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Honeywell

November 10, 2017

Glenn Gallagher
Pamela Gupta
California Air Resources Board
1001 I St
PO Box 2815
Sacramento, California 95812
Via online submission

RE: Comments by Honeywell International Inc. on California's Proposed Adoption of U.S. EPA SNAP Provisions

Dear Mr. Gallagher and Ms. Gupta,

California Air Resources Board (ARB) Staff has released draft regulatory language that would incorporate by reference U.S. EPA's dates by which use of hydrofluorocarbons (HFCs) in certain applications are unacceptable under the Significant New Alternatives Policy (SNAP) program of the Clean Air Act. ARB Staff is proposing to incorporate only those phaseout dates that apply to certain stationary refrigeration and air conditioning applications. We appreciate the opportunity to submit these comments on the proposed action. Honeywell strongly supports ARB Staff's proposal and urges Staff to extend this proposed action to incorporate by reference the phaseout dates set by SNAP Rules 20 and 21 for <u>all</u> applications addressed by those rules.

This proposed action would continue California's long history of demonstrated leadership on environmental policy. We hope that other states will view California's approach as a simple and relatively easy way to drive significant greenhouse gas emissions reductions in the face of regulatory uncertainty at the federal level.

Honeywell is a global leader in providing energy efficient technologies and innovations that can help the world solve its energy and environmental challenges. Our Fluorine Products business is a recognized leading innovator in the development of environmentally preferable fluorocarbons for use as refrigerants, foam blowing agents, solvents, propellants, and other uses. Since the 1990s, we have helped businesses replace ozone-depleting substances in these applications with alternatives that have less impact on the stratospheric ozone layer and global climate change.

ARB Staff has taken an important and significant step to support the continued success of the transition to HFC alternatives in light of the uncertain future of EPA SNAP Rules 20 and 21. ARB Staff's presentation at the October 24, 2017 stakeholder workshop states that ARB Staff is proposing this action to "provide regulatory certainty" and "protect emission reductions." We respectfully submit that these reasons also justify <u>incorporation by reference of all of the EPA phaseout dates</u>, not just those phaseout dates established for some stationary refrigeration applications.

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ARB Staff's comments at the October 24 meeting suggested that the Staff is considering utilizing other regulatory programs to address applications beyond stationary refrigeration and air conditioning. Staff referenced the Advanced Clean Car program to address HFCs in mobile air conditioning. This program only currently offers incentives for switching to low-GWP alternatives. It does not mandate phaseout of HFCs in mobile air conditioning—and to do so would require a new rulemaking. The more efficient and immediate way to support the continued transition to low-GWP substitutes in this application would be to simply extend the proposed action to include the applicable provisions of EPA SNAP Rule 20.

ARB Staff also mentioned that they are considering whether HFC blowing agents used in foam manufacturing could be regulated in the Title 24 process to revise the California Green Building Standards. We believe that there is a better and more comprehensive vehicle for providing the regulatory certainty offered by the SNAP phaseout dates. Moreover, HFCs are used as blowing agents in a variety of foam applications, not just building insulation. They are used in numerous applications that would not be covered by changes to the building code, e.g., domestic appliance foam for refrigerators, freezers, and water heaters; commercial appliances such as walk-in and reach-in coolers; marine foam; refrigerated transport; pipe insulation; flexible integral skin applications in automotive and furniture, and numerous other applications. Incorporating the provisions of EPA SNAP Rules 20 and 21 is the easiest and quickest way for California to support the continued transition to low-GWP foam blowing agents in a wide variety of applications.

With respect to aerosols, while ARB has named HFCs in aerosol consumer products as an early action mitigation measure, it has not yet modified its regulations to prohibit the use of HFCs in consumer aerosol products (except with respect to pressurized gas dusters), which represent one of the largest uses of HFCs. The most efficient approach to address HFCs in aerosol applications would be to incorporate by reference EPA's SNAP Rule 20 and 21 phaseout dates.

The EPA SNAP Rules 20 and 21 were the result of a multi-year stakeholder engagement process. As ARB has acknowledged by proposing to incorporate by reference those EPA phaseout dates that apply to stationary refrigeration and air conditioning, extending such an action to include the rest of the applications covered by EPA's SNAP rules will provide regulatory certainty and protect the emission reductions projected for a transition based on the phaseout dates set forth in those rules.

Attached is technical information that we provided to EPA in support of the proposed SNAP 20 and 21 rules, updated to reflect more recent data. We urge ARB to continue to support the transition to low-GWP alternatives already underway by incorporating by reference all of the phaseout dates provided by EPA SNAP Rules 20 and 21.

Sincerely,

DocuSigned by:

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George Koutsaftes
Vice President & General Manager
Fluorine Products
Honeywell Performance Materials & Technologies

APPENDIX: TECHNICAL INFORMATION

I. Stationary Refrigeration & Air Conditioning

End-Use	Product	EPA SNAP Phaseout Date	Supporting Information	Supply of Alternatives
New Retail Food Refrigeration and Vending Machines (stand-alone)	HFC blends R-507A, R-404A HFC-134a	Jan. 1, 2019/Jan. 1, 2020	• SNAP applications for HFOs are under review, (R-448A (Solstice® N40) for Vending Machines) after which full industry evaluation will occur • HFOs could provide optimal balance of safety, performance and GWP improvement • Adoption of hydrocarbons and CO_2 requires costly redesign; limited components are available for CO_2 systems	• Propane, R-744a supply available, subject to component availability • R-448A is SNAP-approved in low-temperature (i.e., temperatures at or below 32°F (0°C)) stand-alone equipment • R-450A is SNAP-approved for vending machines and other applications and available today • Commercial quantities of HFO-1234yf available today, subject to SNAP approval for vending machines
New Retail Food Refrigeration (Condensing Units and Supermarket Systems)	9 HFC Blends	Jan. 1, 2018 (condensing units); Jan. 1, 2017 (supermarkets)	• Multiple HFO blend options available today including R-448A and R-449A. They offer excellent performance and lower energy consumption compared to R-404A. • R-448A has been qualified with numerous manufacturers • Oak Ridge National Labs evaluation of R-448A showed excellent performance	• R-448A and R-449A currently being widely adopted
Retrofit Retail Food Refrigeration (Condensing Units and Stand-alone)	9 HFC Blends	July 20, 2016	• Multiple options exist today including R-407A, R-407F, R-448A, and R-449Awhich have been used successfully in thousand of retrofits • Extensive adoption is now occurring with R-448A	• R-407A and R-407F widely available and SNAP-approved • R-448A currently being widely adopted
New Chillers	HFC-134a, R-404A, et al	Jan. 1, 2024 (subject to narrowed use limits thereafter)	• HFOs have much lower GWPs • HFOs offer comparable or better energy efficiency • Time needed to allow for changes to standards, building codes, and industry training to handle mildly flammable refrigerants of some of the alternatives • There are multiple OEMs that have adopted HFO alternatives into their equipment	• Chillers are available today using both 1233zd and 1234ze • HFO-1233zd(E) and HFO-1234ze(E) are being produced in commercial quantities today • HFO-1233zd(E) and HFO-1234ze(E) are SNAP-approved for chillers • R-450A SNAP-approved and available today

a. Chillers

Alternatives such as HFO-1233zd(E), and HFO-1234ze(E) are both commercially available, SNAP-approved, and have comparable or higher efficiencies than HFC-134a and much lower GWPs than HFC and HCFC refrigerants currently used in chillers. Many of the leading chiller manufacturers have already introduced chillers with low-GWP refrigerants. Specifically, Trane now sells a line of high-efficiency chillers based on HFO-1233zd(E) that are available in capacities ranging from 740 to 3,500 tons. Carrier also has a line of chillers based on HFO-1233zd(E). Several other manufacturers currently offer high-efficiency chillers based on HFO-1234ze(E) in sizes ranging from tens of tons to hundreds of tons. These HFO-1234ze(E) chillers largely have been launched in the EU where the formal promulgation of the F-gas regulation has motivated manufactures to develop and commercialize these units. EPA SNAP 21 Rule has similarly accelerated commercial development in the U.S. ARB should continue to support this transition while the future of EPA's SNAP rules is uncertain.

II. Mobile Air Conditioning

End-Use	Product	EPA SNAP Phaseout Date	Supporting Information	Supply of Alternatives
Motor Vehicle Air Conditioning (MVAC)	HFC-134a	Model year 2021 (with narrowed use limits for export to countries without servicing infrastructure through model year (MY) 2025)	• The EU MAC Directive prohibited the sale of new cars using HFC-134a in the EU28 countries as of Jan. 1, 2017 • Turkey has adopted a rule similar to the MAC Directive and will phase out use of HFC-134a in new vehicles starting Jan. 1, 2018 • Korean carmakers will begin voluntarily converting their local market cars from HFC-134a to HFO-1234yf starting Jan. 1, 2018 and should be completely converted by 2020. They have a rule similar to CAFÉ on the books now. • Only minor modifications to A/C system hardware have been made to convert car models from HFC-134a to HFO-1234yf use. • 50% of the new cars sold in the US in 2017 will already have been converted from HFC-134a to HFO-1234yf. The adoption of a SNAP-like rule and timeline will encourage OEMs to continue to convert their models. SNAP-approved; GWP = .31	• HFO-1234yf commercial scale production has been expanded. Plants operating today in China, Japan and the US

EPA's unacceptability listing for HFC-134a in this application will result in emissions reductions of approximately 10 million $MtCO_2e$ annually. The transition to low-GWP alternatives is well underway.

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- All of the Tier 1 suppliers of A/C system hardware to the auto industry currently offer cost competitive A/C systems to accommodate alternatives to HFC-134a like HFO-1234yf. The U.S.-based car companies, including Ford, GM, and Chrysler, have already converted more than 70% of their production to HFO-1234yf ahead of the MY21 SNAP deadline. In the EU, the Motor Vehicle Air Conditioning Directive prohibited the sale of passenger cars using HFC-134a effective January 1, 2017. In anticipation of the phaseout, 100% of European production moved to HFO-1234yf in Q3 and Q4 of 2016 as the MY17 vehicles began production.

- Ford, General Motors, and Chrysler are already selling more than 30 models using HFO-1234yf including high volume models such as the Ford F-150 pickup, Ford Focus and Fusion, almost all of Fiat Chrysler's product line made for the U.S. market, and all of the high volume GM products including Chevrolet Silverado pickup trucks, Chevy Malibu and Impala and almost all of GM's SUVs. In total, we expect 8.5 million new MY17 cars using HFO-1234yf to be sold to owners in the U.S. in 2017.

- Adequate refrigerant solutions exist. The EPA has already SNAP-approved HFO-1234yf, HFC-152a, and CO_2 (R-744) for motor vehicle air conditioning systems and, as noted above, low-GWP motor vehicle systems are currently in widespread use in the U.S. and Europe.

- Production capacity has been significantly expanded for HFO-1234yf around the world. There are multiple production sites operating today in China and in Japan. In addition, Honeywell initiated production at its world scale plant in Louisiana in April of this year.

- With respect to concerns about the flammability of low-GWP substitutes, not a single safety issue related to the use of HFO-1234yf in passenger vehicles has been reported, and today there are almost 40 million cars on the road globally safely using the new refrigerant. Other low-GWP options like HFC-152a are much more flammable than HFO-1234yf and may need more complex and costlier systems developed before they can be deployed safely in passenger vehicles. HFO-1234yf systems can safely utilize the same system architecture as HFC-134a systems, as documented by the Society of Automotive Engineers (SAE) study CRP1234, which adequately protects against any flammability risks. Using HFO-1234yf in motor vehicle A/C systems does not require a secondary loop design like an HFC-152a system would.

HFO-1234yf also has no measurable energy efficiency difference compared to HFC-134a systems. To the contrary, auto manufacturers that have tested and used HFO-1234yf in their vehicles have found that systems designed for the properties of HFO-1234yf are at least as efficient as those using HFC-134a, and in some cases systems HFO-1234yf systems were found to be more efficient.

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III. Blowing Agents in Foam Applications

End-Use	Product	EPA SNAP Phaseout Date	Supporting Information	Supply of Alternatives
Polyurethane Foams: Rigid, flexible, integral skin, board and bunstock	HFC-134a, HFC-245fa, HFC-365mfc, and blends	Jan. 1, 2017 (subject to narrowed use limits, which expire Jan. 1, 2022)	• Flexible and integral foam customers already transitioned away from HFCs	• HFO-1233zd(E) • HFO-1336mmz • Methyl formate • Water
XPS	HFC-134a, HFC-245fa, HFC-365mfc, and blends	Jan. 1, 2017	• Numerous alternatives approved by SNAP and in use • EU and Japan largely do not use HFC-134a • HFO-1234ze(E) offers both low-GWP and high energy efficiency (even better than 134a) • Low cost of transition – 5-9% higher board costs	• CO_2 • Butane • HFC-152a • HFO-1234ze(E)
High–pressure spray polyurethane foams	HFC-143a, HFC-245fa, HFC-365mfc and blends	Jan. 1, 2020 (subject to narrowed use limit)	• Significantly lower GWP alternatives SNAP-approved • Quickest transition (6-18 months) and easiest application • Improved performance (energy efficiency) and lower cost (raw material yields) • Approximately half of Honeywell's foam customers have commercial low-GWP systems	• Water • HFO-1233zd(E) • HFO-1336mzz • Hydrocarbons
Low-pressure spray polyurethane foams	HFC-134a, HFC-245fa and blends	Jan. 1, 2021 (subject to narrowed use limit)	• Low-GWP one-component foam commercial since 2008 • Low-pressure low-GWP two-component pour foam systems commercially available • Low-pressure two-component spray foam – technical solutions being developed and optimized	• HFO-1234ze(E) • HFO-1233zd(E) • Methyl formate • HFO-1336mzz

Recently, several customers across many applications have already transitioned from high-GWP to low-GWP foam blowing agents. Below is a select list of customers across various foam applications that are already selling products commercially:

- Extruded polystyrene (XPS)—Jackon, Abriso, Knauf, Fibran, Austrotherm
- Appliances—Whirlpool, Midea, Haier, Hisense, Festivo;
- Spray foam—Lapolla, Demilec, SES, NCFI, , Elastochem, Toyo, Asahi, BIP;
- Panel—Kingspan, All Weather Panel;
- Commercial refrigeration equipment—Porkka, Okamura;
- Refrigerated trailers—CIMC China; and
- One-component foam—Dow, Fomo, Soudal.

Across most applications, many additional customers globally are in various stages of commercial development. Some customers have only recently started trials and our expectation is that these customers will be able to reach commercial solutions well within the timelines established by the EPA SNAP 20 and 21 rules.

Customers have several available SNAP-approved options from Honeywell and other chemical manufacturers. According to EPA, even more options will become available in the near future. Honeywell is operating large-scale manufacturing plants for HFO-1233zd(E) and HFO-1234ze(E), which are replacements for HFC-134a, HFC-245fa, and HFC-365mfc. Chemours has full-scale production of HFO-1336mzz (a substitute for HFC-245fa, HFC-365mfc, and blends thereof). As noted above, several customers in the U.S. and abroad have adopted substitutes for HFC-245fa, HFC-134a, HFC-365mfc and blends thereof. Strong regulatory action will continue to drive conversions away from high-GWP HFCs to products with much lower climate impact.

In many instances customers are seeing benefits of better performance, energy efficiency, non-flammability, and better product yields (less foam for the same performance), in addition to greenhouse gas emissions reduction. For example, refrigerators made with HFO-1233zd(E) are 8-10% more energy efficient than those manufactured from flammable hydrocarbons and 2-4% more efficient than those that use HFC-245fa, so appliance manufacturers can either reduce foam thickness or improve energy efficiency at the same foam thickness. Similar energy efficiency benefits are being seen across spray foam and other foam applications as well, offering customers better performance and/or lower cost alternatives across a range of applications.

Many low-GWP substitute solutions, such as HFO-1233zd(E) for polyurethane (PU) foam or HFO-1234ze(E) for extruded polystyrene (XPS), are similar or better on a life-cycle analysis basis. They are of similar or better energy efficiency than the HFCs they are replacing and significantly lower in GWP. Hence their life-cycle impact is order(s) of magnitude better than the HFCs they are replacing. For example, a thorough life cycle analysis of HFC-245fa and HFO-1233(zd)(E) in closed-cell spray foam[1] showed that the impact of using HFO-1233zd(E) improved the GWP payback by up to 90% compared to HFC-245fa. Therefore, in addition to offering direct GWP savings, several substitutes for HFCs are expected to dramatically reduce the CO_2e emissions on a life-cycle basis as well.

a. HFC-134a in XPS Applications

For XPS users, several solutions are already available, listed as acceptable under SNAP, and have been in use globally for some time. For example, in Europe, approximately 80% of the industry uses solutions other than HFC-134a, including CO_2, HFC-152a, isobutane, and HFO-1234ze(E). Similarly, in Japan, all XPS is produced with alternatives to HFC-134a, such as isobutane and HFO-1234ze(E). All of the above solutions are listed under SNAP as acceptable and are available to U.S. customers, some of whom are already using these low-GWP technologies in other parts of the world. HFO-1234ze(E) has been commercial since 2008, and is being used by customers in Europe and Japan. Honeywell is now running a large, world-scale commercial plant in Baton Rouge, Louisiana, which started operating in September 2014.

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[1] Bogdan and Pascual, Environmental assessment of next generation blowing agent technology using Solstice LBA in ccSPF, Polyurethane Magazine, 5 (2012).

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Energy efficiency and cost are two important factors to consider in evaluating alternatives. First, with respect to energy efficiency, the table below shows that HFO-1234ze(E) is an excellent foam-blowing agent and results in energy efficiency properties that are comparable and in some instances better than HFC-134a. Vo and Fox from The Dow Chemical Company published a peer-reviewed study, which noted, "… [T]hermal insulation performance of foams obtained with HFO-1234ze(E) and co-blowing agents is very similar to those blown with HFC-134a produced today."[2] Jackon has been selling boards in the EU with energy efficiency that is better than HFC-134a since mid-2011 and four other EU customers are using HFO-1234ze(E) commercially. A major Japanese producer has also been commercially been selling boards made with HFO-1234ze(E).

Table 1.0 Comparison of Energy Efficiency Performance of Foam Blowing Agents[3]

Blowing Agent	**CO_2**	**HFC-134a**	**HFO-1234ze(E)**
Aged lambda (lower = better)	34-38	29-30	27-30
% improvement over CO_2	—	~12-15%	~12-20%

In addition to HFO-1234ze(E), which offers comparable or better energy efficiency as HFC-134a in XPS, companies like The Dow Chemical Company have commercialized other solutions to improve energy efficiency with CO_2. For example, Dow's XENERGY technology, according to Dow, is the "[t]hermal insulation of the future. XENERGY™ combines proven features of STYROFOAM™ with up to 20% higher insulating properties made possible by a new manufacturing process using CO_2 and reflecting particles in the foam cells. The result: reduced heating costs - increase efficiency, comfort and sustainability."[4]

b. HFC-134a in Polyurethane Applications

HFC-134a is also used extensively in PU foam in rigid applications, such as continuous and discontinuous panels, commercial appliances, and spray foam. Across the various applications, a variety of solutions are available, including hydrocarbons, methyl formate, formic acid, methylal, HFO-1234ze(E) and HFO-1233zd(E), and HFO-1336mmz. Both HFO-1234ze(E) and HFO-1233zd(E) have large-scale U.S. manufacturing plants: Honeywell's HFO-1233zd(E) plant began operating in May 2014 and HFO-1234ze(E) plant started up in September 2014. Chemours now operates a HFO-1336mmz production plant. Several customers in a variety of industries, including construction and commercial appliances have trialed HFO-1233zd(E) and HFO-1234ze(E) and are in various stages of transitioning to those substances. They are seeing benefits of not only significantly lower climate impact but also improved thermal insulation performance.

HFC-134a is used in three main PU foam applications, each of which is described below (and further described in comments by the Center for Polyurethanes Industry (CPI) and the American Chemistry Council):

[2] Vo and Fox, *Assessment of hydrofluoropropenes as insulating blowing agents for extruded polystyrene foams*, JOURNAL OF CELLULAR PLASTICS, 49, 423 (2013).
[3] Honeywell analysis based on customer information.
[4] http://www.dow.com/products/market/construction/product-line/xenergy-extruded-polystyrene-insulation/

- Low-pressure one-component foams: Honeywell's HFO-1234ze(E) has been commercially sold in the EU in low-pressure one-component foam since 2008 by companies like Dow, Fomo, Saudal. Hydrocarbons are also used extensively in these applications.

- Low-pressure two-component foams used in commercial appliance and other pour applications: Customers have several solutions that are low-GWP and acceptable under SNAP, including Honeywell's HFO-1233zd(E) and HFO-1234ze(E).

- Low-pressure two-component spray foams: Honeywell's HFO-1233zd(E) and HFO-1234ze(E) product and blends thereof are being technically proven in this application by several customers, several of whom are optimizing the product.

Overall, across all foam applications, including XPS and PU foams, customers have either commercialized non-HFC-134a solutions or have technically feasible solutions ready for commercialization, and there are sufficient number of SNAP-acceptable solutions to enable customers to transition to low-GWP substances relatively quickly. The relative cost of transition to low-GWP substances compared to continued use of HFC-134a has decreased dramatically, due in part to the rising costs of HFC-134a imported from China due to anti-dumping actions against Chinese manufacturers.

c. High-Pressure Spray Foam Applications for Polyurethane Foams

In Honeywell's view, this is the easiest and quickest application to transition. For example, high-pressure spray foam was one of the last applications that Honeywell started to commercialize with customers, but the first low-GWP product commercialized in the U.S. was in a spray foam application with West Development Group.

Several low-GWP and non-flammable alternatives have been listed as acceptable under SNAP for use in spray foam applications. Honeywell has been selling HFO-1233zd(E) commercially in this application since March 2013 in the U.S. and globally. HFO-1233zd(E) was also successfully trialed in Philippines by UNIDO in 2012. In the U.S., several customers, including small businesses such as Lapolla industries, Demilec, SES, and Elastochem, have commercialized low-GWP spray foam formulations containing HFO-1233zd(E). In Japan, spray foam made with HFO-1233zd(E) has been commercialized by numerous customers including Toyo, Asahi, and BIP. In our experience, in the U.S., it took just 6-18 months from start of development to a formulated system that was technically and commercially saleable, with all the requisite regulatory approvals. Further, several U.S. customers are close to commercial systems and will be undergoing product certification shortly. We expect the commercialization timelines to continue to shorten. The supply chain of additives (catalysts, surfactants) has also developed substantially, so customers have a wide variety of components to formulate with HFO-1233zd(E). As another proxy for how quickly spray foam can transition, recently, when new materials such as HFC-365mfc blends have come to market, the industry has indicated that it can transition rapidly, typically in less than six months.

Low-GWP alternatives in spray foam applications are high performance, low cost, and in ample supply. Customers who have already commercialized low-GWP spray foam based on HFO-1233zd(E) are seeing benefits of better energy efficiency as well as reduced cost. HFO-1233zd(E) has demonstrated better yields (more foam per pound of liquid component) by as much as 10-12%,

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which results in large cost savings. In addition, these foams have shown 4% to 8% improved energy efficiency, which means that customers can either improve the energy efficiency for the same thickness of foam or reduce the thickness to further bring down cost. On a total life-cycle analysis basis, which includes both direct and indirect GWP, foams with HFO-1233zd(E) are shown to reduce CO_2e life-cycle emissions by up to 90%.[5]

These alternatives are available to supply the U.S. market. Honeywell's HFO-1233zd(E) large-scale plant started up in May 2014 and Chemours recently started operating its HFO-1336mmz plant. Below is a map showing the adoption of Honeywell's low-GWP foam blowing agents globally.

Figure 1.0 Global Adoption of Solstice in Foam Blowing Applications

5 Bogdan and Pascual, Environmental assessment of next generation blowing agent technology using Solstice LBA in ccSPF, Polyurethane Magazine, 5 (2012).

IV. Aerosols

End-Use	Product	EPA Phaseout Date	Supporting Information	Supply of Alternatives
Consumer Aerosols	HFC-134a	July 20, 2016 for many applications, including tire inflators and novelty aerosols	• Multiple/wide-ranging low-GWP commercial products and/or shelf-ready prototypes currently available	• Large, commercial-scale plants for low-GWP alternatives in operation to supply global demand (Hydrocarbons, HFC-152a, HFO-1234ze(E), CO_2)
Technical & Medical Aerosols	HFC-134a	July 20, 2016, with exceptions	• Multiple/wide-ranging low-GWP commercial products and/or shelf-ready prototypes currently available	• Large, commercial-scale plants for low-GWP alternatives in operation to supply global demand (Hydrocarbons, HFC-152a, HFO-1234ze(E), CO_2)
All Aerosols Applications	HFC-125	Jan. 1, 2016	• Multiple/wide-ranging low-GWP commercial products and/or shelf-ready prototypes currently available	• Large, commercial-scale plants for low-GWP alternatives in operation to supply global demand (Hydrocarbons, HFC-152a, HFO-1234ze(E), CO_2)
All Aerosols Applications	HFC-227ea	Jan. 1, 2016, except in metered dose inhalers	• Multiple/wide-ranging low-GWP commercial products and/or shelf-ready prototypes currently available	• Large, commercial-scale plants for low-GWP alternatives in operation to supply global demand (Hydrocarbons, HFC-152a, HFO-1234ze(E), CO_2)

Most customers have already transitioned away from HFCs, since EPA SNAP 20 Rule listed HFCs in many common applications as unacceptable as of January 1, 2016. Aerosol product manufacturers have several options from Honeywell and others that are listed as acceptable under SNAP and are currently available.

Honeywell has invested significant capital ($33 million) at its Baton Rouge, Louisiana manufacturing facility to ensure high-volume manufacturing capability for HFO-1234ze(E).[6,7] As announced on September 16, 2014, construction of the plant has been completed and commercial operations began in Q3 of 2014.[8] The investment provides more than sufficient capacity to meet growing demand for low-GWP product necessary for compliance with the EPA SNAP Rules 20 and 21.

Below is a map showing global adoption of Solstice propellant.

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[6] http://honeywell.com/News/Pages/Honeywell-To-Invest-$33-Million-In-Louisiana-Facility.aspx

[7] http://honeywell.com/News/Pages/Honeywell-Announces-Investments-Of-$200-Million-In-Louisiana-Facilities-Backed-By-Tax-Incentive-Framework-Agreement.aspx

[8] http://honeywell.com/News/Pages/Honeywell-To-Increase-Production-Of-Low-Global-Warming-Materials-Reduce-Hydrofluorocarbon-HFC-Production-By-Nearly-Half.aspx

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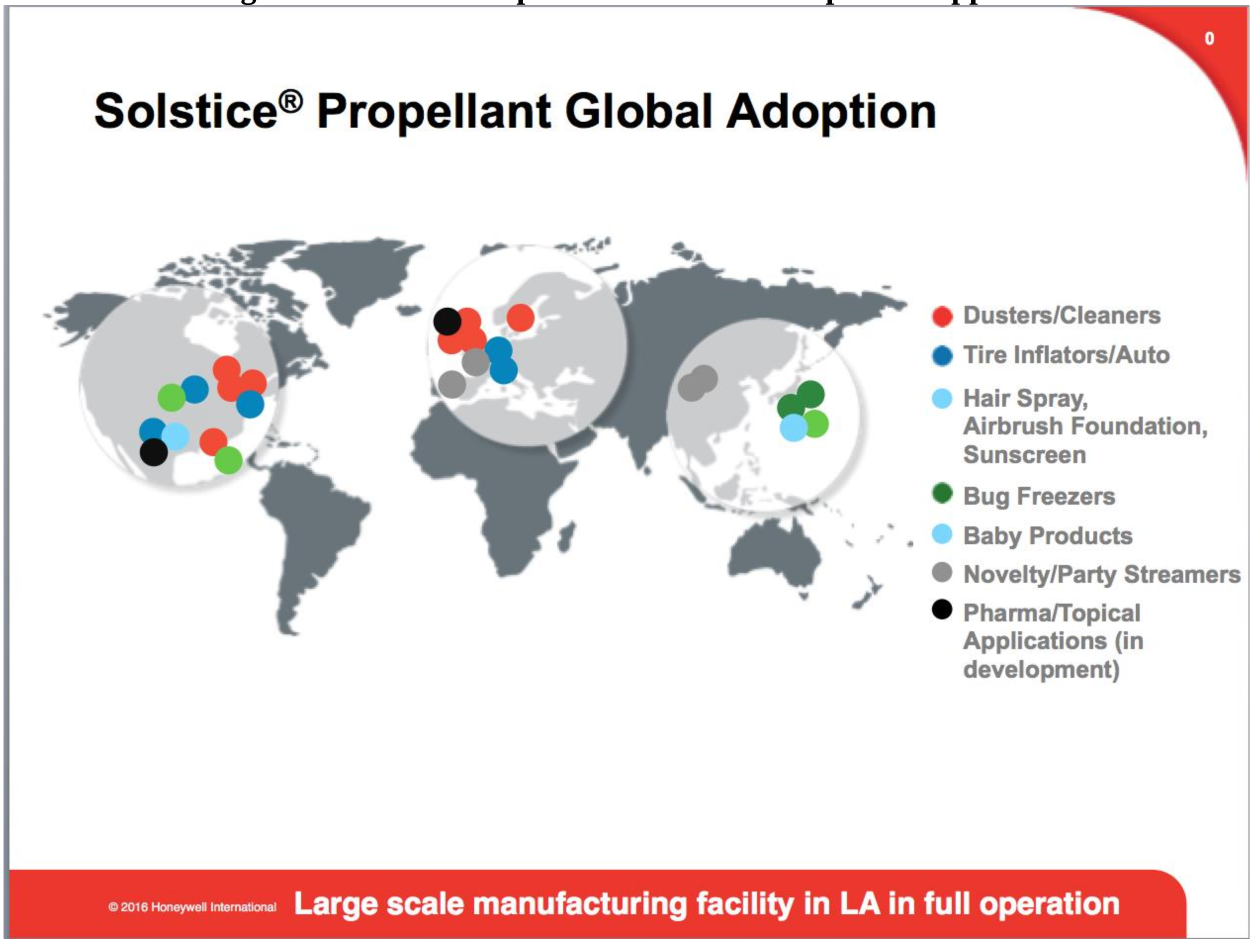
Figure 2.0 Global Adoption of Solstice in Propellant Applications



Many aerosols manufacturers have already transitioned away from HFCs to other alternatives. Because transitioning to substitutes in the aerosols industry requires little investment, the uncertain fate of EPA's SNAP Rule 20 is likely to cause a large number of aerosols manufacturers to revert back to using HFCs. It is therefore critical that CARB extend its proposal to incorporate EPA SNAP Rule 20 by reference to the aerosols applications covered by that rule.[9]

[9] SNAP Rule 21 did not contain any unacceptability listing decisions for aerosol applications.