

Overview of Commercial Lighting Requirements of 2009 IECC
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Rosemarie Bartlett: Welcome, ladies and gentlemen. I'm Rosemarie Bartlett with the Pacific Northwest National Laboratory, and I'd like to welcome you to today's webcast, an Overview of the Commercial Lighting Requirements of the 2009 International Energy Conservation Code, brought to you by the U.S. Department of Energy's Building Energy Codes Program.

At this time, all participants are in a listen-only mode.

Before we begin the webcast, we will conduct a polling session. We have one polling question for you today. To answer the question, you'll need to press the numbers on your touchtone phone. Please wait for the entire question to be read before responding. There will be a brief 10-to-15 second period of silence after the question has been asked so that the results can be compiled. Please remain on the line. The question is: How many attendees are at your location viewing the webcast together? Please use the appropriate number on your phone to represent the number of viewers at your site. For example, press one for one viewer, two for two viewers, and so on. Please press nine to represent nine or more viewers. Once again, the question is: How many attendees are at your location viewing the webcast together? Please use the appropriate number on your phone to represent the number of viewers at your site. Please answer now by using your touchtone phone. Please remain on the line during the silence while the results are compiled. Thank you. This concludes the polling session.

A couple of logistical announcements before we begin. You may ask a question at any time during the webcast today by using the Q&A menu on your computer. Questions won't be answered via the computer but will be answered live by the presenters as time allows at the end of the presentation. If you are interested in receiving AIA credit or continuing education credit for this webcast, stay tuned to the end of the webcast. Before we get to the Q&A, we'll put up a link at that point that you can write down and plan to go to at the end of the webcast.

We're very happy to have as our speaker today Eric Richman of the Pacific Northwest National Laboratory.

Eric, please begin.

Eric Richman: Thank you and welcome to the presentation on the 2009 IECC Commercial Lighting Requirements.

I'd like to start with a bit of background what this code is and where it comes from. It is the International Energy Conservation Code. It provides commercial and residential provisions, but we're going to be talking about the commercial lighting requirements today. These are contained in Chapter 5 of the IECC Code, which also references as an alternate compliance path the ASHRAE 90.1-2007. This Section 5 includes lighting, of course, and it covers lighting controls and power density for both interior and exterior; and there are some major changes in the 2009 version, which we will cover here as well, two of them being some daylight zone control requirements and some new exterior lighting requirements,

an expansion of those exterior requirements into zone applications instead of one single application.

So the IECC Code compliance process here is kind of a graphic showing you the whole thing. The first box of course is to find out if your project must comply with the IECC.

So let's look at that. Does your project need to comply? First, you need to identify if IECC 2009 is the applicable code for your state or jurisdiction. As you may know, there are lots of different versions of several codes out there that may have been adopted by your state or local jurisdiction. You need to determine if this is the one that you have to comply with. If you don't know, you can always go to a source like energycodes.gov and it'll be able to tell you which is the appropriate code for your location or your state or jurisdiction. If the answer is: Yes, IECC 2009 is your code, then you need to determine if your building is either commercial or high-rise residential. That's what we're covering for requirements today. And generally if you are a commercial entity or a high-rise residential building, you will have to comply with a set of requirements other than if you are a one- or two-family residential dwelling or if you fall under any of the other R-2, R-3, R-4 three stories or less residential type applications. Those would be found in a different section of the code, not the commercial requirements.

So assuming that you do have to comply with this code, when do the lighting and power requirements apply? And it's going to apply for anything that's in an original installed lighting system or a new building. It also will apply for a new addition and will apply for a tenant build-out. If you are altering an existing

system, it'll also apply; and if you have a change in occupancy of an existing building that's going to increase the energy, you also will have to comply with the lighting requirements. There are some specific exceptions. If you are dealing with a building that is on a state or national historic building register listing or if it is eligible through documentation to be listed, it's exempted from the lighting requirements. If you are doing alterations to areas where less than 50% of the luminaires are being replaced and the power is not being increased, then you don't have to show compliance there either. And if you have a situation with dwelling units, the part of the building, the lighting within the dwelling units is exempted as long as more than 50% of the permanently installed parts of that system include high-efficacy lamps or lighting sources.

And let's cover that a little bit more by describing what is meant by that. It is defined in the document itself, high-efficacy sources will be compact fluorescent lamps, T-8 or smaller diameter, which means T-12s, a common application, is not necessarily going to comply. It has to be T-8 or smaller fluorescent lamps, or lamps with a minimum efficacy which is based on lamp wattage. And here's a table that's included. If you have larger wattage lamps say greater than 40 watts, you have to have a source with at least 60 lumens per watt. And as it goes down, the efficacy requirement is less of course. And what you'll find is that most fluorescent products will meet this. There will be some T-12 products that won't, so you may have to be careful there when you're looking at what sources are used in your dwelling units.

So getting down to the actual compliance process, the lighting section is over to the right. Compliance is based on either complying with the IECC Section 505 itself or, as mentioned, the alternate compliance path which is referenced to be

90.1-2007 Section 9. There's another way to comply which is using the building performance method. We are not going to cover any details with that in this presentation, but that is the whole building modeling that of course is always an option if you would like to go that path.

So what's covered under electric power and lighting? There's very little in electric power. We will cover one item on electric metering. The majority of it is in lighting. There are mandatory interior lighting requirements, which comprised primarily required controls. There are very few specific wattage efficacy limits, mostly controls in the mandatory section. There's also an interior lighting power allowance requirement. This is the one most people are familiar with, the lighting power densities where you're given a certain amount of wattage to use and that's your limit for compliance. There are also exterior lighting controls, again some required controls and one requirement on lamp efficiency. Exterior lighting also has a set of power density, similar to interior, the same kind of format dealing with exterior applications, and we're going to cover that of course in detail. And then as I mentioned, the one electric metering requirement.

So starting off with the interior lighting control, basic control requirement is that each space surrounded by floor-to-ceiling partitions, basically each room or large area much have independent lighting control, and the intent here is of course is to allow occupants to control the lighting in each space as needed at the use they need when they need to do it. These controls must be located in the space. However, you can have a control switch from a remote location if there's a need for that, but then it has an additional requirement to have an indicator that identifies the lights that are served, it could be just simply a listing, and some indication of status, usually a pilot light indicating whether those lights are on or

off. And there are some exceptions to this control requirement, security or emergency areas that must be continuously lighted of course are exempted for obvious reasons. Lighting in stairways and corridors that are elements of the means of egress are also exempted from this requirement.

There's also a separate control requirement which is called light reduction. You may understand it as bi-level control, that was kind of the predecessor of this requirement, and it basically requires that each area must allow the occupant to reduce the connected lighting load by at least 50% and in a reasonably uniform pattern; and this of course allows occupants to moderate their light levels, gives them more flexibility, allows them to save energy if they are of a mind to do so.

The compliance of this can come in several forms. You can control all the lamps or luminaires such a dimming system that can dim down to at least 50%. You can have dual switching of alternate rows, alternate luminaires, alternate lamps, anything that gives you a uniformed pattern down to 50%. You can also switch the middle lamp if you have, for example, three lamp luminaires. This would give you a two-thirds/one-third which would comply with your requirements as well. You can also control each individual luminaire, each lamp. This will be a more expensive option, but that would comply with the requirement as well.

There are some exceptions to the interior lighting reduction requirement, some spaces where it simply doesn't make sense or is impractical to comply with. Areas of course with only one luminaire, there's really no practicality of that. Areas controlled by an occupancy sensor are exempted because the occupancy sensor provides in most cases more energy savings than a simply bi-level or manual lighting control. Certain space types where it's not practical - corridors,

storerooms, restrooms, or public lobbies - there may be security issues in some of these as well so those are exempted. Sleeping units of course are exempted, again for practicality reasons, and also spaces with low installed wattage, less than 0.6 watts per square foot. Again from a practical standpoint, that isn't as much energy savings and therefore it's exempted.

One of the major control requirements in the standard and most standards across the country is automatic shutoff of interior lighting, and this is required in this code for any building that is greater than 5,000 square feet, you're required to have auto shutoff. What is important here is to kind of define what a building is because there has been confusion in the past. There are a couple of different phrases here - any structure used or intended for supporting or sheltering, any use or occupancy. This is typically what we think of as a building, a unified structure. But a building area surrounded by exterior walls and firewalls is also considered a building for this requirement. The classic example might be a retail mall that may be on its own greater than 5,000 square feet, but each individual business entity might be smaller than 5,000 square feet, and typically these have their own electrical service. They have firewalls between each unit and by the second part of the definition would then be considered a building. So an individual business entity less than 5,000 square feet wouldn't fall under this requirement, but any of those over 5,000 square feet would. And then of course like most requirements, there are a few special exemptions. Sleeping units where it doesn't make sense or might be an issue with the lights going off automatically. Lighting for spaces where patient care is rendered are exempted for similar reasons; and the catchall, any other area where you might endanger occupant safety can be exempted as well.

How do you comply with this requirement? There are basically three methods. The first is some kind of an automatic time-of-day controller. Typically this will be a whole building controller, might be tied into an EMCS system for the building. There are some limitations. It must control less than or equal to 25,000 square feet for each switch or each control point and not more than one floor for each switch or control point, or you can comply with occupancy sensors that turn lights off within 30 minutes of the occupant leaving the space, and these if they were put in every room would also comply. One point to make here is that you can combine these two as you see in the graphic. You can have occupancy sensors in some spaces where it makes sense and have a whole building control switch system for the rest of the space as the combination works just fine to comply with the code as well. And a third option, again somewhat of a catchall is if you have some other type of automatic, has to be an automatic signal that does this control, that would comply as well. The key here being that it must be an automatic control.

There is an override requirement also for automatic control such that if an occupant needs to come in and do some work afterhours, for example, they can come in and make that work. There are some requirements to the override. It must be readily accessible, again, so occupants can activate it. It must be within the view of the lights or area that's controlled so the occupants can see what they're actually overriding. It should be manually operated, again, for occupant use. It should have a less than or equal to 2-hour override. There's a limit on that. You must control less than or equal to 5,000 square feet with each override. You don't want to turn on lights in areas that aren't going to be used, and there are some exemptions. In areas such as malls, arcades, auditoriums, etceteras, where you have single large area uses and you have a separate control, captive

key or control in another part of the building, you can exempt that as well with the same kind of a two-hour override. The override in these similar kinds of spaces can also be larger than 5,000 square feet. You can cover up to 20,000 square feet with these. So again to reiterate, in these spaces you can have over 2-hour override and you can cover a lot larger spaces.

The one final control for scheduling is called "Holiday Scheduling." In a lot of building types you're required to have a separate control that will turn off all lighting loads for 24 hours and then resume. There are some exceptions where it doesn't make sense because holidays are not typically observed from building operating conditions such as retail stores, restaurants, groceries, places of worship, and theaters, which are typically operating during holiday hours, these would be exempted.

Now we'd like to talk about one of the new provisions for 2009 which is daylight zone control. We need to start off with a couple of definitions, one for a daylight zone under a skylight. The simplest way to look at this is the dimensions of the skylight and in each of the four dimensions add to that the floor-to-ceiling height or the dimension to a ceiling height opaque partition that might be in the way, or one-half the distance to an adjacent skylight or other vertical fenestration, whichever is least. You add these to the skylight dimension in all four directions and that defines the area that is considered a daylight zone when you have skylights.

Let's look at similar definition for vertical fenestration when you have windows, and this is defined by a depth and a width. The daylight zone depth in this case is assumed to be 15 feet into the space away from the vertical fenestration or

windows or to a nearest ceiling height opaque partition, which of course would block the light, whichever is less. The width is then going to be the width of the window plus two-feet on either side, or the width of the window plus the distance to again an opaque partition, or the width of the window plus half the distance to the next daylight area or with skylight or vertical fenestration, whichever is least. So that the defines the two daylight zones, one for skylight/one for vertical fenestration.

The actual requirement for these daylight zones is that you must have individual control of the lights separate from the general lighting, and this allows occupants then to control that lighting and make use of the daylight. There's some special cases if you have contiguous daylight zones adjacent to vertical fenestration, in other words there are a row of windows. You can control larger areas with a single control if that zone or the areas in that zone do not encompass more than two adjacent orientations. So you could have a north and a east corner, for example, all in the same control, but areas on the north and the south could not be controlled with the same control for obvious reasons. If you have daylight zones that are under skylights and are greater than 15-feet from the perimeter, then these must have a separate control as well from the area that's daylight with windows on the side of the building, must be a separate control. There are of course some exceptions. If you have a daylight space that is enclosed by walls or ceiling height partitions and contains two or fewer light fixtures, then you're not required to have a separate switch, again from a practical standpoint that doesn't make a lot of sense. And one other note, these are - - these can be manual or automatic controls. There's no specific requirement as to what kind of control other than it has to be separate from the general lighting so occupants can affect them differently when there is daylight available.

There is also a separate control requirement for a sleeping unit lighting. This applies to all sleeping type units - hotels, motels, boarding houses, etceteras. There must be a master switch at each room or each main room entry. So if you have a hotel room that's just one room, typical configuration you have to have one master switch near the door. If you have a hotel room with suites within it or suite with rooms within it, you can have a switch at each individual room. The idea here is that each of those switches would then control all permanently wired luminaires or switched receptacles, with the exception of bathrooms. Those do not have to be controlled, and this of course allows the occupant to turn off all the lighting in the space as they're leaving the room without having to go back into the room to turn off individual lights.

Another requirement for tandem wiring, and this is intended to eliminate the use of magnetic ballasts which are still used in some applications today, eliminate the use of those when they're driving single lamps. So if you look at the example there, if you have a couple of three lamp luminaires that have one-to-two lamp ballasts, which is a common configuration, at least for older technologies, you want to tandem wire the two individual lamps so that you do not have a magnetic ballast driving just one lamp. That's the basis of the requirement and the exemption - - exceptions, of course, feed to that. In other words, telling you what would work in order for you not to have the tandem wire, which are going to be common applications where you have high frequency electronic ballasts you don't have to deal with this requirement. If you have luminaires that are on an emergency circuit, again those are exempted. And if you don't have an available pair, those are exempted. Again this only applies to magnetic type ballasts when

you have a one- or two-lamp ballast driving just one lamp. Not a very common application today but sometimes you will run into it.

One other specific requirement on exit signs, there is a limit of the wattage. It must not exceed five watts per side, and there are lots of choices out there that meet this requirement, pretty easy to match.

And that basically ends the interior control and miscellaneous requirements, so now we'd like to move on to the major requirement in the code, which is the interior lighting power density limits. And most of you are probably familiar with these. It's a requirement that your connected interior lighting power must not exceed the allowance that you're given for interior lighting power, so it's fairly straightforward in that you have to calculate what your allowance is and calculate what your proposed wattage is and make sure your proposed wattage is less than the allowance. So blanket notes here: You calculate your power allowance based on a building area type with some additional allowances. You calculate your proposed wattage. You have to follow some wattage rules when you do this, and we'll discuss those, and there is some exempted lighting as well that you don't have to count. Then you compare these two numbers and you'll determine if you comply or not.

So let's go into that with a little more detail. The requirement is based on building area type for your allowance. And what you see here is the actual table from the code that has each of the available building area types, and there are 32 of those, with their watt per square foot allowance. What you need to do is find your building or building areas within this table. If you don't have an exact match, you're going to want to try and find the closest match; and in some cases, you

may have to talk with the building official to determine what would make sense and what they would except or what's reasonable.

Once you've chosen your building area type from that table, you can then apply an allowance to it, a wattage allowance. You need to remember, however, that that building area includes all of the common space types you would find that. So in this case a simple example of an office building area is going to include some corridors, restrooms, lobby, office spaces. You don't identify those separately. That becomes part of your building area type. If you had another building types here restaurant, it would include some of the same types of spaces as well as cooking facilities and dining facilities. So it's done by building area type, not by individual space. And then of course you identify the watts per square foot lighting power allowance, multiple it by that square footage to determine what your total wattage allowance is.

Here's an example again with an office, fairly straightforward, 200,000 square foot office building. It's given an allowance of 1.0 watt per square foot. It's just simply 1.0 watt times 200,000, you have 200,000 watts to use for your compliance limit.

If you have a multiple occupancy building, the example here being a museum with say a retail associated with it and a cafeteria, then you - - and because all three of those building area types are included in the table, you need to calculate them separately. Now if you wanted to, you could try and say, "Well this is just a museum." But in this case, museum, retail, and cafeteria are all included in the table, so you do have to use those. A museum might be a common space type including a little bit of retail in some cases, but typically wouldn't include retail and

a cafeteria, so it makes clear in this case you have to separate them. The simple rule is if part of your building has a general building area is including as a building area type on the table, you must use that and calculate using that building area type. So in this case, you calculate your allowance for each of those three areas, add them together and that becomes your total allowance.

So again here's a similar example. You have the museum at 40,000 square feet at an allowance of 1.1, similar case for cafeteria and retail, you calculate the individual wattages, add those up and you have a total allowance for the entire building.

There is one part down in the end of the table that wasn't shown, but is shown more expanded here, which is the one allowance that your given for additional power for retail spaces. And in this case, if you do have retail display lighting, and it's very important to understand that this is additional lighting, it's in addition to your general illumination in this space, it's installed specifically to highlight merchandise, typically it's going to be an adjustable type of lamp that is aimed at and specifically only lights merchandise. A general rule of thumb would be if you turned off all of this additional lighting, you would still have a space that's generally illuminated. These are just additional lights. If you do have these, you are given an extra allowance, and it starts with 1,000 watts as a base load and then you get multiple by each retail area a separate allowance. And you'll see there are four retail areas, four allowances, the first two are allocated at 0.6 watts per square foot, Retail Area 3 and 4 at higher values, and there are definitions here for what each of those areas is. And Retail Area 1 is basically anything else that's not listed in 2, 3, and 4. And for 2, 3, and 4, you'll see there are specific allocations for different types of merchandise. If that's the type of merchandise

you have in a certain part of your retail store, that's the retail area that it's defined as and you have an allowance that's given for that. Again, you need to make sure that this is only for highlighting allowances, highlighting merchandise, not for general illumination. There's also an exception here at the bottom that notes that if you have merchandise that isn't included in Retail Area type 2, 3, or 4, or in Areas 2, 3, or 4 that you believe should be included in there, as long as the building official accepts that addition, you can use those 2, 3, and 4 allowances.

So now that you've identified what your allowance is, you need to figure out what your connected lighting power is, and this again is the sum of the wattage of all your proposed connected lighting power, and this must include your overhead lighting; it must include your task lighting, and it must include decorative lighting, unless it's exempted elsewhere, and we'll talk about those exemptions. And note also that your wattage must be calculated based on actual power charge on, not just nominal lamp rating.

Here's an example of connected lighting power, the rules for the connected lighting power. You must calculate your screw lamp holders. These will be your typical Edison-based. So let's look at how that calculation is to be done. There are some rules that have to be followed when you're calculating your installed wattage. For screw lamp holders, the typical Edison-based product - can lights, etceteras - it must be the maximum labeled wattage of the luminaire. So whatever the labeling is that came from the factory, et cetera, is the number you are to use. You cannot use the simple wattage of a bulb you may or may not be putting into that fixture. It's got to be the maximum labeled wattage of the luminaire, because that is the wattage that may at some point either initially or down the line be installed into that fixture. If you have low voltage lighting, it's

going to be the rated transformer wattage for that low voltage lighting system. If you have line voltage track, you have three options. You can install the specified wattage with a minimum of 30 watts per linear foot, or the wattage limit of a system circuit breaker that that set of track is on, or the wattage limit of other permanent current limiting devices, and these are commercial devices that are permanently installed on a piece of track or a set of track. You can use either of those to calculate the line voltage track. If you have other types of luminaires and lighting, it's the manufacturer's rated wattage of the lamp plus ballast. You have to include ballast when you have a lamp plus ballast system. So these are the rules you have to use to calculate your installed lighting power.

And of course, as mentioned, there are exemptions to the installed power. We're not going to go through each of these, but there's a fairly long list of specific applications that are exempted from the calculation, and they include areas or applications for the most part like professional sports arena playing fields. Sleeping units, as we mentioned before, are exempted. Other areas which are going to be quite varied and are for other purposes other than perhaps general illumination, such as casino gaming areas, task lighting for medical purposes is of course exempted, and a whole host of other applications where again it's not necessarily general lighting or it's for a specific purpose that really should not be controlled separately. These do not have to be counted when you're calculating your proposed wattage.

So what if you get done with your calculation and your proposed design does not meet code? There are several things you can do. Certainly the first thing you should do is check your calculations. Did you pick the appropriate building area types? You want to make sure you got the right numbers for your allowance. Did

you pick the actual lighting equipment wattages? Did you follow the rules and calculate according to what you're actually going to put in there? And make sure specifically that you follow the list of exemptions. You don't want to have to be counting any lighting that is not required to be included. You also want to look at your design. Do you have reasonable illuminance levels provided? You may find in a lot of your applications that your places are overlit. This is not necessarily a fault anywhere, but it's commonly done. You want to look at whatever recommendations such as the IES Light Level Recommendations and make sure that you are on par with what you actually need and not more than you need because if you are lighting to above typical recommendations, which is what the code is based on, you will find that you're going to have a lot of trouble complying with the code. Have you used the most efficient light sources? Again, the code is based on the use of generally efficient light sources and so if you aren't using those, then again you're going to have trouble complying with the code. If you still are having trouble, you might want to consider using the alternate Standard 90.1-2007. It does offer potentially some other flexibility in that it has a space-by-space method that may make it a little easier for you to show compliance. It might be worth trying as well. And as a final step of course, there's always the whole building or building performance method that's allowed in IECC 2009 which essentially models the energy use for your entire building, and that's one way also of showing compliance. You may find that's the easiest. One note on using the alternate 90.1-2007 method, the current 2009 IECC requires that if you go to that method, you must use it for all disciplines - envelope, lighting, mechanical. You cannot just do it for the lighting say and then do IECC for mechanical and envelope. It has all to be done either to 2007 90.1 or to IECC 2009.

So that basically covers the interior lighting requirements, let's look also at some - - the exterior lighting requirements, and let's start first with controls. If you have any dusk-to-dawn lighting, your typical parking lot type application, you must have either an astronomical time switch or a photosensor to do that control automatically. If you have any other night lighting that isn't strictly dusk-to-dawn, you can either control it with an astronomical time switch or a combination photosensor and time switch. That's your choice, provides a lot of flexibility. But in either case, it's going to be automatically controlled. And all time switches must have a ten-hour battery backup so if there's a loss of power, you're not going to lose the control requirements right away.

There's also one exterior efficiency requirement, and that is that all building grounds lighting if it's over 100 watts must have a source efficacy of at least 60 lumens per watt. And if you look at this table of general lighting sources, you'll see that that 60 lumens per watt is going to restrict the use of incandescent, halogen, and some compact fluorescent. But again, this is for luminaires over 100 watts, so you're probably going to find you're going to be using either a linear fluorescent or an HID, like a metal halide product; and in most cases, those will meet this requirement. You may find some that don't on the lower end of those product ranges. So again, you'll have to be careful. But for the most part, it's going to eliminate the use of incandescent and lower end compact fluorescent products on the exterior, and that's essentially the intent of that requirement. There are some exceptions to that. If that luminaire or light is controlled by a motion sensor, which again provides about the best energy savings you can get, it would be exempted. If you... If the light is used for any of the purposes in the exterior lighting power allowance exception section, which we will go over, it is also exempted of course. And if it's an approved light for historical safety

signage or emergency consideration, then it's also exempted from this requirement.

So exterior lighting power limits, similar to the interior lighting power limits, there is a parallel set of exterior lighting power limits. These are applied not so much on an exact space type, but more on an application or surface type, but the process is the same. You calculate your lighting power allowance based on these functions, spaces, and applications, and then you calculate the proposed connected lighting power that you're going to install on the outside, again using the same wattage calculation rules and looking out for any exempted lighting that you don't have to count. And then just like with the interior, you compare these two values and you need to make sure that your proposed wattage is less than or equal to the allowed wattage.

So the exterior lighting power limits, what's covered under these? Essentially any exterior application is covered. The table tries to be inclusive in that it has a section for everything you might encounter on the exterior, and again this is only for lighting that is powered through the building itself and associated with the building. It is divided into two separate types of applications. One called tradable, another called nontradable. The difference of course being that with the tradable applications, just like with the interior lighting power allowances, you can swap wattage from one application to another. It's the total wattage used for those applications that's important. Nontradable surfaces are use it or lose it. They're going to be special applications with special allowances and you cannot trade from one to another. You might use it for that application or you don't get that allowance.

So let's look at that in a little more detail. Tradable surfaces, this is a list of the basic tradable surfaces. These are going to be the more common applications in most building exteriors - uncovered parking lots, walkways, stairways, pedestrian tunnels, main building entrances, other building entrances, canopies of pretty much any type, freestanding and entrance, open sales areas, and street frontage. All of these are tradable surfaces. So, for example, if you didn't use all the wattage that you were allowed for a parking lot, you could apply some of that to a pedestrian tunnel or canopies, for example.

And the nontradable surfaces, these are the nontradable surfaces in the table starting with building façades; and it includes specific applications, like I mentioned, such as automated teller machines, very specific application; entrances and gatehouse inspection stations; loading areas for law enforcement, these are related again to security issues; drive-up windows, again a very specific application; parking near 24-hour retail entrances. These are again special applications. A lot of times they're driven by security issues and they are considered nontradable.

One thing with the requirement that also needs to be dealt with is the application of an exterior lighting zone. The requirements are based on what kind of exterior lighting zone your building is in. The realization is that different areas of where your building is located have different lighting requirements. If you're next to a lot of exterior lighting, your lighting because of contrast or visual needs is going to have to be higher. If you're in low light ambient conditions, you don't need as much light. So there are four defined zones here. The first one is for those low light areas - national parks, state parks, basic forest land, or rural areas where there isn't much light to begin with so you don't use much light for contrast and

visual capability. Area 2 is going to be a very common application for a lot of buildings, and these are basically residential zoned or neighborhood district - - neighborhood business district zones. Light industrial might be included in there as long as it has limited nighttime use, mostly a lot of residential and neighborhood business areas. Skipping over Number 3, going to Number 4, this is going to be the high end of the scale, very high-activity commercial districts. These are typically going to be located in major metropolitan areas, inner cities, etceteras, with a lot of exterior lighting to begin with and so the lighting needs are going to be higher. This area, because it is the top of the scale, would typically be designated by your local land use planning authority. If they agree that you're in Zone 4, then you can use that allowance. Going back to Lighting Zone 3, that's all other areas in between, and this is going to cover a lot of commercial areas that are not within an residential zoning space and not within a inner city type environment. This will also be a common application.

So once you've determined which zone you're building is in, you're then able to go to the table and actually pick your allowance, and this is the first part of the table starting off with the tradable surfaces. But you notice at the top, there's a base site allowance. So depending on whatever zone you're in, you do start off with a certain number of watts just from the beginning because you're going to need a certain allowance for different parts of exterior lighting, and the allowances are different of course because of the zoning. The base allowance is there because there's a realization that if you have particularly a small building, you're not going to be covered potentially by a lot of the allowances per square foot. You're going to have somewhat higher needs because of what's considered the economies of scale. You have a smaller building, you don't have as much as square footage to get the wattage you might need. So you start off with a base

allowance, you then pick each of the applications that you do have and you get an allowance for each one of those. And just like the interior, you have to have that area type or in this case application type to get the allowance. So if you do not have any parking area that's lighted, you don't get any allowance for that application. You only get an allowance when you have that particular application, and this table should cover each of those. So here's a set of the tradable surfaces. You'll see that in general the allowance goes up as you go from Zone 1 to Zone 4, recognizing the fact that in Zone 4, you need a lot more lighting for most applications.

Here's a second part of the table that covers the rest of the tradable surfaces. And again, you'll see that for the most part they start low in Zone 1 and go up to Zone 4. In one case here, for example, outdoor sales street frontage, there's no allowance and that somewhat recognizes the fact that in Zone 1, you're probably not going to have any street frontage. But even if you do, there's no allowance given for that.

The next section would be the nontradable surfaces. These are the use it or lose it. And in these, you'll see that a fair amount of the time the allowance doesn't change, and this is representative of the fact that a lot of the nontradable surfaces are based somewhat on the fact that there's a security issue with some of these applications, so there are requirements other than the energy code that specify how much light is needed and so it stays the same regardless of whether your - - wherever your location is, for example, an automated teller machine that's based more on security requirements than it is on lighting requirements in various zones. So again, once you've calculated the allowance for each of your applications, you sum that up and that becomes your allowed wattage.

Now as we mentioned, there are exemptions here that you don't have to use when calculating your installed power. Here's a listing of them. Again, won't go through each of them in detail, but they are similar in their application to the interior exemptions. There are a few here of course that are specific to exterior such as theme elements in amusement parks, lighting for industrial production, things of that nature, public monuments, registered historic landmarks. These you want to make sure you don't count as part of your compliance requirement.

So once you added up all of your wattage, you've compared it to your proposed, if you aren't meeting the code, what do you do? Again, first thing you do is check your calculations, make sure you have applied the appropriate surfaces, that you've claimed all the allowances you can get, make sure you're using the actual lighting equipment wattages, again based on those rules, and look at your design. Did you use reasonable exterior illuminance values? And again, the IES provides exterior illuminance recommendations. If you're well above those, then you're going to have trouble meeting the code. And just like with interior, if you aren't using efficient light sources, you're going to have trouble meeting the code as well because the code is based on reasonable light levels based on IES recommendations and efficient light sources. So... And again, if that isn't working, you might want to try the 90.1-2007 Standard. It is essentially the same requirement so you probably wouldn't see any difference there, but it's always an option if you want to try that. But in the case of exterior, the requirements currently are exactly the same so you wouldn't see any difference. And as a final option, you can use the total Building Performance Method, that's always available for use.

One last requirement on metering, and the requirement here of course is for residential type facilities. Each dwelling unit needs to have a separate meter. And the idea here, of course, is to allow the occupant the capability of having the data they might need to make good decisions that of course can lead to energy savings.

And that completes the presentation for today. Thank you.

Rosemarie Bartlett: The U.S. Department of Energy would like to thank all of you for your attendance today.

Before we begin answering as many of the questions that have come in as possible, I'd like to put up the link where you can complete an evaluation, provide us with your AIA information or print a certificate of completion, please write down the link carefully and type it into your browser. Note that you need to make sure that you have it written correctly and typed in correctly - - typed correctly into your browser.

Now for the questions. Eric, take it away.

Eric Richman: Okay, we have a bunch of them here that have come in, and I'll try and answer these as quickly as I can trying to get through all of them. First one here... I'll read the question and provide hopefully an answer that makes sense to everybody.

First one. Lighting within dwelling units, do the fixtures have to be documented although they are exempt? And the answer is: Yes, they must

be documented in that you must somehow show to the building official for compliance that they are going to be exempted because they meet the requirement, but then you do not have to count them in terms of your, for example, watts per square foot when you're doing LPD compliance.

Second question. **Do we need bi-level with automatic control?** And the basic answer is no. If you are complying with the essentially bi-level requirements, one of the exemptions is if you have occupancy sensor control. So if you have an automatic control on the lighting, then you do not have to have bi-level because the occupancy sensor control basically does the same job or even a better job.

Another question. **Please clarify again the mall example for the controlled requirements. Did you say that an enclosed mall space less than 5,000 square feet does not need to meet the requirements?** Yes for override. That's for the override part. When you have to provide override for your automatic shutoff in a mall space, the override can be up to 20,000 square feet instead of 5,000 square feet.

Another question. **With auto shutoff of lighting loads, is a blink alert required prior to the sweep at the end of the override period?** This is not required by the energy code; however, there may be some other safety code or best practice code that requires this. It sounds like it might be a good idea. But the energy code itself does not require that.

Another question. **So in a hotel suite, you do not need to have a master switch at the entry door that turns off fixtures in all rooms of the suite?**

That's correct. In a multi-room suite, it's up to you. You can either put a master switch at each individual room or at the main exit, your choice.

Another one. **Is square footage based on gross square foot or net square foot?** And I believe this is asking about the issue of wall thickness within a building if you're doing gross square footage for a whole building, and typically it's the nominal gross square footage so you are not required to remove wall thicknesses in that calculation.

Another one. **For merchandise that is vertically displayed like on the wall, do you still only take the floor area or can you take the wall area where the merchandise is on display?** And this I believe is referring to the additional lighting power allowances for retail. The old system that a lot of you may be familiar with in previous versions of national (inaudible) standards was based on merchandise display area. And so if you had a vertical display area, you would count it as it sits vertically. This new system has been redone, redeveloped so it's a lot here to apply and the idea of where you have vertical display area has been incorporated into the calculation, but now you only have to do a calculation on the floor area for each type of merchandise. So the vertical component is already incorporated and it is just floor area at this point.

Another question on exemptions. **Is a press box at a sporting arena exempt also?** Again, I believe this is referring to the sports - - professional sports lighting exemption. No, the press box is not part of the actual sporting activity. However, if you have some permanently installed lighting for video production, which is one of the exemptions, and it's only there for video production and it's not used for anything else, in other words it's off except when you're doing a video production,

that might be exempted under that exemption but not the press box itself under the sporting area exemption.

Another one on sleeping unit power density. **If the sleeping unit power density is exempt, how would that be applied in a multifamily application?** And the answer is: You just calculate the wattage you're applying and the lighting power density for the non-sleeping unit spaces. So you would just exempt the square footage and the lighting in the sleeping units and you essentially pretend that you have a building that's just made up of common spaces - hallway, lobby, laundry, et cetera.

Question on determining exemption from LPD. **As a specific situation when determining if a space is exempt from LPD if it serves both as video production space and also as say a church, will only the video support lighting fixtures be exempt?** That's correct. The video production lighting, this is an exemption on the lighting itself, not the space, so the video production lighting is only used for video production can be exempted. But if that same lighting is used for day-to-day operations, then it has to be counted.

Question on a bare porcelain medium base socket. **This is one of the wattage rules. A bare porcelain medium base socket is rated at 660, says watts, but I believe you're meaning volts, that's the wattage you're required to list?** I believe again there's some confusion about wattage rating for a socket - - I mean sorry voltage rating for a socket, which I believe the 660 is. The wattage rating that you have to go by in the wattage calculation rules is usually a sticker somewhere on the luminaire. It's not a rating for the socket, and it would be in

watts and it would rarely be something like 660. I believe that's the voltage rating. Anyway, it's the wattage you need to look out for, not a voltage rating.

Question on a hotel suite. **Is a hotel suite of rooms considered a sleeping unit, or is only the area containing the bed a sleeping unit?** The definition includes the entire hotel suite just as it would include an entire apartment, for example, so all of that would be considered a sleeping unit.

Another question on what's connected lighting. **Is an office cubicle with lighting built into the cabinet with a plug-in cord connected, is it covered task lighting?** The intent of course is to count everything in your design that's part of the lighting design at the time your design lighting for the building. So if there's... If you're designing say an open office space with all of the lighting you're going to require without any furniture mounted task lighting, in other words you're going to design all the lighting required in the space to be provided by overhead lighting, then that's what you count. If you're intending that there will be furniture mounted additional lighting in there that provides some of the lighting for the space, then that must be counted. Again, the intent is you must count everything that is intended to be part of that space to provide illumination in the space.

Can you exceed the watts per square foot if lighting is on less than usual, such as in a church? No. There's a lot of interest in kilowatt hour based codes. The current codes are power density based, in other words to eliminate wasteful over designs, so you cannot reduce the - - or increase your lighting power density allowances based on hours of operation. It is truly a power density limit requirement.

For exterior lighting efficiency requirements, if the total wattage is less than 100, are CFLs acceptable, for example, using a fixture with one 42-watt CFL lamp? Yes, the requirement is and the intent is any lamp that's over 100 watts has to meet the efficiency requirements. So if you're under 100 watts, you can use essentially whatever you want as long as it also then of course meets the lighting power density requirements in the exterior section.

For interior lighting in all scenarios, building type or ASHRAE space-by-space method, is the lighting power density effectively all tradable? Yes, the intent for interior lighting whether it's whole building method or a space-by-space method you might use with ASHRAE, that's all tradable. The nontradable surface areas in the exterior is specific to exterior. All the interior is intended to be tradable.

Does the exemption for compliance area basis of 50% apply to the entire building or just the modified space? And this sounds like it's referring to the alterations part of the code and it's mentioned on a space basis whereas you only have whole building lighting per density requirements in the IECC code. Yes, the intent was to apply this on a space-by-space basis. So I believe what you would end up doing is if you exempt - - are going to exempt a few spaces with your alternation project because you're only replacing less than 50% luminaires, then I believe that the solution is to treat the building as if those spaces did not exist when you go to do compliance. And the wording is perhaps a little loose here, so this is one thing you'll want to verify with the building official before you finalize your plans. But that is the intent to apply this on a space-by-space basis.

Another question here. **Are interior lighting controls for light reduction required?** Yes, there was a slide on this for light reduction requirement which used to be the bi-level control requirement. Essentially... To repeat it, essentially in any space that's required to have a control by the code, you must have the capability of doing light reduction. And as I mentioned answering another question, occupancy sensors in that space would comply with that requirement as well.

Another question. **Can area calculations for exterior lighting overlap? For example, if you have a tradable area of a canopy or over a nontradable area of an ATM, can you count the overlap area?** In this specific case, I would say that, yes, you can count that because an ATM has very specific nontradable lighting requirements. However, if you have something else that's a little more generic, for example an entrance at a gatehouse which is also under a generic canopy, those are essentially doing the same thing so you wouldn't really be able to double count those. If you do have a case like this, this is one place where I would say go the building official ahead of time and explain to them why you're doing what you're doing and make sure it's okay with them. Because without an explanation, it's just going to look like double counting to them.

So a bunch more questions here. **Let's see, exterior lighting zones tradable per square foot?** The exterior lighting is applied on a zone basis, but the tradable versus nontradable part still applies; and per square foot, it depends on the application. Some of these are per square foot, some are per linear foot, and some are per actual application. I hope that answers that question.

Holiday scheduling. **Do occupancy sensors satisfy the requirement for holiday scheduling?** It doesn't specifically note that in the requirements, as I recall. There isn't a special exemption for that, but it kind of makes sense. And in this case, you might want to go to the building official and explain that it's going to do the same thing and they might give you a variance for that, but it doesn't specifically list that as an exemption.

Can we claim credit for using higher color temperature lamps? There's no credit for color temperature. The requirements, I believe if you're talking about general lighting interior or exterior, there are tables of lighting power density limits and that's simply based on the wattage of the lamp, so the color temperature wouldn't matter. That's strictly a design issue that's left up to the designer.

Daylighting. **Are there any requirements dealing with proportional compensation electrical to compensate for variations in daylight illumination?** There are daylighting requirements, but the daylighting requirements, as noted here, are only to provide the capability of controlling the daylight area separately. There are no other requirements currently in IECC 2009. There may be in the future, but right now they're simply requirements to provide that control capability. What you do after that is up to the designer.

Another question here. **What do we do if there's a conflict between the NEC and the IECC?** In general, the energy codes give way to safety issues, and you noted there are a couple places where I mentioned there are exemptions where there's a light health safety issue. And in general, for the entire energy code, if there's a conflict with an electrical or safety building code, the energy code tends to give way.

Okay, what are the rules for counting plug load? Plug loads are not part of the energy standard at this point, so they really don't enter into the picture. In the future, you may see plug load code requirements in the standard, but currently there aren't any.

Do any lights on an emergency generator have to be controlled with an automatic shutoff? The automatic shutoff applies to the whole building. But again, there was an exemption for matters related to life health safety. These would have to be addressed with the building official on a case-by-case basis.

Question on remote switching. **Can a remote switch be located outside of the space that doesn't have an indicator if the space can be viewed from the switch, i.e. through a window in a door?** I believe that does comply because it talks about being visually accessible. Let's see, I just want to make sure here. I believe that probably would comply. Again because the language doesn't specifically allow that, you would want to check that with the building official. But it seems like that certainly meets the intent of being able to see the light that's going to be controlled.

In multiple use, does each area have to comply or is based on the total allowable wattage? If you have say a combined office with restaurant building and you're using both of those different LPDs, it is tradable. So it's the total wattage of your entire building that matters.

Another question. **Does a room with an occupancy sensor need to have a local manual switch for occupant control?** There is a requirement that you

have a manual control initially, so you would have to have at least one manual control for serving the area. If you also combine that with an occupancy sensor, that does meet some of the other requirements, but the language does say you have to have at least a manual control. And most occupancy sensors provide this as part of the switch. There's usually a manual on/off component.

Another question. **Where can I find a code change summary from IECC 2006 to IECC 2009?** I'm not sure. I'm not aware of one that's been done specifically on the IECC codes. You may go to the IECC website and there may be something there that they've provided, but I'm not aware of one.

For a building being remodeled over 50% of its square footage but installing less than 50% of the quantity of new fixtures, is the code required to be applied? As I mentioned earlier on a similar question, the 50% for alterations or remodels is intended to be based on a space-by-space method. So any space in your renovation where you're replacing less than 50% of the luminaires, you would not necessarily have to show compliance to it. You would treat those as not part of your remodel situation.

Another question on LEDs. **Do you consider LED power requirements in the requirements?** I can tell you that the basis for the interior and exterior lighting requirements does not specifically address LED lighting, although it's understood that it's an up and coming choice, although LED lights are still a relatively small percentage of interior lighting and they aren't specifically addressed. However because the efficiency of the LEDs can be much better than other sources, you're likely to be able to meet the energy code by the use of LEDs.

Who is responsible for calculating, the architect planning designer or electrical engineer? That depends. It's the... It's up to the building official as to what they will accept. Different jurisdictions have different rules, but the energy code just states what the requirements are. The local building official is the one you would have to ask about specifics in terms of who actually does the calculations of the requirements documentation.

Question on the methodology. **What's the method used to calculate the allowed lighting power density for a space with more than one story, for instance an atrium?** There is in the ASHRAE code that has a space-by-space method, a special section for atriums. For a whole building method like this, you would have to just use the ground floor square footage. You wouldn't be able to take additional stories. If you have an atrium however - - I mean I'm sorry, mezzanine that's being lighted separately from the ground floor, you certainly would count that square footage in your calculations.

Is bi-level switching required in retail space even though it's likely it will never be used? There isn't a specific exemption for retail spaces in lighting reduction control. This again if it's an impractical requirement, you might want to go to the building official and make your case and see if they would allow an exemption for that, but there's nothing specifically for that. The energy codes unfortunately are not perfect and they don't always cover everything and this sounds like one case where you might want to just make your case to the building official and see what they can do for you.

Does the master control for hotel rooms apply to nursing homes? I believe if you look at the definition for a sleeping unit, you may find that a typical space in

some nursing homes doesn't comply because it's not a complete sleeping unit. Typically, and let me check on this real quick here, and I can look at the definition. For a sleeping unit, it says: "A room or space in which people sleep which can also include permanent provisions for living, eating, and either sanitation of kitchen facilities, but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping unit." So in this case, I believe most applications of a nursing home would be considered a sleeping unit if it's an individual nursing home space. Again, this may be something you want to check with your building official just to make sure that they agree.

Does R-3 residential multifamily have to comply with this code? If it's three stories or less, it would comply with the residential code. It's only if it's going to be high-rise that it would have to comply with the commercial part of the code.

Does separate metering for high-rise residential have to be utility metering or could some meters be used? And I don't believe there's an actual requirement in the code that it be utility metering. I don't believe it's specifically says that, so it should be able to be something that can be - - can provide the user of the space some idea of what their electrical energy use is. You'll want to check the requirements, and I don't have that right in front of me. But again, you might want to check with the building official to make sure that what you're putting in is correct, but I don't believe it requires actual utility grade metering?

When calculating wall façade lighting power density, is the link measured in width or height of the wall? I'll just explain the way a façade is done. The idea is you have two options. You can either do it in watts per square foot of the illuminated wall or surface and you would essentially calculate whatever surface

is intended to be illuminated, the entire area in square footage and you apply your value to that or a watts per linear foot. So if you have a tall wall section that you're uplighting, for example, it would be the width of that wall section you're going to light regardless of how tall it's going to be, it's just the width. I hope that answers that question.

Are separate meters required for tenant spaces in a multitenant building?

Yes, that's the... Let me check here. That's the basis for the requirement, separate metering required for each dwelling unit. And of course this is only for multi or for high-rise because that's all that the commercial code applies to and it only applies to dwelling units. So if you're talking about a commercial building with office tenants, no, this is for dwelling units.

If alteration reuses existing luminaires and greater than 50% of the area is altered and no load added, is compliance exempted?

Generally the intent, as I have understood it, is that it's only if you're replacing luminaires. If you move a luminaire from one location to another, that's typically not considered a renovation or an alteration and so that - - my understanding is compliance wouldn't be required. But again, this is one of those things those you may want to check with the building official because the language doesn't specifically address that.

How does the code address partial building alteration?

If you have a renovation, it's only the parts of the building that are being renovated that need to be comply with the standard. You don't have to make the rest of the building comply with the standard.

Let's see, we have a 24/7 security emergency response center. Does that building require either automatic control or bi-level lighting? And again, there typically are exemptions. And let me check here. For the automatic shutoff, there is an exemption for spaces where an automatic shutoff would endanger occupant safety or security and you might make a good case that is one of those cases. For the light reduction control or bi-level, there isn't a specific exemption for that. But again, you might make your case that that doesn't make any sense to have that because it is a 24-hour situation. But again, it's not specifically mentioned for the bi-level lighting, you'll have to make that case yourself.

Is video conference lighting considered exempt? Not necessarily. Again, there is an exemption for lighting for theoretical purposes including performance stage film production and video production. If you had, for example, a lighting control system in a video conferencing room where you had a general setting and maybe a classroom setting and maybe an office setting and you had one that was just for video production and they were luminaires that were never on except when you're doing a video production and other lighting wouldn't be at the same time, for example, that might be exempted because it is truly separate lighting used only for video production and only on when video production is going on. Again, this would be one where you'd want to document that heavily for the building official to make sure that they're comfortable with that.

Another question. **Is landscape lighting accounted for in the exterior lighting allowances?** And yes, there is a specific... Well there isn't a specific landscape lighting item in the table, although there is a... Well there are several. You'll just have to kind of pick on, maybe it's part of a walkway or... Actually it would be...

There's one that's talk about plaza areas and special feature areas, this is where you're going to have to put your landscape lighting. So the table is intended to cover everything you might encounter. Just like with the interior requirements, you'll want to pick the closest applicable space. And in this case I think for landscape lighting, it would be that special feature area which is under walkways ten foot wider or greater. It's under that section.

Do you public schools with court sports within gyms qualify as court sports areas? If it's truly specifically for court sporting and you can define it separately and it has perhaps different lighting design, then, yes, that would be seem to make sense. Again, in cases that aren't clear cut, you would make that case to the building official.

Why does building façade fall under nontradables? (Inaudible) security concerns? No, it doesn't necessarily present security concerns. Not all the tradable section applications are security-based, some of them are. Façades is just one that is so unique and variable it wasn't considered appropriate to have it as a tradable option.

Is the automatic shutoff on 5,000 square feet and master override required even if all lights are controlled by a sensor? There is an exemption for automatic shutoff, which is an occupancy sensor. So if every space was controlled by an occupancy sensor, then that complies with the automatic shutoff requirement.

Another question. **With regards to exemptions for interior allowances, can you clarify what is meant by lighting approved for safety or emergency**

considerations? Would this apply to normally on fluorescent lighting fixtures with integral battery packs for emergency mode? Again, lighting approved for safety or emergency considerations, commonly these would be the battery packs that are not on during normal operating hours. And actually language in some of the codes, it actually says it's only exempted if it's not on during normal business hours, but in some cases there is dual capability for some lighting. This would be one thing, again, because the language isn't necessarily clear, you would probably want to check with this the building official to make sure that it could be exempted. For example, in the exemption section, one of the (inaudible) emergency lighting automatically off during normal building operation. This would be typically the battery packs. The ones that are on during the daytime would typically have to be counted.

Can you please clarify or give example of task lighting that would qualify for exemption with auto shutoff? Does it have to be integral? Does it matter if it's LED or linear fluorescent? I believe you're talking about furniture mounted supplemental task lighting that is controlled by automatic shutoff and it doesn't matter what type it is. This could be, for example, in a cubicle situation or in an office where you have task lighting under shelf or a desk lamp that is on a circuit that's controlled by an occupancy sensor so that when you leave the office, it turns the task lighting off. That's a typical example of that.

If one building has less than 5,000 square feet but is under one roof with other buildings, would these requirements have to be met? And I believe you're talking again about the auto shutoff. The intent - - tried to make it clear in one of the slides, perhaps it isn't. Even though the language says building, the intent is for it to be a - - I'll call it a building entity and I'll use the example of a

strip mall. If you have a strip mall that's well over 5,000 square feet but each individual unit is less than 5,000 square feet, commonly a strip mall business entity will be surrounded by firewalls, which if you look at certain building code definitions defines a building and it might have - - probably will have its own electrical service, has its own operating hours, is its own business entity and therefore it is what is really meant to be applied to that 5,000 square foot automatic shutoff rule. So in a strip mall with a bunch of individual businesses that are say 4,000 square feet, those businesses would not be required to have that control under the IECC 2009.

In a dental treatment room is separately switched, can ceiling troughers for use of the dentist count as being exempt? Technically if that lighting is there for, I don't remember the exact wording, for medical procedures, if I can find that... Let's see, it talks about it for... Oh, task lighting for medical and dental purposes. If you can document that that's really task lighting for medical and dental purposes, then technically it complies as an exception. But if it's two-by-four trougher just like the two-by-four trougher right next to it in the ceiling, I think you're going to have trouble convincing a building official that that's what that's for. But the intent is if it's separately there only for use during dental procedures.

Another question on: **I perform a lot of pharmaceutical work. I struggle to meet LPDs based on client FDA lighting requirements. What building type would you use for a research facility? Pharma facility, we are typically required to design two 70/80 foot candles.** That's a good question. This is an issue that's been raised recently in a lot of discussions on development of energy codes and there's a realization that there are a couple of issues. One, there aren't appropriate laboratory type building types or space types in the code and

there are some what I'll call corporate or organizational requirements or recommendations that designers like yourself are having to meet. In terms of the building type, one suggestion might be to look at using the ASHRAE alternative because you do have a space-by-space method and there is a laboratory space type in there. You may not be happy with what the allowance is for that laboratory space type, but at least it's get you closer than a whole building basis. In terms of the corporate or organizational requirements, if they are a life health safety ordinance required by a state or local jurisdiction, then you would be exempted. But my understanding is those are mostly corporate type requirements. You're kind of stuck between a rock and a hard place unfortunately in that those are not necessarily based on current IES recommendations, which is where the code comes from. You might want to discuss with the organization where the requirements came from because they may be outdated. But if you're stuck compiling with them, you're going to have to just do some more work, maybe trying to find some trade-off somewhere else in the building or you can always make your case to the building official if you feel that you're having to comply with some other requirements that simply can't be met by the energy code.

We have time for one last question?

Rosemarie Bartlett: Probably have time for a couple more, but I just wanted to interject. We're getting several questions from folks asking if the presentation is available. And so I wanted to let everyone know that, yes, a PDF of the presentation is available, and the link to that file was provided on your confirmation email. But as Eric continues to answer questions here, I'll go back and pickup a slide and put it on the screen that has that link as well.

Eric Richman: Okay, another question on individual metering requirements. **Am I correct in that the IECC requires only individual electrical metering and not individual gas metering?** That's correct. The requirement is only for electrical metering. Gas metering of course can be a good idea, but this is the - - it's essentially in an electrical requirement section so it's only specifically for electric metering.

Is exterior general signage lighting business identification to be included in the exterior exceptions? The exception is for, and let me check here, specialized signal directional and marker lighting as well as advertising signage or directional signage. So if you have a sign that has your business name, I would consider that to be probably advertising signage and that would be exempted. Again, you can always check that with your building official to make sure, but it does talk about advertising signage and I think that would comply.

Can you explain what it is meant by the exemption on the lighting calculation integral to equipment or instrumentation installed by the manufacturer? I've seen cases where sales display cases are proposed for the exemption. If it gets shipped to you with the lighting already installed, the sockets are in the piece of equipment, you plug a light in it and you're ready to go, and again if the capability to put the lighting in is installed by the manufacturer, then it is exempted. So a classic case might be a refrigerator case or a piece of mechanical equipment that's got its lights installed.

Clarification, when you say the IECC gives way to the NEC, are you saying that the IECC... No, kind of just the opposite of that. The NEC requirements would take precedence over the IECC requirements because the NEC

requirements are probably health, safety, and construction-based.

Another question on patio lighting, doesn't seem to be addressed anywhere, can you please clarify? Yes, that's one of the other issues. For example, outdoor restaurant patio lighting isn't a separate section. You're again just going to have to find an appropriate application and again maybe this would be the walkways ten feet wide plaza area, special feature area would probably be the closest for that kind of application.

An exterior mechanical equipment area requires higher illumination for maintenance purposes, is there a way to increase the lighting (inaudible) for that function? There's nothing specific in the code itself, but all the tradable services of course are tradable, so you may be able to find some wattage in some other application to account for that. That's my best suggestion. Hopefully those areas are small and you can maybe get some wattage from another application. But there's nothing specific for that application itself.

If using a time clock photocell setup for exterior lights, does the time clock have to be astronomical? It's design calls for the photocell to turn the lights on a desk and the time clock turns them off at a specific time during the night. I believe that would be comply, just you're allowed to have any combination of time clock and photocell.

Does the additional merchandise lighting needed - - need to be less than the additional allowance or is the allowance added to the overall power density for retail area? The additional merchandise retail lighting power allowances are in addition to the general allowance. The general allowance

would be typically for your overhead lighting in say a big box department store. The allowance is only for specific lighting that's installed and switched just to highlight specific merchandise, for example track light that's aimed at mannequins or aimed at a specific piece of merchandise, that's what the additional lighting power allowance is for, and it is use it or lose it. You don't automatically get it. You have to document that that lighting is being used to highlight merchandise.

You mentioned that cord and plug fixtures need to be counted towards watts per square foot for office desk lighting, yet later on you mentioned that plug load is not counted. Oh sorry, I thought you meant general other plug loads. Plug-in lighting does need to be counted as part of your lighting power density if it part of the lighting design. For example, if you have an open office area and you design it with some overhead lighting and that's going to provide the say 35 average foot candles that you're required for your design and you don't have any intention that there's going to be any other lighting in the space and someone brings in a desk lamp and puts it on their desk and plugs it in, you're not required to show compliance for that desk lamp. It's only your initial design. But if your initial design is counting on desk task lamps or under shelf task lamps, then those must be counted.

Are exterior flag lights included with tradable areas? Is flag lighting exempt from the exterior lighting allowances? There's no specific exemption for flag lighting, but of course it's not included specifically in the table requirements either. Again, you would need to find an application to put it under. Or as you'll note, there is a base side allowance for each exterior application and that might be a good use for that base side allowance. The base side allowance

is in there specifically because the code just can't think of everything so then it realizes there's going to be something it forget and flagpole lighting could be one of those.

A dual service building space area such as auditorium doubling as a dining area where the stage lighting is exempt, is it appropriate to count the dining area and it's allowable wattage and auditorium area and it's allowable wattage separately? If you have the same space that's doing double duty and you have some exempted theoretical lighting, yes, the theoretical lighting is exempt, but you can't double count that space. It's only one space. It gets one allowance. So in that case, if it's truly dual purpose, I would suggest you pick the one that has the highest allowance.

And we have time for one more question. **Are all lights in an operating room exempt or only the surgical troughers and surgical boom lighted lights?** Again, it's anything that's there for task lighting. So, for example, if you have some overhead troughers in the operating room and they're there just for general illumination for people walking around or for cleaning, but then you have the big overhead light over the operating table and other articulate lights, it would be - - the general overhead trougher lighting would have to be counted, but the other articulated special surgery lighting would not.

Rosemarie Bartlett: Well thanks so much, Eric. You made it through the vast majority of the questions. That was a yeomen's effort there. We'd like to thank everybody for participating in today's webcast brought to you by the U.S. Department of Energy. You may all disconnect.

Please Note: * Proper names/organizations spelling not verified.
[sic] Verbatim, might need confirmation.
- - Indicates hesitation, faltering speech, or stammering.