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These comments reflect the views of AHRI and the member companies of the AHRI Zone Control Systems Technology Section. The slide references are to the slides presented at the 2013 Building Efficiency Standards and Residential Zoned A/C Workshop held on July 15, 2011.

Slide 5 – Typical Practice – Two Types of Zonal Systems

Multiple Systems, High Performance as compared to what? The author's previous study showed a number of homes with single systems had lower than expected efficiencies and higher initial cost not only for the equipment but also higher operating costs when both A/C compressors are running. Each furnace, air conditioner and heat pump requires a certain amount of power that must be taken into account in order to calculate the home's electrical load. This increases the load for each home and increases the electric demand on the utility. Homes with multiple systems that can be combined into one unit and zoned with dampers can reduce the utility's demand.

Single speed compressors and fans cannot modulate to track load. Currently with the majority of the installed systems this is true. However, that is why zoning is used to condition the zones inside the home as the load changes in different areas of the home.

Supply air flow is low when all zones are calling. This statement is misleading in that the volume of air (CFM) through the HVAC system is not reduced when all zones are calling. The air velocity and volume delivered to the registers may be slightly lower with all dampers open versus when only one zone is open.

By-Pass ducts are common and are used to control the static pressure and velocity in the duct system as zone dampers open and close, while maintaining a constant volume of air moving through the HVAC Unit.

Slide 6 – Code Change Proposals

Eliminate bypass ducts – The manufacturers of Zone Control Systems who have sold millions of systems for over 50 years cannot all be wrong. By-Pass ducts serve a purpose to maintain air flow and pressure in a duct system.

Delete the current Zonal A/C performance compliance credit – This will result in higher energy costs, resulting in continued poor comfort conditions and homeowners over compensating on thermostats, in order to maintain the comfort level in areas without a thermostat.

Slide 10 – Typical Dampered Multi-Zone A/C System with By-Pass Duct

While this may have been the case in many of the homes in the case study, it is not the recommended method. We believe the case study homes have flaws that affect the operation of the system and contributed to the negative effects of the case studied homes.

Slide 11 – How Zoning with Bypass works

If in actuality these systems were not performing properly, the study results were adversely affected. Since these systems are stated to have low airflow when both zones are calling, may indicate a problem existed before the zone system was installed, such as over-use of high resistance flex-duct and/or excessive duct leakage.

Slide 12 – Bypass Duct Flex from Supply to Return

This slide is indicative of extremely poor workmanship and rampant over-use of high resistance flex-duct. This HVAC system will consume more energy whether or not it is zoned.

Flex-duct is arguably the single most likely cause of high duct pressures and poor air delivery to the occupied space. The CEC can make a much larger impact on energy savings by limiting flex-duct to the last 6 ft. of branch runs and prohibiting the use of flex-duct on main duct runs and bypass runs.

Slide 14 – AHRI – Manufacturers

AHRI will argue that this study's conclusions do not look at the overall energy consumption of the home or how the system is operated. The presenters cite prior studies only to support their positions. The presenters completely ignore the same study's conclusions that zoning can save over 20% when zones are setback. If the goal of the CEC is to provide common sense energy reduction solutions, zoning with setback thermostats provides that ability automatically and not just in some cases, but in all cases.

Slide 15 – Research on Multi-Zoned Systems

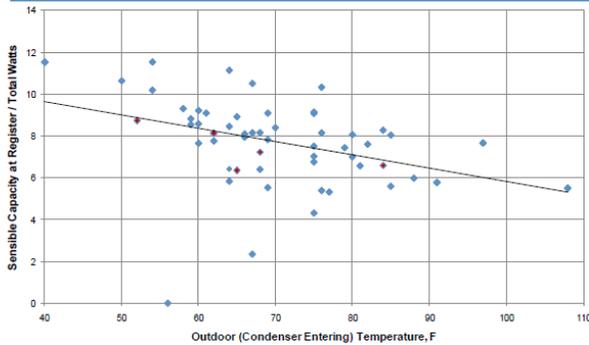
These separate research projects both came to the same conclusions, zoning can add 20% (not the 35% as noted on this slide*) to energy costs if no setback is used and can provide 25% savings when setback is used. Attached is another chart from a more recent study on zoning showing a 30% reduction in cooling KWH with zoning. The presenters continue to report only on the increase in energy and not on the savings.

*The Oppenheim Study from 1991 must have been misquoted in the NAHB/Carrier Study as no place in the 1991 Study does it note a 35% increase. Only a 20% increase is noted. A full copy of both studies is attached.

Slide 23 – Average Energy Impact

The presenter's presentation from April 12, 2011, shows the total number of homes surveyed with lower than acceptable EER ratings. While only two zoning systems were substantially below the acceptable line, 16 non-zoned systems fell at or below the lowest rated zoned systems. Our point is that there are many reasons for systems not to be performing in the field at their rated efficiency levels. Zoning should not be singled out because of poor installations. The efficiency of each of the underperforming zoning systems can be improved by correcting improper installation techniques. We maintain that the presenters are unfairly critical of zoning. Considering that this study also has a substantial percentage of non-zoned systems, 20% whose efficiencies fall below the acceptable line. Slide 6 from the April 12, 2011 presentation states that 60% of the 80 homes surveyed also had lower than standard cooling air flow.

Zonal Systems (red) Have Low EER



California New Home Energy Survey

- We have completed the survey of a sample of 80 new 2007 CA homes and found:
 - AC systems have low capacity and efficiency
 - Cooling air flow lower than the standard in 60% of systems
 - Cooling duct pressures are very high
 - Cooling Fan Watts are high
 - MF Duct Leakage is very high, while SF is pretty good

If issues exist with 60% of the systems, and zoning is less than 10% of the systems and only two zoning systems are substantially below the average, common sense dictates that these are not properly performing systems to be used as a standard for gauging performance.

Slide 25 – No Bypass and No Extra Cost – Bonus Supplies

This proposed scheme where the “Bonus Supplies” are damper controlled while the main ducts to the zone have no control at all will result in over-shooting the thermostat. There is minimal temperature control and this will only result in over-shooting thermostat set-points in those zones, causing homeowner discomfort. The presenters should review zoning manufacturers’ guidance.

Slide 26 – Damper Stop Relief

This can certainly be a supplement to a by-pass but not a cure all. The damper stop adjustment may be at a point where too much air enters a zone, and will only result in over-shooting thermostat set-points in those zones, causing homeowner discomfort.

Slide 27 – Another Answer

The alternatives to Zone Dampers mentioned are multiple units or mini-splits. This logic makes **no sense** when it comes to energy efficiency. This suggests adding a second or even third unit to a home. Adding units will increase the utilities demand load to provide added electrical capacity to the home by two or three times as using one unit with zoning. Instead of having one 30 Amp circuit and one HVAC Unit, the alternative is to add two or three – 30 Amp circuits. This makes absolutely no sense as utilities are looking to decrease their load requirement. Adding extra air conditioning units only increases generation capacity requirements for utilities.

Slide 28 – Variable Capacity

We concur that variable capacity is a great option but not an alternative to zoning. We believe variable speed systems should be zoned in order to achieve maximum energy efficiency. Zoning will match the capacity of the HVAC system to the zone load. This is where the HVAC Industry is heading. New federal

energy regulations will be in place and manufactured HVAC systems that can meet these new regulations will be the majority of the market by the time these new proposed CEC Regulations take effect. Why not have a regulation in place that anticipates the market?

Slide 29 – Conclusions

Bypass should be eliminated because they intrinsically reduce energy efficiency is not valid as in the NAHB/Carrier study, a by-pass was used and over all energy savings was achieved using setback control.

Multi-Zone Systems are for comfort, not energy savings, is stated only because of the potential for higher energy cost based on misuse of the system or poor workmanship.

This whole study ignores the stated energy savings when zoning is installed with setback control and the ironic part is that setback thermostats are mandated. The CEC should mandate setback thermostats along with zoning and significant energy savings will occur. Why are the CEC presenters ignoring this glaring answer for an extremely viable low cost option to save energy?

Slide 30 - Code Change Proposals

Zoning should remain as part of Energy Code as the occupants have the ability to set back rooms/zones of the home. Just as the CEC presumably would not ban the use of a light switch for each room and only require one light switch for the whole house, the CEC should not ban the use of a thermostat for each zone. Zoning is for comfort and energy savings. The studies have proven so with the use of setback. Also, people who are comfortable are less likely to change the thermostat settings than those who are uncomfortable.