KIMBERLY FUHRMAN: OK, good afternoon. We're going to go ahead and get started. We have a lot of information to pack into this hour. Welcome to Autodesk University and your first afternoon class, right after lunch. I hope you all had some caffeine or something, you know, keep you going.

This is Energy Analysis for Architects. You do not have to be an architect to be in here. We're glad you're here. But if you've realized that you're in the wrong class, I don't want to waste your time. Feel free to jump out and head to another class.

Yeah, my clicker's not working. Ah, technology. Gotta love it. Well, Dennis, I think we might have to swap.

DENNIS MCNEAL: Oh. Here you go.

KIMBERLY FUHRMAN: It worked at home.

DENNIS MCNEAL: That'll [INAUDIBLE] for you, too.

KIMBERLY FUHRMAN: OK. That'll just work? Is there a thing for it?

DENNIS MCNEAL: Oh, don't know.

KIMBERLY FUHRMAN: Sorry about that. We're looking for-- no. I don't see it. OK, speaker fail. You are the man.

DENNIS MCNEAL: Slight technological interruption. We'll be right with you.

KIMBERLY FUHRMAN: There we go. We can [INAUDIBLE]. Yeah, it's not on the right screen though.

Let's try this one. Gotta love it. Why am I not getting the right screen? Oh, nice.

There we go. OK, sorry about that. [INAUDIBLE]

OK, it's all going to go smoothly from here. I promise.

DENNIS MCNEAL: Smooth as silk.

Yeah, right. I'm seeing all sorts of stuff this morning. But my name is Kimberly Fuhrman. I'm the BIM manager at LSC Design in York, Pennsylvania. This is that narcissistic slide that they make you do, all the things that I've done.

And I'd like to point out, especially, that I'm very involved with AUGI. And if you don't know what AUGI is, the Autodesk User Group International, it's a great community. It's been around a long time. They have, actually, a user group area in the hub, and then they're also going to have a booth in the expo hall. So make sure you check them out and check out their membership.

Their general meeting is tomorrow afternoon at 4:30. You don't have to be a member to attend, so I would encourage you to check that one out.

With me today is Dennis McNeal. And I actually met Dennis last year up at Autodesk's office in Waltham, Massachusetts. Why can't I say that?

DENNIS MCNEAL: Waltham, Massachusetts.

KIMBERLY FUHRMAN: That's the one.

You could say Boston. Nobody would know the difference.

KIMBERLY FUHRMAN: I could say Boston. Close enough, right? And that was inside the factory, formerly Revit Gunslinger event. I found out that Dennis and I are both from Pennsylvania originally.

DENNIS MCNEAL: Right. York, Pennsylvania.

KIMBERLY FUHRMAN: And we had a lot of conversations about energy analysis and Insight 360. And so when I came up with the idea for this class, I immediately thought of Denis. Reached out to him because I knew he would have insight into Insight, right? And I'm really, really glad that he is with us today to help present this class.

So this is the summary. I'm sure you've all read the description online. And the learning objectives. These are the points that we're going to try to hit today.

And before we start, how many architects do we have in the room? Whoa, cool. OK, can some of you fix those lampshades? Because they're really bugging me.

DENNIS MCNEAL: How many engineers do we have in the room that want to be architects? Only one. Well, we'll talk to you later.

KIMBERLY FUHRMAN: Just a few.

DENNIS MCNEAL: Talk you off the cliff.

KIMBERLY FUHRMAN: OK, so why are we talking about energy analysis and architects in the same sentence? Isn't that an MEP thing? You know, aren't we leaving that to the engineers?

Well, here's the thing. You know, when we're early in design, when we're thinking of those schematic, those creative, you know, early mass buildings, you know we're not really talking to the MEPs yet about systems, right?

We're not really talking to the electrical guys about light fixtures, right? We're talking about mass buildings, maybe basic outlines or basic building shapes, the site, things like that. So when we're talking about energy analysis, we're looking at how we can look at the building envelope, the building construction, and how we can make the best building out of it, OK?

Benefits of early energy analysis. So when we're talking about the definition of early energy analysis, the process of analyzing a building's energy performance by calculating how well the integration of that building's form, systems, and envelope perform under the surrounding environmental conditions, OK? Very, very wordy definition.

I say, what is the best case scenario? How can we make the best possible building for our client, for the environment, and meet all of the owner's recommendations?

OK, so some benefits. Well, obviously, if you have a better building, you're going to have happier clients, right? You're going to give them what they wanted, hopefully, OK?

You know, we sometimes go into client meetings and we say, I understand your problem. Here's the building that you should have. In reality, the owner or the client should have some input because it's their building and they're going to have to live with it.

So what we can do with early energy analysis is give them some options, OK? We can say, OK, this is option one, and then this is another option. If you just do this, maybe you can save this in the long run, OK?

So you don't want to be on the receiving end of that phone call when the client finds out I could have put a little bit more insulation in my walls and saved on my heating and cooling costs, and the architect didn't tell me, right? So you don't want to be this guy up in the corner. You don't want to be Mr. Angry Client up there.

You want to make sure that you give your clients options. Let them make the choice. You can give them the most sustainable building on the planet, but, you know, unless it's what they truly want, they're not going to be happy with it. So you want to have Mr. Happy Client down in the lower right corner.

This building, by the way-- I just found it fascinating. This is right up the road here in Las Vegas. I forget the name of it, but it's actually a brain surgery institute. I want to say Lou something building. Google the image. You'll be able to find it. But I just thought it was a neat representation of a crazy building.

It is really dry in here.

OK, so another reason-- excuse me-- for early energy analysis, of course, is change orders. Any decisions that you can make early in that process-- they call it BIM. That early collaboration, sitting down with your entire design team, your clients, your users, your owners. And any of those decisions that you can make early on will help, hopefully, reduce your change orders in the field.

No guarantees. You're always going to have change orders. It happens, right? But any of those big decisions that you can make early on hopefully will help to funnel that construction time a little bit.

DENNIS MCNEAL: And, of course, those big decisions are easier to do early on, right? So if you find out some type of thing about your model late in a game, you're in design development or something and you find, gee, I could save a ton of energy if I rotated this building 15 degrees, it's probably too late, you know? Every project manager will look at you and go, that was a great idea a month ago. So these tools let you do analysis before you have a whole lot of information.

KIMBERLY FUHRMAN: OK, so then these all look familiar, right? LEED, WELL, Green Globes, codes, OK? We're always dealing with energy codes, with certifications and so forth, and they keep getting more and more stringent, right? So what happens-- let's say LEED v4 just went into full effect, where they just phased out 2009, so now any new projects that you register under LEED have to be

registered in LEED before, right?

So what are they working on now? Guess what? They're working on the next version of LEED, OK?

Same thing with your codes. They set out codes, and they're working on the next version. How can we make them better? So keeping up with those.

And personally, I'm a lead AP. I Love sustainable buildings. The building that you're sitting in right now, I found out this morning, between the Sands, the Venetian, and the Palazzo is the largest LEED-certified building on Earth. How cool is that? That's pretty awesome. So just a fun fact to throw out there.

But we're always dealing with codes. And this is just where I live in one county. We have different codes for neighboring counties, so we have to keep up with all this stuff.

So I have a couple giveaways, and I have two trivia questions for you. The first one without, Googling, because I know how you technology people are, is when was the International Energy Conservation Code established? What year?

I heard '90 something. Any guesses? It was in the '90s. I'll give you that one. No. I haven't heard it yet.

AUDIENCE: '95.

[INTERPOSING VOICES]

KIMBERLY FUHRMAN: I heard it-- '98. Who said '98? All right, you got it. Thank you for not Googling.

OK, and the second one was when was the USGBC established? US Green Building Council.

AUDIENCE: [INAUDIBLE]

KIMBERLY FUHRMAN: Good job, 1993. All right, you know '93 was in there somewhere, right? Yeah. So codes and certifications-- another reason to use early energy analysis.

But I'm the architect, I'm not the MEP. No, you're not the MEP. And we're not doing energy modeling, we're doing energy analysis, OK? So there are pieces of the building that when we put them together, the architect has the decision-making power with the client to make. So

you're looking at things like the building envelope, the glazing, and really, just the mass of the building itself and the orientation.

So that leads us into Autodesk Insight 360. I'm going to go through a couple of slides that show you the interface and the toolbars and so forth of Insight, and then we're going to cross our fingers and switch to a live demo and show you how that actually works.

So Insight 360-- how many of you have used some type of energy analysis software? OK, how many of you have used Insight 360? Quite a few. Good. OK.

How many of you used Green Building Studio? OK, you're all familiar with that.

OK, so Insight 360-- my experience at my firm, we tried some other energy analysis software. We felt like we were getting too far into that energy modeling line. It needed so much information, it was so detailed, it was cumbersome. And we just felt like we needed something not dumbed down, because we're smart people, but we just needed something that would fit our needs for that early schematic design.

So when I was introduced to Insight 360 last year, I thought a-ha, this is it. This is what we needed.

So Insight 360 is an add-in for Revit. It is included with your subscription or with your industry collection that they've moved to now. And it is an add-in that goes into your Analyze tab in Revit. So we're looking at the Revit toolbar right now.

And in order to run Insight 360, we start with the energy settings, and, really-- we're going to probably repeat this a few times-- the only thing you really need for the analysis is your location and a mass or building walls and levels, OK?

We'll run. We'll actually create our energy model. And then after that, we can go right into Insight 360. We can we can skip over everything else within Revit.

So when you set your energy settings, you've probably all seen this in Revit. And what they've done for 2017 is actually simplify the interface for the energy settings. So when you go into your energy settings, really, the first thing you want to set is your location. Like I said, the most important thing. When you go into your location then, you would put in your address of your site, which you would hopefully know, and then it will give you options for weather stations, and you can pick the closest weather station.

Now, I don't know, Dennis, if you saw it on the forums. There was a question from someone in, I believe, Guam. And their closest weather station was, like, across the ocean. So they were kind of questioning that.

Guam's, I think, is OK. I've seen problems where if it's in a country that's on a block list or something like that, they won't get a weather station. But there are literally thousands of them around the world.

And so there's a tremendous amount of engineering that goes on behind the scenes with these tools. After spending years with them, one of the things we continually ran into is that the tools almost seem too simple to architects. They look at it and they go, well, look at all these things, but how can I be sure they work? Well, there's a tremendous amount of engineering that goes into all this stuff. And real energy engineers, not just architects guessing at things.

But the climate data is-- you can select these from climate servers around the world. It's historical data, so it's as good a data as you can get. And that's just one of the tools. But there's a ton of cloud tools that get used here, and it all just kind of happens for you, which is pretty cool.

But takes it out of the way. So all you have to do is kind of focus on your building, kind of do a little vetting of your energy model. And really, literally, the only setting that you have to set in Revit is your location. If you don't set your location, your model will be modeled in Boston, Massachusetts because that's where Revit's made, so they were kind of partial to that.

And it is interesting, because we used to see the statistics. Since it's a cloud application, we see results of all the analyses that happen. You know, where they're run and all this kind of stuff. Get a tremendous amount of buildings being modeled in Boston, Massachusetts for some reason. Go figure.

KIMBERLY FUHRMAN: So then moving down the energy settings dialog here on the left, the next section is your energy analytical model, and this is actually relating to your Revit model. So the first one is the mode, and that gives you options to use either building elements or conceptual masses or a combination of both, which is rather unique, I believe, to Insight 360.

DENNIS MCNEAL: And if you use the combination, you'll never go wrong, because any element in Revit that can be used in energy analysis will get utilized. So it's not really overkill, it's just easy.

KIMBERLY FUHRMAN: And everything else I usually leave as default. We have the ground plane at level 1, which is typical unless you have, kind of, a weird site. I don't know, our here in Las Vegas everything's pretty flat though, right?

DENNIS MCNEAL: Yeah.

KIMBERLY FUHRMAN: You have your project phase, which is typically new construction, but you can also run an analysis on an existing building.

DENNIS MCNEAL: Yeah, and that can be important sometimes because the analysis will do anything from that phase back. So if there is, like, a future or phase one, phase two, and you're in phase one and run your analysis, phase two will be ignored altogether. So that's the only kind of critical thing about that.

KIMBERLY FUHRMAN: And then the analytical space resolution is just how much of a gap that Revit recognizes as a space or before it, to close the space. Same thing with the surface resolution-- how wide of an area you have before it recognizes it as a surface.

DENNIS MCNEAL: Can I geek out about that for just a moment?

KIMBERLY FUHRMAN: Go ahead.

DENNIS MCNEAL: Yeah. So that's really about the fineness of your energy model-- how accurate are the spaces and services that get made? Now, "accurate" is probably not a good term because in energy-modeling land, a super accurate, fully closed model is not necessarily a more accurate energy model.

So what you can do in Revit is you can use these values that will leave some gaps and things in your energy model. When you look at it, you go, oh, look, there's little spaces in between this and that. That doesn't matter at all because it's a very small amount of area and volume that gets lost in those things. It makes, almost always-- so you can pretty much count on always-- no difference in the accuracy of your analyses. But if you crank those values up to their maximum and you have a sizable building, it can take a long time to run your energy analysis or a long time to make your energy model, and it's not really necessary.

So that's why those are in there. You can tweak them, and usually, if you tested enough models like I did, you find a range that tends to work really well for different model sizes and

so forth. But you can pretty much leave those alone for the most part. Not really necessary.

And like Kimberly was saying, the settings here-- the reason that there are all these settings in Revit is prior to Insight 360, the workflow was you would go into Revit, you'd make some energy setting changes, you'd run an analysis, it would come back, you'd go, oh, maybe if I did this, and then you'd go try some other things, and you had to keep doing this kind of guessing analyses, right? One at a time. And going in and out of all these dialogs, you had become kind of an expert on what all those settings were. Kimberly will explain that Insight 360 removes the need for you to do that altogether, but they're still hanging around because it's Revit, and Revit keeps everything. Legacy.

KIMBERLY FUHRMAN: Yeah, they like to hang onto things.

DENNIS MCNEAL: Yeah. People get attached to stuff. You know, you take it away from them, they don't like you after that.

KIMBERLY FUHRMAN: The advanced energy settings-- if you're working in older versions of Revit, you'll probably recognize these were actually in one dialog box, one long dialog box originally, and now they've kind of split it out. So you really don't have to go into the advanced energy settings at all in order to run Insight 360. Probably the most important item on this dialog box would be your building type. Other than that, you can really use the defaults for everything else.

Your HVAC system. Maybe you're early enough in the design phase you don't even know what the HVAC system is going to be. Outdoor air information-- if you go into that, it brings up another dialog box. It's already set at the minimum code of 15 CFM per person, so there's really no need to mess with that unless you know exactly what you're going to be doing.

DENNIS MCNEAL: Yeah, that's a good point, too, that the default settings in energy settings is roughly ASHRAE 90.1. So, you know, it's just this side of breaking the law. So that's where you start from, but you'll see when you look at Insight 360 that you wind up with a whole range of performance that you can set in your building.

KIMBERLY FUHRMAN: So once we have created our analytical model, we've set our energy settings, our location, then we can switch to Insight 360. And what you would do is hit the Generate Insight, and it will pop up with a message and it'll say, OK, I'm going to run Insight. I'll send you an email when your Insight is finished.

And so you go back to doing whatever you need to do, you get your email, and then you would open Insight 360, which will take you to an external website. And the top of the website will look like this. It will have your analytical model, and then in the upper left corner is a little circle-- you'll see right now that it's yellow or orange-- and that is your energy cost mean. So that little guy is what you want to keep your eye on because that is the potential savings that you're creating with your building model.

DENNIS MCNEAL: Yeah, I think it's dollars per square meter.

KIMBERLY FUHRMAN: Yes.

DENNIS MCNEAL: So basically, right now, this building is $17.4 per square meter in cost. And as you improve your performance, that number decreases. And then the button gets happier. It turns to yellow and then green. And I don't know what happens if you get to 0. It might explode or something.

Yeah, so just to geek out again a little bit, what actually happens to get you here is you have Revit, and you have some settings in Revit when you send off this energy analysis, right? And that's basically the default.

And what we do, or what Autodesk does, is sends that analysis to the cloud, and then it runs algorithms. Runs algorithms that runs a energy whole building energy analysis basically over a period of a year. 24/7 analysis. So its whole energy systems.

It's calculating fan loads, electrical, lighting power density, all these different things, but it calculates all the options it knows about for those things with each other, so it does these giant matrices of analyses. It runs hundreds of analyses of your model based on that one model and its geometry.

So what's happening now is Revit is kind of responsible for the geometry side. So you build your model. You kind of define a geometry.

And then the cloud uses all these other options in these matrices of analysis. And you're going to see in a minute all the options you get back out that will show you things you can do with your model to improve its performance. So what it does is it totally removes the need, unless you're changing the geometry of your building, to keep going in and out of Revit, changing settings and trying something out. So it does all that work for you, and that's all cloud stuff.

So another little insight is that energy analysis was the first cloud application in Revit. And so now, you know, Autodesk is all about the cloud, but this was one of the first things in Revit that was ever done using cloud.

KIMBERLY FUHRMAN: And also, this model is live. It's not connected to your Revit model, but you can navigate it just like your Revit model. You can rotate it, you can cut sections, and take different views of that, as well.

So them below that, on the same page, then you start getting into the widgets, which is a fun word. But on the top left here is the benchmark comparison. That number, that 17.4-- that's your energy cost mean duplicated from that little circle up in the upper left. But this gives you the benchmark comparison of that number versus the ASHREA 90.1, which you can see in this example, we kind of made that.

And then the bottom line, if you can barely see where it says it's the Architecture 2030 challenge. Does everybody know what the Architecture 2030 challenge is? I'm seeing some nods. Yeah?

OK, so it gives you those two benchmarks, and the goal is to get that orange-ish color to green. So the further down you move in that benchmark comparison, you'll see those colors turn toward green.

The second box in the middle top is your model history. So as you're going through Insight 360 and you're making changes to the analysis, it keeps a record of what those changes were. And that also is an interactive bar. You can go back. You can take that model back to a certain point, and just make comparisons and scenarios between those model changes.

The rest of the widgets-- and there are quite a few; I'll show you when we get into the live demo-- are all of the options that you have to mess around and play with and see how these changes affect your energy model. So in the top right corner, you'll see a little arrow. It opens up to a description of what each of these options are, and then when you click on the arrow, it actually flips the widget to give you a chart or a graph of what the other options are, and maybe what your savings could be.

So it's kind of hard to see. There's actually a grayish tone to the chart. So as you narrow that down and if you make changes, then on the right side--

I've narrowed it down to actually zero glazing on the south wall to get to green, 6.77. Probably not what you're going to do. So it's finding that right combination of all of widgets-- maybe you're making little changes here, little changes here-- and those changes combined then will drop that number down to green.

DENNIS MCNEAL: Yeah. So each one of those little points, whether circular or triangle, represents an individual run that was done on the model. So on some of those, you can glance at these charts and you can see at a glance how much change you can impact on your building by changing, say, southern walls or whatever.

And what happens to me fairly often is I get surprised. You know, as an architect, I almost always think, gee, if I had insulation, that's the bomb. That's going to make my building so much better. Or if I improve my glazing, that's got to be really big impact on my building.

And these charts will sometimes show you that that's not necessarily the case. That you're probably going to be better off looking at some other things, like possibly lighting power density or plug loads and things like that. And it kind of depends.

But they might surprise you sometimes. When you look and you go, oh my, there's almost no difference between a single pane of glass and a quad glazing in my building in terms of performance, or very small differences. But it will help you. These tools, the way I'd like to think that they would get used-- the way we would hope you would use them-- they're the start of a conversation. So they're a conversation with your owner, they're a conversation with your consultants about impacting these things.

So you're looking at lighting power density. I don't know how many of you all know how to get to low lighting power density, but you probably need to have a conversation with your consultant at that point to how do we do that? Can we really get down to this low wattage on this building, or is it more realistic that we look at a range that's a little higher? And that's what these tools will do for you.

KIMBERLY FUHRMAN: So at this point-- oh, the results. Once you make all these changes, when you go back to your analytical model, at the top of the screen, you'll see that those changes have affected not only your energy cost mean, but maybe the colors on your analytical model. And then, of course, your benchmark comparison will drop, as well.

And there you can see just the changes that I made in that particular model dropped the

energy cost mean down to $4.39. Maybe it's feasible, maybe it's not. Maybe it's what the client wants, maybe it's not. And that's a discussion that you have to have, OK?

How many of you have had clients that said, I want higher energy costs and really high electric bills? But they all say, I want a cheaper building, right?

DENNIS MCNEAL: Or I want an efficient building no matter how much it costs.

KIMBERLY FUHRMAN: Right.

DENNIS MCNEAL: They all say that.

KIMBERLY FUHRMAN: That's true. So it's finding that balance, it's having these discussions of what the client wants, how much energy efficiency they want, and not only giving them the options, but also showing them, maybe, the return on investment. If you do this, then 15, 20, 30 years from now, it'll be worth it. So having those discussions.

All right, I'm going to switch-- everybody cross your fingers.

DENNIS MCNEAL: We need a drum roll.

KIMBERLY FUHRMAN: We're going to switch to the live demo. All right, mouse works. That's a plus.

DENNIS MCNEAL: There is where you always say, you know they tell you never to do a live demo?

KIMBERLY FUHRMAN: Yeah.

DENNIS MCNEAL: We do it anyways. All right.

So Kimberley's showing, basically, just a mass model. Any Revit element will work with this. And you don't have to use these tools just at the beginning of a project. You can use them at any point with your Revit model. So you can use normal Revit elements.

The only thing is is they just need to be room bounding, which most Revit elements are by default. There are some that aren't. If you do this enough, you'll start becoming aware of which ones don't work that way.

But since she has it set to the combined mode, if she had walls and roofs and things like that in there, they would get used as well as the massing. And the only other thing to say about a model-- if you ever talk to an energy engineer, people who, like, to make these energy models, they take your Revit model and they try to duplicate it as an energy model and model it up. And they have to make these perfect models that are seamless.

They're all tight seams. They can't have a single gap in them whatsoever. They just fail. And that's the history of energy modeling.

This tool throws that on its head because we only need you to make a model that's reasonably closed. And the secret is there's little gap measurements that we have in the energy settings. You can go about two times those values with gaps in your model, and Revit will still make energy models for you.

So it doesn't have to be a perfect model. If you're missing a floor, all the energy leaks out into the environment and you can't make an energy model with that. But if building has walls, floor, and roof, you can make and energy model or just a mass like she has here.

KIMBERLY FUHRMAN: And actually, this is a combination.

DENNIS MCNEAL: Oh, you have roofs? Oh, I see one now.

KIMBERLY FUHRMAN: Yeah, I do. So this area over here is the conceptual mass with mass floors applied, which you need to have for your energy model. And then this little piece here-- just walls. Simple walls, roof, floor.

And then, of course, I have used both conceptual masses and building out elements. Everything else I've left the same. Baltimore, Maryland just because it's what I know. No special reason there.

DENNIS MCNEAL: It's a good town.

KIMBERLY FUHRMAN: Yeah. So once I have those energy settings, I can create my energy model, which I have already done. And I'm going to switch to that. So this is your analytical surfaces. And you can see that it has applied the perimeter zones around the edge, as well.

DENNIS MCNEAL: Do you want me to talk about--

KIMBERLY FUHRMAN: Sure.

DENNIS MCNEAL: --how this is done? So yeah, I had the pleasure of working with the geniuses that did this stuff, and these guys are brilliant, these developers at Autodesk. So what they what they do is they come in-- so imagine we're making an energy model and it includes this room. They use a technique that they developed called voxel grids.

And basically, if you thought about a virtual box, and it starts somewhere. And what they do is with the program, they start somewhere in a model and they start putting boxes in the room. And they fill the room up with as many boxes in all the directions as possible. And when they get to the outer edges, bang-- they make an analytic space of that room.

So this space would have a big box, and then from that box, they derive all the analytical services. So floors, walls, ceilings. And depending on whether there's another room on the other side or whether there's air on the other side, that determines whether that surface is an interior surface, an exterior surface. And then, of course, they have your building model, so they know what its orientation is.

And then all those things are used when we make the energy model and send it out. And when it gets sent out, it actually gets bundled up into a gbXML file, which you can give to an energy engineer to use to build a model of their own if they want to. And goes to Green Building Studio and to climate servers and [INAUDIBLE] servers, and it uses all these different servers at the same time and runs those hundreds of analyses for you. But all you do is you just have to make a reasonably closed model, and then it does all that in the background.

KIMBERLY FUHRMAN: So this is really all I need to create my insight, send it to Insight 360. So for some reason, my Insight panel keeps jumping over here to the right, up in the upper right corner, if you can see it.

DENNIS MCNEAL: It likes to stay there.

KIMBERLY FUHRMAN: It does like to stay there.

DENNIS MCNEAL: Sometimes it gets really small.

KIMBERLY I like it over here.

FUHRMAN:

But I would click the Generate Insight. I'm not going to do it because it does take a little while to process. Through the magic of technology, I have already run the insight on this--

DENNIS MCNEAL: And it's kind of like cloud rendering. So it sends it, and then you can get back to work. So it doesn't tie up your machine generating the energy model. You don't have to wait for it to be done. So it literally takes a couple minutes.

KIMBERLY FUHRMAN: OK, so then once you get the email, then you can jump right into Insight 360. And so this is the energy model that we have. And you can see right now, it's pretty high. It's up there at $21.7 per square meter per year.

DENNIS MCNEAL: Oh, can I ask a question--

KIMBERLY FUHRMAN: Yeah.

DENNIS MCNEAL: --just before we get away from the energy model? Does anybody think it's weird that there is a physical representation of the energy model? I mean, it's not a real thing, right? So that was something that got struggled with when we developed these tools. Because for a while in Revit, you couldn't see the energy model. You just had to trust us that it got made. We would never do you wrong.

But the whole reason that we made it is because the one thing that we wanted you to do is to vet your energy model. To just look at it and go, yes, that looks like what I would expect to see for surfaces in my building and spaces in my building that participate in energy use. Or these spaces are not part of my energy model, and so I don't want to see them as energy services. So that's the whole reason that that thing is there.

And we try to put it in the background a little bit, but it is part of this process, this workflow. Yeah, you just have to make, kind of, a Revit model and send it off, but you do want to take a look at your energy model in your project, and make sure that you're getting what you expect. Because perhaps you didn't send a wall up to a roof on a gable of your building or whatever, and all the energy in that space leaked out, and you didn't get an energy model for that part of the building.

So it does help you troubleshoot your models a little bit sometimes. Oh, look, I'm missing a

floor in this whole side of the building. Didn't realize we hadn't done that yet.

But besides that, it is just a way for you to look and compare what kind of volumes and services are getting done. So in Revit, you get a 3D energy model view made automatically by the tool, and you also get schedules for your energy surfaces and your energy spaces that are made that give you area and volumes and things like that. So all those are just so you can look at your model and vet it to have some comfort that the energy model that got bundled up and sent out is a fairly realistic version of what you did.

AUDIENCE: [INAUDIBLE]

DENNIS MCNEAL: Yeah, I basically do two things. I will generally go into the energy model, and I will just isolate the energy spaces. And I use that as just my overall-- did my overall volumes of the building get captured? And if I look and I'm missing some spaces, that probably meant that I had a leak in the model somewhere, and there's something over there that's not causing the energy model to get made for that bit. And then I'll go back and I'll try to find that and fix it. Sometimes that's a little bit of looking around. So that's one thing you do, and that kind of gives you an idea of the volumes.

And then secondly, and actually way less important, to look at the individual surfaces. You see the colors on the model there. The green are the exterior walls, and the roof's a different color. And that's actually the surface, and Revit has a material color assigned to that.

So you can check that, but in reality, if you have a wall that's called a roof or something like that-- and sometimes you'll get in those kind of conditions where you have sloping walls or sloping roofs, that Revit will misidentify one as a roof instead of a wall. Doesn't really matter because the energy analysis happens the same way through that part of the building. So those are a little less important, but primarily I recommend just going and looking at the energy analytic spaces, and making sure that the volumes of your building is getting captured. So you want to make sure that you've vetted it that much at least.

KIMBERLY FUHRMAN: OK, so we have about 15 minutes left, and I just wanted to show you how the widgets work. Now, here is your benchmark comparison. The model history, so you can watch this change as we make changes to the energy model.

And the widgets-- how they work. If you click on the arrow, it flips. And it's really hard to see on the screen-- looks a lot better on my laptop. But the values for building orientation, different

angles, are listed at the top.

The triangle shows where the model is right now, OK? So you'll see it called BIM. That's what your model is showing.

You can see that from this chart, rotating the building probably isn't going to be cost-effective for you, OK? So you can narrow down his choices. If you click anywhere in one of these widgets, which is what I just did, you'll get a new window. Shows your energy cost mean.

And then as you make changes, you can see that it updates. We'll bring it down. And even if you narrow it down just to where the model is, you can see that value has already changed.

DENNIS MCNEAL: So you see you get that dollar value in the widget, the 20.4. It's real easy to focus on that, and go, how do I know that my building is going to cost exactly $20.4 per square meter? You don't.

So the important thing to understand is that you're talking about ranges here. So what's a relative range? And from an architect's point of view, what you want to know is where can I make the most impact in my model for energy? And so don't take the dollar values too literal, although they are pretty accurate. But we all know that there's a lot of things that impact the energy use in a building, and how much energy dollars you're going to spend, including how the owner runs the place.

So that's why you have these ranges. And so there's a temptation to grab all those ranges and slam them right over to maximum impact and go, look what I did. But what you want to be thinking about is is this a good thing to do? Is it a relatively easy thing to do?

What are the impacts outside of energy? Yeah, maybe you'll save a few dollars if you go to quad glazing, but are you really going to buy a quad glazing on your building? And would it be better for me to focus on one of these other tools that has a much higher payback value?

KIMBERLY FUHRMAN: I would be cautious showing these values to a client simply because of that dollar figure attached. You want to make sure that you have that disclaimer-- that you're not actually going to save $4.23 every time. Give them the ranges and say, OK, you'll have a better result with this than you would with this. but kind of leave it vague for them so that you're not tied into any specifics there.

So just going through, there's really not a whole lot. These are all pretty flat. But you can see what some of the options are-- your infiltration. Lighting efficiency-- OK, there's a pretty steep

one.

DENNIS MCNEAL: Ding, ding, ding. We have a winner.

KIMBERLY FUHRMAN: Winner. So if I click on that widget and bring it down-- well, let's bring it way down. Now, that's your lighting efficiency. So you may or may not know what that is. You can choose let's go-- what is it? 3.23 watts per meter squared, or you can just bring it back, maybe, to what the model is at the triangle, and still adjust your energy cost mean that way.

Another big one is always the plug load efficiency. There, again, you're probably not going to know exactly what that is, so probably choosing a safe middle range is probably pretty good. Operating schedule-- that can greatly affect your building efficiency. You may or may not have a choice in that. That might be dictated by the type of building that you're creating.

HVAC there, again. If you know the system, great, you can put that in. There's quite a few options there. If not, you can just leave it as it's modeled.

And then the panel efficiencies. Dennis, do you want to explain these? This has to do with actually putting the PV panels on the building.

DENNIS MCNEAL: Yeah. So panel efficiency-- so they have three different variations on those. And you can see on that chart that there's not a whole lot of energy impact difference in this particular model from panel efficiencies.

And then you've got payback. Basically, the payback limit is if you're willing to push your return on investment out further, then you can see better payback for your energy. So these tools are kind of the first start of adding the renewable energy side into the energy analysis, because in almost any building that you do, you're not going to be able to get down to, say, net zero by just saving more energy. At some point, you're going to have to make up a difference with some renewables to get down to net zero.

Because that's the whole 2030. That 2030 guideline, by the way, is is accurate to the year, so it's the current year guidance is what it's giving you feedback on. So next year, it's a little bit more stringent until we get to 2030, and then it's basically a net zero at that point.

So I know what the team was talking about doing last time I talked to them is that they wanted to add more renewable options into these tools. And they also wanted to do a lot more around operating schedule, because Ian Molloy at Autodesk, who's an energy engineer, likes to blow

architects' minds by telling them that the building type doesn't matter. And they go, what do you mean it doesn't matter? This is an office building. I've got to set it as an office building.

Oh, and by the way, it's got retail on the first floor. I got to set that for that. And I have apartments up in the upper floors. I got to set that at that.

And he says, you can't do that. Revit just won't let you do that. But it will run different operating schedules for you. So what you want to do is find the closest operating schedule to what your building runs at, and that is essentially your building type. Kind of weird, but in an energy engineer's mind, it's true.

But they want to expand those tools to have more options, because right now, they don't have quite enough options, I don't think. And one cool thing is since this is a cloud tool, it gets updated all the time. You'll come in one week and look at it, and they'll have certain values and settings, and you'll come in a week later and look, and they'll have added something that gives you more information. So they don't have to wait for a release schedule to update these things. It's just kind of like your phone. They get updated all the time.

KIMBERLY FUHRMAN: So the last thing I wanted to point out is as you're going through adjusting the widgets and so forth, if you hover over the dots or the triangles, it will actually give you a value of how it's going to affect your energy model. So in this case, if we use a 1/4 window height shade on the east wall, you can save $0.07. It'll drop your energy cost mean $0.07. So that's just another helpful tool as you're going through to see if the impact is going to be as effective as you need it to be.

So while Dennis was talking, I was very rudely going around and just kind of adjusting these, just to see how we can get it to be, maybe, a little bit more efficient. Not quite getting it to green, but I've definitely made well past the ASHRAE 90.1. Getting closer to that Architecture 2030. Hopefully, maybe with a few more changes, I could actually hit that benchmark if that's something that we're looking for.

But while I'm going through, I can save different scenarios, and those are the scenarios that I can take to the client. If you have two or three different scenarios, that's probably sufficient, because once you get past that, you're not going to have much difference in your energy analysis results. So that's one thing that you can do.

You can also, like Dennis said, export the gbXML file, and take that into an energy modeling

software. Send that off to your MEP.

If you put a little bit of time into this, and you're building is close to what it's going to be, just think of how much time you've saved the MEP engineer when they go to do their energy modeling. You can give them the Insight 360 results and say, this is what we've come up with. You guys take it from here. We're not going to cross that line into energy modeling. We'll let them have that fun stuff.

DENNIS MCNEAL: So you've probably figured out by now that these tools are not a substitute for detailed energy modeling. This doesn't give you a license to be an engineer, but it does give you some talking points. So what I recommend is that you do the Insight 360s early and often.

So do them early in your modeling. Get some talking points. Let it help shape your building. And then as you go on in the model, as things change, repeat. Because it's very quick-- you can literally go through all those widgets in 15 minutes and get some actionable direction.

And that's really what it's for. So your energy engineer doesn't have to worry that he's being replaced by a computer or anything. And this is definitely not detailed energy modeling, it's just simple analysis for architects.

KIMBERLY FUHRMAN: Again, it goes back to what's my best case scenario to meet the clients' needs, to meet codes, to meet certifications, and to make a better building? Workflow process-- so we're talking about how do we do this? When do we do this? Who in the firm does this work? And now what? Happy clicker.

So how? We showed you with the Insight 360 tools. Very simply running your basic schematic design through energy analysis, Insight 360. When? Dennis just said it-- early and often.

And you can do it at different stages in schematic design. You can also continue it through your construction documents if you prefer. You're probably not going to see a whole lot of change, but maybe just for a checkpoint you can run it again.

Who runs the Insight 360? This is probably going to be one of your project architects or your senior technicians-- somebody who understands what the impacts are of the changes that you're making to the model. There, again, you're not affecting your Revit model, so any decisions that you come up with in Insight 360, you'll have to actually go back and change your Revit model to match those.

And now what? Well, hopefully, you've learned something today that you can take back to your office. There are lots of resources. I have these as live links in the handouts that you've downloaded. And also, the PowerPoint will be available after the presentation, or after AU.

So feel free to reach out to us. Did everybody get something out of this that you can take back? Yes? I see lots of heads nodding. Good. I think we did our job, Dennis.

DENNIS MCNEAL: All right. Thank you.

KIMBERLY FUHRMAN: Very good. Thank you all. Don't forget to--

[AUDIENCE APPLAUSE]