CAL SMACNA

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California Association Sheet Metal and Air Conditioning Contractors National Association

Cyndi Marshall
Executive Vice President

SMACNA

Telephone
(916) 363-7460
Facsimile
(916) 363-7544
E-Mail
cyndi@cal-smacna.org
Office
8880 Cal Center Drive, Suite 280
Sacramento
California
95826
Website
http://www.cal-smacna.org

December 6, 2011

Ms. Martha Brook
California Energy Commission
Office of High Performance Buildings and Standards Development
1516 Ninth Street
Sacramento, CA 95814

Re: 2013 Building Energy Efficiency Standards: Proposed Revisions to Non-Residential Standards

Dear Ms. Brook:

Thank you for your attention to the concerns of the California Association of Sheet Metal and Air Conditioning Contractors' National Association (CAL SMACNA) regarding the California Energy Commission's proposed revisions to the Building Energy Efficiency Standards contained in the California Code of Regulations, Title 24, Part 6. We are pleased to find that our Sep 26, 2011, letter expressing comments on the proposed revisions received your attention and a prompt response prepared by Taylor Engineering and CTG Energetics.

CAL SMACNA had performed an initial review of some of the Title 24 revisions that have been presented in the Commission's workshops including related feedback from our member contractors and consultants. In our Sep 26 letter to the Commission, CAL SMACNA identified four proposed revisions that presented problems and outlined our concerns accordingly. Those four revisions include: Data Center Economizers, Kitchen Ventilation, Laboratory Exhaust, and Outside Air and Demand Control Ventilation.

In reviewing your response, we are encouraged to find some of our concerns being met with agreement. However, with regard to several other concerns that are not met with agreement, we feel we have not seen an adequate justification for the position of the Energy Commission. In particular, we feel that in some cases our concerns were misunderstood or overlooked, and in other cases Taylor Engineering and/or CTG Energetics have applied a narrow analysis of heating, ventilation and air conditioning systems that ignores the practical realities that contractors must confront with every project.

Our hope with this letter is to distinguish, with regard to each point of disagreement, whether our apparent disagreement stems from a misunderstanding of terms or from a genuine difference of policy opinions. Additionally, where the latter scenario applies, we hope with this letter to continue a dialogue that improves the proposed revisions.

CAL SMACNA is a non-profit trade association representing over 600 union sheet metal and air conditioning contractors who employ more than 25,000 men and women throughout the state of California. These contractors perform commercial and residential heating, ventilating, and air conditioning, manufacturing, and testing and balancing.

Please find attached our review of the four abovementioned revisions, as well as our answer to Taylor Engineering's and CTG Energetics' response to our concerns. We look forward to discussing these and other proposed revisions with you and your staff in the near future.

Sincerely,

Cyndi Marshall

Cyndi Marshall, Executive Vice President

This document discusses the following four revisions to Title 24 proposed by the California Energy Commission (CEC), dealing with energy efficiency standards:

- Economizers for Data Centers,
- Kitchen Ventilation,
- Laboratory Exhaust, and
- Outdoor Air and Demand Control Ventilation Systems

For each revision, this document outlines the initial concerns and recommendations of CAL SMACNA that were raised in our Sep 26 letter, CEC's response to those concerns, and CAL SMACNA's response to CEC's response.

I. ECONOMIZERS FOR DATA CENTERS

This revision states each cooling fan system serving a computer room must include either an air economizer or waterside economizer.

Our Recommendation:

CAL SMACNA recommends the CEC adopt a more regionally sensitive approach to encouraging waterside economizers, and clarify how the revision classifies new generation systems, such as direct (DX) and indirect (evaporative) cooling.

While we understand the general benefit to energy efficiency that economizers are capable of providing, CAL SMACNA is concerned that waterside economizers (WSE) are particularly sensitive to climatic conditions. In particular, studies have shown WSE provide minimal energy savings in warmer climates, such as in Southern California, or in higher-humidity climates, such as in the San Francisco Bay Area. On a statewide basis, air-side economizers consistently outperform WSE, leaving WSE to present superior energy savings only in relatively unique climatic settings. CAL SMACNA therefore urges a more regional approach to encouraging WSE.

CAL SMACNA also feels that the revision is unclear as to how new generation systems, such as DX and evaporative cooling, could be classified.

Taylor Engineering's Response:

(with our Response to the Response in italics)

We thank you for taking the time to review and comment on our proposed measures for Title 24 2013. This proposed measure has already been presented at 3 workshops co-sponsored by the Green Grid (5/10/10, 7/15/10 & 4/11/11) and at several major venues including a Data Center Dynamics Conference (7/16/2010), a SVLG Data Center conference (10/14/2010) and at several PG&E Pacific Energy Center classes. Thus far the response to our proposals has been very positive.

In your comments you raise two separate issues:

- The climatic dependence of air- and water-side economizers, and

- How the proposed requirements address other technologies like direct or indirect evaporative cooling.

We will respond to each of these separately in the paragraphs that follow.

Issue 1: Climatic Performance of Economizers

The structure of our proposed requirement for economizers in data centers follows the format of the existing economizer requirements in Title 24 2008 144(e). These both share the following characteristics:

- The economizer requirements are based on characteristics of the design (such as unit capacity),
- Either water-side economizers or air-side economizers can be used to meet the requirements, and
- The requirements are prescriptive and alternative designs that don't have economizers can be used through the performance method of compliance if they have other energy efficiency features.

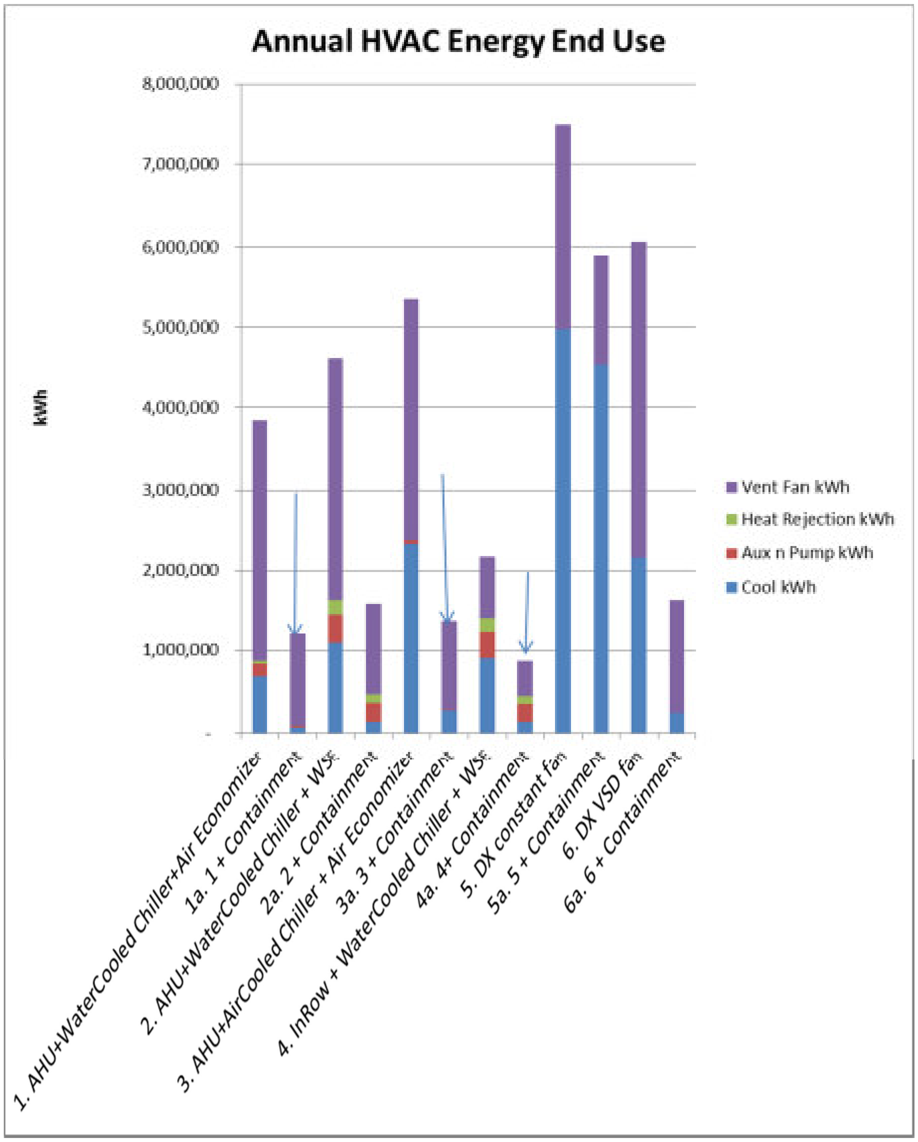
Our CASE proposal documents the simulations that we ran in a range of different California climates including CZ 04 (San Jose), CZ 06 (Los Angeles), CZ 07 (San Diego) and CZ 12 (Sacramento). As shown in the figure below, these climates represent approximately 40% of all new construction for commercial buildings. In each climate both air and water economizers had very quick paybacks (less than 5 years). Furthermore they are more cost effective for data centers than they are for office buildings which currently have economizer requirements in all 16 climate zones. The increase in cost effectiveness for economizers in data centers is due to the high density of the cooling loads and the long hours of operation.

Figure 1 California New Construction Data from Dodge Data Base

	Building Standards Climate Zones (BCZ)																
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Statewide
2010	0.029	0.292	1.202	0.728	0.141	1.167	0.779	1.485	2.913	0.499	0.625	2.945	1.330	0.181	0.093	0.282	14.691
2011	0.029	0.317	1.421	0.777	0.151	0.896	0.334	1.182	2.265	0.323	0.481	2.295	1.238	0.140	0.082	0.227	12.157
2012	0.031	0.354	1.692	0.857	0.166	0.740	1.619	1.016	1.788	0.894	0.591	2.237	1.207	0.162	0.066	0.190	13.611
2013	0.032	0.385	1.903	0.926	0.180	1.328	2.541	1.608	3.046	1.280	0.728	3.081	1.443	0.228	0.088	0.278	19.075
2014	0.034	0.394	1.896	0.952	0.185	1.616	2.737	1.913	3.759	1.363	0.794	3.595	1.621	0.256	0.107	0.336	21.559
2015	0.035	0.376	1.743	0.912	0.177	1.652	2.728	1.973	3.943	1.363	0.808	3.701	1.696	0.264	0.114	0.356	21.841
2016	0.035	0.366	1.695	0.887	0.172	1.491	2.429	1.830	3.653	1.244	0.790	3.539	1.686	0.252	0.110	0.343	20.522
2017	0.035	0.367	1.694	0.887	0.172	1.313	2.255	1.651	3.251	1.176	0.775	3.306	1.621	0.236	0.101	0.314	19.154
2018	0.035	0.373	1.715	0.904	0.175	1.278	2.289	1.621	3.189	1.197	0.782	3.279	1.628	0.237	0.100	0.309	19.111
2019	0.036	0.382	1.738	0.930	0.181	1.300	2.363	1.648	3.251	1.235	0.802	3.350	1.667	0.241	0.102	0.315	19.539
2020	0.036	0.392	1.758	0.961	0.187	1.319	2.433	1.672	3.305	1.272	0.825	3.424	1.708	0.246	0.104	0.320	19.962

Our firm has done evaluations on air and water economizers on dozens of real data centers for customers including Oracle, Symantec, Kaiser Permanente, Stanford University, eQuinix, Lawrence Berkeley National Laboratories, Sun Microsystems, Vantage and others. We consistently find that both air and water economizers in data centers pay back in less than 5 years for new construction using calibrated models actual construction cost data. Furthermore we have at least a dozen projects with water-side economizers in the two climates that you mention the San Francisco Bay Area (CZ 03 and CZ04) and Southern California (CZ 06). Where we have compared air- and water-side economizers in these climates they are equally effective as shown in Options 1a and 2a in the following figure.

Figure 2 Example Comparison of Air- and Water-Side Economizers for the Bay Area (CZ04) for a Commercial Client



Although this figure indicates that air-side economizers would save more energy at this facility, water-side economizers might be preferred by an owner who is concerned about gaseous contaminants or maintaining humidity levels in their data center. Furthermore it is harder to retrofit air side economizers than water side economizers in an existing building where a new data center is being added. We feel that giving the industry a choice between either air- or water-side economizers strikes a balance between energy savings and flexibility.

In sum, we are confident that both air- and water-side economizers are cost effective for data centers in all of the climates of California following the economic criteria set forth by the California Energy Commission. Furthermore we believe that offering the choice of either air- or water-side economizers for compliance is an important element for gaining industry buy-in of the new proposed requirements for data centers.

We greatly appreciate your explanation of this issue and have no further concerns with the climatic implications of the economizer requirement.

Issue 2: Treatment of Other Non-Compressor Cooling Technologies

Title 24 is a standard which provides minimum requirements for efficiency based on standard construction practices. High efficiency emerging technologies like non-compressor cooling using direct or indirect evaporative cooling are neither prohibited nor mandated. These technologies are not currently common in data center design.

In our proposal as written an owner could use evaporative cooling either to increase the savings over the base standard (e.g. for rebates or LEED points) or use it to meet the air-side economizer requirement which is written to allow economizing with air-to-air heat exchangers. Here's the proposed data center economizer wording as written in our report:

A direct or indirect evaporative cooling system would comply with 144(m)1A if it could carry the design cooling load at an outside temperature of 55Fdb/50Fwb.

There is also the option of using the performance approach.

As you can see, the proposal as written can accommodate designs that utilize direct or indirect evaporative cooling. We hope that this clarification addresses your concerns. We will add examples of evaporative cooling to the Compliance Manual to make sure that this intent is clear.

We greatly appreciate your explanation of this issue and have no further concerns with the treatment of other non-compressor cooling technologies.

II. KITCHEN VENTILATION

Due to the multifaceted nature of this revision, CAL SMACNA's outline of concerns and recommendations is broken into five sections, each addressing one of the five proposals contained in the revision.

Proposal 1

This revision would clarify that kitchen ventilation is not an exempt process and should be addressed in Title 24.

Our Recommendation:

None. CAL SMACNA agrees that kitchen ventilation should not be an exempt process and that this topic should be addressed in Title 24.

Proposal 2

The revision would prohibit replacement air introduced directly into the hood cavity of kitchen exhaust hoods from exceeding 10 percent of the hood exhaust flow rate. CEC has explained that direct supply of greater than 10 percent in short circuit hoods can reduce capture and containment, requiring generally higher exhaust rates and higher room makeup rates to offset higher exhaust rates.

Our Recommendation:

Title 24 should allow kitchen operators to use short circuit hoods.

Our experience suggests that short circuit hoods are not a common technology in California, as CEC also attests in its presentation of the revision. Where short circuit hoods are in use, commercial kitchens have generally found them to be the best option to suit their particular ventilation needs. Those needs typically include minimizing the energy costs and avoiding potential grease buildup that result from over-exhausting transfer air in some kitchen environments. In certain kitchen settings, short-circuit hoods have demonstrated the potential to provide superior efficiency by minimizing removal of conditioned makeup air. In fact, numerous models that are commonly used in today's market, and approved by independent testing and certification organizations such as United Laboratories and the National Sanitation Foundation, have been shown in tests to supply up to 70 or 80 percent non-conditioned makeup air internally into the hood capture area. This capability reduces heating and cooling costs of transfer air and more efficiently captures and contains grease and humidity.

Further, CAL SMACNA is not convinced that direct supply of makeup air leads to over-exhaust. Exhaust rates are prescribed by code based on square footage of the hood and type of cooking, among other factors. Whether a kitchen uses a non-short-circuiting hood or short circuit hood, the exhaust rate does not change. The presumption that short circuit hoods automatically lead to higher rates of exhaust underlie CEC's Life-Cycle Analysis, presented as part of CEC's presentation of this proposal, that compares the costs of a non-short-circuiting hood system with the costs of a short circuit hood system; the analysis arbitrarily doubles the exhaust from a short circuit hood relative to a non-short circuit hood. As a result, the presentation draws a clear picture of how CEC's flawed presumption that short circuit hoods over-exhaust led to the proposed prohibition of short circuit hoods.

In those relatively few kitchens that use short circuit hoods, CAL SMACNA believes reducing short circuit makeup air to 10 percent or less may require kitchens to condition the balance of the makeup air that is not directly introduced into the exhaust hood. CAL SMACNA therefore requests that CEC allow kitchen operators in those rare instances to seek the exhaust option that best suits their needs.

Taylor Engineering's Response:
(with our Response to the Response in italics)

The commenter's first concern regarding short-circuit hoods implies that the proposed code measure is intending to limit the use of short-circuit hoods because they do not adequately capture and contain smoke and heat plumes. This is not the case. Short-circuit hoods can work but as the results of the research study performed by PG&E, Architectural Energy Corporation, and Fisher-Nickel indicate, typical short-circuit hoods fail to adequately capture and contain smoke and heat plumes at UL 710 listed or stated airflow rates. The effect of this failure in commercial installations would be either objectionable spillage of smoke and heat into kitchens or what is presumably more commonplace: the exhaust rates are increased to a point where capture and containment is satisfactory. This increase of exhaust airflow and by extension makeup airflow is the basis for Life-Cycle Analysis comparison.

While we agree, short-circuit hoods in some environments may result in spillage of smoke and heat or increased exhaust rates, our experience and UL listings show these outcomes are not commonplace. The Life-Cycle Analysis' basis on this flawed assumption thereby weakens the analysis.

The commenter indicates that short-circuit hoods have been implemented successfully in the commercial installations which is undoubtedly true. There was, however, no data provided about whether those systems are successful using the UL listed or stated airflows or whether the airflows needed to be increased to work adequately.

Our experience and UL listings show CFMs can be decreased using short-circuit hoods. For example, Captive Aire System's Model R Internal Compensating Hood uses up to 80 percent internal untempered makeup air with minimal removal of conditioned air from the kitchen area and a minimum exhaust CFM rate of 251; Model ND Exhaust Only Hood uses up to 90 percent makeup air supplied through optional rear plenum with an exhaust CFM rate of 150; Model SW Compensating Hood with Internal and Front Discharge uses up to 80 percent makeup air with a minimum exhaust CRM rate of 251.

The commenter's second point appears to be that the mechanical code prescribes the exhaust rate based on other factors and therefore short-circuit and non-short circuit hoods are required to have the same exhaust rate. Chapter 5 of the California Mechanical Code describes minimum hood airflows for non-listed hoods. Short circuit hoods are listed hoods so the mechanical code does not apply and the mechanical code says nothing about maximum hood flow rates.

We did not intend to assert that the mechanical code prescribes the same exhaust rates for short-circuit and non-short circuit hoods, and we regret any confusion on this point. Our point here was actually to show prescribed exhaust rates are based on multiple complex factors that contractors must take into account when determining what type of hood is right for a particular kitchen. That the code does not dictate whether the hood is short-circuit or not short-circuit allows contractors the appropriate leeway to adjust to multiple complex factors to achieve the required exhaust rate.

With shortcircuit hoods the actual exhaust flow must be increased well above the exhaust flow of a nonshort circuit hood to work properly.

CAL SMACNA has not seen any evidence to support this claim. Just the opposite, as our response outlines above, our experience and UL listings show CFMs can be decreased using short-circuit hoods.

The analysis compared a UL listed non-short circuiting hood to a UL listed short circuiting hood where the exhaust air for the short circuiting hood was increased to simulate the same capture and containment performance as the non-short circuiting hood. Neither the hoods nor the airflows used in the analysis are subject to the mechanical code. The assumption used in the analysis assuming higher airflows for the short-circuit hood does not violate this code primarily because the hoods are UL listed and ideally engineered to perform at stated airflows and secondly, the code does not prescribe hood maximum airflows.

The analysis used by Taylor Engineering presumes that short circuit hoods automatically lead to higher rates of exhaust, and arbitrarily doubles the exhaust from a short circuit hood relative to a non-short circuit hood. As we have shown, this is a flawed presumption.

There are several exhaust hood design options available to kitchen designers and operators that work better and use less energy.

Proposal 3

The revision would prohibit mechanically cooled or heated makeup air delivered to any space with a kitchen hood from exceeding the supply flow required to meet the space heating and cooling load, or the hood exhaust flow minus the available transfer air from adjacent spaces, whichever is greater. "Available transfer air" is defined to mean that portion of outdoor ventilation air serving adjacent spaces not required to satisfy other exhaust needs, such as restrooms, not required to maintain pressurization of adjacent spaces, and that would otherwise be relieved from the building.

Our Recommendation:

Transfer air in the dining or restroom areas should not be used in substantial amounts to cool the preparation area. While we appreciate CEC's inquiry to reducing energy costs associated with cooling and heating makeup air, we are concerned that measures to capture what is defined as "available transfer air" would disrupt the air balance between the preparation area and dining area of commercial kitchen, contributing to possible customer discomfort, contamination of the cooking area, and inefficiencies that end up costing more in energy. CAL SMACNA believes prudent kitchen ventilation is premised on a separation of the preparation area and dining area as two distinct environments. Breaking the seal between these environments with substantial air transfers could compromise customer comfort, sanitation, and energy efficiency. Although we understand CEC's attempt to reduce energy use by moving conditioned air from the dining area to the preparation area, CAL SMACNA believes this revision may require air transfers that are much too large and the large quantities of transferred air may have adverse effects that far outweigh whatever energy savings may accrue.

Title 24 and ASHRAE Standard 62 currently do allow air transfers from the dining area to the preparation area. However, the amount of these air transfers is typically calculated to avoid contamination of the preparation area and increased cooling load in the dining area, and generally is around 5 percent. By proposing that a very large amount of air be transferred from the dining area to the preparation area using the required outside air from the air conditioning units, this revision neglects those priorities. With regard to energy efficiency in particular, the part of the revision exempting dining areas that use these air transfers from demand-control ventilation requirements implies a tacit admission that air balance in the dining area would be significantly and unpredictably impacted.

In addition to these potentially adverse effects of the revision, CAL SMACNA questions whether dining area air conditioners can substantially affect kitchen temperatures. The air that flows from the dining room air conditioning units to the preparation area would be approximately 75 degrees. Because a commercial kitchen requires a large quantity of air exhaust and makeup air due to the amount of heat and humidity produced during operation, dining area air conditioning units are unlikely to provide a substantial cooling effect to the kitchen. CAL SMACNA questions whether it is prudent to compromise comfort of customers, sanitation of food, and efficiencies of air balance, for the minor, if any, cooling effect that these air transfer can provide.

CAL SMACNA also questions how, under this revision, air will flow from the dining area to the preparation area. While typical coffee shops have pass thru windows, too much air passing through will cool foods and potentially reduce customer satisfaction. Additionally, high-end and buffet restaurants tend to have very little open passage for air to transfer from the dining area to the preparation area.

Taylor Engineering's Response:

(with our Response to the Response in italics)

The proposed measure does not, as the commenter interprets, consider using available transfer air to provide additional cooling to kitchen preparation areas. The proposed measure attempts to regulate the amount of mechanical cooling and heating of 100% outside air used as kitchen exhaust replacement air by using all available transfer air.

We believe this is a semantics issue that does not change our outlined concerns about transferring large amounts of air from the dining area to the preparation area.

The measure also **does not require large amounts of transfer** to be used that would disrupt customer comfort, sanitation, and energy efficiency *(bold added)*. The measure attempts to mandate the opposite condition whereby all transfer that is available is used as makeup air and does not mandate that designers produce transfer air that was not already available. Use of transfer air will, as the measure's supporting calculation show, save energy versus conditioning 100% outside as makeup in all climate zones.

The concept of a seal between kitchen areas and all adjacent areas is not a condition that exists in most commercial kitchens. The standard practice for kitchen design is to make the kitchen area more negatively pressurized than adjacent spaces to ensure that odors and moisture do not migrate to other areas. As such, air is continually infiltrating from adjacent more positively pressurized spaces via doors, pass-throughs, or transfer air ducts. The proposed measure does not alter this standard design practice and retains the same level of care regarding customer comfort and sanitation.

The kitchen ventilation efficiency option does not, as the commenter states, say that transfer air cannot be used if demand control kitchen exhaust systems are proposed. The measure gives kitchen designers options to satisfy lower energy targets whereby they can choose to **use transfer air to makeup 50% or more of the total exhaust airflow** OR use demand control ventilation OR use energy recovery devices OR use limited conditioning of outside air *(bold added)*.

Given the contradiction between the two bolded statements above, we see this explanation presenting contractors with a false choice. The explanation requires contractors to either transfer large amounts of air from the dining area to the preparation area (using transfer air to makeup 50% of more of the total *exhaust airflow should be considered 'large' by anyone's accounting), which we have shown to reduce comfort and sanitation, or contractors acquiesce to rigid and burdensome requirements without consideration as to whether those requirements appropriately address each particular and unique kitchen environment.*

These options are meant to recognize that if transfer air is being used then the energy goals are being achieved and demand control ventilation is not necessary. The reverse is also true, if a designer chooses to use demand control ventilation to meet the energy targets, they do not then have to at least 50% transfer air as makeup. This proposed transfer air measure would still be in effect obligating the designer to use as much transfer air as possible but there are no prescribed minimum or maximum transfer air percentages. Nothing about the either measure indicates that the use of transfer air for kitchen makeup has any negative energy, comfort, or safety effects.

The commenter's fourth paragraph reiterates CAL SMACNA's understanding that the primary use of transfer air is for cooling the kitchen. This is not true. The use of transfer air conserves the energy that would otherwise be used to condition 100% outside makeup air to kitchens. The commenter continues, expressing that transfer air would simultaneously provide too much cooling (Sentence 3) and minor to any cooling (Sentence 4). Transfer air to the kitchen is not intended to provide any appreciable cooling or heating because it is essentially temperature neutral and would not affect the occupants of the dining room in any way as transfer air would otherwise be exhausted from the building via a different path. 75°F transfer air would not likely overcool a kitchen whose space temperature setpoint is under 80°F. If this actually were the case on a year round basis and unconditioned outside air is deemed a better solution, this option is available for the designers to use while still satisfying the energy code.

Our concern is less with the semantics of what Taylor is attempting to accomplish, and more with the effects of large air transfers that Taylor intends to employ to accomplish it. Transferring large amount of air from the dining area to the preparation area presents untested, unmeasured, and ill-defined positive benefits at the cost of compromising comfort and sanitation.

Kitchen designers have many options at their disposal to transfer air from adjacent spaces to kitchens with food pass-throughs representing only one of them. The concern the commenter presents of overcooling food in pass-throughs, while valid, does not recognize that other options are available including but not limited to overhead transfer ducts and transfer fans. The commenter also does not recognize that this measure is attempting to codify what is already common practice amongst chain restaurants. These businesses including almost every fast food establishment use transfer air as exhaust makeup which passes through the open interface between the dining and kitchen preparation areas.

That using transfer air as exhaust makeup is voluntarily common practice in certain types of restaurants does not make it appropriate to require this practice in every restaurant. In particular, Taylor suggests this practice is commonplace in fast food restaurants; these types of restaurants characteristically provide dining space in a single large room where air flows are more predictable and easily regulated. In contrast, other types of restaurants may include multiple rooms, such as banquet halls, upstairs seating, and hallways that complicate attempts to channel "transfer air" to the preparation area without compromising comfort and sanitation.

Proposal 4

The revision would place limitations on exhaust hood airflow rates. Specifically, this revision would establish maximum net exhaust flow rates per linear foot of hood length for each of a number of types of hoods, with each hood type's maximum rate depending on the kitchen equipment duty, which is also specified.

Our Recommendation:

Keep regulation of cfm for kitchen hoods in the California Mechanical Code for consistency.

Previous versions of the California Energy Code have not addressed cfm for kitchen hoods, but the California Mechanical Code has requirements for Type 1 kitchen hoods. In the interest of simplicity and consistency, CAL SMACNA recommends CEC leave this matter for the Mechanical Code instead of adding different criteria in a different code. If the requirements in the Mechanical Code are incorrect, CAL SMACNA recommends changing that code instead of adding separate criteria to the Energy Code.

Taylor Engineering's Response:

The California Mechanical Code provides prescriptive kitchen exhaust minimum airflows for unlisted hoods. The CMC does not limit the maximum exhaust airflow any hood which is the subject of the proposed measure. The effect is that some unlisted hoods may be installed and commissioned to operate at higher airflows than necessary which has the combined negative effect of increasing fan and makeup air conditioning energy. This measure attempts to limit the energy waste associated with this practice.

Exhaust hoods that are listed per UL 710 are exempted from complying with the CMC minimums per Section 508.1. Listed hoods often meet the limits in the proposed measure or can be re-engineered.

It should be noted that this proposed measure only applies to relatively large kitchen facilities. Kitchen hoods in smaller kitchens would not have any exhaust airflow maximum limitations.

Proposal 5

This revision would establish requirements for controls for demand control ventilation or energy recovery.

Our Recommendation:

Allow flexibility for the owner, kitchen designer, and mechanical engineer to agree on controls for demand control ventilation or energy recovery that work best for each building's unique needs.

The Energy Code should allow this as an option but not require it. CAL SMACNA recommends that the codes should not mandate the type of system or the type of controls required, but the requirements for the different types. The type of system or type of controls should be a discussion between the owner, kitchen designer, and mechanical engineer to agree on what works best for the building's needs.

Taylor Engineering's Response:

(with our Response to the Response in italics)

The proposed measure intends to provide several options to the designer and owner to satisfy the energy requirements and is not limited to only demand control ventilation and energy recovery devices as the commenter implies. The commenter omitted the two other options which allow the design to satisfy the energy code using transfer air OR limited conditioning of outside air. The control requirements associated with the demand control option have been included to ensure occupant safety and achievement of the energy goals in those cases where demand control ventilation is the option selected to meet the requirement.

Per our comments regarding Proposal 3, CAL SMACNA finds that transferring large volumes of air from the dining area to the preparation area would in many cases compromise comfort and sanitation, and therefore does not present a plausible or acceptable option. We again recommend Title 24 allow owners, kitchen designers, and mechanical engineers to use their discretion when determining what works best for each building's unique needs. CAL SMACNA believes this issue area thwarts a uniform one-size-fits-all requirement, as well as the proposed three-sizes-fit-all options.

III. LABORATORY EXHAUST

This revision states that buildings with laboratory exhaust systems where the minimum circulation rate to comply with code or accreditation standards is ten air changes per hour (ACH) or less, or less than the design exhaust airflow, must be capable of using variable air volume (VAV). The revision provides an exception that hoods can remain constant air volume (CAV) where required by code, the authority having jurisdiction, or the facility Environmental Health and Safety department guidelines.

Our Recommendation:

Add an exception to the VAV requirement for certain types of laboratory hoods and biohazard applications that may be better served by CAV bypass hoods or fixed air balance.

While CAL SMACNA appreciates the exception being made for laboratory facilities with code, jurisdiction, or guidelines requiring CAV, we request an additional exception that explicitly addresses safety issues associated with certain types of lab hoods and biohazard applications that are better served by CAV bypass hoods or fixed air balance.

In addition to requiring VAV for certain laboratory facilities, CEC also contemplates requiring a project to include run around coils to precondition makeup air from laboratory exhaust systems within a prescribed range of total exhaust rate and minimum air change rate. CEC also contemplates prescribing a level of acceptable effectiveness of run around coils. CAL SMACNA appreciates the approach that CEC is taking which is sensitive to varying climate zones. Energy simulations that CAL SMACNA has performed on past energy projects demonstrate run around coils typically show limited benefit in Southern California. Where there is a number of intake and exhaust air ducts that must be piped for run around coils, the relatively warmer climates of Southern California may cause the benefits of run around coils to fall short of offsetting the higher fan and pump energy costs.

Taylor Engineering's Response:

(with our Response to the Response in italics)

We thank you for taking the time to review and comment on our proposed measures for Title 24 2013. This proposed measure has already been presented at 3 public workshops (5/10/10, 8/26/10 & 4/5/11), a Labwize Conference (6/17/2010), an AIHA working group (7/5/2011), several meetings for CalOSHA and ARB and at several PG&E Pacific Energy Center classes. Overall the response to our proposals has been very positive.

In your comments you raise two separate issues:

- The use of CAV hood for some application, and
- Concerns about the cost effectiveness of run-around coils

We will respond to each of these separately in the paragraphs that follow.

Issue 1: The Use of CAV Hoods for Certain Applications

We agree with your comment that some hoods should be allowed to remain constant volume due to the need to maintain a constant capture velocity and dilution. Examples include hoods with radioisotopes, explosive chemicals like perchloric acid and certain biohazard hoods. We have reached out to the industry to identify characteristics that could go into the standard to identify these applications. The result is the current proposed language which reads, "Exception: Exhaust and supply serving zones where constant volume is required by the AHJ, facility EH&S department or code."

This proposed language was presented to commenters from CalOSHA, ARB and members of an AIHA committee. With all three groups we specifically requested input on this exception and to date have received none. If you have alternative language which you prefer, please provide it and we will consider adopting it.

Our suggested language is: "In addition, hoods may remain constant air volume where hoods contain a material that may be characterized as radioactive, explosive or biohazardous."

Issue 2: Concerns about the Cost Effectiveness of Run-Around Coils

We agree with your concerns about the cost effectiveness of run-around coils for heat recovery. As a result of our analysis which showed that it was only marginally cost effective we have dropped this measure from our proposal. We originally had it slated for the reach code but do not plan to pursue it as there are legitimate concerns over service of the coils exposed to exhaust.

We greatly appreciate your consideration of cost effectiveness in your judgment of run-around coils.

IV. OUTSIDE AIR AND DEMAND CONTROL VENTILATION SYSTEMS

This revision would change the nonresidential compliance manual and MECH-2A and MECH-6A acceptance testing forms to eliminate the field calibration option for CO2 sensors, add field verification of CO2 sensors to acceptance testing, confirm dynamic control of outside air, confirm pre-occupancy purge for all system types, verify proper location of outdoor air ducts in plenum systems, add guidance for measuring outdoor air flow, and correct CO2 sensor mounting height in compliance manual.

Our Recommendation:

Forgo adopting the revision as it is overly prescriptive and would add significant costs without significant energy efficiency benefits.

We recognize the importance of thorough acceptance testing for demand-controlled ventilation, however CAL SMACNA believes these changes are overly prescriptive and could add unnecessary cost and complexity to the installation of air handling units. SMACNA contractors already take responsibility for the accuracy of their installed CO2 sensors and energy cost savings associated with demand-controlled ventilation. While SMACNA contractors already take the precautions outlined in this revision for most LEED-certified buildings, imposing these prescriptive requirements uniformly on air handling units could diminish the ability of SMACNA contractors to deliver their characteristic quality of work at fair costs.

CTG Energetics' Response:

(with our Response to the Response in italics)

In general, the changes to the acceptance testing forms do not impose new testing requirements or add significant labor hours. Rather, the changes are straightforward clarifications to ensure the accuracy of the tests relative to Section 121 requirements, and to ensure the results of the testing forms can be easily interpreted by enforcing officials. In fact, the elimination of the option for field calibration of CO2 sensors should work to reduce the amount of field labor by technicians by ensuring factory calibrated sensors are specified.

Although this revision would ensure that factory calibrated sensors are specified, there is no reason to expect sensors to remain factory-calibrated for the life of their use. Technicians would still need to test their sensors. How else could they prove the sensors work? Therefore, this revision would add significant labor hours.

Though field verification of CO2 sensor performance will be required, as noted in the response below contractors are already taking responsibility for the accuracy of the CO2 sensors. Therefore recording this accuracy in the acceptance testing procedures should not, on net, add significant project costs.

Requiring verification in acceptance testing would add significant project costs in many cases because this revision would impose a one-size-fits-all requirement on all projects. For example, where demand control ventilation is required, Title 24 currently requires CO2 sensors at the control point of the main *system. LEED requires CO2 sensors at every zone, even if it is not a control point. Depending on the project, this can multiply the costs dramatically.*

Changes to the Compliance Manual provide background and guidance to the testing process, and should work only to increase the quality of work delivered in the field with no additional project costs.

Unfortunately, this revision would neither increase the quality of work of CAL SMACNA contractors nor avoid creating additional project costs. Accordingly, this revision fails both standards you have set for changes to the Compliance Manual. Therefore, we urge CEC to reconsider this revision.