PEER REVIEW COMMENT TEMPLATE

An *Emission Reduction Measurement and Monitoring Methodology for the Conversion of Foam Blowing Agents from High-GWP Materials to Low-GWP Materials* was prepared by Dentons US, LLP. The methodology was formally submitted to ACR on July 7, 2014. ACR reviewed the methodology and provided comments on several occasions; the authors submitted multiple methodology revisions throughout the ACR review process.

The methodology was posted for public comment from February 17 – March 27. Following public consultation, the methodology has undergone a scientific peer review process.

Note to reviewers: This template is organized by section of the methodology. Please insert your review comments in the table for that section. In the first round of review, all peer reviewers should insert their comments in the first column, leaving the second column for methodology author responses. This will be followed by an abbreviated second round of review in which the reviewers comment on the authors' responses and methodology revisions, followed by a second round of responses from the authors.

Please add rows to each table as needed.

1. Background and Applicability

1st Peer Review	*Author Response*	2nd Peer Review	Author Response
We recommend considering the use of "lower GWP" instead of "low GWP" when referring to alternative BAs, or ensuring that the term "low GWP" is defined well because it can mean different things in different contexts, specifically various sectors in which HFCs are used. Furthermore, "low GWP" and "high GWP" should only be hyphenated when used as an adjective (e.g., low-GWP material). For example, in the first paragraph, the hyphens should be deleted.	*We have revised the methodology to use the term "near-zero-GWP"* *Please explain further how and when low or high-GWP or near-zero-GWP is used as a noun and not used at as adjective. It seems as if it is always used as a descriptor, and hence an adjective.*	Please see comment below regarding the GWP limit (in row three of Background and Applicability). Low/high GWP is used as a noun when the GWP value is the noun: "HFC-134a has a high GWP." When used an adjective: "HFC-134a is a high-GWP HFC."	We trust the changes made address these editorial comments
Table 1: Definitions • **Blowing agent:** Consider adding that BAs can also be used as an insulating component of the foam, in addition to being used to propel the foam mixture. • **Continuous laminated board stock:** "Pentane" does not need to be capitalized. • **Extruded polystyrene:** Consider including additional information about this end-use. For example, XPS foam is manufactured by an extrusion process at elevated temperatures, which offers improved thermal properties. XPS includes board stock (or 'board'), billet, and sheet foam; board and billet foam is often manufactured for construction applications, although XPS billet is also manufactured for buoyancy and insulating pipe applications.	*Table 2 is now a list of foam applications with a description and examples for each.* *The definitions listed by the reviewer have been incorporated into both Table 1 and Table 2.*	Suggested edits: • **High global warming potential blowing agent:** For the purposes of this methodology it is a BA with a GWP of greater than 5. However, it is often used within the industry to refer to HFC BAs with very high GWPs (i.e., 1,000 or greater), many of which have now become ~~disallowed by the SNAP rule~~ unacceptable substitutes according to decisions made under USEPA's SNAP program. • In the definition for **Hydrocarbon,** the pentane formula is missing closing parentheses: (e.g. pentane (C_5H_{12}) and propane (C_3H_8)) • In the definition for **blowing agent**, ICF suggested adding that BAs can also be used as an *insulating* component (not *injecting* component) of foam.	Methodology changed to use of TEAP definition of "low". GWP is otherwise not relied upon for "Eligible Blowing Agent" Other edits accepted.

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• **Global warming potential:** A global warming potential is a quantified measure of the globally averaged relative radiative forcing impacts of a particular greenhouse gas. • **Hydrocarbon:** Suggest listing both common name and formula for each example. (e.g., pentane [C_5H_{12}], propane [C_3H_8]) • **Low GWP material:** Suggest defining the term "low-GWP" rather than "low-GWP material." The use of the terms 'material' vs. 'BA' are also used interchangeably which is a bit confusing. Suggest being more consistent in terminology. See additional comment on the definition in the comment below. • **Rigid polyurethane foam:** The acronym "PUF" is not typically used in industry. Peer-reviewed reports in the foam blowing sector usually refer to this end-use as "rigid PU foam." Suggest incorporating all foam technologies considered in the methodology in this table (i.e., the rigid PU foams listed in Table 4). Specifically, definitions for all types of rigid PU foams should be included (e.g., injected, discontinuous panel, integral skin, continuous laminated board stock).			
Using a GWP of 5 as the limit for defining a "low-GWP" alternative seems arbitrary and may leave out common "low-GWP" alternatives that should also be considered (e.g., hydrocarbons). Furthermore, there is some uncertainty associated with GWP values across different sources (e.g., IPCC 4th and 5th assessment reports) that could	*We have modified the methodology to include hydrocarbons.* *It should be noted that if the U.S.EPA adopts a lower NAAQS for tropospheric ozone (to which hydrocarbons are a principal contributor) the regulations may become more stringent and limit*	Using a GWP of 5 as the limit will exclude HFOs and other lower-GWP fluorinated compounds, including Solstice™ 1233zd(E) (GWP = 4.7 – 7), HFO-1234ze (GWP = 6), and HFO–1336mzz(Z) (GWP = 9). These compounds are even listed in Table 10 in Appendix B as having a GWP of greater than 5, yet are still considered	A new definition of "Project Activity" has been added which then refers to revised definitions of Eligible Blowing Agent and Eligible Foam Application. Eligible Blowing Agent excludes GHGs with a GWP >30 and organic compounds which do not have a "negligible photochemical

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affect whether or not a material could be considered to have a "low-GWP." According to the IPCC, GWPs typically have an uncertainty of ±35 percent. Generally, non-HFC blowing agents are a functionally negligible GHG source compared to high-GWP foam BAs. The EU 2014 F-gas Regulation places prohibitions on foams that contain HFCs with a GWP of 150 or more. Additionally, the Montreal Protocol regards chemicals with a GWP less than approximately 100 are considered to be "low-GWP." The definition of a "low-GWP" should be consistent with the Montreal Protocol or the U.S. Clean Air Act.	*hydrocarbons based on the regulatory requirement of the ACR Standard.* *In order to better describe the intent of this methodology, we have included the term "near- zero- GWP" to describe BAs with a GWP of 5 or less. This methodology is intended to provide an incentive for industry to move beyond regulatory requirements associated with low-GWP. Additionally, this is a US-based methodology and EU regulations are not applicable.* *Under ACR's Practice Based Performance Standard the methodology (and all projects developed under the methodology) need to demonstrate that they are not business as usual. The use of hydrocarbons (specifically pentane) has increased significantly over recent years. So much so that by setting a GWP limit that would include pentane violates the ACR Performance Standard. We reference a report from Huntsman and also reference an American Chemistry Council Center for Polyurethanes report provided to ACR which shows the predominant use of pentane in certain foam blowing applications.* *We would like to note that according to the UNEP-TEAP, 2014, Decision XXV/5 Task Force Report Additional Information to Alternatives on ODS, "the foam sector has made significant strides in addressing the phase-out of ozone depleting substances since the signing of the Montreal Protocol in 1987. The availability of hydrocarbons at an early stage of the transition period has made it*	to be "near-zero-GWP BAs." This is confusing and should be revised. Furthermore, a GWP of 5 is arbitrary and does not take into account the variability of GWP at such low magnitudes. Suggest using GWP less than 30 based on UNEP TEAP definitions of "low GWP." Specifically, a GWP less than 30. Substances with a GWP less than 30 are short-lived and the precise GWP values take into account local impacts more than global equilibrium effects. Hydrocarbons and short-lived unsaturated, synthetic fluorocarbons fall into this group. Compounds with GWPs less than 30 will likely have similar impacts on climate, and much less than the next class of compounds with greater GWPs (i.e., substances with high radiative forcing and shorter atmospheric lifetimes such as HFC-152a).	reactivity" as defined by U.S.EPA Appendix A has been revised to provide background on the applications which meet the requisite test for lack of "market penetration", for the "performance standard" approach. The nominated applications so qualify (each has a market penetration of less than 10% for low GWP BAs.)

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	that a genuine low-GWP and cost-effective alternative has been available for large parts of the foam sector throughout that period, even at the time of the phase-out of CFCs in non-Article 5 Parties. *Therefore, the account of the transition history since 1987 in the polyurethane and phenolic product sectors is dominated by whether a specific foam sub-sector could adopt hydrocarbon technologies or not.* *There have been a number of reasons cited over the period to explain why hydrocarbon solutions were not appropriate. These have included:* o *The flammability risks associated with the production/deposition process* o *The flammability risks associated with product installation and use* o *The higher gaseous thermal conductivity leading to poorer thermal efficiency of the foam* o *The cost of flame-proofing measures for production processes in relation to the size of the manufacturing plant (lack of economies of scale)* o *Local health & safety regulations* o *Local regulations on volatile organic compounds (VOCs)* o *Waste management issues*		

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	Some of these have largely been discounted in more recent times, but others continue to be of importance and some are even growing in significance (e.g. waste management issues) as hydrocarbon blown foams reach end-of-life." *We would further note that EPA's recent SNAP decision did not accept a request to move up the transition date for Rigid PUF in appliances (even though cyclopentane was asserted to be commercially available) in favor of a later transition date, which would allow other BAs to be developed (ones which were non-VOM materials and with lower GWP than cyclopentane. [See 80 FR 42929. Col 1 ,(July 20, 2015)]* *Because this issue repeats in later sections, and in order to simplify the response, the foregoing should be considered as "Repeated Response #1"*		
To potentially expand applicability conditions under this methodology, imports of steel-faced insulating panels for secondary processing could be considered. Research indicates that this foam type can be recovered more easily than others and that a majority of them are already segregated at end-of-life due to the high value of recycled metals.	*This methodology applies to the use of BA in foam manufacturing and use in North America. It is not applicable to foam products manufactured outside of North America.*	OK	
HCs are the substitute of choice for many PU and XPS applications, particularly for large manufacturers that can afford exposure and safety controls. A rationale for eliminating HCs does not seem valid.	*We have modified the methodology to include hydrocarbons. See "Repeated Response #1".*	OK	

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Small manufacturers or specialty manufacturers are the ones likely to use HFOs and also the ones less likely to have high production volume, making the offset projects smaller and less profitable, which may not justify enduring the complexity and cost of developing the project for some manufacturers. Some portion of these users may also not have the technical capacity to develop a project.			
In Section 1.1, the term 'without impacting performance' implies that constant thermal performance (R-value) is assumed. Since different blowing agents have varying thermal conductivities, the thickness of insulating foams required to achieve the same performance will also vary. This will, in turn, impact the amounts of blowing agent used for differing technological solutions. It may be that the methodology ignores the variation in thermal conductivity. However, this should be stated. If it doesn't, then the method needs to make clear reference to the importance of comparing blowing agent technologies at constant R-value.	*The equations in this methodology require the project developer to note the quantity of baseline BA that would have been used in the absence of the project activity and also the amount of near-zero-GWP BA used in the project activity. This quantification of the foam previously used and now used accounts for any differences in volume required during the conversion to obtain the same quality of product that was originally being produced.*	Section 1.1 has been substantially re-written and bears little resemblance to the first version. This includes the dropping of the term 'without impacting performance'. However, 'constant performance' is not prescribed in the methodology and terms like 'same quality of product' do not really address the issue. There was some hope that the inclusion of 'Design Spec.' in the Definitions would provide the basis for constant performance (thermal or otherwise), but it is not then referred to in any elaboration of the project activity.	The Methodology has been revised to require that the BA for the Project Activity (whether or not a blend) must have equivalent thermal performance to the BA in the baseline. This is found in the parameter BAR, in Equation 1A and in the Parameters Monitored section of the Methodology.
In Section 1.2 (Table 1), what is an example of 'non-injection processes' used in domestic refrigerators and freezers?	*Methodology no longer references "non-injection process".*	Agreed.	
In Section 1.2 (Table 1), is the definition of 'high-GWP BA' anything with a GWP >5? If so, this should be stated explicitly under the 'Baseline activity' definition. If not, the actual qualifying GWP should be stated.	*Definition has been changed to "*For the purposes of this methodology it is a BA with a GWP of greater than 5. However, it is often used within the industry to refer to HFC BA's with very high GWPs (i.e., 1,000 or greater), many of which have now become disallowed by the SNAP rule."	This response raises a question about the status of the SNAP Rule in the context of the Regulatory Surplus Test. If a ban on the use of a BA is scheduled to be introduced on, for example, 1st January 2020, does a project commenced on 1st July 2019 with the intent of addressing the impending SNAP ban meet the Regulatory Surplus Test (3.2.1)? If not,	The methodology provides a strong incentive to undertake early action to switch. In the example provided, a switch to an Eligible BA prior to a regulatory deadline would be an eligible project activity. The Methodology is meant to incentivize early action and does not attempt to assess the particular motivations of

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		what is the latest date at which a project would meet the Regulatory Surplus Test?	an individual actor beyond GHG reductions achieved by switching to a more environmentally preferable BA.
In Section 1.2 (Table 1), under 'carbon dioxide equivalent', explicit reference should be made to the time horizon which I guess will be '100 year' in this case.	*Definition changed to "CO2e is a metric to compare GHGs based on their GWP relative to CO2 over the same timeframe. The IPCC publishes GWP values for converting all GHGs to a CO2e basis. This methodology references the 100-year GWPs in the IPCC Fourth Assessment Report (AR4).*	Fine!	
In Section 1.2 (Table 1), under 'Continuous laminated board stock', the word 'panels' in the definition should be replaced by 'boards' so as not to be confused with rigid faced panels.	*This definition has been removed from Table 1 and included in a different format in Table 2 where it now is described as a part of the foam applications in the methodology.*	This seems to have compounded the error. The terms continuous laminate and boardstock are synonymous, but neither is associated with the term 'panel'. The term 'panel' is typically reserved for rigid-faced (usually steel) panels which can be made either continuously or discontinuously. At present, Table 2 is missing any reference to continuous PU panel production, which I presume must be a qualifying technology.	Definitions are now in Table 1 and Eligible BAs in Table 2. Definitions have been clarified, and the definitions shortened to address the eligible foam applications.
In Section 1.2 (Table 1), 'End of Life' emissions are not just related to destruction, but also occur during decommissioning, recovery and collection of foams.	*We have considered all of the peer review comments on EOL and have met with the California Air Resources Board (ARB) on this issue to obtain their input.* *Before we submitted this Methodology to ACR, we had investigated the EOL issues thoroughly. We viewed the EOL as a complex issue that could create such controversy that it would preclude adoption of this simplified approach.* *We concluded that EOL emissions are separate and should not be included in*	With my original comment, I was not challenging the reason for the exclusion of EoL issues from the methodology, but simply your wording of the definition in Table 1. I note that this has remained unchanged in the later version. The matter would simply be addressed by extending the definition to say…*'The emissions associated with the decommissioning, recovery and destruction of foams'*	Thank you for the clarification. Comment accepted and edit made

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	the methodology, at this time, for the following reasons: ○ *The emission reductions are not realized until many years later. Even though the methodology allows offsets for the 10 years of use beyond manufacturing, EOL can occur many years beyond that and they are not comfortable with such a potentially long timeframe.* ○ *Tracking the EOL for the foam manufactured and used is nearly impossible. The possibility of double-counting as a result of another methodology is a concern.* *The varied end uses each have its own EOL profile. Some have zero EOL (integral skin foam). Others have an EOL that may not be encountered for decades. And still others have substantial EOL, such as residential refrigeration, but also have a more complex EOL profile. We therefore, strongly suggest that this Methodology be completed and focused consideration be given to particular EOL applications.* *One of the major issues we encountered in looking at EOL is the environmental impact of giving credit in an early vintage year, when the presumed reductions (from having a "near-zero-GWP" in use) would not occur for a decade or more. If the EOL credits were recognized and sold, and then used, all within a few years of the actual "avoidance" of the high-GWP BA, the Method would have the perverse effect of allowing MORE GHGs to be*		

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	emitted in the short term. That result appears completely contrary to the principle of avoidance on which this Method is based. *Because this issue repeats in later sections, and in order to simplify the response, the foregoing should be considered as "Repeated Response #2"*		
In Section 1.2 (Table 1), the definition of Extruded Polystyrene would better read – *'Rigid foam extrusion technology generally used to form insulation boards'*	*Definition changed to "*XPS is a liquefied plastic that is extruded into foam boardstock and billet that is cut to form various insulation products."	Hmmm! I am not sure that this definition brings any further clarity. The term 'liquefied' can be associated with any thermoplastic material, so it is, in my view, redundant.	We focus XPS on boardstock/billet as contrasted with sheet. Examples in the revised definition are from EPA's SNAP rule. New definition in Methodology: Rigid foam extrusion technology used to form insulation boardstock or block rather than in a sheet form; typically used in the following applications: roofing, walls, flooring and pipes. Does not include XPS sheet foam applications..
In Section 1.2 (Table 1), the GWP definition should also have reference to the 'time horizon' (100 year?)	*Definition changed to "Global warming potential is a relative scale translating the global warming impact of any GHG into its CO_2e over the same timeframe. This methodology references the 100-year GWPs in the IPCC Fourth Assessment Report (AR4)."*	Fine!	
In Section 1.2 (Table 1), the hydrocarbon definition should read *'An organic compound containing only hydrogen and carbon atoms (e.g. Pentane, C_5H_{12})* Note that the formula provided is for propane!!	*Definition changed to "*An organic compound containing only hydrogen and carbon atoms (e.g. pentane (C_5H_{12} and propane (C_3H_8))."	Fine!	
In Section 1.2 (Table 1), the HFC definition should include reference to HFC-227ea.	*Definition now includes HFC-227ea.*	Fine!	

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In Section 1.2 (Table 1), "Low GWP material" is defined as having a GWP of less than 5. We have had experience in Europe of trying to apply a cut-off of 5 and found it extremely difficult to practically operate this because GWPs are difficult to determine at levels this low, particularly for hydrocarbons where the GWP will vary and depend on the local environment. I note that the Methodology excludes consideration of hydrocarbons as low-GWP BAs because of the potential impact on tropospheric ozone and also safety concerns (more on this later). The European F-Gas Regulation [EC 517/2014] contains a list of GWPs (Annexes I-IV) and it should be noted that some unsaturated HFCs/HCFCs have GWPs above 5. Therefore, the Methodology could be seen as discriminatory between legitimate low-GWP solutions.	*We have modified the methodology to include hydrocarbons. See Repeated Response #1.*	The inclusion of hydrocarbons has been noted and is welcomed. The fact that hydrocarbons are already widely used in some foam sectors should mean that those sectors are not considered as eligible under the methodology. However, if I understand your response completely you are saying that you want to promote shifts from HC to "near-zero-GWP" solutions. Is that correct? Surely, the decision on what counts as 'Additional' and what is 'Business as Usual' will depend on the foam sector being considered. For a sector that is highly reliant on HFCs, a move to HCs would still make sense. On a related point, the purpose of drawing attention to the European experience was not to promote the adoption of European approaches in North America, but to highlight the practical issues that you will have in determining whether you have GWP of less than 5 or not. What is the burden of proof and who will be liable if the claim is subsequently disproved. In summary, I think that you are 'dancing on the head of a pin' here and that the failure of the methodology to address "equivalence of performance" means that loss of thermal performance could more than outweigh gains from direct climate impacts when you are moving from a GWP of <20 to a GWP of <5. This, in my view, undermines the credibility of	We have addressed this comment in several ways. -- raised the GWP to 30, and removed GWP from being the only criteria; -- we agree that the incentive will be greatest for an HFC user and small or ephemeral for "low-GWP" BA users (however, an HC user, which is dissatisfied with HC performance, if it meets the other eligibility criteria, might choose another low-GWP BA [e.g. HFOs or a blend of HFOs and MF]). We obtained a survey which looks at application specific market penetration factors. For some, HCs were tried and adoption remains low, but high enough that including HCs in the market analysis would disqualify the application from eligibility. As suggested, applications where HC consumption is high were removed from the methodology in order to focus on those sectors where low GWP BA have not been adopted at high rates. For some applications, a consensus has formed that HCs are not appropriate, for safety factors and otherwise.(e.g. XPS-boardstock). Moreover, by focusing on the non-GHG organic compounds which have negligible photochemical reactivity and near-zero GHGs, the incentive is reserved for the newer BAs and for

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		the whole methodology, especially when GWP determinations are uncertain at these values. The text of the Decision XXV/5 Task Force Report, which you liberally cite in your response, supports the view that this is a case-by-case issue. However, I remain strongly of the view that you will have great difficulty in validating projects based on the GWP <5 criterion.	smaller manufacturing facilities which need "drop-in" BAs. In other words, it can be argued that HC are business as usual in the industry at large and therefore, are excluded from crediting in the eligible foam applications. There is also a substantial quantity of higher GWP BAs which would shift early, including HFC-152a users. Note that these sectors/applications have substantial potential (perhaps over a million tonnes of carbon credits annually). We have added the suggested condition for "equivalence of performance approach" as discussed in an above response.
In Section 1.2 (Table 1), the Rigid PUF definition contains the phrase '*manufactured with rigid PUF'* which seems to make a circular definition. I suggest that the phrase is replaced with *'requiring rigid form and structure'*	*Definition changed to "*Foam created through the mix of polyurethane and a BA. Rigid PUF is generally used for. It is one of the applications approved by this methodology."	Previously, this entry was in Table 1 (Definitions) but has now been shifted to Table 2 (Foam Application Descriptions). The term "Rigid PUF" is a generic term and does not relate to any single foam sector. Therefore, I don't think it has any place in Table 2 and should be re-inserted into Table 1.	See revised Table 1 (definitions) and Table 2 (Eligible BA applications)
In Section 1.3, the first sentence implies that the only Baseline activities being considered in the Methodology are those involving 'HFC gases'. Is that the case? If so, it should be stated more explicitly than it is. If not, it might be better to replace *'HFC'* with *'high-GWP'*.	*Methodology changed to reference GHG instead of HFC. The CDM methodology we referenced was focused on HFCs. This methodology is focused on GHG reductions from BA, in general.*	Fine!	
In Section 1.3, the first reference to *'ACR'* should be spelled out as the *'American*	*The first reference to ACR is the first paragraph of the methodology where it is now spelled out.*	Fine!	

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Carbon Registry' since it is not obvious otherwise.			
In Section 1.3, *'low GWP BA'* is defined as having a GWP <5. – See earlier comments on this.	*We are changing the name to "near-zero- GWP" to better express that this methodology is going above and beyond current regulations and practices.*	Noted, but see previous comments on uncertainty associated with GWP at these levels.	This has been addressed
In Section 1.3, the explanation is given for why hydrocarbons are not eligible as alternatives. This explanation is based on tropospheric ozone formation and/or safety in operation. No real references are supplied to support either of these arguments which makes the whole basis of the Methodology weak. These are not exclusions adopted in other parts of the world, and it would be more credible if reasons were given as to why this mattered so much in North America.	*We have modified the methodology to include hydrocarbons. See Repeated Response #1.*	Noted. This concern is at least partially addressed by the references given in Repeated Response #1. That said, the inclusion or exclusion of HCs is dictated by either: • Non-eligible foam sub-sector • HC GWP above 5 It is not clear how many HCs can be formally considered as having GWPs below 5. As noted previously, the actual value could depend on location.	See prior responses. The Definitions of both Eligible Foam Sectors and Eligible Foam BAs work together to define the Project Activity
In Section 1.3, Rigid PUF is included as an example of a sector which has low uptake of low-GWP BA. However, this is tricky, since there is no definition of high-GWP BA (is this anything >5?) – see earlier comment. In most jurisdictions, pentanes would be considered as low-GWP BAs and these blowing agents already dominate the PU Board stock market. The Methodology therefore needs to be tighter in its definitions when setting out its rationales and explaining its inclusions and exclusions.	*Methodology has been revised to use the term "near-zero-GWP" as a BA with a GWP of 5 or less. This level has been set to meet ACR's Practice-Based Performance Standard by accounting for pentane dominating the PU boardstock.* *Hydrocarbons are no longer excluded in this methodology. However, if an increase in a pollutant such as VOC occurs that all regulations are complied with.*	See comments directly above on HC and whether they are in fact "eligible" as well as uncertainties associated with GWP at these levels.	See prior comments. Based on continued development of the methodology and additional research, HC are excluded from crediting in the 4 eligible foam applications.
In Section 1.4, although reference is made to a 10 year crediting period, the focus of the commentary is on the manufacturing phase rather than the use phase. Some specific mention of the contribution of the	*The methodology has been revised to include both manufacturing and use phases throughout the document.*	Fine!	

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use phase in the first 10 years should be made.			

2. Project Boundaries

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Under the project boundaries, focusing on manufacturing only can reduce complexity to the methodology. However, most emissions from foam applications do not necessarily occur during manufacturing. For example, emissions from closed-cell foams occur primarily at end-of-life (i.e., between approximately 40% and 90% depending on the end-use). Therefore, benefits from transitioning to an alternative may be greatly underestimated for these types of foams. Consider incorporating end-of-life emissions into the project boundary to maximize benefits allowed under this methodology or further explain why they are not considered. Consider reviewing the Climate Action Reserve (CAR) U.S. Ozone Depleting Substances Project Protocol as an additional resource for project boundaries and calculating baseline emissions from foams.	*We have considered all of the peer review comments on EOL and have met with ARB on this issue to obtain their input. See further Repeated Response #2.* *ARB's ODS protocol was referenced for this methodology.*	OK	
Under the project boundaries, foam manufacturing and usage need to be defined further.	*The methodology has been revised to include both manufacturing and use phases throughout the document.*	OK	

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In Section 2.0, the impression is once again left that the 10 year crediting period is focused on manufacturing only.	*The methodology has been revised to include both manufacturing and use phases throughout the document.*	Agreed.	
In Section 2.1, the geographic boundary is broadened to include the usage 'site', although this is an unusual choice of term.	*Methodology has been modified to use the term "project site"*	Fine!	
In the Project Boundary diagram, the Foam Usage element is clearly included in scope. Therefore, there is a need to alter the language in Section 2.0 to reflect this.	*The methodology has been revised to include both manufacturing and use phases throughout the document.*	Agreed	
In the text below the diagram, there is reference to the BA being '*entirely used*'. It is not clear what this means when the BA is certainly not entirely emitted and a reservoir continues beyond 10 years.	*Text has been deleted. We agree that the BA is not entirely used within the manufacturing and 10 years of use included within this methodology.*	Fine!	
Again, Table 2 implies that it is only HFCs that are being considered in Baseline activities.	*The methodology now references GHGs rather than HFCs.*	Fine!	

3. Baseline Determination and Additionality

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Section 3.1 Baseline Determination (page 9) – Table 3 – Source information of GWP values (i.e., AR4) for each baseline BA should be footnoted or indicated if a single source was used.	*The methodology now references all GWP values.*	OK	
Section 3.1 – In the Baseline Determination, the methodology should clarify how foam manufacturing and use for a domestic versus an export market will be addressed in terms of eligibility and factored into the calculations. Export markets may have	*This methodology is applicable only to projects manufactured in North America. Therefore, it is only applicable to regulations in North America Where the product goes for use after it is manufactured or what the export*	OK	

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varying regulations on HFCs such as the EU and its F-gas regulations. If foam manufacturing and use for exports markets is eligible, how would the project need to demonstrate additionality, specifically on passing the regulatory surplus test?	*regulations require are not relevant to this methodology.*		
Section 3.1 3.2 (page 9) – With regard to EPA regulations, the methodology states: "In July 2014, the U.S. EPA proposed new regulations under its SNAP program would prohibit the use of HFC 134a in XPS applications and HFC-134a and HFC-245fa in domestic refrigerators and freezers starting in January 2017. The proposed listing would not affect spray foam. If the SNAP rule is finalized as proposed, after 2017 the default baseline will be determined by the GWP of the BA predominantly used by the industry in those applications in place of the delisted HFC BAs. When EPA issues its final rulemaking, ACR will update this methodology to adjust the baseline as needed." One issue raised is whether this methodology will still be relevant and meet its stated objectives once the U.S. EPA rule is finalized. If the rule is finalized as proposed, there is a period between finalization of the rule (the date when the rule goes into effect, usually 60 days after publication in the Federal Register) and the actual dates when certain HFCs may no longer be used in certain foam BA applications in the U.S. This raises a number of questions:	*EPA SNAP rule was revised in July 2015 and the relevant dates and requirements have been incorporated.* *A project opting to use a near-zero-GWP BA prior to the required change date will receive credits based on their actual baseline BA usage until the required change date. After the required change date the project will use a "default BA" which is the BA that the project developer would have used instead of the near-zero-GWP BA.* *EPA recognized the effects of increased use of hydrocarbons and reversed course from the proposed SNAP to allow HFC-134a to continue in the refrigerant sector. EPA considered whether hydrocarbons could be used as an alternative for large canister adhesives. EPA expressed concern that such use in nonattainment areas would violate applicable regulations. Instead, EPA decided to allow HFC 134a to be used as a refrigerant - even though its use had not been proposed.*	Section 3.1 – Footnote 4 (p.14): There can be a lot to question when a company chooses its default blowing agent (BA). For instance, footnote 4 describes a company switching from HFC-134a to methyl formate due to EPA's latest SNAP rule and then being allowed to use HFC-152a as the baseline BA for calculating reductions. There is no reason to assume they would have used HFC-152a when forced to transition due to that rule. Just choosing the highest-GWP remaining is not a proper way to determine the likely "default" or "baseline" BA that would have been used. Because HFC-152a is listed in Table 4 as a potential BA in XPS and Integral Skin, and the rule doesn't change that status, it seems like these two end-uses are the ones where this issue could arise. Perhaps if a company was using in their operations BOTH HFC-152a and a BA with a change of status, they'd have an argument that they would have shifted to all HFC-152a; otherwise, it's unclear how they could prove that would have been their choice to comply with the rule but nonetheless decided on a near-zero-GWP BA.	Comment addressed. We have modified the definition and the requirements in the text (see section 4.1 and 5.2). There is now a requirement that a financial, market and/or technical analysis be provided and verified in order to document the likely switch to a default BA. Additionally, the concept of "greenfield" projects has been removed and therefore a default BA may only be applied in scenarios where there is a regulatory requirement to switch to a substitute BA.

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• In certain respects, one could take the position that the transition away from certain HFCs in certain foam BA applications are effectively mandated once a final rule is published or goes into effect. How will projects be credited taking into account when this methodology is finalized, the final rule effective date, and the actual dates when certain HFCs will be unacceptable for certain uses? • Manufacturers could have considered a number of options for foam transition projects to low-GWP BA based on factors including the availability of alternatives and costs. They could have considered taking action: 1) prior to the final rule, 2) after the final rule published or went into effect, 3) to stagger production line transitions prior to the specific HFC deadline, or 4) to wait until very near the specific HFC deadline. How would the methodology make the determination that the project was not mandated by regulations and when emission reductions were additional to "business as usual"?			
		Section 3.1 – Table 4 (page 14) - Is there actual use of HFC-245fa in XPS?	See, *inter alia,* the Caleb report. And the citation in Table 8 of SNAP which lists 245fa as being used in XPS Boardstock and Billet. We are aware of statements in the SNAP discussion that about 80% of the XPS Boardstock market uses HFC-134a, which is consistent with our own research (see Appendix A),

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All GWPs used to calculate the baseline and corresponding offsets should be from the same source. Table 3 should be updated to more clearly indicate the source for all GWPs listed. IPCC's Fourth Assessment Report is recommended and is consistent with EPA's U.S. Greenhouse Gas Inventory. Parties to the UNFCCC have also agreed to use GWPs based upon a 100-year time horizon.	*All sources of GWP values are now referenced in the methodology.*	OK	
The "SNAP 20 rule" is more appropriately referred to as the *Proposed Rule: Change of Listing Status for Certain Substitutes Under the Significant New Alternatives Policy (SNAP) Program*. The rule numbers found on EPA's SNAP website are not how they're referenced in the Federal Register and serve a purpose to list the rules in chronological order. Furthermore, this proposed rule was released for and received public comments. SNAP and EPA should also be defined the first time the acronyms are used.	*SNAP is defined at the first use in the first paragraph of the methodology.*	Recommend revising this sentence: "For projects required to transition to a lower GWP BA due to a regulation such as EPA's SNAP…" to: "For projects required to transition to a lower GWP BA due to a regulation, such as EPA's SNAP Change of Status Rule,…." Suggest also adding… Additionally, EPA's SNAP program regulates in other capacities (e.g., acceptability of substitutes, future status change rules). Please follow the link to see EPA's regulatory decisions and upcoming activities. Table 5 is inaccurate. Recommend including "blends thereof" for HFC-134a, HFC-245fa, and HFC-365mfc where applicable. Furthermore, there is more detail for the SNAP transition dates than what is shown. For example, for rigid PU appliance foam, the BAs listed are acceptable subject to narrowed use limits for military or space- and aeronautics-related applications* and unacceptable for all other uses as of **January 1, 2020** and	We have made revisions in response. However, advice as to what may occur in the future is inappropriate for a methodology such as this. We added the "blends" reference to Table 6 and for calculations involving blends (Section 4). We added the later date for military or space- and aeronautics applications in Table 6.

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		unacceptable for all uses as of **January 1, 2022**. Recommend adding a footnote direct to more details about the dates and/or including a link to the rule or fact sheet.	
The qualification for a project to have a technology with a low market adoption rate seems arbitrary. If a low-GWP alternative replaces HFC-134a in any foam technology, for example, it should be eligible regardless of the technology's current adoption rate. Spurring innovation can also serve as a goal of an offset protocol, although not a requirement. For example, for spray foams, HCs would not be chosen in many outdoor applications (e.g., roofs) because of flammability; however, marine flotation foam, which is a type of spray foam, would likely move to HCs for large users.	*A low market adoption rate is the principal criterion for the ACR practice-based performance standard for new offset methodologies.* *The methodology now references foam "applications" rather than "sectors" as this more accurately relates to how industry and regulations refer to them.*	OK	
In Section 3.1, the text refers to *'the most commonly used BA for the sector'* but does not make it clear that this is related specifically to North America and not other jurisdictions where BA selection may be different.	*The methodology more clearly references that this is a North America based methodology.*	Text of Section 3.1 has changed substantially, so difficult to make comparisons on this issue based on this specific text. Nevertheless, the ambiguity is certainly reduced.	Ok
Table 3 implies that pentane is a baseline BA, but this is in contradiction with Table 2. The source of the figure '11' should be cited.	*To avoid any confusion, pentane has been removed from the commonly used BAs table. However, it should be noted that for certain foam applications, pentane makes up a large portion of the BA used. While the offsets created by converting from pentane to a near-zero-GWP BA would be minimal, it is allowed under this methodology.*	It seems that Table 4 (as it now is) has been modified to remove Rigid PU Continuous Laminated Boardstock which, bearing in mind the wide-spread use of pentanes, might be viewed as a non-eligible foam sector. However, since your tighter definition of "near-zero-GWP" BAs makes such a project theoretically eligible, wouldn't it now be	We agree that continuous laminated boardstock does not appear to be eligible application.

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		better to leave Boardstock in to highlight this point and make it clear how the methodology is now being applied – even for HC baselines?	
Table 3 addresses 'Rigid PUF – All Other' which would include PU Board stock and other PU applications primarily using hydrocarbons (e.g. water heaters), although HFC-245fa is cited as the BA.	*Rigid PUF – All other has been removed. Definitions have been revised to more clearly define the applications.*	Understood.	
HFC-152a should be included as a likely BA for XPS. In fact, the most likely blowing agent for XPS is a blend of HFC-134a and HFC-152a. This highlights a more general point that BA blends are not considered at all in the Methodology. An appropriate and documented approach to blends is critical for the functioning of the Methodology in practice.	*HFC-152a has been added for XPS and integral skin PUF.* *Blends are considered in this methodology. The equations refer to the quantity of baseline and project activity BA used. If a blend was used previously then the quantity of baseline BA will be the quantity of the blend that was high-GWP that was replaced by the near-zero-GWP BA.* *Text has been added to the methodology to note how blends should be handled in the equations.* *"If blends of BA are used in the baseline activity then only the quantity of non-near-zero-GWP BA (BA with a GWP greater than 5) should be considered in calculating the quantity of baseline BA."* *"If blends of BA are used in the project activity then only the quantity of near-zero-GWP BA should be considered in calculating the quantity of project activity BA."*	It is good that blends are now more explicitly addressed in the text. However, the likelihood is that the baseline will be comprised of blends of high-GWP blowing agents. I assume that the weighted average GWP is taken in this instance, but I don't see that explicitly mentioned in the revised Methodology. Perhaps I have missed it.	Quantification of BA blends is now explicitly addressed in Sections 4.1 and 4.2.

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In Section 3.2.2, no specific criteria seem to be set to define a *low market adoption rate for low-GWP BAs'*	*ACR had asked that we not specify a particular value for the "low market adoption rate"*	OK. Did they state a reason?	ACR has been reluctant to make a precedential statement. We have asked ACR to collect information to satisfy itself that this methodology meets the intent of the performance standard approach. The market penetration rate for these Eligible Foam Applications is below 10%, even when HCs are counted.

4. Quantification of GHG Emission Reductions

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Section 4.0 – Suggest that it may be helpful for users of this methodology if authors considered providing tables of project example calculations for the various sectors of eligible foam use. This has been used in other methodologies and suggest that it would be helpful here.	*We have simplified the equations in Section 4.0 to better reflect the calculation being made. We have also included baseline BA quantity equations for remote PU spray applications and BA blends.* *Examples of calculations have been provided in footnotes #3, 7, 13, & 14.*	Footnote 14 mentions blowing agent blends; otherwise, they are not mentioned in the Equations 1, 1A, 1B, and 2. Is the assumption that blends will be addressed by summing the emissions for each foam blowing agent. So, for instance, if there is a blend of HFC-134a and HFC-152a for XPS that is replaced by HFO-1234ze(E) (see additional comment below on including this agent), there would be separate calculations for -134a and -152a that are summed to calculate baseline emissions. For Equation 2, there would be separate calculations for the components of a blend that are then summed, such as if a blend of water and 1233zd(E) replaced HFC-245fa.	Quantification of BA blends is now explicitly addressed in Sections 4.1 and 4.2.

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Section 4.1 Baseline Emissions (p. 11) – Suggest clarifying, if this is the intent of the methodology authors that the full 10-year baseline emissions calculation is done so that credits will be issued for the full crediting period at the first issuance.	*It is the intent of this methodology that all offsets for the project activity should be issued at the same time as this is the precedent set by the CDM methodology we referenced.* *The following language has been added to the methodology: "Offsets will all be issued at the same time (i.e. in advance) for the full 10 years of the project. Projects will be defined by the timeframe of the verification. For example, a foam production line using HFC-134a converts to a near-zero-GWP BA on March 17, 2017. A suggested verification timeframe would be from March 17, 2017 through December 31, 2017. All foam produced on the foam line within that timeframe has the potential to create offsets under this methodology, provided the required monitoring and recordkeeping is maintained. Assume the baseline BA was HFC-245fa with a GWP of 1430, the project activity used a BA a GWP with a BA of 1, each pound of near-zero-GWP BA replaces 2 pounds of the baseline BA, and the amount of near-zero-GWP BA used during that timeframe was 50,000 pounds. The reductions associated with the manufacturing and 10 year use period of that foam line would be 76,180 tonnes of CO_2e or 76,180 offsets issued."*	OK	
Section 4.1 Equation #1 (p. 12) – This equation calculates baseline emissions from manufacturing and use of high-GWP BA, but the definition for several parameters (FYL, AL, and GWP) refer to "low-GWP BA."	*The equations have been changed, simplified, and corrected.*	OK	

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		Section 4 – Table 7 (page 18 and 19) – a. Typo – the footnote after the title should be 9 not 4. Also, footnote 10 should be included in the "First Year Loss" column heading, just as it is in Table 6. b. For XPS using HFC-245fa and HFC-365mfc, we don't believe that the source referenced (2006 IPCC Guidelines) includes emission estimates for that combination. If this is the case, then this deviation from the source should be explained in a footnote. We note that Table 7, nonetheless, uses the more conservative (lower emission rates) of the two XPS lines (one for HFC-134a and one for HFC-152a) listed in Table 6. c. The XPS row is repeated, with the same loss rates and timelines as in the first; suggest additional explanation for repeating this or delete.	The previous Table 7 (now included as Table 8) has been extensively revised. The referenced issues have been addressed. On comment d., the previous Table 4 (now table 5) has been changed to a list of "common" baseline BAs. XPS has been removed from Table 8

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		d. It is not clear why HFC-365mfc is included in Table 7. It is not listed as a potential baseline blowing agent in Table 4, and it isn't a near-zero-GWP blowing agent. But if someone could claim that as a baseline BA, the GWP calculation should also account for any co-blowing agent, typically HFC-227ea and sometimes HFC-245fa (Note: HFC-227ea is mentioned only in the definition of an HFC, where it is listed as a common HFC used in foam blowing.) Suggest that clarification is needed on whether HFC-365mfc (and co-blowing agents) are allowed as a baseline BA or not.	
As Table 4 indicates, a majority of emissions occur at end-of-life for the foam technologies chosen to be included in the scope of the methodology. Projects may become unattractive if the methodology only focuses on manufacturing losses. Again, it may be the case that open-cell foams are more attractive projects under this methodology.	*We have considered all of the peer review comments on EOL and will not be including EOL in this version of the methodology. See Repeated Response #2.* *ARB's ODS protocol was referenced for this methodology.*	OK	
Equation 1 gets cut off somewhat at the bottom of page 11. It would be easier to read if the equation was moved to the following page.	*Formatting changed.*	OK	

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In Equation 2, there is no discussion of R-value and energy efficiency of materials during use. If more energy is consumed because the new material does not insulate as well, or more material is required to generate the same R-value as the high-GWP material, then a factor for one or both of these variables should be considered.	*This equations were based directly on the UNFCCC methodology AMS-III.N (Avoidance of HFC emissions in rigid Poly Urethane Foam (PUF) manufacturing.* *The equations in this methodology require the project developer to note the quantity of baseline BA that would have been used in the absence of the project activity and also the amount of near-zero-GWP BA used in the project activity. This quantification of the foam previously used and now used accounts for any differences in volume required during the conversion to obtain the same quality of product that was originally being produced.*	OK	
In Section 4.0, it would be helpful if explicit reference was made to qualify the inclusion of 'use emissions' – up to year 10.	*The methodology has been revised to include both manufacturing and use phases throughout the document.*	Noted.	
With reference to Table 4, it is worth noting that the process for the revision of the 2006 Guidelines is now underway at IPCC and that data inputs are welcome for the development of the 2016 Guidelines.	*We would expect that IPCC values will be used in future versions of the Methodology. We do not, however, wish to hold up this Methodology to wait for the IPCC revisions. We have been informed that some applications will have the emission factors increased.(e.g. residential appliances)*	Agree with your strategy not to wait. It was simply an FYI.	**Thank you**
The positioning of Equation #1 is unfortunate, since it looks as though the whole equation is divided by '11' (the page number)!!!	*Formatting issues have been fixed.*	Good!	

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In the footnotes to Equation #1, the GWP_{HFC} definition should refer to the 'High GWP BA' not 'Low GWP BA'. This is important, since Table 3 has no 'Low GWP BAs' listed according to the definitions applied in the Methodology	*All equations have been changed and simplified.*	Noted.	
Similarly, the $PGWP_{HFC}$ definition on page 13 cites Table 3 when it should cite Table 7.	*Corrected.*	Good!	
In Section 4.3 line 2 (the Activity-Shifting Leakage paragraph), 'issued' should read 'is used'.	*Corrected.*	Good!	
In the footnotes to Equation #3 it is hard to connect the parameters to the concept of Activity Shifting Leakage, since it is unclear which process is being referred to – the original process or the new activity.	*We have improved the clarity of how the equations are used and relate to each other.*	Agreed. They look considerably better.	

5. Monitoring and Data Collection

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Section 5.0 Monitoring and Data Collection – This section lacks a lot of detail on monitoring, reporting, and verification that would be relevant to this methodology and could be useful guidance to users. Is the reference to "meeting the requirements of the ACR Standard" sufficient guidance?	*Section 5.1 relates to a project monitoring plan (a template for which is provided by ACR) that a registered project is required to use and provide to ACR. Once a project completes this template, significant project level detail will be provided.* *Additional information and guidance around recordkeeping and monitoring requirements has been added throughout the methodology.*	OK	
Section 5.2 Data Collection and Parameters to be Monitored – It would be useful to include additional discussion of the recordkeeping requirements to demonstrate historical and project-related	*Additional information and guidance around recordkeeping and monitoring requirements has been added throughout the methodology.*	OK	

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BA usage. Referring to source data from "operational records and calculated" in the summary tables really doesn't offer much guidance to either the project developer or a verifier to confirm that records appropriately demonstrate historical and project-related BA usage.			
In Section 5.2., one of the other parameters to monitor would be the leakage associated with the equipment in alternative uses (leading to Activity Shifting Leakage).	*Leakage activity has been added to the monitoring section.*	Fine!	

Appendix A: Foam Blowing Agent Industry Background *(Note to reviewers: Deleted after 1st Peer Review)*

1st Peer Review	Author Response	2nd Peer Review	Author Response
In the second paragraph *'liquid plastic resin'* should be replaced by *'a liquid polymer'*	*Appendix A has been deleted.*	That deletion of the 'old' Appendix A certainly helps.	
In Table 5, it should be noted that packaging applications (e.g. coffee cups) are made from XPS Sheet not XPS Board. XPS Sheet has never used high GWP BAs once CFCs were phased out and those uses should not be referenced. Equally, it is probably not helpful to mention a specific brand name (Styrofoam).	*Examples of foam applications are now included in the methodology in Table 2.*	Fine!	
In Table 5, the PU Spray description reads too much like a promotional piece. Trench-breakers are also a relatively small use and probably don't warrant specific mention.	*Table 2 in the methodology now describes the foam applications and examples.*	Fine!	
In Table 5, the description of PU Discontinuous Panel should read: *'The panels have a polyurethane core and steel or other rigid faces. They are produced individually.'*	*Description has been changed to "Also known as "sandwich panels". The panels have a polyurethane core and steel or other rigid faces. They are produced individually."*	Fine, but note the earlier comment about the exclusion of PU continuous panels.	

Appendix B: Basis for Sectors and Technology for Methodology *(Note to reviewers: Section completely revised and included now as Appendix A)*

1st Peer Review	Author Response	2nd Peer Review	Author Response
p. 19 – EPA's proposed SNAP rule is again referenced here. Based on what EPA finalizes in its rulemaking, will the methodology authors also update Appendix B specifically to confirm applicable sectors (i.e., low market shares for low-GWP BA based on a revised baseline) going forward? Will this follow what was done for the methodology in terms of gathering updated foam industry information, updated reports, comparison of updated sector sales information provided to ACR?	*The updated SNAP rule was issued in July 2015. All relevant information in this rule has been appropriately incorporated into the methodology.*	EPA's SNAP program has not listed the following substances in Table 10 as acceptable substitute foam blowing agents: ammonia, dimethyl ether, methyl bromide. These should, therefore, be removed from Table 10.	Table 10 revised and now included as Table B.1
		Appendix B – Table 10 a. For GWPs, clarify the specific values that should be used since some are currently not specified or only provided as a range. b. Solstice GBA (HFO-1234ze(E)) has a GWP in the range 1 to 6 and should also be a candidate for inclusion. (GWP=1 reference in AR 5 and Hodnebrog, Ø., Etminan, M., Fuglestvedt, J. S., Marston, G., Myhre, G., Nielsen, C. J., Shine, K. P., Wallington, T. J.: "Global Warming Potentials and Radiative Efficiencies of Halocarbons and Related Compounds: A Comprehensive Review," Reviews of Geophysics, 51, 300-378, doi:10.1002/rog.20013, 2013.) (GWP=6 reference in "Atmospheric chemistry of trans-CF3CH=CHF: products and mechanisms of hydroxyl radical and chlorine atom initiated oxidation, M. S. Javadi, R. Søndergaard, O.J.	Table 10 revised and now included as Table B.1

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		Nielsen, M. D. Hurley, and T.J. Wellington, Atmospheric Chemistry and Physics Discussions 8, 1069-1088, 2008—cited in SNAP Notice 27). c. Footnote 19 says the BA names are from the EPA's latest SNAP rule, however, EPA's SNAP program does not use the term "HFO-1233zd(E)" for the compound "trans-1-chloro-3,3,3,-trifluoroprop-1-ene," (Solstice LBA) since this compound contains chlorine.	
Although HCs contribute to the formation of tropospheric ozone, the use of HCs in all applications currently using HFCs are expected to have little impact on local air quality. An analysis was conducted in support of EPA SNAP's final rulemaking, *Listing of Substitutes for Refrigeration and Air Conditioning and Revision of the Venting Prohibition for Certain Refrigerant Substitutes*, which concluded that even if all the refrigerant in appliances in end-uses addressed in this rule were to be emitted, there would be a worst-case impact of less than 0.15 ppb for ground-level ozone in the Los Angeles area. As the consumption and emissions of HFCs in foam blowing agents is much smaller than that in refrigeration and air conditioning, HC releases from foam applications should also not have a significant impact on tropospheric ozone levels.	*We have modified the methodology to include hydrocarbons. See Repeated Response #1.*	OK	
This is the first section where HFC-152a is mentioned. Even then, there is no mention of the use of HFC-134a/ HFC-152a blends.	*Blends of BA have now been addressed in the methodology in Section 4.0.*	OK	

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Again, reference is made to the GWP of pentane being '11', but no source is cited.	*GWP of pentane is now included under Saturated Light Hydrocarbons, as referred to in the SNAP rule. The GWP referenced of 3 – 10 is taken from the SNAP rule in the Federal Register.*	OK….but even SNAP does not cite references for this data, which is a sensitive point when the range straddles your cut-off for a 'near-zero-GWP' BA.	Table 10 revised and now included as Table B.1
Table 6 should refer to 'Rigid PU Foam' in the second row.	*Tables have been changed. Comment is no longer applicable.*	Fine!	

Appendix C: Sample Low-GWP Materials *(Note to reviewers: Section completely revised and included now as Appendix B)*

1st Peer Review	Author Response	2nd Peer Review	Author Response
Table 7 (page 21) – Source information (i.e., AR4) should be footnoted for the GWP values for each alternative or indicate if single source was used.	*The source of all GWPs noted in the methodology have been referenced.*		
The list of low-GWP alternatives in Table 7 should be revised. This table contains some ODS compounds (e.g., methyl bromide and methyl chloroform) as well as several compounds that are not likely used as foam BAs. For example, acetone is a flammable solvent and also a VOC. We recommend referring to substitutes listed as acceptable in the relevant end-uses of the foam blowing sector on EPA's SNAP website (http://www.epa.gov/ozone/snap/foams/index.html).	*The list of near-zero-GWP alternatives is now Table 10 and it includes all acceptable foam blowing alternatives that meet the definition of near-zero-GWP in the methodology. The names are as they are listed in the revised SNAP rule as of July 2015.*	OK	
Table 7 does not seem to have any references to the sources of the GWP data cited.	*All sources of GWPs noted in the methodology have been referenced.*	Will Solstice LBA be considered a "near-zero-GWP" BA or not, bearing in mind its range in Table 10?	Per the revised definition of an Eligible BA, yes.
Table 7 also seems to cite trade-names liberally leading to repetitions (e.g. methyl formate and Ecomate.	*The list of near-zero-GWP alternatives is now Table 10 and it includes all acceptable foam blowing alternatives that meet the definition of near-zero-*	OK.	

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	GWP in the methodology. The names are as they are listed in the revised SNAP rule as of July 2015.		
Formacel FEA-1100 HFO-1336mzzm(Z) is not listed. Is this because its GWP is >5? This could be viewed as an anti-competitive exclusion.	*The GWP of Formacel FEA-1100 is 8.9 and does not qualify as a near-zero-GWP BA under this methodology.*	Has DuPont (now Chemours) been consulted on this? If not, the competitive implications of this stance could be substantial – especially in view of the range being quoted for Solstice LBA.	Per the revised definition of an Eligible BA, this is no longer an issue.
Methyl Bromide is a banned ozone depleting substance, so it is not clear why it is included in Table 7.	*It is included as an acceptable substitute under the SNAP program.*	In which applications? I have never known it to be used as a blowing agent anywhere in the world.	Table revised and now included as Table B.1. Methyl bromide removed.

Appendix D: References and Other Information *(Note to reviewers: Removed as Appendix and inserted on page 23-24)*

1st Review	Response	2nd Review	Response
Last reference – Publication year of TEAP "Rigid and Flexible Foams Report" should be included as there are a number of reports.	*The date of 2014 has been added to the reference.*	OK	