October 28, 2015

Mary D. Nichols
Chair
California Air Resources Board
1001 I Street, P.O. Box 2815
Sacramento, CA 95812

Re: Draft Short-Lived Climate Pollutant Reduction Strategy

Dear Ms. Nichols:

Bluon Energy, LLC, a California-based company, appreciates the opportunity to comment on the draft Short-Lived Climate Pollutant Reduction Strategy recently issued by the California Air Resources Board (ARB) (the "Draft Strategy"). Bluon is uniquely positioned to comment because it is an energy-focused refrigerant company that has developed an effective and efficient replacement product for high-global warming potential (GWP) refrigerants – an identified goal of the ARB staff in the Draft Strategy.[1] Bluon looks forward to the opportunity to work with ARB to ensure that any final strategy for short-lived climate pollutants (SLCPs), as well as any regulations that flow from that strategy, actually reduces greenhouse gas (GHG) emissions associated with hydrofluorocarbons (HFCs) and achieves ARB's overarching goal of reducing global warming.

Introduction

In step with ARB and its Draft Strategy, Bluon supports the goal of reduction of SLCP emissions from refrigerants in California and beyond. In an effort to further that goal, Bluon has developed a science-based approach that achieves both a substantial reduction in GWP from HCFC-22 as well as increased energy efficiency.[2] By taking a holistic view to reducing GHGs rather than focusing solely on an approach that simply offers a low-GWP alternative, Bluon can offer insight into a more comprehensive approach backed by science.

[1] *See* Draft Strategy, p. ES – 4.

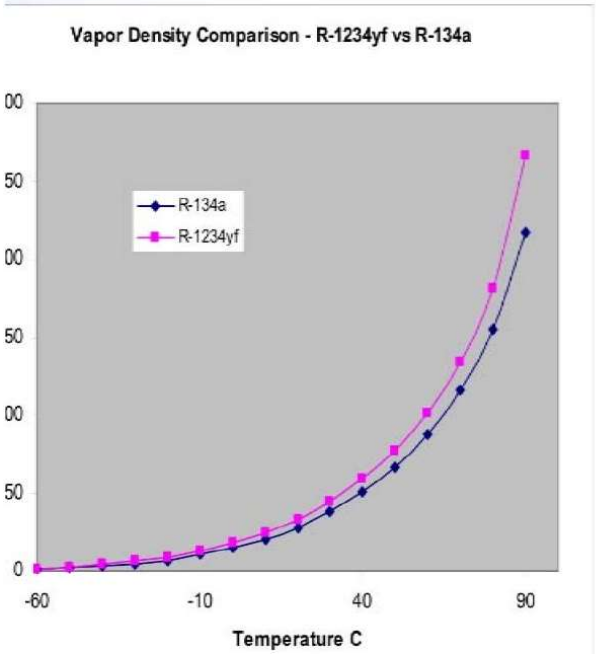
[2] Bluon has developed an alternative refrigerant, TdX20, which has a lower GWP and higher energy efficiency than HCFC-22. Sale in interstate commerce of TdX20 as an alternative to HCFC-22 in residential and light commercial air conditioning and heat pumps is allowed by the US Environmental Protection Agency (EPA) pending a determination of its acceptability as an alternative under the Significant New Alternatives Policy (SNAP) program, expected soon. *See* Letter from Robert Landolfi to Charles Hawkins: Completeness Determination for SNAP Submission for TdX20 (May 13, 2015).

Draft Strategy

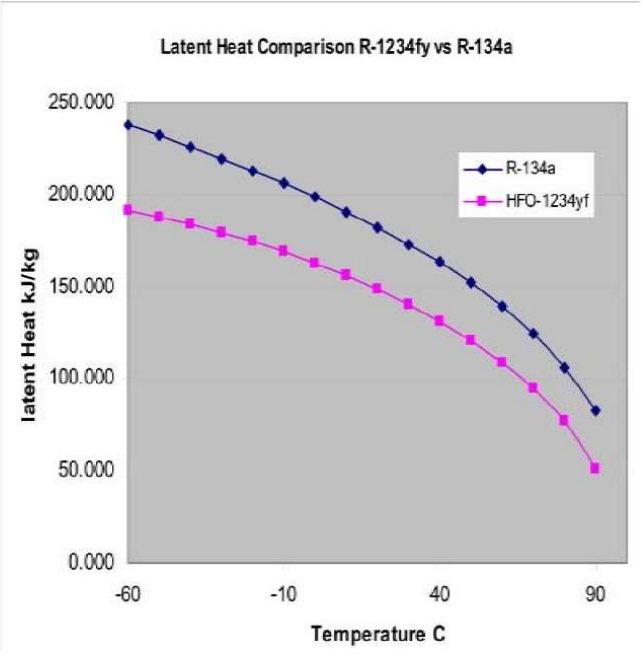
The Draft Strategy recognizes that a science-based approach is the most effective approach ARB can employ to achieve its goal of reducing overall average global warming.[3] As part of that approach, the Draft Strategy indicates that ARB could consider a possible wholesale ban on high-GWP refrigerants contemporaneous with incentives for use of low-GWP alternatives. While its goal is laudable, this strategy ignores a highly significant aspect of any science-based approach – energy efficiency.

When accounting for energy efficiency, it is readily apparent that simply switching to a low-GWP refrigerant alternative does not result in the most effective outcome for reducing GHGs. Put simply, low GWP does not necessarily equate to low GHG. This is because low-GWP products, in many instances, are less efficient than the products they are designed to replace. An illustration of this fact is evidenced in the following charts contrasting R-1234yf, which has very low GWP, with R-134a, which has a higher GWP but is more efficient.

Calculated Vapor Density



Calculated Latent Heat



The foregoing table demonstrates that the reduced energy efficiency of R-1234yf essentially eliminates the environmental benefit from the lower GWP of the product. This decrease in energy efficiency means that more electricity needs to be generated which in turn increases the

[3] *See* Draft Strategy, p. ES – 1.

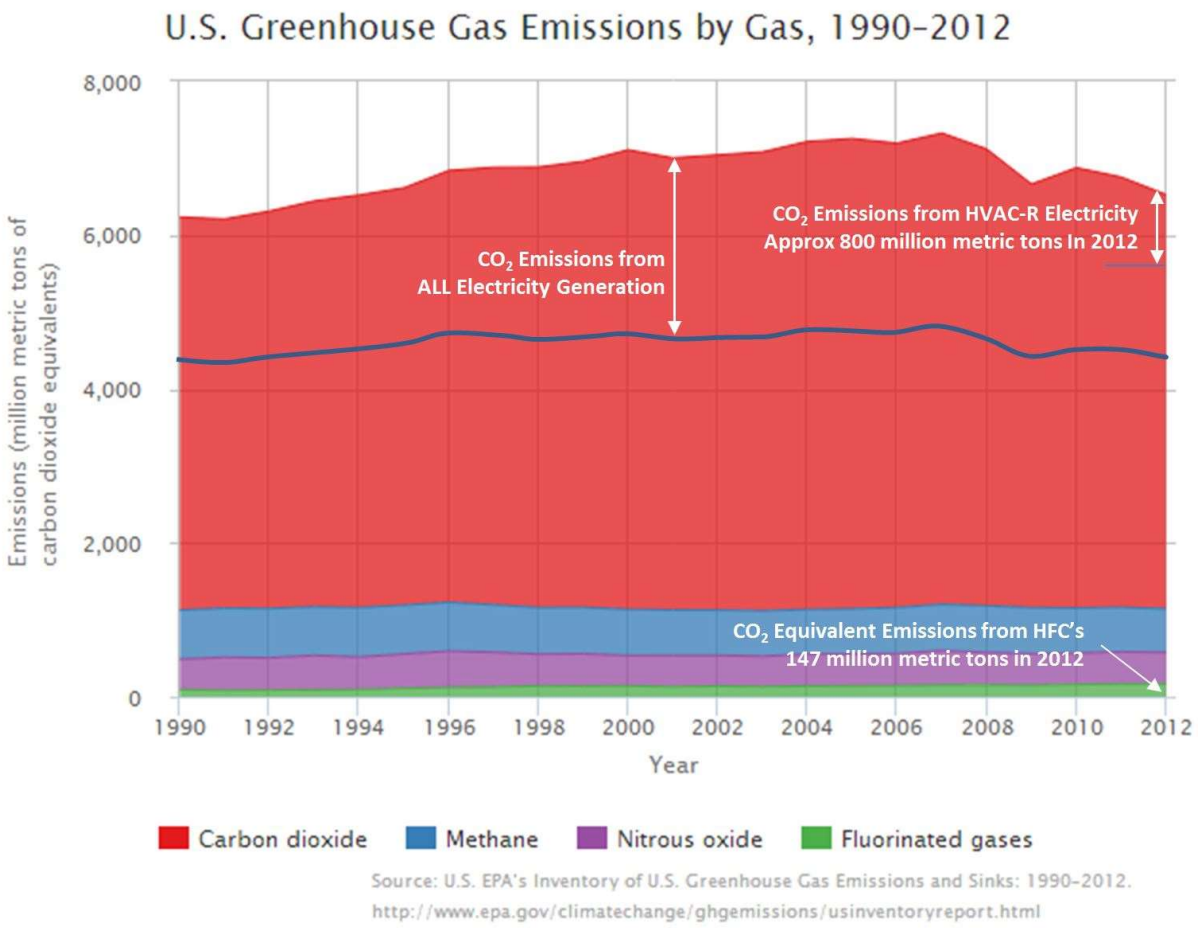
overall CO_2 emissions associated with that product and ultimately contributes to an overall increase in GHGs. Applying a science-based approach that accounts for energy efficiency in conjunction with low-GWP alternatives, on the other hand, provides for optimal results in achieving an overall decrease in GHGs associated with HFCs.

Effectively Achieving Science-Based Targets

GWP considers the impact of leakage, by measuring the CO_2 equivalent of a refrigerant being released into the atmosphere. However, GWP completely fails to consider the energy efficiency associated with those CO_2 emissions. And by offering an inflexible strategy that focuses solely on low-GWP alternatives, the Draft Strategy equally fails to account for increased CO_2 emissions that result from use of less energy-efficient alternatives.[4] This can be avoided by utilizing a more flexible science-based approach that accounts for energy efficiency along with low-GWP alternatives.

The energy efficiency of a refrigerant can have a far greater impact on overall GHG than its associated GWP. This point may be best illustrated by the following table which shows how the emissions from electricity generated to run heating, ventilation and air conditioning (HVAC) equipment dwarfs the impact of HFC leakage from that equipment.

[4] The Draft Strategy briefly mentions "[s]witching to low-GWP refrigerants that can also improve the energy efficiency of certain appliances and systems," but does not address the corollary principle that switching to low-GWP refrigerants can decrease energy efficiency. *See* Draft Report, p. 4.



In fact, there is increasing recognition of what may be termed functional GWP (F-GWP), which takes into account added CO_2 emissions from electricity consumption as well as the CO_2 equivalent of GHGs being released into the atmosphere.[5]

Further support for this point can been seen when considering a replacement refrigerant that has the same GWP as HCFC-22, but has 10% greater energy efficiency. In a 10-ton unit, the replacement can reduce CO_2 emissions by more than 3,800 lbs. or nearly 2 metric tons per year. By contrast, a low-GWP alternative (defined for purposes of illustration as GWP < 150) in the same equipment – assuming it operates at the same efficiency versus what it is replacing – would only achieve a reduction of 1,900 lbs. or nearly 1 metric ton per year.[6] This example is even

[5] See Executive Order 13693, 80 Fed. Reg. 15781 (March 25, 2015), establishing sustainability goals for US Executive Departments and Agencies, which defines 'Scope 2' GHG emissions as "direct greenhouse gas emissions resulting from the generation of electricity, heat, or steam purchased by an agency."

[6] The Draft Strategy provides that "[s]everal refrigerants are currently available with a 100-year GWP of less than 1500 that can be used in existing equipment designed for higher-GWP refrigerants" but fails to account for the energy efficiency of those low-GWP alternatives. *See* Draft Strategy, p. 63.

more compelling when considering that most low-GWP alternatives are known to be less efficient. Under the foregoing example, all it takes to offset the benefits of the low-GWP alternative is a 6% decrease in energy efficiency.

Employing a science-based approach that accounts for energy efficiency can also help the ARB avoid some of the issues associated with the introduction of R-410A systems as preferred alternatives. We know today that R-410A has significantly higher leakage rates due to higher operating pressure required to be achieved by R-410A equipment and thus contributes to higher CO_2 emissions. Had a science-based approach been employed when R-410A became the standard to replace HCFC-22, such regrettable substitution could have been avoided.

Conclusion

Any effective strategy considered by ARB must account for energy efficiency. Simply adopting a strategy that creates bright-line restrictions focused solely on refrigerant GWP would be a disservice to the people of California and to those that follow the strategy ultimately adopted by ARB. Myopic focus on encouraging low-GWP alternatives does not provide the most effective and efficient outcome for achieving overall CO_2 reduction. Bluon looks forward to working with ARB staff on developing a final strategy that effectively accounts for energy efficiency to achieve ARB's goal of reducing overall average global warming.

Respectfully submitted,

Douglas Reinke
President and CEO

Peter Capuciati
Executive Chairman of the Board