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Subject: **Draft Strategy Reducing Short-Lived Climate Pollutants in California**

Executive Overview:
CARB's initial definition of high GWP being any refrigerant greater than 150 GWP in standalone refrigeration could potentially eliminate many equipment classes. If California adopts a level this low it would eliminate most of the stand-alone/open air screen market, and be economically devastating to companies in your state that depend on impulse sales of products, and create significant economic disruption in broad segments of the foodservice, convenience store and supermarket markets that rely on these products for a large percent of their sales.

We request that the levels reflect one of the several alternative man-made drop-in refrigerant replacements for the industry's current choice (404-A) be allowed. Ideally, we would request 448-A, which has a GWP of 1,270, a 68% improvement over 404-A (GWP is 3,950). Alternatively, if more time were given for product design and testing, and if offsetting conflicts with DOE compliance can be resolved, a 134-A look-alike (R-450A), with a GWP of around 600 would be a 85% improvement over 404-A These could both be done without eliminating an entire market segment.

Over the next several years, refrigerant manufacturers and refrigeration component manufacturers as well as safety regulators would then be able to develop the next generation of refrigerants (A2L) and components to further lower GWP. We would ask that California's timeline fall in line with federal regulations.

Our company is proud to be the industry leader in supplying the market with the most energy efficient open air screen cases *made* which meet or exceed DOE regulations. If California sets GWP limits lower than the EPA's, the proposals would put us out of compliance with the DOE regulations. We have worked very hard to improve our products to achieve these levels. The regulatory burden that the federal government is imposing has become overwhelming, which has made us very concerned about the lack of coordination between the EPA and the DOE and now individual states on rulemaking activities for the same industry and the threat to take these energy gains away.

EPA and DOE history:
Structural Concepts Corporation has supported and wants to continue to support the effort to reduce the overall energy usage and the carbon foot print our product has on the environment. With each phasedown of refrigerant gases in the past, from CFC to HCFC, HCFC to HFC there has been a readily available alternative refrigerant that required no more than a compressor and valve change. If the GWP

limits are set too low, we are left with only flammable refrigerants or a high pressure refrigerant with no component availability and reduced efficiency rates at elevated temperatures.

Issues with A3 Refrigerants:

1. Burden of time & resources to comply.
   We estimate that it will take a minimum of 40,000 man hours to redesign and test new systems. This is the equivalent of using our entire research and development department for three years and would have the effect of shutting down any other R&D or product development projects essential to bringing new technologies to the market and remaining competitively viable. We would also need to prototype well over 200 display cases for validation testing of DOE and NSF regulations adding additional demands on production. This does not include the time needed for component manufacturers and certification bodies to perform their respective functions.

   The reason the regulations would be so resource intensive is with the current charge limits on A3 refrigerants, approximately only 15% of our self-contained (stand-alone) product lines could be converted to a hydrocarbon refrigerant with a single compressor / condensing unit. These units would need a complete redesign of the refrigeration system and have to be retested and recertified. The remaining 85% of the product offering would need to go to multiple compressor /condensing units. In addition to compressors and valves, heat exchangers and electrical components would need to be designed into the product to conform to current U.L. safety standards.

   The addition of multiple condensing, safety features and the efforts associated from the above would put a burden on our customers as the cost would increase across the board for our product.

2. Incompatibility with DOE regulations
   With the additional compressor required for 85% of our products, energy efficiency would be compromised given the typical low EER ratings on smaller compressors. This in turn would cause DOE energy levels to be exceeded unless the standards are re-evaluated given new circumstances. To keep the charge limit down, hot gas condensate heaters would need to be replaced with electric heaters again increasing overall energy consumption that could potentially put the unit over the allowable DOE energy levels but definitely raise the energy consumption. So for a 10 year life expectancy, all of our HC product would result in increased energy consumption and an increased overall carbon footprint between 10 and 40% over R404A. *Chart A refers to actual data collected and calculated per EPA web site.*

3. Manufacturing Safety Concerns
   If an accelerated timeframe is taken and a low GWP limit set, it may not be nearly enough time to redesign our manufacturing processes to provide a safe environment for our employees to work. Charging systems and procedures will have to be researched to be OSHA compliant. Employees and service technicians will need to be trained and capital investments for process equipment will need

to be made. Just implementing the charging and handling of the explosive refrigerant in a manufacturing environment would take several years. In addition, since an A3 cannot be used in every product we would have to have multiple refrigerants resulting in a higher probability for human error and a potential accident. Other liabilities exist once the product would be in the field and many of our customers have concerns about flammable products placed into their store environments.

Issues with CO_2

1. Lack of Material/Components
   Currently there are only a few compressor manufacturers that produce CO_2 compressors and these are primarily for small vending machines and large refrigerated rack manufacturers with barely any offerings in between. The major compressor manufacturers of fractional and small hp compressors have abandoned the possibility of producing CO_2 compressors as it is not economically feasible for them with the increased material thicknesses due to the high pressures and the inherent inefficiency of CO_2 when ran transcritical. One major manufacturer of compressors produced a CO_2 compressor that was double the weight of their current compressors. This increased material and increased shipping weight again adds to the overall carbon foot print.

2. Incompatible with DOE regulations.
   When ran above the critical point of 86.5°F (which would be common as many store environments can reach 80°F） the systems consume much more energy than traditional systems today. Using data from one CO_2 compressor manufacturer with a 95°F gas cooler temperature, the overall energy increases by 45% from the current R404a compressor. This inefficiency would push the case over the allowable energy levels as dictated by the DOE and per our testing and calculations exceed R404A carbon footprint by approximately 30%, not including the footprint to produce the extra copper and steel needed for the high pressure components.

3. Burden on End Users.
   The component cost associated with the high pressure equipment and safety features would again put a burden on our customers as the cost would increase across the board for our product. With pressures 8 times higher than traditional HFC's all the componentry needs to have much stronger, thicker material. Mechanical expansion valves are not available for CO_2 systems as they cannot handle the pressures involved. This would require electronic expansion valves and case controls which would increase the cost dramatically.

4. Burden of time & resources to implement.
   Lower cost cap tube systems could be considered but the lower efficiency again would raise the carbon footprint and compromise DOE energy levels. CO2 could take even more man-hours than propane to redesign. Not only would we have to redesign the system but we may also have to redesign the display case. Due to the large size of all the components needed to handle high pressure, there will not be enough room in the machine compartments to house them. Again the time it would take to get through all of the regulatory and safety approvals would push the implementation time frame out by many years.

The cost of implementing all of the efforts mentioned above for A3 refrigerants or CO2 we estimate at $5M+ and to amortize that into our cases will price us out of the market for some or all categories of product we produce.

Alternate Refrigerants / Time Lines:

CARB cannot just focus on the GWP number for a given refrigerant without taking into consideration the overall energy usage and the overall carbon footprint of the equipment itself. If the industry is forced to go to only these refrigerants we would find ourselves in a situation where we no longer meet the energy requirements set forth by the DOE or the safety requirements by U.L. Which brings us too……the need for additional low GWP refrigerants.

Currently SNAP has many refrigerants submitted for approval. We have tested some of these refrigerants with very good results. Both R-448A and R-449A have 1/3 the GWP of R404a and provide a 5% energy reduction. We as well as other CRE manufacturers have evaluated this refrigerant in our labs and all of the compressor manufacturers are testing them as well and finding very similar results. If California adopts levels allowing this refrigerant as well as the EPA giving SNAP approval for medium temperature standalone equipment, air screen merchandisers could be converted over much more easily.

A2L refrigerants are another class of refrigerant with an even lower GWP that has potential, if these refrigerants can get added to the acceptable list with a larger charge limit this would give us an additional refrigerant choice. Unfortunately the timeframe for implementation through the regulatory and component manufacturers would take a considerable amount of time before implementation.

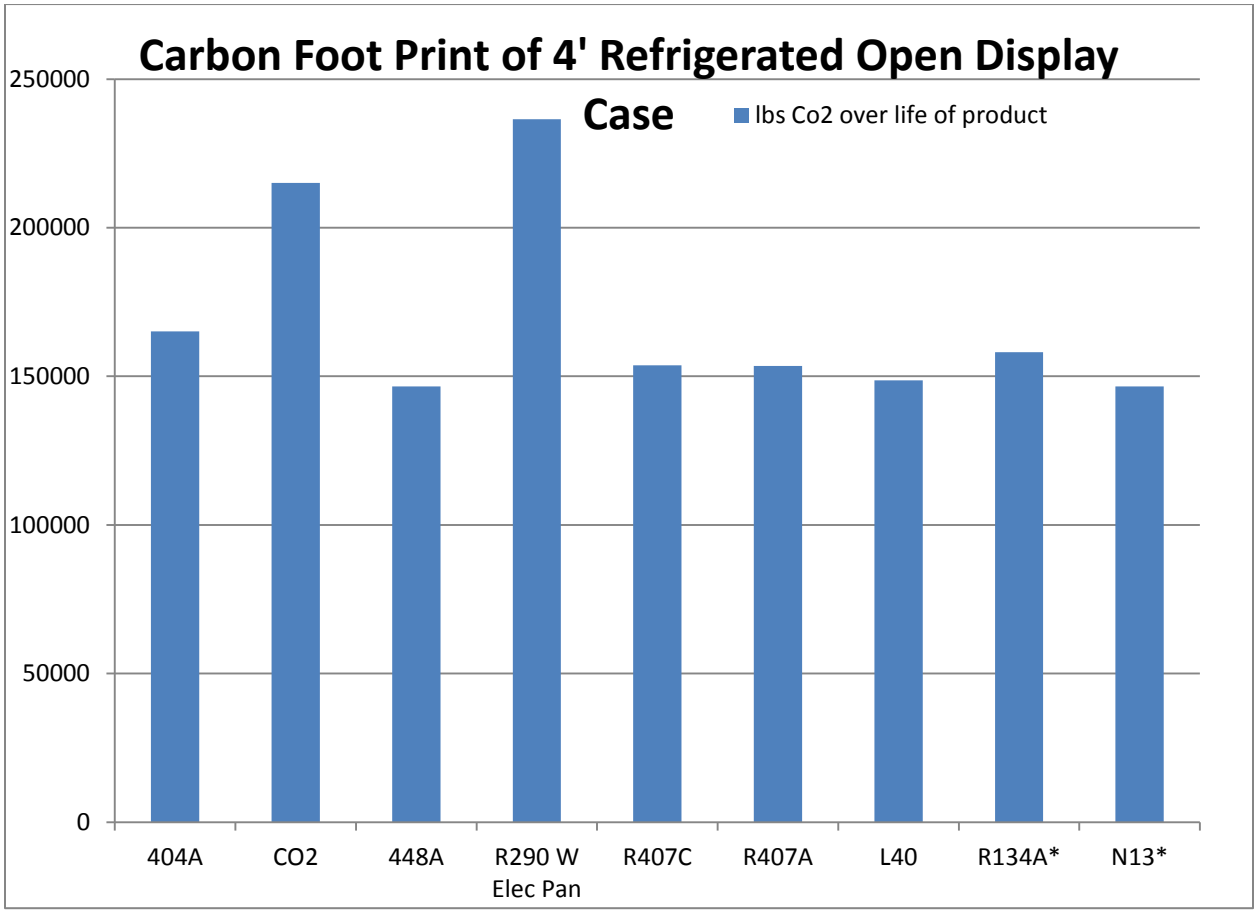
Supermarket systems and condensing units are allowed refrigerants that stand-alone retail systems are not. If standalone refrigeration units could be allowed to use refrigerants such as R407A, R407C and R407F we would see an energy reduction and a GWP reduction. When these refrigerants were tested in a self-contained system, the result was a 3-5% energy improvement over R404A. R134A or a “look alike” refrigerant with a lower GWP may also be acceptable if energy efficiencies can meet or exceed the performance of R404A. If all or some of these are proven acceptable, the implementation time frame would be much faster than with the current alternatives given.

Summary:

In summary, the cost, safety, regulatory and component availability concerns if California sets GWP limits lower than the federal standard for standalone refrigeration units as well as the shear amount of time it would take to redesign over 600 models we would need 10 to 15 years to implement across all of

our models. If California aligns itself with the federal standards, implementation could be done in a shorter timeframe and decrease the carbon footprint of our product vs going backwards.

Chart A



* R134A and N13 configurations had to go to a larger compressor with an EER of 9.8 vs 7.7 of the R404a compressor due to the volumetric inefficiency of R134a vs R404a.