factors related to health in the built

environment that aren't about infectious diseases. So short answer is, yeah, we're in this for the long haul.

Eric Schiff:

I'll pick up with that by noting your essay in the New York times last week with Helen Jenkins, that emphasized the need to clearly define the goals of mitigation measures in schools and other places. There's a long list of measures, masking, capacity reduction, testing, and so on. You particularly emphasized the need to publish off ramps for these measures. At what point are things good enough that we can discontinue some of them? Could you expand a little on your thinking and perhaps offer specific suggestions for a random county like Onondaga?

Dr. Joseph Allen:

Yeah. The basis or the reason we wrote that article was because there's a lot of confusion out there, and it's understandable. It's a confusing landscape. But I think a lot of the confusion and even disagreement among experts stems from the fact that we haven't always been clear about what our goals are. For example, if your goal was zero COVID, then a set of policies flow from that, including it may be closed down schools or whatever it has to be. If your goal is reduce severe disease and death, then in some of the high vaccinated states, they might already be there. In other words, are we tracking cases or is the goal severe disease and death? What are we actually trying to do? I don't think the country's been very clear from the beginning about what our goals are. And that's important because the two most salient factors or risk factors are age and vaccination status at this point.

Dr. Joseph Allen:

We don't always stratify our thinking or our policies based on those factors. I think that's an important starting point. To get to your question about specifics, we use the example of mask in our article because when CDC put in the mask guidance for schools, which is important, especially in areas that have high community spread, they actually put it in place for the entire country. The recommendation for the entire country, which applied to places like Vermont, which at the time had less than one case per a hundred thousand and less than one death per hundred thousand. So we challenge people to think through this a bit and say, well, is there an end game because we can sleepwalk into indefinite masking. I don't think that's good public health policy either. People are willing to do these things that are necessary to keep everyone safe, most people are, but they want to know there's an end game, not just indefinite.

Dr. Joseph Allen:

And we argue this similarly that some people say, well, we just have to do mask until we get a vaccine for the youngest, those under 12. That seems to make sense on its surface. But think that through. Right now, the 12 to 18 year olds, only 30% vaccinated. We can very likely find ourselves in February vaccine approved for those under 12, but still only 30% vaccinated. What then? Is it okay to take mask up or do we keep them on indefinitely? I just don't think we've challenged ourselves with the hard questions, as we deal with the immediate, which we have to, but think through what the long term implications are and what that messaging is back to the public.

Eric Schiff:

Do you think the community caseload, you mentioned the one in a hundred thousand for Vermont, community caseload should be one of these factors? There should be thresholds and criteria based on that as well as vaccination status?

Dr. Joseph Allen:

Yeah, actually the Vermont level's higher now, but I use that as an example from when the policy was set. Personally, I don't think cases are the right metric at this point in the pandemic. Prior to vaccines, cases perfectly predicted, perfectly and sadly predicted hospitalizations and deaths. The vaccines have the power to decouple that. Now, if you're in a part of the country or part of the world, low vaccinated, then cases are still sadly going to predict hospitalizations of deaths. We just saw this through the south. So cases are irrelevant metric. As you start to move to the Northeast, higher vaccinated populations, we should see this decoupling. And then I don't think cases make as much sense. Unfortunately, I think it goes to the lagging indicators of hospitalizations, ICUs, and deaths. So this just gets back to the larger point of the New York times articles.

Dr. Joseph Allen:

What are our goals? If the goal is zero COVID, then we have to track cases. I don't think that's reasonable at this point. We just opened by talking about this will be endemic. I also don't think that's the goal. We've accepted, "disease and death to some level, take seasonal influenza that causes a lot of morbidity mortality." Unfortunately we've "accepted it without altering society all that much to address it." So I think we have to start thinking in terms of those levels. I think in high vaccinated places, the better match or metrics of community risk then become the hospitalization and death indicators.

Eric Schiff:

Right. So in a previous period, we could use the total caseload since the hospitalization rate was fairly definite. At this point, it varies dramatically, I guess, between the vaccinated and unvaccinated. Complicates things enormously. I'd like to move on, moving towards Dr. DeSiato, who actually is in charge of some of these measures in the school districts near Syracuse, but as an expert in particular, in measures like ventilation improvements. How about sharing with our viewers, a few of your most efficacious mitigation measures that you'd recommend to school superintendents such as Dr. DeSiato.

Dr. Joseph Allen:

Yeah. First I should say thanks to all the people working so hard in schools. It has been an extraordinarily difficult year and challenging year. From my view, the good schools I've worked with, they're doing a terrific job. I think before we start to talk about controls, we should just start with the higher order question, which is how is the virus spread? Everything flows from that. This is where CDC, World Health Organization, got it wrong for a long time. We're calling this from February, 2020, that the virus is spread through the air. Once you understand that, then the controls make sense. Because if you don't say that, if you think it's droplet or you think it's contaminated surfaces, then a whole other set of approaches. And that's actually what was said earlier, is droplet and fomite contaminated surfaces. Well, then cleaning and enhanced cleaning becomes a key strategy.

Dr. Joseph Allen:

The reality is it's spread through the air. We understand that, then you understand well why mask became critically important and why the building level factors are important. So we know that respiratory aerosols, when we admit them, when we talk, sing, or just breathe, if you're infectious, they

can carry the virus. It'll travel well beyond six feet. Nearly all of the spread has happened indoors. Nearly of it. In under ventilated places. So to control far field transmission, beyond six feet transmission, you need to remove them out of there. That's what the ventilation can do, or clean it out of there, that's what filtration will do. We've been very clear from the beginning. Our recommendation is in smaller volume places like schools, low typical ceiling heights. We recommend four to six air changes per hour through any combination of better filtration or ventilation.

Dr. Joseph Allen:

I recommend prioritizing these three in this order; First, bring in more outdoor air as much as you can. Two, MAF-13 filters on your recirculated air handling system. So MAF-13, just the rating system and enhance filtration. Three, use portable air cleaners with HEPA filters. It really is that simple. We know it can be effective. I think those are the key mitigation measures for the airborne spread. We can talk about other mitigation measures like vaccination and testing, but in terms of airborne spread in the building, that's what I recommend.

Eric Schiff:

I know. Moving on now. But I did notice that testing seems to be a key component in the English experience where I happen to have some grandchildren enrolled at the moment. Okay. So let me go ahead and move on to Dr. DeSiato so we leave some time for our listeners to send in questions. We're very pleased to have Dr. Donna DeSiato with us today. She's a regional celebrity in public education. She has a doctorate in education from none other than Syracuse University and has worked passionately for over 20 years in the Syracuse and East Syracuse Minoa school districts. She's currently the superintendent of the East Syracuse Minoa school district. That would be a independent school district, just east of Syracuse. Beyond the normal workload of managing the district, she's worked to develop career pathways and partnership with industry and higher education, including innovative STEM learning models.

Eric Schiff:

She shares many collaborators with the Center of Excellence and Syracuse University, including King & King Architects, Siemens, Sage University of New York's, Environmental Science and Forestry College, Le Moyne College and Onondaga Community College. She received recent recognition from a venerable organization that people outside the region wouldn't have heard of, The Technology Alliance of Central New York. She was their 2020 stem outreach individual of the year. So Dr. DeSiato, many of us don't actually know how measures such as masking are implemented or mandated in our regional school systems. Could you summarize briefly how that's organized both at ESM, your school district and other school districts that might differ?

Dr. Donna DeSiato:

I sure certainly will. Thanks for inviting me to join you today. And thanks for all that you're doing to inform our public regarding these matters. First and foremost, our goal this year is to have 100% of our students to the extent possible and practical return to in-person learning. As you all know that wasn't something that we could accomplish last year for a variety of different reasons, but we did do it to the extent that we were able to at each level. This year, we are having 100% return to in-person. The only exemption to that is a medical exemption. The masking is one of the mitigation factors. It has now been at all levels. The federal level, the CDC has it as a recommendation. The Onondaga county department of

health has it as well. The governor recently, through the New York State department of health, has it as a universal masking expectation for all schools.

Dr. Donna DeSiato:

When I say that, it's one of the mitigation factors you just talked a moment ago about the MAF-13 filters. We actually have that in all of our schools. Most school districts do. With the exception of those that may be at such an age where we have the highest degree of filtration, that particular unit, and it's at an acceptable level. But in all of our schools where we can, we do have the MAF-13 filters. We do have the air exchange types of protocols. We have hand hygiene and we have distancing. It was six feet last year. This year it's three feet distancing. There is no requirement for masking outdoors. It's strictly indoors this year. Whereas last year it was both for the majority of the school year until the end of the school year. But this year it is indoors only.

Dr. Donna DeSiato:

And we do frequently administer mask breaks for our students. I think the other part about masking, and I know you have other questions you want to get to as well, is that you mentioned earlier about, is there a point at which there's a threshold. In or about, I think the week of July 7, the state came out with, were at a very low transmission rate in Onondaga county, and if you were at a low transmission rate, you could invoke a removal of the mask for those who voluntarily wanted to share with us that they were vaccinated. We did do that as a district.

Dr. Donna DeSiato:

We went through the entire summer really at a very high success rate of not having the transmission of the virus. But now we're at a high transmission rate. So we do have the universal masking policy for the start of school. I do anticipate that as we go through this school year, I believe the way that the New York state department of health latest commissioner's determination is constructed, that the commissioner will be able to allow for the variance of transmission rates across the state, as we hopefully lower that transmission rate in various areas.

Eric Schiff:

So just to clarify that point, if we reach that stage, an individual school district would be able to decide or follow some rules as to whether that particular school district would implement a particular measure?

Dr. Donna DeSiato:

Again, we literally get an updated guidance almost every 24 to 48 hours right now. And so we're reading through that with both our medical director and our attorneys. We anticipate that will be the end result. I can't tell you for sure that that's it today, but I do think that everyone understands that our goal is not necessarily to remain masked all year. Our goal is to start the school year in the safest level of mitigation that we can, based on the fact that we have a high transmission rate right now. I do know that various state organizations are working towards having that scale of flexibility. It does certainly. In schools, that means that 12 and under, or under 12 years of age, they would still remain in a masked environment. But 12 and over, those who are vaccinated and are beyond the two weeks of their second shot or their final stage of vaccination, would be able to become unmasked we believe. We don't necessarily have that at this moment, but I think that will be one of the goals that we will see happen this year.

Eric Schiff:

Right. I think what I'm trying to find out is whether there's a statewide set of instructions or guidance that pretty much defines what an individual district is expected, what the parameters for a specific district are, or how much you initiative can an individual district take either within or beyond those.

Dr. Donna DeSiato:

Right now we are under a universal so to speak mandate from the department of health. We are also under an emergency order from our county that has to do with our employees being either tested weekly or sharing proof of vaccination. So in both the state and in the county, they pretty much operate with regard to the following CDC guidance, but they can become more restrictive, not less restrictive. So in this case, the state has to be determined to become more restrictive with regard to employees. The governor is following the same pattern of expecting that employees are either tested weekly or they can provide proof of vaccination and then be exempted from testing weekly. Just to give you an example, we have nearly 700 employees. We have only 52 employees that at this time are not vaccinated.

Dr. Donna DeSiato:

So those employees all have met the requirement of being tested this week and will be administering the test as long as our employees need to be tested. For students, and for staff, we have the universal masking based on the most recent commissioners from the state department of health. We anticipate that they'll allow some variance as the school year goes on. I believe that they're looking at starting with a universal masking for the entire state in order to get school up and running, knowing that people have been in various parts of the state. They've been in various locations, and we're trying to get back to school with everyone being fully in-person. And then we will also have some testing protocols as we go through the school year.

Eric Schiff:

Okay. I think that's certainly clearer to me. As a sort of last question before we turn to our listeners, could you share with us something about your experience as superintendent, being seen as the figure who is implementing these measures? Your experience with parents, children, and other stakeholders. I'm sure you have experiences of good cooperation, but probably also some conflict with parents.

Dr. Donna DeSiato:

Sure. We actually have had tremendous support. I think that at times, one, from staff, they have been outstanding with regard to both the modeling and the implementation of the protocols. Our students, without question, I believe that because it's so important for students to be engaged in school, they met whatever criteria or request or requirement that they were asked to do. And parents have been extremely supportive. Parents who have asked questions along the way, parents who may find this to have at times be either confusing or to create some conflicts really our experience has been, they've approached it from really asking good questions, wanting really clarification on the information and wanting to share at times where they may have some aspect for their family, that we may need to have further consideration for. I think that's understandable when you're educating as in New York state, millions of students. In any district our size, literally thousands of students who come from all different homes and all different types of circumstances.

Dr. Donna DeSiato:

So we're really trying to work through that. By enlarge, I would say the vast majority of parents want in-person learning to return. For those who have highly sensitive situations, we deal with those on a case by case basis. We're trying to work through that. But overall, I think we're going through something we have never had to live through before. We're trying to learn and trying to navigate this in the best way that we can so that everyone can have a healthy and safe environment, but also one that's inviting and engaging.

Eric Schiff:

All right. Thank you so much, Donna. I'd now like to switch from our Q and A sorry, from our discussion amongst the panelists and me to take some questions from the listeners. As long as Donna is ready to go here, I happen to have an early one for Donna, which is, are your mask breaks indoors?

Dr. Donna DeSiato:

They're both. We actually have just visited all of our schools with our staff because our staff started this week and our students start on Tuesday. And so we have a mask protocol of every 60 to 80 minutes. There must be at least one mask break. There can be more. But at least one that's occurring every hour. The reason why we do the 80 minutes is because at our high school, we have an 80 minute block. But we've also encouraged our staff to really think about outdoor learning in this beautiful fall season, in really engaging students in outdoor learning types of experiences and activities. Because in the outdoor setting, they can actually remove their mask for the period of time that they're outdoors.

Eric Schiff:

Okay. I think that's pretty clear for your district anyway. Let's see. I have a question for Joe, which reads, does anyone share particular building case studies and data in order to allow for better strategies and custom site specific policies? It's a rather lengthy question. Both building and vax rate in regard to COVID. Some detailed question. I can read it again if you like Joe.

Dr. Joseph Allen:

Well, it's just the last part I need to hear again. It sound like it hinges on changing protocols based on vaccination rate. Did I hear that right?

Eric Schiff:

Let's see. Custom site specific policies. Yeah. They're both adapted to building and vaccination rates. Yeah, that's all I have, is that text.

Dr. Joseph Allen:

Yeah. A lot hinges on that. First I'd say big picture. All of this has to be customized because every building is different as you all well know. There's a lot of customization that has to happen. I also think it's reasonable to customize your pros based on things like vaccination rates, but also testing and the screening protocols that are in place and how good your ventilation system is, and the like. Here's why I don't think you've seen any hard and fast rules on what percent of vaccinated lets you then do or pull back on X, Y or Z control. It's because, take even a high vaccination rate, 95% vaccinated. Well, what if the 5% unvaccinated are immune compromised or people who are older, very high risk people for COVID if they catch it. That then would require a different strategy to keep them safe.

Dr. Joseph Allen:

If you told me it was 96%, 95% vaccinated and the unvaccinated, like we have in younger elementary school, where the kids are at much lower risk, that's a different scenario. If you have these other good controls in place, then I think it could be reasonable to start thinking about tailoring that specific. I think a lot of people are looking for that straightforward guidance based on percent vaccinated. I don't think it's there unfortunately. But yeah, a lot of this has to be tailored. We try to simplify the message, even building level controls. But of course it matters if you have a room with a window. Well that's one strategy. People say, well, should I not open the window, or should I use the portable air cleaner if I have a central system? It all varies based on the system. We try to give that high level guidance though. And then it gets tailored by building type.

Eric Schiff:

Okay. Another pretty detailed question for you, Joe. The listeners starts off by thanking us all for the event. I'm glad that he or she is appreciating it. I have two questions for Dr. Allen. So I'll start with the first one. If schools, I think you just alluded to this, "If schools have HVAC systems with outside air and MAF-13 filters, you still recommend portable HEPA air filters. My school is saying they're not necessary because they're achieving over 10 air exchanges per hour and it's apparently a childcare center."

Dr. Joseph Allen:

Yeah. I think that's a really good comment and question. It lets us break this down a bit further. I think that's exactly right. So we give this guidance. You can achieve this. You can achieve our target air changes per hour through any combination. If your building truly has enhanced air ventilation rate, upgraded their filtration and they're hitting those targets, in this case, it sounds like they're going well above the targets, then you get an additional benefit by having a portable air clean with HEPA, but it's not necessary at that point. Where the portable air cleaner with HEPA comes in is if you had a system that couldn't handle MAF-13 filter or you're in an interior room and don't have a window or the ventilation system can't bring it more outdoor air, then you add those other layers. So in that case, at least how you describe it, and it sounds like they're hitting the target, not only hitting, but exceeding the target, in that case, yeah, you wouldn't open windows or add anything additional.

Eric Schiff:

Yeah, I know it. That sounds pretty good. 10 air changes per hour. I think that would be a dream for most schools. Let's se if it mentions some relevant context, is that it's a childcare center so children remove masks to nap, which I'm a little surprised at and sometimes to eat, which doesn't surprise me. But I'm not sure that needs any more comment than we've got. Let's see if we have some additional questions on. Let's see. Another one for Joe. I guess you're the person of the moment. "I was also wondering if you could speak about the safety of child care centers, given young children do after remove masks to nap. If the staff is vaxed and masked, there is ventilation in the school, there's children in pods, is that enough in the face of Delta? There is also no testing for young children."

Dr. Joseph Allen:

Yeah, without knowing the specifics, I think we have to step back and also look at risk from a larger perspective. And for some, not for some reason, we know why, but thankfully kids are at much, much lower risk. And to put some numbers on this, we're not just worried about death, but I'll use death as the first metric. Whereas the risk might be percent level for people who are older, meaning one in a hundred risk of death if you catch this, what we've seen for younger kids, it's on the order 10 to the minus six or one in a million or a couple in a million. So the risk is very low and hospitalization risk covers

between there and 10 to the minus five or one in a hundred thousand risks. Tragedies definitely do happen. I'm not minimizing that in any way. But the context is such that it's such an extraordinary difference in risk over age groups. That said, we still want to have controls in place.

Dr. Joseph Allen:

I personally feel comfortable in a scenario where you have good controls in place, all of the staff vaccinated. We have to get the vaccine mandates. I don't understand why we're not there. I wrote a piece in Washington post last month, urging this. That makes sense to me as a strategy. The staff are masked, kids when they can be good ventilation filtration. If you do these things, we can never get to zero risk. There's no such thing. We can dramatically reduce risk. And on top of that, the younger kids have a lower risk. I also want to jump off that comment and talk about that wider lens of risk for a second. We think about schools and child care. We often talk about the risk in the classroom, but not the risk of being out of the classrooms. Let me talk about kids who hadn't been in school for the past year.

Dr. Joseph Allen:

Millions of kids had missed school. This we have seen has led to extraordinary issues around mental health. Around loss and literacy. Around loss in gains. Around mathematics. So decrease in socialization. Increased weight gain. Less physical activities. It's critically important that the kids are in school and we actually know how to keep adults and kids safe in school. So I think that's the most important lens to put on all of this. Is to think about exposure risk broadly, and the importance of having these kids back in and back in schools and putting the controls in place to be sure they're as safe as can be.

Eric Schiff:

Okay. That's very helpful. Let's see. I have one for Donna and that is," How does Dr. DeSiato expect to utilize the federal funding available to combat COVID?"

Dr. Donna DeSiato:

We actually have a variety of strategies that we're looking at. Part of it is the areas that we upgraded for systems to make sure that we're sustaining the MAF-13 filters and all of the other. We did put in the HEPA filters of filtration. I believe it's an ultraviolet light system type of mitigation factor in all of our nurses' offices and in any area where we might have a student that might be taken to with regard to symptoms. We also are utilizing that for the purchasing of the types of cleaning products that we need and the masks that we're providing students, not to have their own mask. We provide the masks. So there's a whole series of both for the facility and the physical plant, but then there's also other strategies that we're also implementing for the federal funding. It certainly has come at a time in which it's much needed. By providing that it doesn't take away our school funding from being able to provide our educational programs.

Eric Schiff:

Let me follow up, Donna, with you. A listener writes in, "I'm concerned about lunch, crowded, no masks, indoors. What are you suggesting or what policy are you implementing in your school district?"

Dr. Donna DeSiato:

We're talking about lunch time?

Eric Schiff:

Yep. Lunch time.

Dr. Donna DeSiato:

In the cafeterias, we now have the three foot distancing. The amount of time that a student actually removes their mask is really pretty much very limited to just the time in which they're eating. We actually went through an entire school year, last year. At that point they were six feet. Now it'll be three feet. We were actually three feet for the end of the school year. We have not experienced that being a time in which the virus was transmitted in school, but we keep a very close watch on it. In the event we need barriers or other mitigating factors, we have put those in place where we do have the ability to take students outdoors.

Dr. Donna DeSiato:

We do that on a regular basis. And we do have picnic tables or other types of tables that we've put out for that purpose. We also encourage that they employ, like when they're coming through the line that they're seating, students like every other table or every other desk, in most of our cafeterias now. We have individual desks right now just to again, create a distancing and that they do every other row when they're first being seated so that when the child is removing their mask, they're actually at more of a distance from the other students.

Eric Schiff:

Well, I should ask Joe to pick up on that, because I think there are probably some elements he may not fully agree with, unless you comment.

Dr. Joseph Allen:

Well, no. I think it's a key point because this is the unmasked time, but I think the principles of exposure, you have to manage intensity, frequency and duration. I think that's exactly right. If the duration is shorten their mask list, if you have de-densified rooms, again, if you have the good ventilation filtration, it can be done. I like the idea of splitting kids out to pods, having somebody in the classroom, some of the cafeteria that's a de-densification approach, outside of course is the best thing you can do. As crazy as it sounds, we've been doing this with some schools, encouraging a little bit of the quiet time.

Dr. Joseph Allen:

So I've seen in schools, some of them are putting on a short movie for the 20 minutes while kids are eating and then they can be out doing recess, whatever, because it comes down to emission rates. So I think a lot of this depends not only in the context of what's happening in the school, but also in the surrounding community. The risk is going to be a lot higher if you're in an area with Delta and the case load is much higher and you have a lower level of vaccinated adult population and teen population. I think all these factors come in. It's hard to get a straightforward one-size-fits-all answer there.

Eric Schiff:

Okay. A couple of more questions. The next one is for Joe. "COVID is an invisible threat. Is there a role for tools like carbon dioxide monitors to gauge the need to increase ventilation?"

Dr. Joseph Allen:

Yeah, there's no question. For those who aren't familiar, we use carbon oxide all the time as an indicator of ventilation rate where the biggest source of CO2 indoors. This has been used for a long time in my field of industrial hygiene and building science. You can look at steady state CO2 concentrations to estimate the ventilation rate or the decay rate of CO2. I think it's really useful for that exact reason. That's a smart question. It's invisible and not only it's COVID or SARS, COVID 2, the virus that causes COVID invisible, but so are the building controls like ventilation and filtration. You walk into a room, you don't know that these improvements have been made. How can you make the invisible visible? Well, you can use realtime monitors, carbon dioxide monitors to show people what the CO2 concentration is, maybe to reassure them.

Dr. Joseph Allen:

In fact behind me, oh, it's on my desk right here. CO2 monitor on my desk. I'm embarrassed to show the concentration. It's way too high. It's over a thousand parts per million. I wouldn't have people in my office. This is a home office. With that level of ventilation. I do want to flag one important thing if you think about CO2 monitoring. CO2 is only a good indicator of the outdoor air ventilation strategy. It does not cover filtration.

Dr. Joseph Allen:

So remember we talked about the two strategies that work in tandem and can overlap, ventilation and filtration. Filters don't capture CO2. The particle filters don't capture CO2, they capture the virus. So you could have a situation where you had a classroom that had high CO2, bad for other reasons, high CO2, but because you have excellent filtration, you still might have a protected environment from the virus. So it's not so straightforward all the time. I see CO2 being used on social media in a little too simplified a manner, but done right it is a very effective tool to show that you're actually hitting your outdoor ventilation targets.

Eric Schiff:

Okay. Another question for you, Joe. Let's see. "For areas and places that refuse to wear masks and not everyone is vaccinated, what mitigation strategies do you recommend? More layers of protection such as HEPA and upper room UV."

Dr. Joseph Allen:

Well, let's be clear that the number one thing that has to happen is people need to get vaccinated. These are safe vaccines. They have the most studied, most highly scrutinized vaccines ever. They're safe and they have an impeccable safety record actually, and they're effective. They're reducing the likelihood that you get the virus and they are extremely effective at reducing the chance you get severe disease or death. So we need to start there. And I think it would be a mistake to start dropping to these other control measures without putting in the best control measures first. I've talked a lot about.

Dr. Joseph Allen:

For the past 18 months, I've talked a lot about the hierarchy of controls. It's a framework we use in the field of worker health and safety. There's a hierarchy for a reason. If you could, the first step is eliminating the hazard. If you could, "eliminate it through vaccines", the best strategy we have, then you can add these other measures, but start to pull back some of them. But to drop to the least effective measure first, any one of these measures and not use all of our top measures, really is hard for me to

even comment on that. We really need to get people vaccinated. We really need to put in the whole suite of measures to keep people safe, especially if we get through the Delta wave.

Eric Schiff:

Okay. So probably it's going to be one of our last questions. Let's see. I have a couple more here. Again for Joe, do you want to comment briefly just on operating costs associated with increasing either air changes per hour or of course filtration. Good filters use somewhat more energy to run than the weaker filters.

Dr. Joseph Allen:

Yeah, there's going to be an operating cost. Small increase in cost with the filter. You're going to pay an energy penalty and a cost for the higher pressure drop with the better filter, and bringing in more outdoor air, especially in the outside of the shoulder seasons. This is real and we have to think about the climate threat and we have to also, maybe that's another conversation on the sustainability side. The way I see it though, we're in the middle of an acute threat and that acute threat is a virus that has really devastated the entire country and world over the past 18 months. Both in terms of lives, but also livelihoods, crushed economies, those have public health impacts too. So the operating costs to me are a secondary concern when you're facing an acute hazard. In other words, I would never argue for energy conservation saving a few dollars on your operating costs and that increases risk to kids in the school. I think most people would agree with that.

Dr. Joseph Allen:

I do think coming out of this wave, we need to have a serious conversation of this so-called energy versus health trade off and how we can actually have both energy conservation plus healthy indoor environments. We can't just seal up our building envelopes, decrease ventilation rates, save tons of energy and cause these other health problems. So that's an area for the building science community in particular to focus on hopefully, as we get out of Delta at some point and get back to this question of energy conservation while still having healthy indoor environments. And I think for too long, those have been at odds.

Eric Schiff:

Okay. Just to follow up with one last question, sort of a broad one, but are there certain types of buildings that are especially good or bad for ventilation? Old, new urban, rural 70s, 50s, 90s, just your experience as sort of an expert on this.

Dr. Joseph Allen:

I've done work in a lot of different buildings. I think it's too simple to try and simplify it because I've seen old buildings that are great. I've seen new buildings that are terrible and everything in between. We're talking about schools. I would single out schools in particular for one thing, one, we've underinvested, grossly underinvested in our school building infrastructure. We're paying the price right now, but we've been paying the price for decades to be honest. The building standards are bare minimum standards. They're not even health based standards. On top of that, they're design based standards, not performance standards and schools aren't even meeting that minimum. For example, we talk about air exchange rates. The minimum target is about three air changes per hour. Most schools on average about one and a half. Some schools are down at one air change per hour.

Dr. Joseph Allen:

That's clearly unacceptable. Not even meeting the bare minimum and then throw in a pandemic and a highly transmissible virus. Those standards aren't even set for infection control, and now you have a major problem. So across the United States, we have a real problem with one set of buildings in particular, and that's our schools, which gets to the American rescue plan funds. We have a once in a generation opportunity to fix the neglected school infrastructure. There are funds available to do this right. I don't mean short term stop gap solutions like Plexiglas. We can put in the fundamental changes that are necessary to protect against COVID and other infectious diseases and provide a healthier learning environment for years, if not decades, if we do it right.

Eric Schiff:

Okay. Well, I think that's a great place to stop on the importance of investing in our schools. I want to thank Joe and Donna for really informative remarks and thank our listeners for sending in some stimulating questions. Let's wish us all improving conditions for the next year. All right. Thanks everybody. Bye bye.

Dr. Donna DeSiato:

Thank you.