

COMcheckBasics.wmv

Transcription

SLIDE 1

This video is brought to you by the U.S. Department of Energy Building Energy Codes Program. My name's Pam Cole from the Pacific Northwest National Laboratory and I will be going over *COMcheck* Basics.

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So what is the *COMcheck* software itself? Well, it's an energy code compliance software tool and it's all based around the national energy codes. However, to get a little bit more understanding of the tool itself is to know and understand a little bit more about the commercial energy code and what's included within that code and how it's implemented within the tool.

So on the left hand side it talks about the building systems. These are systems that actually are separated out by the actual code: Envelope, HVAC, Service Water Heating, Power, Lighting and Other. There are also mandatory provisions so there's ways you can show compliance to these provisions in the codes and again, then there's mandatory that regardless of what compliance path you take there are provisions that have to be met regardless.

Those compliance options will start out with prescriptive which is very basic: meeting some prescriptive tables, you might not need a software to do that, you could probably do it by paper depending on how complex the building is.

Then there's the tradeoff option which allows you to do tradeoffs between components, between lighting applications.

And then there's the Energy Cost Budget method which is entire, a whole building analysis of the entire building, which would include your envelope, lighting, mechanical, service water heating, all in one package and you're looking at the entire building as a system.

Then there's the simplified compliance approach. What *COMcheck* is, *COMcheck* works between the prescriptive and the tradeoff and is more of a, less of a tradeoff approach type tool. Each system is treated separately, meaning envelope has to show compliance on its own, the lighting would have to show compliance on its own, and mechanical really isn't a pass or fail in *COMcheck*, it's just a really simplified way to show your mechanical systems and the more detailed the system is, the more information will be pulled from the applicable code that you're dealing with that will provide the additional provisions. It might be required based upon the system that you've entered.

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So where can you go get *COMcheck*? This is a screenshot out at energycodes.gov, the building energy codes website, and there's a couple ways to get to *COMcheck*. There on the left hand side, is basically how the program is broken out into what that program does, which is development of codes, adoption,

compliance (which is the software tools), then there's regulations and then there's a resource center that has other training materials and so forth.

But where you can get to *COMcheck* on the left hand side is by clicking on the compliance navigation and then you can get into *COMcheck* that way. Or on the right hand side under popular links because these software tools actually are the popularist ones for Building Energy Codes program is that you can click on *COMcheck* right from there.

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So when you get to the *COMcheck* page, here's a screenshot of what that page has in it. So there is a windows tab, the *COMcheck* web tab, and the technical support tab. So what does that mean? There's two software, applications, that *COMcheck* can be used on. One where you can download it to a Windows System and then on this tab it's telling you what codes are supported. It'll also when there's a new release and what represented—if there's any new features or information that would be valuable to that user, we will place it there.

COMcheck web doesn't require a download. You can go out there, register yourself with a email log-in and password, and start saving your projects electronically.

Then the technical support tab is another important tab because this is where if you want to go to the technical validation, the underlying assumptions of how all of the components and methodologies are calculated within the tool, then you can go to that technical support document. Of if you're looking that you have any questions on national codes or implementation of a certain building or an assembly, you can get to our helpdesk and submit an electronic question through our helpdesk system.

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So I talked about the two different tools and here's the screenshot of them. I will be demoing the desktop version, but this screenshot shows you in the left upper hand corner is a basic screenshot of the desktop. Then on the right hand side is a screenshot of the web tool.

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What makes these two tools really unique is that the data can be exchanged between the two. For example, if I'm out there and logged into the *COMcheck* web, and this is a screenshot of being logged in and I have a project saved, example here is Denver, and let's say I want to upload that project, not save it to our servers, but save that data file to my desktop. I can do that. I can do both and then let's say maybe the internet might be down, whatever it might be, but I have the desktop version installed on my computer. I can upload that saved project file onto my desktop version and use as though I could use it the same as on the *COMcheck* web so it makes it a pretty nice feature.

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So with *COMcheck*, again this is just the basics of *COMcheck*, there's really a lot involved and a lot of it is code dependent. But the basic steps are: is enter your project information, enter your building components if that's applicable to you, it might be that you're just doing lighting design and that would be the next step, and/or mechanical, and then the requirements tab which takes you through all of the

other mandatory requirements and validating whether they're going to be met or not and then viewing and printing and saving that project. Again, not all of these might be applicable. For sure you would have to enter your project information, but maybe you're only doing building envelope and you have a lighting designer that's doing the lighting portion, that's fine. Maybe you share the file. The big plus about the COMcheck web tool is that you can have other designers that are involved in a project enter their information for their systems and save an overall one compliance report. So that feature makes it really nice to use the web tool where you wouldn't have to send a data file, but you could compile the entire thing. But here's the basic walk through steps. So let's go through these.

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So what is the information you need to have in front of you? Before you even get started, you need to have your take-offs and what does that mean? You've got to have the building plans in front of you or at one point be looking at the building plans and doing your take-offs and having the whole summary of your take-offs on a piece of paper or whatever it might be, spreadsheet. You also need to have those insulation, which are the R-values, fenestration, your U-factors, solar heat gain, you need to have those values and those typically come from your specs that are based off the plans or they could be on the plans.

If you're doing lighting, you need to have the lighting fixture details. You might have to have the manufacturer catalog to go through and find the manufacturer ID, but the best place to start, and hopefully before you start entering it, you have the full summary of the lighting fixture details.

And then if you're doing the heating and cooling system, you want those details as well so you can start entering them. Service water heating, same thing.

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So as we're talking about project information, there are several different tabs within COMcheck and I'll be showing you those. These are basically just some screenshots to go through and get you started for a flavor of what I'm going to show you when I get into the actual software. So the project screen. The first thing is you need to make sure you're on the appropriate code. There are several energy codes that you can choose from within COMcheck and then there's some state specific ones. And you might be working in several different locations. The next one is, as I mentioned, location. That means the city and/or county. In the web tool, it's quite easy to choose your county designation. In the desktop tool, the choice is, it defaults. It only has the city option. So pay attention to that one if you're working in county designations.

The project type is where you're entering *Is this new construction? Alterations?* So forth. Then there's space conditioning type. Project details. And this sounds like a lot, but when I show it to you, you'll see it's not a lot of detail. Then you go into building use, exterior lighting area applications and then preferences.

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So as I say select the appropriate code and what that means, here yet again is another screenshot that takes you out energycodes.gov and there is a link within the tool if you're not sure what code is

applicable in a certain state or location, you can click on that link and if you're connected to the internet, it'll bring you back out to this page and you can select the state from the dropdown menu where it says select state. But the purpose here is to show you if you're looking at this map, not every state adopts the same code, same version of a code, and some states have state specific codes. So you need to be very careful about knowing that the code that you're showing compliance to is the one that that jurisdiction is enforcing.

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So with project type as I mentioned, what that means is defining *Is this new construction? Is this an addition? Or an alteration?* With commercial buildings, it gets a little bit more... a lot more questions when it comes to project type. You could have multiple things going on with the building, meaning you could have an existing building where on the North side you're doing an addition, and on the South side of that of that building you might be doing a whole wall replacement. So how do you do that all within the software? These are some questions that do come in and there is different ways you can go about that. You might have to have several reports, but it's understanding really what that building is at first before you start going through the path of entering your components envelope and/or lighting.

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With that, there is a different way of calculations happen that are different than new construction or an addition. With new construction, on the envelop side, you're entering the entire building envelope. For an addition, you're just entering those new, enveloped components. But for alterations for envelope, this is where it changes the calculations and really it's based on individual components on a case by case basis. So it is only the portions of the building, that building envelope, that you're touching. Or for lighting, it's only the space that you're renovating. And there are exemptions that apply. The same would have to do with mechanical equipment. There might be some exemptions that apply to mechanical if it's a replace like for like. And I'll show you just very quickly some of the differences between the alterations features that are in the tool versus new construction and addition.

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Again with the alterations, just another helpful hint is that there are some exemptions that can go and are code driven by depending on what alteration type you're choosing. For example, let's say I'm doing a roof replacement but I'm not exposing down to the trusses. Then you might be exempt from having to meet the energy code for putting in additional insulation in that roof area. That's one example. Another one is, as I mentioned, the compliance pass or fail. With alterations completely different. With new construction and addition, you're going to get a percentage pass or fail overall compliance result. With alterations, it's a strict pass or fail because each individual assembly on the envelope side has to either meet or not meet. If it doesn't meet, then you need to figure out how you're going to get that assembly to meet code. Lighting the same thing. It's a pass or fail for that space that you're dealing with. So you don't have tradeoffs really to speak of when it comes to alterations.

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Space conditioning. Space conditioning in the project tab means, *Is this a non-res building? Is this a residential building?* And residential means high-rise residential: greater than three stories, multi-family

building that has more than three dwelling units. *Or is this semiheated?* And when I say semi-heated, I have this option here], but this isn't applicable to every code. It means no mechanical cooling, but it's only an option if you were to be showing compliance to ASHRAE 90.1. Then there's other things that might be applicable such as versions that are applied to only one type. There is a majority space floor rule and I'll get into that as well. But these space conditioning types, you could have all three in your project. And the way COMcheck, the baseline is set up is that it goes to those prescriptive tables within the code or 90.1 as the baseline and it will look at it. And for example, in 90.1, one prescriptive table is split is there's prescriptive requirements for the non-res part of a building, a residential part and a semiheated. But you could have mixed. So when you are defining your building envelope, you won't be penalized if it was just all one construction type and you can separate them out.

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So with project details, this is still more on the project screen, is it's optional. Here is a screenshot example of what that looks like in COMcheck. My suggestion is that you do enter this information because the more information you can enter that you submit to that jurisdiction, then the easier it is for them to go through plan review or to be able to get a hold of someone if they have questions. So there's three tabs. The title/site/permit one where you're going to enter the name of the project, the address or construction site, permit if you had one. Then the owner/agent is another tab. Designer/contractor is the third one and this is, again, these are optional information that you can add to your project that will show up on your report.

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So, helpful hints. Building use types, in COMcheck vary by code. What can also impact it is daylighting and solar gain calculations. And then the lighting power allowances change by building use type as well. This is all project information that you would be entering, but it's really important at first that you get the project information exactly as that building is going to be constructed because if you go back and have to change project information or building use type, you might have to re-enter some of your other information in the envelope portion and/or the lighting or mechanical. Because it's really driven by those building use types.

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Also, there is a preference in COMcheck. A lot of designers might work in one location, and they might be submitting to only one jurisdiction. To show it a little bit easier, I want to set some preferences that I don't have to continually, every time I start a new project, enter that information again. So the preferences, which is a nice feature, is in the general tab of the preferences, I can go in and select a location, a file location where I want to save all my projects. And it will open every time. I can also ask the software to say, I want you to go out and check when I'm in COMcheck, to see if there's a new update. I want you to do it monthly, yearly, and I'll show you in the software where that's at. Then there's an upload usage data where you can opt out if you don't want the data to be uploaded to our server. It doesn't have to do with proprietary information. It has to do with statistical analysis on a nationwide level or state level. In the project tab of the preferences, you can default to a certain location so you don't have to choose it every time. And then there's envelope options you can choose from, such as I always want to default and have my visible light transmittance or orientation specified.

The applicant preferences, this is where the project details that I just discussed is that you can actually save them in preferences, and then you're not trying to repeat when you start your third or fourth project, it'll automatically upload all that information. Reports, another nice feature, is I can customize my signature lines. If it's the same contractor, maybe I want to put his name on there, or there's three of them, I can put them on there and then it will show that. It makes that report look that much more formal and nice. And then emailing those reports, I can save that actual location, as I mentioned, the jurisdiction, type it in once in preferences, then it's saved and it'll be there every time I open up *COMcheck*.

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So a couple of things on screen operations on basic function. Here's a screenshot of a project, it's just an example file. The important thing to look at on this screenshot here is down at the very bottom. This is showing you two bars. Compliance bar where it starts calculating your compliance. And as I mentioned before, the only calculations that happen in *COMcheck* are for the envelope itself as a system, interior lighting as a system, and there's also exterior lighting. This one isn't showing exterior lighting, but there is exterior lighting as compliance as well. Mechanical, again, is just entering the information. There is no pass or fail. The status bar, it gives you information as you're going along and entering your project information or your envelope or lighting. It's a good thing to get in the habit of looking at because it helps you as far as figure out where you are with your project.

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Colors are also really important in *COMcheck*. Red, green and blue are the main colors that change within the program. Red, just think of that as meaning bad. Or that something is missing. So when I have questions that come in and say it's not showing a pass or fail, I don't know what I'm doing. I always tell them first thing, go look at whatever you're doing whether it's envelope or lighting or all of it, go click on that tab and look to see if anything is in red. Here's an example. The roof, the gross area was not entered. So without that, the software can't calculate the rest of compliance because it doesn't have the square footage for that assembly. Green is good. When you see green, typically that will be down at the bottom in that compliance bar where it's showing a passing and it'll be in plus and it's showing it in green. The blue, if you see things that show up in blue, kind of similar to red, you won't see anything failing, but blue can also mean it's missing information, and it still can't determine compliance. So something can be as much as that you have not entered any lighting for a certain space type and it's waiting for you to give it information on the lighting fixtures before it can calculate that compliance. That's just one example.

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So let's take a look at building components. If you were just doing envelope compliance, what does that involve as far as what you would have to put into *COMcheck*. Really what you're doing is you're taking those building plans and you are defining the building thermal envelope. So you're not putting in and defining any interior walls between conditioned spaces, any interior floors. It's only the exterior thermal building envelope that defines that conditioned space or semiheated space, depending on where your project is that's either separating conditioned from unconditioned or outside air.

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Now again, these are code dependent entries. So the entries for you assemblies can change based on code. The demo I'm going to show you in the software, I'm just going to have it on one code type but if I change that code, you might see different assembly types that would come up and one example is interior wall button. Interior walls, and by code this comes from ASHRAE 90.1, is a wall that's between a conditioned and unconditioned space. For example, a warehouse that has an office space in it but the warehouse is either semiheated or unconditioned. That's an assembly option button within the software but it's only code driven. Also lighting for exemptions and allowances is very code driven again. But depending on what code you are on, certain exemptions allowances might apply to a certain space such as retail display lighting.

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The options menu in the program gives you the ability to add additional information that's not so much maybe code driven, but maybe you want to have it on your project. Such as doing orientation. That's not a code requirement within COMcheck to have that to complete a project, but you could add that and orient the entire building and put your projection factor in. And what the projection factor is, is actually a calculation of the overhang. And when you do orientation, you're going to want to separate all your walls out and put the appropriate windows and doors under each respective wall. Visible light transmittance is another option that you can also choose from and enter the VLT values in your project.

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Some other helpful hints for the envelope: you don't have to use every button. In this screenshot of COMcheck, you see roof, skylight, exterior wall and so forth. If I don't have skylights as part of my project, I'm not going to choose that button. You're only defining that building thermal envelope. All those buttons might not apply to your building. Especially if you had an addition and that addition was over a conditioned floor and you don't even have a floor. Because that would be an interior floor once the addition is built. You can also group like components. Let's say I have a very basic office building, one story. It's all steel framed construction, sixteen inch on center, all those exterior walls. I can total up all those exterior walls if I'm insulating them with the same R-value and put them as one line item. So I can combine them all. The same with windows. If I had a total of all my walls and had one line item, then I would want to total up all those windows, as long as all those windows had all the same U-factor and solar heat gain coefficient. If they have different values, you have to separate them out. The other thing about the square footages involved here is there is one exception to doing your takeoffs. And that is slab on grade. It's very important and you see this screenshot here where it's showing you the column right after construction details, it shows gross area which is where you would enter your takeoffs for each assembly. Then there's another column there that shows square foot. But the last row on here shows a slab on grade and then it's in feet. Slab on grade is the only entry where you'll enter that component in linear feet that exposed edge.

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Envelope helpful hints yet again. Common questions that come up when you're a first time user. Difference between cavity and continuous R-values. Cavity is insulation that is placed between structural members or framing. If you have insulation being placed in between framing members, you would enter

it in the cavity R-value column or cell. Continuous R-value is continuous insulation across structural members such as rigid foamboard or insulation entirely above the roof deck where you don't have any thermal breaks. In the software, you have two columns. Cavity and continuous R-values columns for your assemblies where you're insulating them. It doesn't mean you have to enter an R-value in each one of those columns. You're only entering the R-value of what you're installing or proposing to install within that assembly. After you've entered your building envelope components, and you're looking at your compliance results, this is another helpful hint: look for those fields in red if you're not getting a passing or its saying something is missing, look for and make sure all your entries, double check your takeoffs. Make sure all the square footages have been entered correctly. That you've defined that building envelope and/or addition and that you have put in the right values for the insulation and for fenestration.

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Let's jump to compliance. If you are doing lighting and/or envelope, but lighting compliances individually has to meet compliance on its own. Here's a quick overview on lighting in a nutshell. It's all driven by code. With lighting, you have mandatory requirements. They are split out by interior and exterior. And within those lighting mandatory requirements you have controls, switching and efficiency. These are items you will not be able to enter into *COMcheck*. They're mandatory. They'll show up in the actual requirements tab and the inspection check list. Let's get over to what you would enter into *COMcheck*. You have interior lighting power limits and exterior power limits. Interior stand alone, what it's calculating is it has to be less than or equal to that interior lighting power allowance. There are exemptions to that total connected power that might come in to play. For interior lighting, you can either choose whole building. For example, an office space as I mentioned earlier, so I'm only choosing whole building office, twenty thousand square feet. However, what if I have a complex building, multiple stories, let's say a hospital. I'm probably going to be using my space-by-space and defining out those large areas such as the surgical rooms to the laboratories to the restaurant that might be in the hospital and so forth. With the space-by-space types, you might have allowances. I already mentioned one, which is retail lighting. Not so much in a hospital but if you had a strip mall and had display retail lighting, you might have an allowance that could be applicable to some of that lighting within that display case. Over to exterior lighting. You do have some exemptions that might come into play. Exterior lighting is pretty straight forward. These are done on the application of the lighting itself. There are tradable applications and non-tradable. The non-tradable means use or lose those allowed wattages. One example is ATMs. It's a non-tradable application and you get so many watts per ATM machine. If you don't use the watts, you can't use those left over wattages for another application that you might be doing somewhere else on that site. Again, total connected power has to be less than or equal to that exterior lighting power allowance.

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Interior lighting. I talked about mandatory requirements and interior lighting power requirements. Again, you're looking at proposed wattage versus allowed wattage. As you're going through and defining all of your building types

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And here's an example. A screenshot of the area category or space-by-space type has been chosen. You're going to see that you get watts per square foot based on the square footage of those areas. They're all code dependent yet again, this is just one code. It's giving you an example that those all would all be added up, but you're defining each one and then putting in your fixtures under each one of those area categories. And then this one, you can trade off in between these area categories. Maybe I'm a little bit higher on my first comment space, which is dining area that is showing in this example. Maybe my allowed wattage I have a little bit more than what would be allowed but I have less in my next space-by-space type that I'm showing here, so I could trade between the two. I'll show you an example of that in *COMcheck*.

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With fixtures, how do you enter the fixtures into *COMcheck*? This is a screenshot of that. When you go to the lighting tab, you can now save your own fixture library, which is a really nice feature. The first thing I would do if I was a new user, is to click on the add fixture button and then choose from my list of fixture components and start entering them into my project. But I could also, if I wanted to, add to the library, so I could save my own library. And with that library...

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And here's a screenshot of it, after I show you these categories, is that I could put in my manufacturer ID of each fixture, more details of each fixture if I wanted to, and then I could bring them into my projects through that library. Here are these fixture categories. The important one that I really want to point out is LEDs is quite new to *COMcheck*. A lot of questions came in as far as wanting to use LEDs and they're getting more and more used on exterior and interior parts of buildings. And now we have added that feature and we'll probably expand upon more LED fixtures that can be chosen from within the software. Here is the overall list: linear, compact, HID, incandescent, halogen and so forth.

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Some helpful hints. Fixture wattage. Let's say that you are entering your fixtures. There is a little shortcut so to speak. If you're not sure what the fixture wattage is, you can right click in that fixture wattage cell where it's asking you, and you can use the default wattage. I will show you how to do that. Fixture ID, as I mentioned, it's optional but it makes it nice for the plan review, especially if they've got to go back to the ID schedule, and then they're looking at *COMcheck* to confirm that your compliance results are valid. Fixture description is also optional, but it really makes it nice to be adding in more additional information to help facilitate plan review and inspections.

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Exemptions and allowances. You can choose it from the options menu when you're in the lighting tab. Or from preferences, you could always have it come on so you have this extra column when you're defining out all your fixtures. It is code driven, but how does exemptions and allowances work? Let's say I have an exemption for some fixtures for a certain application. The power for exempt fixtures is omitted from the proposed wattage. Not the allowed wattage, the proposed wattage. Allowances works a bit differently. The allowed wattage for building is increased by the allowed amount. I'll show you in the

software. If you have one of these how that proposed or allowed wattage changed based upon what you're defining as that exemption or allowance.

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Another helpful hint is that you might have some fixtures that are exempt or non-exempt, but you want to include them all within your project. Again, if you have light fixtures that are exempt, define them because this helps with plan review and streamlining that process. Show it all regardless.

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Exterior lighting. Shows compliance on its own. You can't tradeoff any interior lighting with exterior lighting. It's code driven. Again, there are mandatory requirements on controls, switch and so forth and then there's some exemptions. As I've talked about, we've got total connected power, has to be less than or equal to that exterior lighting power allowance.

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Tradable applications. Common applications where unused power can be traded where needed. I gave an example of if you had one area that had your proposed wattage was way higher than the allowed, but then your next application was a little less, you might be able to trade between the two. It will sum them up and you might be under compliance.

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There are non-tradable, and I gave the example of the ATM. You could have emergency lighting or something to that effect that could be a non-tradable and we'll go through some of those. It's a use or lose for your non-tradable applications.

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However, within code, there is an additional five percent. It's an allowance, so to speak, that is the total amount of wattage that can be used for any application or any combination of those applications. This supplemental allowance, you don't really see it in *COMcheck*. I want to have a brief discussion on this five percent because it is a key point—you won't see it until you get to the actual report. It'll calculate it in, but it doesn't just show up. But you would see it on the actual reports.

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Here's a screenshot of the exterior lighting applications. It's really important that with exterior lighting applications, they're a little different. For interior, you're doing square footages of either the space, the entire building or by floor. With exterior, this is based on units. For example, the drive-up window is asking in units, how many windows. Not square footage of the windows, but how many. You get the allowed watts per unit of how many you've defined. This one is a non-tradable application. The next one, main entry/exit, the quantity here and the units is it wants square feet of the door, so you're putting in the square feet of the door. So pay attention to what the units are when you're defining out your exterior lighting applications.

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Now with mechanical. So far we've talked about the project, how you enter project information, briefly

on envelope and envelope assemblies, interior/exterior lighting and now mechanical. Again, not a pass or fail. Different than the envelope and lighting. You're entering your characteristics of either HVAC system, plant or water heating. It works a little differently than the other ones do. The characteristics you enter enable the software to exclude large number of requirements that don't apply to your systems. Mechanical can get very complex. But this also helps really define out and show in those reports everything that would only be applicable to your systems. For the HVAC system, that really refers to a secondary HVAC system which could include controls, fans, terminal boxes, radiators, coils and a package HVAC equipment. It's not the primary HVAC system components. If you were to choose plant, then you're getting into primary HVAC components that you would define, which could be a boiler, a chiller, cooling towers and pumps. Then you have water heating. You don't have to enter your water heating, but if water heating system and you're doing mechanical, for water heating the selection or de-selection of the check boxes in this section determines which water heating requirements apply to your building. Then it all gets customized. In the requirements tab, you would then go in and confirm, based upon the systems that you've entered, which ones are applicable and so forth on those mandatory requirements.

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So some helpful hints on each one of these, the HVAC system, the plant and even over service water heating: if you have different HVAC systems and/or plants, for example, I have two different boilers under my plant, then you've got to click on that plant button more than once to enter that additional different plant. Same as with an HVAC system. If I have more than one HVAC package rooftop unit, I have to click on that HVAC system button more than once to get it into that – it's actually a dialogue that I'll show you, how you can enter another system. If you have identical systems or plants, then you can enter – let's say you have two of the same two rooftop package unit with the same capacity and efficiency, then there is a column where you can enter the quantity as two or however many it might be.

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Water heating, the same thing would apply. With water heating, if you have different systems, water heating systems, then you would click on that water heating button again and you would then define your next one. And if you have multiple ones then you can have the option of defining how many are present.

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So water heating – some helpful hints. The water heater type. Storage water heaters, so heat and store water within the water heater for delivery on demand, and the big part here is that the storage water heaters have an input rating that would be less than 4,000 Btus per hour per gallon of stored water. However, with instantaneous water heaters, this typically has an input rating that's greater than or equal to 4,000 Btu per hour per gallon of stored water, and it can be electric gas or oil. So here's just some helpful hints on the two different big storage or instantaneous water heater types.

SLIDE 42 [39:47]

Fan systems. Fan systems is a new kind of feature depending and it's very code driven. So it helps you to find out your fans for each HVAC system that you have the fan within the HVAC system tab and then

once you have defined your fan systems in the fan systems screen, you can assign them to those mechanical systems that you've defined within the HVAC tab. This might sound a little confusing, but we'll get into it and I'll show you a case study and some examples. A little bit more deeper about fan systems. Fan systems, you have two options on how you can comply with the fan systems. You can either do it by motor nameplate horsepower or brake horsepower. Motor nameplate horsepower is much easier because you don't have as much information you need to enter to get to your compliance for those fan systems supply return, exhaust. The brake horsepower does include, though, an option is it's viable to your project pressure drop credits that could be applicable. So if you have those, if you have that, then you might want to go the brake horsepower route and use those pressure drop credits that could be applicable to your system or systems.

SLIDE 43 [41:13]

So here's a screenshot of the fan systems and entering them and it is a tab within the HVAC section that we'll go through this, that you want to enter each one and what area it served, so then you can go back and grab that fan system and put it in with your mechanical and where it's located. And with this one, you'll see the two methods. You have motor nameplate horsepower, brake horsepower as your two options, and then some of the provisions on these fans down in the lower part where it says the fan ID, fan type. Those change if you were to move it over to the brake horsepower option. And then you also have the propose and max allowed. Those start calculating based upon your fan system that you're entering and we'll get into that a little bit more detail.

SLIDE 44 [41:58]

Now that we've talked about project tab and below, interior exterior lighting, a little on mechanical and fans and service water heating, the last tab, codependent, is a requirements tab, and I've been talking about this a little in between some of these envelope provisions, assemblies and lighting. The requirements tab will come into play regardless of whether you're doing envelope lighting and/or both, but you want to get in there to ensure that all these mandatory requirements are going to be met. For example, if have a slab on gray and I'm doing slab edge insulation, one of those mandatory provisions by code is that that slab insulation must be installed per manufacturer installation specifications. And you will confirm that provision within the requirements tab that will automatically get populated into the inspection checklist that you – once your compliance project is done and it's saved and you print your report, that inspection checklist can be added with that report, it would have that provision in there. So this is great documentation for a plan review or a code official that you've gone through. Another example might be is that I have a provision in these mandatory requirements that is not applicable to my building at all. Well, this gives you the option to go in there and say, "This is not applicable. It will save that provision and put it into that report and that inspection checklist. Easier for the code official to go, "Oh, he's exempt or that's not applicable to this building, great. I don't need to look any further."

SLIDE 45 [43:42]

So I've kind of talked about how this requirements tab worked, but here is a summary yet again as when you get in there, you have options to certify that code requirement. Either you're going to meet it, it could be exempt, or it doesn't apply. And then, that information gets transferred into the actual

inspection checklist, but where it gets transferred is into the comments and assumptions column on that inspection checklist.

SLIDE 46 [44:07]

So some helpful hints as an overview on mechanical is that your requirements can be parsed. They can be parsed out by general, HVAC, plant and water heating.

SLIDE 47 [44:19]

And with that, knowing that you can parse those things out, here is just a screenshot on the envelope requirements and we'll get to the mechanical requirements tab, but this is where you can go through those provisions and say, "It's going to be met or there are some exceptions that might apply to my building. This example is a factory built fenestration and doors. Is the labeling and air leakage requirements going to be met?" And it's clicked on here, yes, requirements will be met.

SLIDE 48 [44:54]

So now that we've kind of talked mechanical requirements tab back and forth, final is those reports. So I have all my project information in there, compliance is passing. I went through and confirmed all my stuff in the mandatory provisions and the requirements tab. I'm going to go up to the file menu and I'm going to save my data file. And then I'm going to go view and print this report. You have choices in the reports section. If you're not doing envelope, of course you're going to click off envelope, but that's an option. There's interior lighting, exterior lighting and mechanical. These are all options for report compilation. You don't have to choose all these, but maybe you're doing all of them, so you'd want to have them all clicked on, but those are optional features. Then, the first pages of that report is the actual compliance certificate whether it be just your envelope or all of them, each one is separated out individually. Then the following pages and I've talked about this requirements tab, is that inspection checklist, which is broken down into phases of inspection. So it will have a plan review section, footing foundation, rough in final. It will have electrical, lighting, mechanical. All depends on your project. It all depends as far as what would be in those inspection checklists based upon your project information that you've entered.

SLIDE 49 [46:18]

So here's a sample screenshot of an envelope compliance certificate. So let's take a look at this a little bit deeper.

SLIDE 50 [46:28]

So with this envelope compliance certificate at the very top of the report, when you're looking at it and even when you're verifying it, you as the user who has just entered your project and you've created your report, verify that everything in the information is correct. Either do it while you're in the software or after you've printed or you're reviewing that report online. And the first thing you want to do is make sure that that code and location and construction type, as I mentioned before, are accurate, that it's right. That can change everything if that project information construction type is not applicable to that building. The next thing on here shows that this one envelope is passing. You definitely want to make sure that the project is passing and/or lighting is passing before you submit that report.

SLIDE 51 [47:13]

You want to make sure that this report is signed. There are stipulations in states and jurisdictions on if you're a registered design professional and having a stamp and so forth, but those provisions would be up to working with that jurisdiction or the state on those applicable things as far as signatures and stamps are concerned when it comes to commercial buildings. The other thing is verifying those proposed U-factors and really a nice feature that is not in COMcheck for the envelope is you can verify your envelope assemblies within the tool, but by looking at your report, you see two columns or you see a column that you do not see in COMcheck when you're entering your data, and it's the last column here called the budget U-factor. That is the baseline that COMcheck is going out to code and looking at as you're specifying your assemblies. So, as I talk to users that are having issue with meeting compliance, I will ask them, I will tell them, "Go view the report and look at the last two columns. Look at where your big hitters are. If you have a proposed U-factor that is way higher than the budget U-factor, then you have an assembly that you might have to make some changes to, or you might have to increase insulation. You might have to switch out windows, but this is real nice that you can go here and quickly look to see if you had any issues where your proposed is way off from that budget U-factor.

SLIDE 52 [48:52]

Here's a screen shot of that inspection checklist, and this one is when I talked about those phases of inspection, this is just an example of the footing foundation inspection and let's get in a little bit more detail of what all these columns mean.

SLIDE 53 [49:10]

So we have the first one is the code section. This one shows an example of actuary 90.1 2007 and down below that, what does that 5.5.3.3 mean? That is the actual section in the code. The FO1 is an internal logging. But that 5.5.3.3 is a really nice helpful resource that if you wanted to, and you want to be on the same playing field as the plant reviewer inspector and you're the designer out on site or the contractor, here's your section number to go talk about below grade wall insulation R-values, as an example. So that's the next column that's on here is that's the inspection type. The third one is – this is for plan reviewers. They're going to go out there and verify off the plans and put that R-value in there of what is being specified for this assembly. The value from the field, this is the inspector that's out in the field, and hopefully, he's putting in that same R-value that would be over in the plans verified column. And then the compliance is, again, this is more or less for the inspector, that they're going to then go through their checklist and determine whether it complies, doesn't comply or maybe it needs a reinspection, whatever it might be.

SLIDE 41 [50:27]

So that really takes us through some basics and COMcheck has a lot of detail and a lot of information, but a lot of it is code driven. And we're going to go take a look at COMcheck and play around with it and go over there functionalities and let's go do that right now. Here's a screen shot of me uploading the actual software.

SLIDE 41 [0:50:51]

Okay, so now we are in the desktop software and let's take a look at the very top, some of these bars, as I call them. At the very top row is the title bar. And what the title bar is, it gives you the project filename, and I don't have a project open, so it is saying untitled. But the extension, the .cck is important. That is the format of the data file that's saved in COMcheck. So if I had a project, for example, that I opened and say it's Jones Family Dining, it would say jonesfamilydining.cck there. But I don't have anything open yet. But that is part of the title bar.

The next thing on the title bar is the version of the software. And then after that, it's showing you the code that it's defaulted to. And what this means is if you go in for the first time, you definitely want to make sure you're on the right code, but when you close COMcheck and you open it again, it's going to open it with the same last code that you were on when you did a project.

[0:52:00] – Screen shots of software begin

So it will open it. It's not going to change that code. You'd have to do that manually yourself.

So the second line here is the menu bar. And you have file, edit, view, options, code and help. We'll go through each one of these. These are based upon different things that can happen within your project. The third one down is it's a functionality. I call it the toolbar, where it's a Windows application here where I can create a new project, I can open from the file here. I can save the project from this icon, cut, paste, duplicate rows, print. However you see that they're grayed out. Some of these will come on and they won't be grayed out depending on what tab you're in. So if I'm in the envelope tab, then I start entering assemblies, then I would have these functionalities of these tools up here.

And then down below that, then you have the actual tabs that you're going to start working in to create your project. The project tab, very important.

[0:53:00]

We've gone through this as far as entering the applicable information of your project. Envelope, interior lighting, exterior lighting, mechanical and that requirements tab. Now, you don't have to be in every one of these. You might just be showing compliance to the billing envelope, or it might be the lighting, vice versa. So, with first time users, they don't think that you have to be using every one of the tabs. It could be someone else on the project, a lighting designer that could be in the lighting portion and doing that piece of the project.

So let's go take a look up here at the menu options before we get into the project details and these other tabs. So on the file, the dropdown choices here are I can open up a new project, I can hit new. I can open up an existing one from recent and I have a couple of them saved. The save and save as here is saving the data file, very important that when you're done, save that project data file. You don't want to have to enter any of your information again or lose any of your information.

[0:54:04]

The view print, so I can view my compliance report, I can print it from this option here. The save report, it saves it as a PDF. So if I clicked this one, this is saving and here's those options as I talked about that I can click on or off depending on if I'm doing all of those systems or I'm only doing one, but this one saves it in a PDF format where you can open it from an Adobe reader or you could create it as an RTF, and what the RTF version means is it gives some functionality that I might be able to embed that in an AutoCAD drawing or a CAD drawing.

So let's go back up to file here. What else do we have? E-mail report. Nice, nice feature that I can go in and when I'm done with my project, I can e-mail what portions or all portions directly to that building department.

[0:55:00]

I can even create the report – I can – I'm on save report. Excuse me. Let me get to the e-mail report one. I can e-mail it directly so if I click on these and I hit okay, the next screen that comes up would be emailing it and here's the recipient who I'm sending it to, the recipient's e-mail address and who it's from, designer, whoever it might be, their e-mail address, the user, and any notes. This is where I mentioned if I'm only dealing with the same recipient or jurisdiction and I don't want to type this in every time, well, you can save all this information even your user information under preferences, and I'll show you where that's at. So let's hit cancel.

What else do we have in this drop-down? So the last one here is the import GBXML. And really, what this is, this is applicable – it's a file format feature, so it really is applicable for CAD systems that they want to import the envelope components only.

[0:56:07]

This won't allow the import of that GBXML file in the CAD for lighting, exterior, interior or mechanical. It's only envelope. So the edit menu. Functionality, the same as the toolbar. You've got the cut, copy, paste, delete, duplicate rows, but here's where that preferences is that I talked about. And the tabs that are in here, so we have general, project, applicant and reports. Under general, as I mentioned, I can actually default to a file location where it's going to save every time. I can show the full path of the name of the data file. I don't know if I would advise this one because if you have a long file path name, it's going to show up on the report, to play around with that one a little bit. Then, I can actually block other users from opening current open data files.

[0:57:02]

This feature depends on the user and how avid the user is as far as the functionality as a preference for that one, or you're on a network.

Version update, I always have mine checked to once a month. You could do it every six months, every week or never. And what this means is, if I'm on the desktop and I'm using it and the codes program has released a new version and you're on the internet, you will get a pop up and it will say, 'Hey, there's a new version out there. You might want to go upload that new version to your desktop.'" So that's a nice feature. And then the upload use data, this really is that project data for statistical analysis. You can opt out of that, but really, it's just saving the actual, you know, insulation values, fenestration values and that sort of thing out to the server.

So let's go over to the project tab. And I will click on that yeah, I want to save some preferences here.

[0:58:00]

So maybe I'm only in one location all the time, only using this code. I can save it here, but be careful. When you start saving stuff in preferences, you have to go back under the edit menu, this edit menu bar, go into preferences and change it 'cause it will keep it, every time you open up COMcheck every time to anything that you've saved under preferences. So the state, the location, all that would be opened every time you opened the tool. I've talked about the envelope features that you can have, that are applicable to a project, so I can have it enable orientation or the VLT or comments where it'll have that column every time I'm in the software. I'm not going to click on them now because I want to show you how you can get to it from the options menu as well. And in interior lighting, I want to make sure, maybe, that I have that column that shows my exemptions and allowances and I can do it from here instead of the options menu for each one of my projects. Let's go over to applicants.

[0:59:00]

Applicant is where I can customize and put in who the owner is, so if I have, you know, I'm dealing with the same person or designer and I don't want to type it in for every project, I could put it in here and then it's going to automatically populate it. Same with over on reports. I can have multiple lines. I can have a customized name for the envelope, lighting and mechanical areas and then this is where I can enter if it's the same jurisdiction and I don't want to keep typing in their name and their e-mail address, put it in here and save it. So you don't have to keep doing it if that's the only department that you're working with.

So that is the preferences under the edit dropdown. The view, I never touch the view menu because this really means that you could click off the toolbar, which I don't advise, or that status bar, that I've already talked about that gives you little teasers at the very bottom of the program.

[1:00:00]

The options, these are great out because it depends on what tab you're in and if I was to go into envelope tab, then I could click on VLT, the orientation button is chosen here. So for example, let's go click on envelope and let's go back up to options and let's click on orientation yet again and look down in these columns that you'll see that I could start doing my orientation. So I have component and I have orientation to specify my building. So, I can click back off that and it'll remove that. If you did this in

preferences, that column will show up every time for every new project you do. So, L-center options, you have that VLT and then these that are grayed out are under lighting, so if I went over to the lighting tab and I click on options and then here a new column's going to appear, then I got that exemption and allowance column. And again, you could default that in preferences if you wanted.

[1:01:00]

So let's go back over and let's now look at – we've gone through those option features. Here's the code menu. Code menu changes. Most recent codes we work on to put them into the tools, so right now, I just have it on 90.1 2007, but there are other codes, the international energy conservation codes and some state specific codes. But you also have on the very last here is what if you don't know your code. This is where if you're connected to the internet, it will take you back out to that screenshot I showed you, to the status and state code pages and you can click on the applicable state and it will tell what is enforced within that state.

Then we have the help and in the help is the entire software users' guide. If you have a question on an input, then come here. Such as, if you click on roofs and you wanted to know a cretin assembly and the definition of that assembly from the drop down choices, it's in the software users' guide.

[1:02:00]

Or you wanted more information on how to enter your lighting, come out here to the software users' guide. There's also a quick start to this, but a lot of valuable information is in here that can be helpful if you are stuck on a project.

So what else is in the help? There you can go to manually check for updates if you wanted. There's a solutions and help and a frequently asked questions. If you click on those and you're connected to the internet again, it'll take you back out to EnergyCodes.gov and there are some FAQs on commercial buildings. There's some FAQs on COMcheck, frequently asked questions and that might be helpful. Probably the most important thing is that you know, commercial buildings, some many different variances and so much complexity that you might have to go into the technical support or the help desk and submit your question into the codes helpdesk online forum.

[1:03:00]

And then About COMcheck really is more or less giving you the build version and information about who built COMcheck, Department of Energy, Pacific Northwest National Laboratory was involved in that, and that sort of thing.

All right, so we've gone through the menus up here. We've talked about the toolbar. Let's get into the project tab. Location, pretty straightforward, defining your state and city. If you have a county designation, I'd suggest going out and using the COMcheck web tool because you have that option to choose from county. Project type, this is where you would define whether it's that new construction, addition and alternations. Alterations, completely different is how it's calculating compliance. It's on individual component by component basis for the envelope and individual space by space for lighting.

Space conditioning. Select all that apply. This means that you might have multiple spaces within a building.

[1:04:00]

Maybe one story is non-res and the next story is high-res multi-family units. And how this works is, as I mentioned again, I could have both these, but when I go over to the envelope tab, and I'm going to choose these two so we can play around with it, that I want to define the applicable building envelope components that would fall under non-res versus the ones that are res, so if it's a five-story building, then under the residential portion, I'm only gonna put those exterior walls that reflect the residential part of that building under the residential portion. Under project details, this is where if I did it under preferences that I showed you earlier, I'd automatically get populated, but you can click on the edit project details button. I showed you a screenshot of this, so we won't go into too much more detail, but I can enter the title of the project, the address, if I have a permit number, owner agent, and designer and contractor.

[1:05:00]

And it would get populated into here and show up on your report.

On the right hand side, you've got the building use type, so I can do it by whole building, and this is all code driven. And from there, it already has a blue – the one line item is already select your building type here so I would click on the little arrow button and I would choose from that drop down list. I can enter area description, it's optional, but I might want to say this is on the fifth story where the lounge is and it's on page plans a10 if I wanted and that helps for a plan review. And then I enter the square footage, floor area square footage of that bar, lounge, leisure area. So I can put in like 1,000 square feet.

Then say if I have another building area method or another building area type, I can add another one by clicking the add button.

[1:06:00]

I can actually delete that one if I want and I can delete row two. I can do duplicate this. Maybe I have several bars and I want to have them defined out separately. I can have another one in there and duplicate that row. Under area category, this is where I can add in space by space. So, again, code driven, but I can go to common space types and probably find close to that same bar lounge. Optional to enter my area description. Square footage of that area and then again, I can add more space types if I want to. So I could put in yet another type of dining if I wanted to have general, put in the information there, and so forth.

The building use types here is really important, especially – well you can't do your lighting without defining it.

[1:07:00]

But what it gives you before you get into the lighting portion, it gives you those allowed watts per square foot, and each one of these are different. Previously, I showed you a screenshot of the different values that you could have, especially if you have several multiple space types in there.

And then it'll total up your total area square footage. This is also another nice thing to take a look at to confirm that your total area here matches what you have on your building footprint, especially if you have several stories you're dealing with. On exterior lighting, code driven again, you could have more information on exterior lighting such as zones depending on the code that you're on, but again, by application. I mentioned the ATM to you, so if I chose ATM, again, area description, you could put in north side of the building, south side, wherever it might be and where on the plans. Quantity. Look at the units first before you start entering required to make sure that your quantity matches what the units is calling out for.

[1:08:00]

So I could put to ATM machines and then very important, tradable or non-tradable. I can add another application here and let's just do – let's just do a parking area. And then again, I'm looking at the units, and this parking area's square footage, so I could put in 20,000 square feet and that's a tradable area. So this is really giving you what you would put into the project tab, but let's take a look down here at the bottom before we start getting into playing with the rest of the tabs. You have envelope TBD, interior, exterior lighting is TBD and I mentioned those colors, right?

Well, TBD, to be determined, we haven't put any information into those project tabs and so nothing can be calculated at this point. And that color's going to be in blue. If we did have information and something was filling, it might be in red and give you a compliance result. So let's go over to the envelope tab. Within the envelope tab, you'll see that there are several components you can choose from.

[1:09:00]

It's those blue and white buttons, roof, skylight. Now, all of them might not be applicable to your building, so if they're not, you don't choose it. But each one of these has a dropdown list of assembly types. So I can click on roof and now I'm looking at my plans and going, "Which one of these closely defines and it needs to closely define because it already will calculate everything involved with that assembly based upon what you choose as your assembly type as common construction, meaning we've calculated it based on ASHRAE fundamentals and as I mentioned previously, now we're getting into more details as far as calculations. If you want to know how these assemblies are calculated, how they're each piece of that assembly, go out to the website and go to that technical support tab and open up the technical support document to look at those underlying assumptions and calculations.

So let's take a couple look at some of these assemblies.

[1:10:00]

So let's just say I choose attic roof with wood joists. If you come over and let's take a look at these columns, I have a space conditioning type that I had two that I chose from in the project tab that I needed to find and make sure I'm choosing the right one. Construction details, this really is applicable to alterations, so it's grayed out. You have gross area, got to look at what type. Slab is the only one where you enter linear feet. You have a cavity and continuous column that you could be working in one or both. The U-factor, this isn't something you would enter for this assembly. Then you have the solar heat gain, projection factor, and of course, this would not be something you'd enter for this one as well 'cause it's a roof and it's grayed out.

But look at the U-factor. It already has calculated, based on what I've entered for this option as an attic roof with wood joists, this is everything in that typical assembly. Air films framing except for your square footage and what you're going to insulate it to.

[1:11:03]

So, let's put in some square footage here. Doesn't change the U-factor yet. What will change it is the insulation being installed. So if this insulation is being installed at the ceiling plane, and it's all one application blown or it's bat, whatever it might be, it's going to be across structural members. It's going to be between the wood joist trusses, so you enter your value as all one. Only would you enter continuous insulation here is if you had insulation foam board that you were using, and of course, with this one, I don't think it would apply if the insulation here, this R-38, the software will make a couple assumptions here based on that R value of how many inches are above the trusses where there is no thermal break and it'll run that calculation. Makes another assumption here or calculation on this assembly type of insulation decreased at the eaves for this one.

[1:12:00]

Now, if I chose a different roof type in here, calculation might be different, such as an insulation entirely above the roof deck, and that would be continuous insulation, and that's your only option here. U-factor changed based upon the common construction, but then again, I'm going to need to make sure, since I've changed this square footage is what I want it to be and that I'm putting in the proper continuous insulation value that I'm applying to that insulation above the roof deck.

Here is where, since I've clicked on both non-res and res on the project tab, I want to be very careful about which one I'm choosing because this goes out to the prescriptive tables based on code to what the minimum baseline is where one might be less stringent than the other, plan review, if you had one of these wrong, you might be out of compliance, so be very careful that you've defined those space conditioning types out correctly for your assemblies.

[1:13:00]

So let's go take a look at exterior walls. Here's your list of choices and they get in more detail. If I go to metal building or I go to concrete, I can choose from thicknesses, I go to concrete block, you even get

more information. I can go to cells empty, cells insulated, the six inch, eight inch, but what if one of these don't apply to my building? For each one of these choices for your components, the roof, the walls, the floor, you always have the option to choose other. And when you chose other, this is where you're going to enter your U-factor. So I can still define under this exterior wall a little bit further if it's a wood frame steel frame, let's just choose that it's a wood frame. But still, again, I choose other, so I'm entering my calculated U-factor. Maybe it's some system that is not a typical assembly that is how we calculate that wall and you want to use your own calculation.

[1:14:00]

It's going to give you a pop-up with a warning to say, "Hey, you've chosen other," and what that means. I make sure my space conditioning type is right. I'm going to put my square footage of that wall in. Height times length of the exterior wall. I mean, that would include all windows and doors is how you're run the takeoffs. And then you see you don't have the option for insulation here. Same would apply if I did roof and I choose other. I wouldn't have the option to show my insulation value. You only have the option to show your overall calculated U-factor and I highly advise that you provide that documentation with your paperwork to the plan reviewer of jurisdiction because they're going to want to verify that that U-factor has been calculated correctly.

This one has the interior wall option and this is code driven on 90.1 where what that means is I might have an interior wall that separates an office from an unconditioned warehouse, so I could define is using that button. But if I don't, I'm not going to choose it.

[1:15:00]

Then your windows and doors, pretty straightforward. Define what type of window it is, double pane, low E. Doesn't change anything. You still have to add construction details here as far as clear or tinted. The rough opening, and if you have all the windows are all the same, same as I mentioned with all the same walls, total them all up, one line item. Only unless the U-factors and solar heat gain, if they're different, then you're going to have to start entering those individually or group them together. So you can group like components together.

Let's say I don't know what the u-factor and solar heat gain coefficient is on my windows. And I'm in this cell over here at U-factor. If I right click with my mouse, I can go down and select default. These are not favorable. They come from the default values of the code that's specified here. I could do the same with the solar heat gain coefficient. I can right click and I can select the default.

[1:16:00]

And it should also be noted here, when you are selecting defaults, rally hard during plan review, if they're trying to go find on the specs to verify that those U-factors are specified on the specs of the plans and then when they go out in the field, and let's say you still meet compliance by using defaults. Let's just say that. How is one to know unless you give them a little bit more information here? So how can we do that? We go back up to options. Let's click on that comments description and now here we

have that column that I talked about earlier in preferences, if you wanted to have it there every time, that I could add in that I used default values.

Very, very helpful for doing plan review and for – if you ever have to come back to this project and you don't know where those values came from. This tells you right there. You could put in here that the values came from some certain manufacturer. Have it there and that could be helpful as well.

[1:17:00]

So let's go take a look at one more thing here as far as basements and floors because basements, a little bit more entry has to be involved and what does basement mean? Below grade wall. By code, the wall is more than 80 percent below grade. So, you have your options of choices to choose from and they can get more detailed depending, and typically it is concrete block or solid concrete, right?

So I'm just gonna choose the solid concrete wall here. And then you now have another column. The thing to mention is is look at all these columns that keep getting added as I enter more details or more assemblies, require more information. You might want to come up to the top and expand your screen so it's entirely on your monitor. So you don't miss any detailed input information because you didn't see it. Or you can expand it as far as coming down and dragging it. You can grab a hold of the software and drag it and expand it if you wanted to a little bit.

[1:18:00]

So with this one, I need information on the density of the concrete. You'll get that off the specs, so let's just say medium. Construction details, is there any furring involved. So we could say, "Yeah, we're furring out the interior of this below grade wall. Here is where you have other input. Pretty straightforward, wall height, depth below grade. So I put in the wall height is nine feet, depth below grade has to be more than 80 percent before it's defined as a below grade wall, so we'll put it at eight feet and we click okay.

Then let's see, I need to enter my square footage here. Cavity and or continuous but be careful here. I said I'm furring out that wall, so by entering continuous, it would be a red flag for me because that would mean no thermal breaks. So if I have furring, would that be that I'm having some framing members there and I really do have only cavity insulation?

[1:19:00]

Let's scroll over a little bit more and take a look here. And I'm scrolling because I can't see the rest of my columns because I'm not expanded. So you can use this bar if it comes up down at the bottom.

So over here, I've made sure I got my wall height and depth below grade. I could enter some comments if I wanted, but let's just leave that one as is.

So there's your basement. So let's go over to floor. Here's your floor options and the one I just want you to pay attention to is that slab on grade. Heated or unheated. Heated means you have a hydronic type

system within the floor. Unheated means you don't have one at all. And so let's go unheated. This is where for a slab on grade, you're going to need to specify some additional information. How is a slab being insulated?

So what you want to click on is construction details. Is there no insulation? Are you doing this horizontal plus vertical and what's the depth of that insulation? And you could choose from it. So here are your options. So let's just choose four feet or fully insulated. It will display here – here it gives you some diagrams on how that can happen and click okay.

[1:20:00]

Now, let's go back over to our columns. Now let's go over to where we got red. Anything in red means we're missing values again. And this is in linear feet. So I'm only entering the exposed edge of that slab.

You only have the option to enter continuous insulation 'cause typically it will be foam board. Here it gives you another little teaser about the slab being in perimeter linear feet only. And I'll enter ten. And then I just tab over and I could enter information on the comments, if I wanted to.

So down below, it says TBD. Well, we know we don't have a complete building here. I'm just showing you how to enter some basic information in some of these assemblies, but let's get over to interior lighting now.

On the project tab, as a reminder, I entered two space types. Anything you enter here will automatically be populated into the interior and/or exterior lighting tabs. So you have to highlight on that row and then start entering the fixtures underneath that row.

[1:21:02]

What it tells you here is overall allowed wattage for the project and then overall allowed wattage for each space type, so for this one, it says 1,400. Proposed is zero because I haven't entered anything yet. So it's highlighted. Let's go up to add fixtures. I can easily come over here and start adding in some fixtures. So let's say new. I'm gonna do 24 inch and I'm just arbitrarily putting some fixtures in. Let's say electronic. Last for fixtures two, number of fixtures that I have, let's say 40. Let's say 20. Then, fixture wattage. Here's that nice little feature that I'm going to right click with my mouse and use the default. You'll want to verify that that fixture wattage is a lamp plus ballast, again, if you're using defaults for this one. If not, then you go from the manufacturer and you use what it is, the fixture wattage right from there.

Let's take a look a little bit more here and now that we have the exemption and allowance column, how does that work?

[1:22:04]

So let's click on the button and let's go first to exemptions. Code driven again, so I'm looking at – this was a dining area and do I have any exemptions in any lighting in this dining area that I want to specify

out? So, whether it might be – and I'm trying to look for a good one, lighting cells, it could be display lighting somewhere. If I had one that matched something that I had, maybe, probably advertising, then I can show that this lighting here – here's my exemption – it will display on the report, but what it does is look at my proposed wattage. As I mentioned earlier is if I have an exemption, it's not gonna start adding any to my proposed. Now, if I had an allowance, now I have 1,400 here, so watch. If I say, "Nope, it's an allowance," let's go look at my allowance options.

[1:23:03]

Let's say it's decorative or it's a decorative sconce or something on the – or something, floor or whatever it might be. I have to enter the floor area of where that lighting allowance is that I want to take that lighting credit for. So let's just say it's 60 feet. And I hit okay.

Now, my allowed wattage for that area just went up to 1,460 instead of 1,400. So that's kind of how really basic the exemption and allowance features work. And I won't go into a lot of detail because again, those – all of those options in there are very code dependent and they're also very application dependent upon what you might have in that space or that building. For example, if I did have some decorative art on the wall, and that could be an exemption for a lighting – you know, showing that lighting above that decorative art. Same can apply over on exterior lighting.

[1:24:00]

Before we get off from the interior lighting, let's look at this feature called fixture library which is a feature both in the interior and exterior lighting tasks. So if I click on the fixture library, this is so nice that if you are going to be an avid user of COMcheck and you want to put in all your fixtures and you want to put in a fixture ID of where it came from in the manufacturer, I've already added one here, a linear fluorescent 'cause I went up as added fixture, hit linear fluorescent and let's put a 22 T5 in there. And I'm just putting an arbitrary one in, right?

So, what's nice about this is I can put the fixture description, the detailed description from maybe the manufacturer or what I have for that. Maybe I have my own special lighting schedule and I want to use it every time. So what this library can do is I can save all these and I can go to my lighting library and upload those to my project for the ones that I want to use that gives me all this additional detail 'cause I've already saved it.

[1:25:06]

Pretty straightforward on how to put fixtures into the library.

So, here, again, I've only entered one fixture under this space type. I'm not done by any means. This is just an example, but for me to start entering fixtures under that next space type that I defined in the project tab, I've got to highlight it and I can either go to the fixture library and then add, you know, from what I have saved or I can just add from new fixtures from the add fixture tab here.

So let's go over to the exterior lighting tab. Now, what has happened here is a reminder back on the project tab, is that I have defined some applications for exterior lighting. Those atomically get populated over onto the exterior lighting tab. Again, you have to highlight as you start entering your appropriate fixtures for each one of those applications.

[1:26:02]

And keep in mind what it's going to give you, the tradable versus not tradable if there is one, the allowed and proposed which is zero 'cause I haven't put anything in. Pretty straightforward here that I can come up and either go to my fixture library and let's say the two that I put in there, that I've saved, I can go add that one, so I want to go close that. And maybe I want to go ahead and change or redefine this component. I could do that if I wanted to, but let's go up – let's get out of here and go back to the ATM and just add a fixture. So let's say it's halogen 70 watt 1 and there's two of them. And I can default if I want to again. I can use the defaults.

[1:27:04]

So with this, it will start calculating your overall tradable wattage and your allowed wattage and it's showing you the supplemental wattage up here that I had mentioned before. And you could go to the help if you want more details into the software help for that explanation that I gave earlier on supplemental wattages, which is that five percent. The – and again, it's use or lose. So, that is for your overall compliance that's calculating up here. If you come under parking, you start adding in your fixtures. Then again, if you had your proposed was way less than your allowed, you couldn't use that extra up in your non-tradable. And we'll take a look at a case study and I'll show you an example of an actual case study that's for a restaurant and how some of these reports look.

So let's go take a look now over at mechanical. Now, mechanical down at the bottom of the screen, you don't have a compliance result.

[1:28:02]

No pass or fail. This is where I've showed you the systems that you can enter such as the HVAC system, plant, water heating. And if you're entering HVAC systems, then entering those fan systems. Really straightforward. I click on the HVAC system. I define what my system is, so let's go heat pump. You know, it's a rooftop package unit. And let's hit okay.

When you do that, then of course all these columns have different information and different details that need to be entered such as, I have the system type that's populated based on what I've entered from my HVAC system. Quantity, if it's all the same type of systems and I have five of them, I'm going to change that value. Capacity, so, if I'm coming at air, I need to start entering the capacity of my units. So I could put 120. And the cooling capacity, maybe it's 130.

[1:29:00]

Fuel types, if it's applicable to this system, which this one's not, condenser, system details and again, this gets in more and more detail depending on your mechanical systems and then it also requirements tab which we'll get to right after that as far as defining it out even further based on these systems that you're putting in. And then your efficiency – maybe you're entering the same efficiency or that efficiency might be better. So I could put in the same if I wanted, but you've got to enter it. It's in red. It needs that value. And/or I can enter you know, a better efficiency if I wanted.

But now, let's take a look. So we've entered one HVAC system. If I wanted a different system, I've got to click on that HVAC system button again. Takes you back to that main screen and let's say I do a central furnace and I could define that and click okay. Now, it's giving me HVAC system two. Got to go through and put the capacity of that system.

[1:30:00]

Now, I have more information. Wants fuel type for this type of heating equipment.

So I could do electric, I could do natural gas, and as I do some of those, you know, proposed efficiency is definitely always something you're going to have to enter here, but might have other details that could be applicable. I'll give you an example. You might have a system that would trigger you having an economizer and you'll see that an economizer system information might come up, based on your system. But I could spend – you know, you could spend a day or three days just going through mechanical requirements and systems and how all the applicable requirements for mechanical systems that are in COMcheck based upon what you're doing.

We won't go that far.

Let's go over to plant before we look at the fan systems which is showing up in red here. So with the plant, we need I can define a boiler if I wanted to, so I could do the heating systems hot and my cooling system type.

[1:31:00]

Pretty straightforward. Right? But then when you enter, you're going to see it comes down into your schedule that it needs to know the capacity of that plant so, you know, whatever it might be. Then you have condenser type. So for the boiler system, you know, I could have evaporative cooled and then of course, your proposed efficiency that you've entered.

If I had another plant, I would click on the plant button again. If I had this plant and there were two of them, I would change the quantity to two.

Let's go over to water heating. Water heating I gave you those two tips as far as the differences between the storage water heater and the instantaneous water heater. So, let's just say we're going to choose

storage water heater. And again, it's populated into my mechanical inputs and I'm going through and I'm looking at things that are in red. So what it doesn't show is the capacity.

[1:32:00]

It should show up in red 'cause I need to put how much the gallons for this water heater. Right? So I'll just put 80. And then we've got the fuel type source, which we can define it as what it is from the mechanical plans. I'll put gas. System details, now we have a new one that's come up because it's based on code driven again. We need to add more information.

And then this also will define what will happen in the requirements tab based upon what I enter here as well. And again, I don't have time to go into each one of these individual details of the every component and especially as I showed you on the envelope, I didn't show you every component within there and what code requirements would be driven by that component. We're just going through the basics. So I will define this as, it has a circulation pump. The input rating I could change. I could go to help and get more information on that input rating and the KBTUs per hour. And then I'd hit okay.

Again, you've got to enter your efficiency even if it's the same as the minimum efficiency or it's better.

[1:33:03]

If it's better, great, but it doesn't give you any credit towards anything else in this project. Nothing towards the envelope, nothing towards the lighting.

So let's go over and let's take a look at fans. We've got stuff that's showing up in red, won't give me a complete report. I could click from fan system details right here, or I could go to the fan systems detail. Either way, it's going to get me over there. So let's click on the tab. It gives you a little information on what do we mean by fan systems and really these are based on the code on fan power limitation requirements. So it's for an HVAC system where you have – you might not have any fans based on that HVAC system, but if you do, you'll want to define them and then add it to that system. So, what does that mean? So with this, we've got a little teaser. It's explaining to the supply return, exhaust fans, how do I get these fan systems entered and saved?

[1:34:01]

Down at the very bottom is a fan system that has a little plus, a little button there. I'm going to click on plus. Now, I have this is fan system one. I'm creating a fan system. I can put the area where it serves, so I can say dining room. And now I have those two options driven by code. I can do the method by the motor nameplate or I can do it by the brake horsepower. With the motor nameplate, when I start entering this fan, let's also take a look at – let's hit plus 'cause let's add a fan in. So here's my first fan and let's look at my fan type. So it could be supply return exhaust. You've got to have a supply somewhere. And supply is what really drives the maximum allowed over in the motor nameplate horsepower.

It might be maybe I don't have a return, but in typical, you're probably going to have a supply and return and/or exhaust within one fan system detail. So let's enter supply, then fan control.

[1:35:00]

Again, code driven to what will happen with the calculations. So let's just say single zone, variable air volume. We can put in – we've got to put in the CFM of this supply fan, so let's put in 5,000. And then from the motor nameplate, the horsepower. So we'll put in three horsepower and then hit enter. Now that when you hit enter, you come down below, you see the max allowed in your proposed? This is taken and it's all based on that it's only going to calculate based on the supply. And let's go ahead and put in a return so I'm going to add – I hit the plus sign. Let's put in my return for this fan system detail. I will come over, I'm going to select single zone BAB. Return, put 3,000 in there.

[1:36:00]

I can tab or hit return. I hit the tab button. And then I can put in my horsepower motor nameplate horsepower of the return side of this system. And then hit enter or tab.

And then it gives you my overall proposal, my maximum allowed. I could be done here. And then I can – I can get out or I can add in another fan system if I wanted. So let's just hit close. Let's go back over to our mechanical, what we have in here for our mechanical systems and so forth.

Now, let's go to the HVAC system one. Fan system details, it shows it in red. Let's click on that and now you see that I have this fan system saved. And I want to make sure that I apply that one to this system. Well, let's say this HVAC system two doesn't have the same fan system detail.

[1:37:00]

Then I will come over here and I'm going to click on the fan system detail again. I'm going to change it – well, we need to define the next fan system. This is fan system two. Maybe it's not in the dining room, but it's in the dining lounge area. And I can go through the same process again and I will now be adding in the fan system for this second HVAC system that I have.

I could go over and I can do the next method. This is the brake horsepower. And just one point to make here is that if you look down below, you now have more information that you'd have to add for your brake horsepower method which is brake horsepower and really the trigger here that would do for the maximum allowed is that there's two things that happen. If you have one of these options up here though, let's say one of those applies, such as the pressure drop credit, then you want to take advantage of that. We'll just go ahead and enter a fan real quickly here and say supply.

[1:38:00]

Let's put in single zone again. Let's even put in the same CFM that I had. And we'll put the brake horsepower at three and the motor nameplate at two. With this, the maximum allowed, what drives that is the brake horsepower running that calculation. But the other thing you have to pay attention to

with this method is your motor nameplate cannot be higher than the max motor nameplate. If this was six, it would be failing or higher than five. So let's close out of this.

So this gives you just a brief, brief overview of the basics of mechanical and again, you can go into many, many different systems and really deep into several different complex systems. But let's go over to the requirements tab at the very end. We are almost done, getting to the last part of showing the basics of REScheck.

[1:39:00]

Now, we have in here these little buttons that show requirements for envelope, interior lighting, exterior lighting and mechanical. And they are broken down by provisions such as if I'm in envelope, I have air leakage. You want to go through these. I want to make sure that if I'm clicking on the first one here, I'm reading it and I'm not going to go through all these 'cause they are code driven. This one says, am I going to confirm that the factory built fenestration on the doors are labeled and that they're going to meet the air leakage requirements?

Here, I'm saying yes, they will be met. That will automatically get populated on your report. If I have an exception for that, then I want to define it. I go through this list and I start going through whether there's compliance will be met or there's some exception. I can also even go further and enter on my plans or pages of where they can find that, if there's an exception or where the requirements will be met.

[1:40:00]

Really saves time for that plan reviewer and that inspector. It also puts everyone on the same playing field. You keep these reports out on site, you're working with the plan reviewer, you're both looking at the same thing.

With this too, as I mentioned when I was showing you the screenshot, it gives you the section number right from the code. So all this would get populated into the inspection checklist and you can go through each one of these provisions in further detail. Same thing applies to interior lighting. I can go through all the controls, plan review, wattages, come over here, define them out further. Exterior lighting, the same thing. And mechanical – mechanical gives you a lot more information depending on what you put in. This could become a very long list.

So, this just gives you a brief overview. Let's open up a project file real quick. I'm going to close this one so as I do that, I'm going to go open a recent case study.

[1:41:03]

It's going to ask if I want to save what I've put in here and I don't want to save any of my changes that I've put in here for this. And now, I'm in an actual case study. Let's take a look at this case study and then we're going to go take a look at the actual report and then we are through showing the basics of COMcheck.

So here's where I have a project. It's on the same code that I've been showing you. But again, depending on the code, things can change. Location, all this information is filled out. This is a non-res building. It's a dining restaurant. Project details are filled in. All my spaces are filled out with the square footages. I have exterior lighting applications that are filled out. Down below, I have compliance results and they all show passing. That's good.

Let's come over to envelope. And here's a typical restaurant and their take-offs. They have a slab on grade and they've defined it and they're insulating it, you know. There's exterior walls and what they've done here is separated all the exterior walls out and shown the orientation and also put the appropriate windows and any doors under each wall.

[1:42:08]

They've defined out the assemblies, the construction type, cavity, and/or continuous insulation, any overhangs which they've put in here as well. They've put the roof in and what they're insulating it to.

This is something a plan reviewer, when they're looking at it, they're going to go through and check all these, but as a user, you'd want to double check them too. Let's go over to interior lighting. This is where it populated those space types again. All the information is defined. This project, they haven't even shown any exemption or allowances for any of their lighting, but they still meet code. But they have taken every one of these spaces and put in the appropriate fixtures and what those fixture wattages are.

Exterior lighting, same thing. Gone through for each application and they've defined out what lighting would be under that application.

[1:43:01]

Mechanical, they have two HVAC systems defined here. Rooftop packages, kind of similar in capacities, but the cooling is different, so they've separated them out, which is good. Air economizer came into play. I talked about that. So, the system capacity here in the climate zone kicked in requirements of an economizer and they had to define that system detail of what type of economizer it was. Shows some fan system details have been definable. Let's go take a look at those in a minute. Efficiencies have been proposed and they have put in. Water heater has been entered. Let's go over to the fan systems and take a look at what they've put in.

So for the first fan system, you'll see that they've put in a supply and return and the CFM air volume and the motor nameplate and the method that they've done it is by the motor nameplate horsepower.

[1:44:00]

So the brake horsepower and that it's meeting the maximum allowed. So all is good. Requirements tab looks like some of that information has been filled in, not all of it, but maybe this project isn't completely done. This is just an example, a case study. So let's take a look at what the report looks like and then we can complete the basics of COMcheck.

Okay. I've brought up the report. This is where it's showing you the version number at the top if they've used the desktop. What code, all the project information. This is new construction. The location of the construction site. Then we have the general information, you know, climate zone, city, state, so forth, the activity types. Come down to it, envelope assemblies.

[1:45:00]

But here's where I showed you the example really early on about pulling up the report, especially if your project wasn't passing these last two columns here, the budget U-factor is the baseline for each assembly and if you're below that, great, but if you're above it, it could be something that is triggering a non-compliance to your project.

You'll see here that this door is above the budget U-factor, but again, COMcheck allows tradeoffs. So even though this one right here, this U-factor for this door is higher, there's other areas where there's building envelope assemblies where the proposed U-factor is a lot lower. So overall compliance for this project is six percent better than code.

Let's scroll down a little bit further. We won't look at all these envelope provisions. Here's where that signature line is. They didn't customize it, but that's where it needs to be signed and submitted. Here is the lighting, interior lighting power. What do we have different here? This is where we have all those space types again, the floor area square footages, the allowed watts per square foot, total watts per square foot if there was any allowances and so forth.

[1:46:06]

Let's get down a little deeper. Here's where it defines out what was put into the interior lighting tab for each space type. It adds them up, gives total fixture wattage and it's telling you what each one is. Really nice as far as I think how the lighting reports are broken out, even the envelope. It makes it easy to read and go through plan review on these. And here's the total proposed watts, 3346. Interior lighting just happens to pass six percent better than code.

Under the interior lighting, you will have the compliance statement. Let's keep scrolling down here. Here's exterior lighting compliance certificate. Similar to interior lighting, but here's your applications for the lighting, exterior lighting applications. But you might have that supplemental watts that I talked about added in here. And it'll show it on the report. Here's all the areas that are defined, total tradable proposed watts, again.

[1:47:04]

So this is where that five percent and you're paying attention to what projects you have here that all those applications do meet what's on the lighting plans.

Signature line. We can go to the mechanical compliance certificate. No pass or fail here. This is just giving you everything that was entered for each HVAC system, the capacity, heating cooling modes, fan systems, CFMs, motor plate specifications, water heater capacity efficiencies, signature line for your

mechanical. Whether it passes or not, you're still verifying that as signing this and submitting it that these systems meet the efficiencies, meet the capacities of code and that I'm going to verify that these will be installed and meet compliance. You've got the composed compliance statement. And now let's get into the inspection checklist.

[1:48:03]

And again, this is a case study, but I showed you a screenshot of this earlier. This is – keep it with you, the user, keep and print this out, but this should also go to the jurisdiction of them to use. It gives them through the stages of inspections. So here's the plan review portion that comes up first. Code section, and then they'll go through and do their plan review but it also gives that comment and assumptions column where the user was put requirements will be met, might show where on the plans, might show no, that that doesn't, won't be met, or they're going to go see the envelope table for the values and they're going to enter them for plan review and then out in the field. And this is just a brief overview of it. It goes through all of them. It'll go through the lighting as well, so the inspection checklist can get quite long if you had every one of your systems filled in for COMcheck.

[1:49:00]

So let's go back up to the top of this example project. And that really ends really a brief overview of the basics of COMcheck. Again, after you get to using the tool and you have questions, you can go out to Energycodes.gov and go out to the technical support and the help desk and submit all your questions that you might have on anything that you're having an issue with your project, how you enter a certain assembly, or go to the software user's guide. But you can enter your questions electronically through that help desk if you have questions further.

[End of Audio]