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Case: ASRAC Fans and Blowers Working Group Meeting

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U.S. DEPARTMENT OF ENERGY PUBLIC MEETING

ASRAC FANS AND BLOWERS WORKING GROUP MEETING

U.S. Department of Energy

Forrestal Building, Room 6E-066

1000 Independence Avenue, SW

Washington, DC 20585

9:00 a.m.

Thursday, May 7, 2015

Appearances for Department of Energy Meeting

Ashley Armstrong, DOE
Wade Boswell, DOE
Stephen Fine, DOE
Pam Pontillo, DOE
Pete Cochran, DOE
Janet Freimoth, DOE
Brooke DuBois, DOE
Rob Boteler, Nidec Motor Corporation
Paul Lindahl, SPX
Larry Burdick, SPX
Mark Bublitz, The New York Blower Company
Tom Catania, Erb Institute
E. Duane Daddis, United Technologies
Steve Dikeman, Acoustiflo
Daniel E. Delaney, Regal Beloit America, Inc.
Mark W. Fly, Aaon Heating & Cooling Products
Dan Hartlein, Twin City Fan Companies, Ltd.
David A. Johnson, Berner International Corporation
Joanna Mauer, Appliance Standards Awareness Project (ASAP)

Frank T. Morrison, Baltimore Aircoil Company
Laura G. Petrillo-Groh, Air-Conditioning, Heating, & Refrigeration Institute (AHRI)
Aniruddh Roy, Goodman Manufacturing
Geoff Sheard, AGS Consulting, LLC
William Smiley, Smiley Engineering LLC
Meg Waltner, Natural Resources Defense Council (NRDC)
Chris Wiseman, Nidec
Michael L. Wolf, Greenheck
Gary Fernstrom, CA IOU's
Sam Jasinski, Navigant
Donald A. McNeil, Buffalo Air Handling
Stephen R. Wiggins, Newcomb & Boyd
Sanaee Iyama, Lawrence Berkeley National Laboratory

P R O C E E D I N G

MR. BOSWELL: I'm sure you are all aware that we are scheduled to start at 9. One group requested that they have a chance to caucus amongst themselves this morning. They are saying that will take them about maybe 20 minutes, so we probably won't get started formally for 15-20 minutes is my guess. If you want to use that time or if there are other people that want to spend that time kind of conversing, I just wanted to make sure that you knew that we would have a slightly delayed start. Thank you.

MR. BOSWELL: Okay do we have everyone here? It looks like we are assembled.

MS. ARMSTRONG: Did you put the new slides in?

MR. BOSWELL: Okay so we are about commence the second day of the working group for the record. If we could just very quickly go around and state your name and your company so we have that on the record and then we will move into where we left off yesterday.

MR. SHEARD: Geoff Sheard, AGS Consulting.

MS. PETRILLO-GROH: Laura Petrillo-Groh, Air-Conditioning, Heating and Refrigeration Institute.

MR. FERSTROM: Gary Ferstrom for the California Investor Owned Utilities Pacific Gas and Electric, Southern California Edison San Diego Gas and Electric and the Southern California Gas Company.

MR. SMILEY: Bill Smiley, Trane Company, part of Ingersoll Rand.

MR. SMITH: Wade Smith with Air Movement and Control Association.

MR. DIKEMAN: Steve Dikeman with AcoustiFLO.

MR. GOODMAN: Aniruddh Roy, Goodman.

MS. WALTNER: Meg Waltner, National Resources Defense Council.

MR. WIGGINS: Steve Wiggins, Newcomb & Boyd.

MR. WOLF: Mike Wolf, Greenheck.

MS. MAUER: Joanna Mauer, Appliance Standards Awareness Project.

MR. FLY: Mark Fly, AAON Incorporated.

MR. BUBLITZ: Mark Bublitz, the New York Blower Company.

MR. BURDICK: Larry Burdick, SPX.

MR. DADDIS, Duane Daddis, Carrier.

MR. HARTLEIN: Dan Hartlein, Twin City Fan.

MR. MCNEIL: Don McNeil, Buffalo Air Handling.

MR. JASINSKI: Sam Jasinski, Navigant Consulting.

MS. ARMSTRONG: Ashley Armstrong, DOE.

MS. LYAMA: Sanaee Iyama, Lawrence Berkeley National Lab.

MR. FINE: Steve Fine, Office of Hearings and Appeals.

MR. BOSWELL: Wade Boswell, Office of Hearings and Appeals and Facilitator.

MS. PONTILLO: Pam Pontillo, Department of Energy Facilitator.

MR. HAUER: Armin Hauer, ebm-papst, Incorporated.

MR. HOWE: Nick Howe, Carnes Company.

MR. JOHNSON: David Johnson, Berner International Corporation.

MR. WAGNER: Greg Wagner, Morrison Products.

MR. COCHRAN: Pete Cochran, DOE.

MR. BOTELER: Rob Boteler, NIDEC.

MR. WISEMAN: Chris Wiseman, NIDEC.

MR. DELANEY: Dan Delaney, Regal Beloit.

MR. CATANIA: Tom Catania, Consultant to AMCA and University of Michigan.

MS. FREIMUTH: Janet Freimuth, Department of Energy, Office of Hearings and Appeals.

MS. DEBOIS: Brooke Debois, Department of Energy, Office of Hearings and Appeals.

MR. LINDAHL: Paul Lindahl, SPX Marley Cooling Towers.

MR. MORRISON: Frank Morrison, Baltimore Aircoil Company and alternate for the Cooling Tower Institute.

MR. PERSFUL: Trinity Persful, Clarage Fan Company.

MR. BOSWELL: Okay and I understand that we have two working group members who are also ASRAC reps that are on the webinar with open mics so I would just ask first Diane to introduce herself and then Deborah.

MS. JAKOBS: This is Diane Jakobs from Rheem.

MR. BOSWELL: Is Deborah still on the web?

MS. MILLER: Yes I am, Deborah Miller representing NASEO can you hear me?

MR. BOSWELL: Yes okay.

MS. MILLER: Thank you very much.

MR. BOSWELL: Thank you. Okay, so I think where we are is picking up the discussion -- actually to Laura I see your card raised is there something?

MS. PETRILLO GROH: Yeah hi, thank you for your patience while we caucused this morning. We had some very serious discussions about fans and regulated products. There is concern in our industry that regulating fans in regulated products will impose an untenable burden on our manufacturers. And I know there are challenges to making sure that fans

are not entering the marketplace and there are loopholes to prevent where their fans -- would say are going into their products and that they are not and we are willing to work through all of those issues, however when you look at you know, furnace fans which are already regulated as a component going into products whose energy efficiency is regulated and now there is going to be stand by and off mode power.

There has been a lot of discussions on unitary equipment but you know from the discussions we have been having you know, fans and packaged terminal air conditioning units, single package vertical units to water source heat pumps and geothermal units, furnaces unitary equipment all across the board, even residential furnaces could be impacted by this.

I don't think that we would be even able to figure out a test method and a metric that would cover the situations where fans are being built and the housing of those fans are actually integral to the unit itself, but there are some of our

manufacturers here who can speak in more detail about those technical issues and if there is a few more minutes I would like to have them share more of what we discussed in the back room, would that be okay?

MR. BOSWELL: Thoughts on that?

MS. ARMSTRONG: Can we hold up for one second?

MS. PETRILLO GROH: Sure.

MS. ARMSTRONG: Just not to, let's just get this out of the way real quick because somebody did ask me to confirm the schedule just before we do a deep dive into scope because I imagine that is going to last or the better part of the morning if not the rest of the day. I think this is what we have as the finalized schedule so I just want to make sure that you all agree we will send out the formal.

Wade I did get approval to Chicago meetings, so which one did you want so I can put it on here?

MR. SMITH: Let me confirm that. We talked about that.

MS. ARMSTRONG: So the June 22nd meeting

in Chicago.

MR. SMITH: Yes.

MS. PETRILLO GROH: Ashley could you make it a little tighter?

MS. ARMSTRONG: Yeah absolutely. Okay does that work?

(off mic)

MS. ARMSTRONG: Oh you are right thank you. So this is what I have, all the rest of them would be in D.C. in June.

MR. WOLF: So this is Mike Wolf, I have got a few concerns here with this just based on some of the dialogue that I heard from some of the folks I hung out with last evening is that on these Monday meetings, I guess I would request that we start that at noon because my fear is some guys are planning on coming in and I know for myself I don't know that I can get here by 9 on Monday and I know I am going to have issues on some of the Sundays so some of the guys are saying well I'm just going to come in and I'll get to it at noon and if I miss a couple of hours, fine.

But I think missing a couple of hours of these things is pretty dang important and I think it's important that we have everybody here for the entire meeting and not coming in late and then we are going to have to rehash things and start over and it is just going to be counter-productive if we can't have everybody here for the start of the meeting so my proposal is starting at noon on Monday and if anybody has got issues with getting home because I know we are going to lose a couple of our guys today at noon or something like that and I have the same concern on the back end.

If you feel you are not going to be here for the entire meeting on the back end speak now because I just don't think it's fair to this Committee or fair to this process for people to be cutting out early and I am certainly respectful of everybody's personal time but you know we have to make sure we set a schedule here that people can get to.

Now let's move on and go back and revisit the proxy issue. That was a joke, for the record.

MS. ARMSTRONG: I have no problem with that other than you are cutting out half a day's worth of negotiations so maybe that's okay -- it's really up to the Committee if we think we can do it. Really you are just doing two half day meetings. I'm not sure that will give you enough time ultimately.

MS. PETRILLO GROH: It looks like there are three Mondays that we are talking about?

MS. ARMSTRONG: Yeah I put them on the noon thing.

MS. PETRILLO GROH: Okay can we maybe do like 10:30 or 11:00 to --

MS. ARMSTRONG: 6.

MS. PETRILLO GROH: To 6.

MR. WOLF: I don't think I can get here from central Wisconsin, I'm sorry we are near Siberia.

MS. ARMSTRONG: But at least 11 would be, you would miss maybe the beginning recap and if today proves anything 48 minutes -- 45 minutes of that was caucusing with different groups anyway so.

MR. WOLF: Well true but I want to be here

for that caucus. And I mean I have -- if we are here I have no problem going later I mean, I don't know if I -- but I think going to 6 or something maybe is reasonable. Honestly by that time I'm starting to wear thin, I don't know maybe the rest of you guys have more stamina than me but if you would go from say noon until 6 or 7 does that get us kind of back to something reasonable Ashley?

MS. ARMSTRONG: Yeah let's try 6 I'm not sure security wise I can get you guys out of here if we stay until 9. Maybe that's not necessarily a bad thing to get to consensus so.

MR. HARTLEIN: Ashley from what we are seeing that will save about $400.00 per head per night if we can just bring a pillow.

MS. ARMSTRONG: You know it may get to that. We are going to become good friends. I can bring my kids in for entertainment. So how does this look? It's okay? It's okay.

MR. FLY: This is Mark Fly. Did we eliminate the 7th and 8th I guess I missed that yesterday?

MS. ARMSTRONG: I think we moved them up a week.

MR. FLY: Okay so there's a month there for our June and July.

MS. ARMSTRONG: Correct.

MR. BOSWELL: I am also assuming that if we are starting at noon that if people come prepared we won't be breaking for lunch and working straight through from noon until 6 for some normal breaks as we go through.

MS. ARMSTRONG: Yeah so just bring your lunch if you have just arrived at the airport.

MR. BOSWELL: And also --

MS. ARMSTRONG: Reagan has some pretty good eating options these days.

MR. BOSWELL: And if you have time to stop at the DOE cafeteria you can bring things from there as well.

MS. PETRILLO GROH: Do we need the same noon time for the meeting in Chicago?

MS. ARMSTRONG: Oh, it's nice for the west coasters who have to come out the day before for all

of the other meetings either way.

MS. WALTNER: That's nice.

MS. ARMSTRONG: Okay so I actually have to announce these in the register so we are going once, going twice it is not going to change.

MR. SMILEY: There is still a discussion on the Chicago meeting do we start first day at noon or earlier?

MS. ARMSTRONG: The west coast asked for noon.

MR. SMITH: In this case you have people traveling from the east coast.

MR. SMILEY: Yeah can they get there by noon on the same day?

MR. HAUER: Armin Hauer speaking. What is the purpose in Chicago, what do we do there, a lab tour and things, can this be?

MS. ARMSTRONG: I think we are doing the same thing that we are doing here. It's going to be actual negotiation sessions. To the extent you know people are interested in a lab tour and AMCA is nice enough to offer or host that I think we would do it

on a separate day before, day after kind of thing. People would stay if they were interested in that but these are going to be negotiated.

I mean we are going to have you know a court reporter, we are going to have legal, we are going to do our negotiation sessions just you know, in Chicago.

MR. HAUVER: Right if you need a tour we have to do it before or after.

MS. ARMSTRONG: Correct, that would be my suggestion.

MR. SMITH: So our meeting room is unfortunately going to be in construction during June so if it's okay if we could move that to the July, I think that would be better for AMCA.

MR. WOLF: Mike Wolf, Greenheck, I'm sorry is that AMCA room going to be big enough to accommodate this group? The training room?

MR. SMITH: Yeah the training room there will be no problem.

MS. ARMSTRONG: Okay.

MR. SMILEY: So what are the start times

then, did they change with Chicago or -- oh that was based on that's a Monday, okay.

MS. ARMSTRONG: That's a Monday.

MR. SMILEY: Nevermind.

MR. WIGGINS: Steve Wiggins, doing noon on Monday in D.C. does that help the west coast don't you still have to come in the day before?

MS. ARMSTRONG: Well it's not the west coast in D.C. it's the mid --

MR. WIGGINS: No, I already -- actually for the first meeting the 19th meeting, I'm leaving to come in on Sunday so -- you have to come in on Sunday. I can't get from Atlanta here by 9 so --

MS. ARMSTRONG: I mean the 22nd is a Monday. So is this something we can all live with? Because I think we could tweak it forever and not everyone would be happy but can we all -- are we all happy enough to start off with scope?

MR. FERSTROM: Ashley this is Gary. I know I can't make it the 3rd and 4th of August and I was wondering if we might not move that to like

Wednesday/Thursday of that week but others may have had conflict so I'm just one person before we lock this in I would like to ask what the issues others might have with moving that back a little bit. I would hate to have to miss the last meeting but I know I have a conflict that I can't change.

MS. PETRILLO GROH: You are proposing the 5th and 6th?

MR. FERSTROM: Pardon?

MS. PETRILLO GROH: You are proposing the 5th and 6th?

MR. FERSTROM: Yeah I would request the 5th and the 6th, okay -- can't make it. What about the 6th and 7th? No?

MS. ARMSTRONG: You are past your deadline.

MR. BOSWELL: I was going to say the deadline this is August 6th as I recall.

MS. ARMSTRONG: Correct.

MR. FERSTROM: Thank you.

MS. ARMSTRONG: How about the 4th and 5th, can we split the difference? One day for each of

you?

MS. PETRILLO GROH: I would like to be here.

MS. ARMSTRONG: So would he.

MR. FERSTROM: I'll send a proxy, not a proxy. Sorry, sorry an alternate.

MS. ARMSTRONG: I mean the only advantage of not doing it the 3rd and the 4th is the 3rd is a Monday so if we shifted it to a Tuesday/Wednesday meeting we maybe could have the 9 to 5 which is our last meeting before that term sheet and we may very well need that time.

MS. PETRILLO GROH: But we can still use the 5th and 6th?

MS. ARMSTRONG: We could or we could just do full days, 4th and 5th.

Are people -- because I think I heard more people are not willing -- would prefer not to travel on Sundays and that is kind of family time I get it.

MS. PETRILLO GROH: For the last meeting.

MS. ARMSTRONG: 4th and 5th? Yes, 9 to 5 okay, 9 to 6, 9 to 5, 9 to whatever. Do you want 8?

We will just do 9, 9 until whatever.

MR. BOSWELL: The 4th and the 5th?

MS. ARMSTRONG: Yeah I don't know what I just did but apparently --

MR. BOSWELL: Both are 9 to 5?

MS. ARMSTRONG: Correct. Okay so we moved one.

MR. BOSWELL: Still two meetings.

MS. ARMSTRONG: All right that's it. We will send out the schedule tomorrow so that everyone has it. So I think it's probably good to pick up where Laura kind of started us this morning and really try to talk a little bit about scope. One of the things that the team here was kind enough to do last night overnight was to try to put in some of the discussion into -- and I think this is what we are talking about, into some slides to help facilitate.

This isn't necessarily representative of DOE's opinion but this is representative of something -- some of the discussion that we had yesterday so I think we can talk about you know, what should the scope be, should it be the same thing that AMCA

suggested yesterday? Should there be any exceptions to that scope? Maybe exceptions isn't the right word because they are still covered by I guess that's where I think we would like to start the discussion. I'm not sure exactly who would like to start it off but --

So this is Ashley from DOE. I think they are intertwined right? I mean the ask is about embedded products and so I think the discussion with respect to where we are at, so is the ask from the AHRI embedded product manufacturers that are represented here for you to be completely not included in the standards for fans, is that your ask? Can you say for the record?

MS. PETRILLO GROH: Yes, that's what we are asking.

MS. ARMSTRONG: Okay so then I think I would like to hear at this point your proposal as to how you think that could actually be administered.

MR. BOSWELL: And I will just remind people when they speak, state your name and company for the record.

MR. ROY: My name is Ahiruddh Roy, Goodman. So Ashley I proposed an idea yesterday as far as regulated products are concerned, we are already submitting certification reports to DOE and perhaps the fan manufacturers you know for them you can add a column in the reports that states or specifies that manufacturers applying that particular basis model to an existing regulated product OEM, something along those lines. And that would possibly address this issue.

MR. FERSTROM: Ashley this is Gary. I don't know at this point whether I support AHRI's proposal or not but I think at a minimum there is an enormous amount of energy saving potential associated with this exemption and I think this group needs to evaluate it in order to come to a prudent consensus on how to treat this proposal.

So as we proceed I think it's important for DOE and its consultant and lab analyst to look at that market and evaluate how much energy is associated with it.

MR. BOSWELL: Okay so --

MR. SMILEY: Bill Smiley, Trane. I don't necessarily know if there is a large amount of energy associated that could be saved with covered products. I have not seen any data or analysis. I do know from my experience that I do not believe there is a significant amount of energy to be saved in regulated products because they are already regulated to product efficiency overall.

I believe that our design practices are always to try to use the most efficient combination of components. And the way they are applied I know from experience that you can take an extremely highly efficient fan and incorporate it into an OEM type product and have a lower overall unit performance because you are not utilizing the other components as effectively.

For example if you take a house centrifugal fan and you put it in a rooftop you know it may not provide air flow distribution across the coil. It may not end up utilizing the coil effectively if you have that type of fan where you could use a lower efficient fan that adapts and

interacts with those components much better. So I struggle with how do we determine what the fan efficiency is on an applied product or a covered regulated product or an embedded fan.

Do you define the fan requirement as a stand-alone where it doesn't operate that way and it can't operate as it does in a unit without components of the unit? Do you test the unit? If you test the unit there's a million combinations to that unit so you burden the manufacturer with testing and regulating every one of those units. I just -- I'm not ready to go to the point where let's say regulated products, embedded fans should be covered by this.

I think they should be exempted at this point in time. Thank you.

MR. BOSWELL: I think Mark you are next.

MR. FLY: Okay you said most of what I was going to say but you know a lot of times these fans inside of packaged regulated products are applied in such a way that you cannot pull that fan out and actually put it in a 210 and test that fan alone,

nothing holds the fan up. I mean it's an integral -- the housing and everything is an integral part and an integral part of the next component become component upstream and downstream in the airflow -- the system effects that the cabinet impose on the fan itself makes it operate completely differently than it would with that stand alone fan test component.

So those are part of the complexities of doing this and like you said there are a lot of times when you are -- the applicability of the fan design is very much related to the upstream and downstream components and what you are trying to accomplish there and so you could greatly affect the thermal efficiency of the unit by changing the characteristics of the fan.

And most of us that build packaged equipment you know we don't care too much about velocity pressure because we kind of live in a 500 foot a minute world, because that is what makes heaters and coils run properly and there is very little velocity pressure at that point.

Condenser fans are kind of the same way

for your blowing, discharging up into the air so you don't have the chance to static regain off that velocity pressure and make that fan efficient. You are basically doing an open free discharge so you are not maximizing that.

If I go messing around with what kind of condenser fan I have I will change the coil design or the coil performance significantly and so my SEER or EER or whatever metric we are using today on that particular product will change drastically.

So the net goal is to save energy at the point of use. It's better regulated with a bigger envelope around what we are trying to save energy on.

MR. BOSWELL: Mike did you have a comment? I think Gary you are next.

MR. FERSTROM: So this is Gary for the California Investor Owned Utilities and I think the advocates in general. We are not here to talk about guessing, we want to find a way to measure these things and evaluate them and come to a good, objective, creditable consensus. My recollection goes back to the pumps working group where the

Hydraulics Institute noted that circulator pumps were small and insignificant and ought to be exempted from the rulemaking and not considered by the working group.

It turned out that they were considered and they were found to have associated with twice the energy savings of all the rest of the pumps put together so I don't think we ought to summarily dismiss the opportunity to evaluate how regulations might work for fans in unitary equipment.

I think it's important this group evaluate that. Then based on the evidence we can decide how we want to move forward.

MR. BOSWELL: Laura?

MS. PETRILLO GROH: I think some of what we are struggling with, it's Laura Petrillo Groh, AHRI -- I think some of what we are struggling with is even how to capture that energy savings or not the energy savings potential, but the fan energy in such a wide variety of unit types in a variety of applications so would there be suggestions on how that could even be evaluated?

MR. HAUER: I cannot understand why the assembly of components -- of efficient components results in a less efficient product. Of course you would also have to redesign the unit in order to take advantage of the efficiency gains for more efficient components. This is just an ecodesign approach so I think the industry should indeed not just replace the fans with a more efficient fan but also redesign the units clearly.

MS. PETRILLO GROH: That's a good point Armin. This is Laura Petrillo Groh, AHRI and then Greg has a question. Has any of this to any extent been captured in DOE's analysis to date and would it be possible to capture the redesign of the units to take advantage of the redesigned fans even in this unit and again we just need to figure out how we would be able to capture the energy savings for the fans to evaluate it.

MR. BOSWELL: Ashley do you want to respond to the question?

MS. ARMSTRONG: Sure. I think the NODA that you have seen today doesn't account for the

potential redesigns and the cost or the benefits that they would provide from better products. Certainly we are happy to work on that analysis. In order to do so, the embedded product manufacturers would need to come to the table with data and help us.

You know from what Gary is asking for, I think it would be very helpful if AHRI and its members and other embedded product manufacturers that may not be members of the AHRI, would provide connected load of OEM products as a percent of fans connected load. That really gets to what you are looking for, that helps inform the decision about whether this does matter or not.

And to the extent you want to make a case that they should or should not, that's really the data that helps inform that case. So I think realistically to back your proposal, for what you are asking of this group, you need to provide data that supports it.

MR. BOSWELL: Okay I think Greg was next in line.

MR. WAGNER: Greg Wagner, Morrison. I

think the discussion got lost on the fact that the power and energy consumption of those fans is already included in the overall regulation of those products so we are not talking about eliminating the measure of energy consumed by a fan. It is included in the measure of how that unit performs and what the folks here talked about is, it is an equation beyond just the fan itself.

It's talking about how the heat transfer and the effectivity of the rest of the system is relative to that fan and those things go hand-in-hand in terms of how you get to the most effective product. And there aren't many cases where the overall system design uses a less efficient than the maximum efficient fan but achieves lower energy consumption as a unit as a whole and it is those kinds of products that the concern is from the manufacturers of those equipment.

MR. BOSWELL: So I'm seeing three tent cards on this side if we can start there and just work down.

MR. ROY: Aniruddh Roy, Goodman. I would

like to address two points. Gary made a point about -- Gary Ferstrom made a point about energy savings potential in unitary equipment. You know we should assess what the certification burden would be for let's say a manufacturer that just bought an impeller and then you know modified the design based on the cabinet needs and you know as far as the certification burden is concerned you know you have reporting requirements, additional reporting requirements than what you currently have in place for EER with the annual filing requirements and so that should account for -- I think DOE already addresses the energy savings in another rulemaking.

And so any discussion of energy savings potentially should be part of that working group or other rulemakings so that is one point and then as far as the equipment redesign is concerned, you know the point that Armin made. Again that's you know, not in the scope of this discussion, you know the equipment redesign is at a covered product level and those are already being addressed at various different rulemakings and DOE showing the quad

savings through those final rules so you know I don't see why you know we are not already capturing that energy savings potential through those regulated metrics.

MR. BOSWELL: Wade?

MR. SMITH: Okay so Laura asked --

MR. BOSWELL: Name and organization.

MR. SMITH: I'm sorry, Wade Smith. Laura asked how would you calculate this you know, it's not rocket science to determine the most typical fan power draw in any particular unit size and multiplying that number times the number of units that are shipped in a year it's not a difficult exercise to determine how large the connected load of fans is in these markets.

So what Gary is asking is he would like to see what that number is and I don't think that's an unreasonable request. It's pretty simple.

MR. FERSTROM: So --

MR. SMILEY: Were you called on?

MR. BOSWELL: Actually yeah you were up and down.

MR. FERSTROM: This is Gary. With respect to the dual regulation yes the unitary equipment is tested, reported and regulated with respect to its heating and cooling performance but correct me if I am wrong, I think this unitary equipment for the majority of hours in a year actually serves a ventilation purpose in commercial buildings and I don't think that ventilation function is really captured by the heating and cooling performance test so that's why I think it's important to evaluate this opportunity.

MR. BOSWELL: Okay, Geoff?

MR. SHEARD: Geoff Sheard, AGS Consulting. Approximately 4, maybe 4 years ago, I had exactly this same discussion with the European Commission Policy Officer responsible for regulation 327 where the point was being made regulating fans and regulated units was unreasonable.

And his pushback was you are not going to get away with it that easily, we are going to regulate them, but we are going to regulate you too. Get over it. And that was the end of the discussion.

So I am not advocating that was a reasonable position but I am advocating that I have got over it.

MR. BOSWELL: Laura I think you were next.

MS. PETRILLO GROH: To Wade's point I think that looking at the fan power as you have suggested looking at it is not -- it is more difficult than you have suggested. Looking at the fan draw for the unit I mean we have got so many different configurations of units with so many different pressure drops and other pertinences within these units that you would never even be looking at the same metric as you would for a free-standing fan, you are not looking at apples to apples in these comparisons.

And I don't know what venue it would evaluate. Mark knows a lot more about the testing of this.

MR. BOSWELL: Ashley?

MS. ARMSTRONG: So I think we are getting a little off track here. Your ask of this group and DOE to a certain extent is to make -- to potentially consider not setting standards for certain types of

fans, certain categories of fans that may be embedded in products. I don't think it is unreasonable to ask for data to support that. Why should we do that? Not just ascertains, but I also -- I think more fundamentally I don't think a self-declaration manufacturer's scheme is an enforceable way to do that either. So that's a non-starter for DOE.

So I want to hear what differentiates these products. How would you tell embedded from not and a manufacturer's self-declaration is just not going to work.

MS. PETRILLO GROH: Ashley this is Laura Petrillo Groh from AHRI. DOE's own analysis doesn't include any of these products right now so it is not just us who is not asking to be regulated, it wasn't even DOE's consideration -- it hasn't been until now.

MS. ARMSTRONG: I don't think that's accurate. We put out analysis for which data was provided to us to help inform interested parties you know, to work with them. We are happy to do that analysis and you haven't seen a proposal, you don't know what analysis will come out that will support a

DOE proposal. We could revise analysis, we haven't taken a policy position on what fans may or may not be in yet. The proposed rule has not come out yet.

MS. PETRILLO GROH: And that's what we are here to discuss but in the framework document it said regulated products were excluded, all of DOE's analysis, all of the fan data basis have excluded this until now so you know to discuss you know how we would collect that connected load is one aspect but you know no manufacturer impact analysis has been addressed on DOE's side and that would need to happen as well.

MS. ARMSTRONG: And I think this started with my opening by saying we would be happy to conduct additional analysis to the extent it was needed if manufacturers would be willing to also share some data about -- like the AMCA members have to help support that analysis, we are happy to go through that and help Gary with his decisions, but I think fundamentally what you are asking for needs to be supported by data.

And so that is what we are asking you to

do for this Committee. I mean this may be an issue where we are just never going to get past it, I don't know. I definitely hope that is not the case but I certainly think we should figure that out today. I mean if the answer is always going to be, you know you shouldn't do it for x, y and z reasons but we are not willing to go collect data or do additional analysis or help DOE to do an analysis to help inform the Committee's decision then I think that should be stated.

MS. PETRILLO GROH: And at no point did we say that we would not collect data. We are having trouble figuring out what data to collect and how to collect it.

MR. WOLF: This is Mike Wolf, Greenheck could I jump in? Let me maybe suggest we reframe the question in the perspective here to something a little more fundamental and that is kind of to Gary's point there's a perceived significant amount of time where this piece of equipment isn't a piece of equipment, it's just a fan.

So the question is where does a fan begin

and where does the fan end. Okay? Because one of the concerns here is an unintended consequence of taking a fan, putting it in a box and I don't remember if it was Bill or Mark that made the comment or maybe Greg, I can't remember you know, I don't know but you could take a fan that by itself can stand alone, test it in accordance with say AMCA 210 the industry methods of test and it could perform very, very well. Now you take it and you put it in a box where you have dampers and coils and filters and so on and so forth and you take a fan that's less efficient as a stand-alone component and put it in there and the less efficient fan actually ends up working better because of all of the twists and turns and stuff that goes on in the box relative to system effect.

So there is also that concern that we have an unintended consequence of taking a stand-alone fan and actually end up using more energy when it is applied in whatever this equipment happens to be so that's one thought. The second thought I have is if there is a and I'm not familiar with the regulation

you are talking about with regard to unitary equipment so on and so forth, but I think there's a theory here okay if I regulate the components, I regulate the motor and I regulate the drives and the fan in this stuff, that some of these more efficient components makes the overall product more efficient and one of the discussions that took place in our breakout meeting was that you know what that might be the case for motors, it might be the case for some of the other components but that premise doesn't hold for fans.

Just because you have a more efficient stand-alone fan it is not more efficient when you put it in the box. And I'm not here to say whether it is or isn't, what I am here to say is if that product is being regulated already, why don't you tightened the screws on that regulation because it appears you have got some loopholes in that regulation that is not evaluating that product to the full extent of its use you know and Gary's term if it is not used for heating and cooling and that's all you are regulating it for well then you have a loophole in that

regulation.

Why you know, complicate this regulation with something that is not covered properly in a different regulation?

MR. BOSWELL: Okay and I think Mark you have been waiting.

MR. FLY: So Ashley you've asked for data and I'm sitting here trying to figure out what kind of data we could get you. I mean do you want data of volume unit shift and the fan energy rated at a test standard rating condition? Do you want it how it is actually applied which sometimes we don't even know?

You know part of the problem with equipment that we do you know we are not running at maximum fan speed typically -- hardly ever, and we are not -- and we apply you know that unit can be applied at half inch of static pressure or six inches of static pressure because it is going to a hospital surgery suite with HEPA filters and everything else status stream so you know I think that the industry would like to provide data but we are struggling with what kind of data you are really looking for. Are we

looking for reality or are we looking for some ideal test standard condition?

Because a lot of time in the regulatory and code world people want a pass/fail, one single number thing and this is not a one single number problem.

MR. BOSWELL: Duane?

MR. DADDIS: This is Duane Daddis from Carrier. The question came up before how can we differentiate these fans and one alternative I will throw out is labeling. The fan supplier could supply a label stating something like for use in only equipment only or regulated equipment only. And the second point that I wanted to make is I had the same question that Mark had, Wade you had mentioned that there was some way to calculate this but I am not sure if we have really defined what we are going to calculate -- is it a theoretical fan savings or is it -- in reality it would be very difficult to determine what the energy savings or the energy consumption of one fan in my equipment and then if I put in a different type of fan that would require a test or

some more sophisticated analysis that you know just a maximum efficiency type analysis.

MR. BOSWELL: And we actually have one member of the public on the web that has a comment that we are going to open the mic for and that person has been in queue for a while so if we could open the mic for that comment. Could you identify yourself.

MR. GABR: Yes this is Sham Morten Gabr from Multi-Wing in Denmark and we are also a representative in U.S. in Cleveland and I have a question whether it could be an option to consider for unregulated equipment manufacturers to use the data from repair manufacturers. The situation is that a lot of OEM manufacturers are building impellers and copying the motors and they are doing it by ordering multiple kit samples, by that they can see what is best for the final functionality so even though the system efficiency problem they know by trying different prototypes what would be the best.

So in short my question is: could it be an option for unregulated OEM equipment to consider using data from impeller suppliers?

MR. BOSWELL: Okay thank you. We are going to go back to comments in the room, if someone would actually like to address we can get to that comment or question kind of in queue as people are waiting so, yes?

MR. ROY: Aniruddh Roy, Goodman. I would like to just go back to the framework document and I know Laura has mentioned this a few times. The framework document from 2013 has a section 1.1 which says EPCA coverage of commercial and industrial fans and concluding or the concluding summary in that section says DOE is not considering standards for fans that are a component in regulated commercial products in this rulemaking.

I would like to know in these last few years what has changed that interpretation from an EPCA standpoint and whether DOE got some date in those two years to suggest that this stance should change currently.

MS. ARMSTRONG: So this is Ashley from DOE and I think we are mixing apples and oranges as we clearly stated at the outset of this. You know the

fan -- there's no fan definition right now in EPCA. DOE has the authority to cover fans. Now DOE is going to set up a definition so you are mixing EPCA with what DOE tentatively stated at the outset of the framework document and as we do in our rules we get comments and we have investigated further and we have learned stuff over the last couple of years because it is our due diligence to do the analysis, to look at the market, to better understand the products and how they might be regulated and I think what we have found over that time frame is that it is really hard to differentiate that from the point of the fan manufacturer -- it's really nearly impossible to differentiate with a fine line what would be a fan that's embedded and what would be a fan that's not.

That raises the issue of a potential major loophole. Now like I said it's not a foregone conclusion for the Department, we haven't made a policy decision as to what we want to do with fans, but what I am trying to tell you is we are here to discuss it. We are not here to relive the framework document. You can keep talking about it but -- we

have moved on.

MR. ROY: Yeah Ashley --

MS. ARMSTRONG: Hold on, but I think moreover to that we are here to come together on a consensus and you are asking for the Committee to consider something and what you are hearing from the concerns of the Department is differentiation, enforceability, loopholes. From the point of the fan manufacturer, how do we tell the difference and we are open to considering all aspects of the scope of this rule however self-declaration is not on the table.

MR. ROY: Anniruddh Roy, Goodman. I think Greg Wagner yesterday had made a point about the fact that there is a way for fan manufacturers to capture that information. I think correct me if I am wrong, but the Morrison Products has an idea of where their products are going, to which OEM's.

MR. BOSWELL: Okay I think Wade was next.

MR. SMITH: Yeah I think the question that you asked Mark is a good one. I guess when we went into the discussions we imagined in our own mind what

kind of data would be needed and appropriate you know so that people can make informed decisions and went about gathering that data. Of course DOE in their framework and subsequent documents they have asked a series of questions and some of what we -- the data that we gathered was in direct response to those questions but some of it was to inform our own deliberations about what we wanted as manufacturers of fans.

And so I'll take as an example a fan category from the data that we gathered has very, very low numbers of horsepower connected to the grid and we are interested in developing, advocating and supporting the regulation that maximizes the energy savings while minimizing the negative impacts on our manufacturer members.

And so putting a lot of investment into redesign of a product that has very little connected load is a lot of bang but very little buck so to speak. Whereas some products have a lot of connected load and very, very efficient alternatives are actually available on the market and in consequence

the investment required by our manufacturing members to offer more efficient products is very low, yet the benefit in terms of savings through regulation is very high.

So those kinds of trade-offs are the fodder of debate and consideration in the process. If the -- like you I think and like most of the AHRI members our efforts ignored fans embedded in regulated equipment because the framework indicated to us that that wouldn't be in play. The fact that it is now in play suggests that that kind of effort is needed and you know, I think your question is a good one and you know it would be nice I think if DOE and/or this group right would say well okay so these are the things that we need in order to give this full consideration.

And Laura's comment earlier is well taken and that is that -- and yours and that is the application conditions defined have a tremendous influence on the amount of energy that a fan consumes. That said if you are trying to estimate the connected load of the market you may have those

application conditions and in our case AMCA members provided that level of detail on an awful lot of the data that they supplied.

But there is also a lot of data that we gathered in which the application conditions were not known and so we didn't know however the horsepower of the fan motor and so one way or another if you are making the best efforts to calculate what the connected load is for a given unit size, you come up with an answer and that answer is not precise and it is not accurate but it is not significantly wrong either.

And so this is the process by which one informs the debate and I think what Ashley is saying is that the folks around the table would welcome that discussion but there hasn't been an effort in part because the framework led us down a different path but there hasn't been an effort to engage, to provide that kind of information and then to inform that kind of debate.

And I think that's where we ought to go with this personally.

MR. FLY: Can I respond?

MR. BOSWELL: Ashley? I would like to keep things in somewhat of a sequence, Steve has been waiting.

MR. DIKEMAN: Steve Dikeman with AccustiFLO. My products don't end up in regulated products and so that's a little bit of a foreign subject for me so I guess you know Gary started to mention something that if I understand it, the unitary gear that we are speaking of here has some regulation on its annual cooling efficiency, your heating efficiency, something like that, is that a good overview of that, but the fan only part of that is not currently regulated, is that correct in general?

MR. FLY: Well it's embedded in --

MR. DIKEMAN: When I do the heat rating I have the fan energy. When I do the cooling rating I have the fan energy but Gary's point was there's gobs of hours where it may be a fan totally, so it shifts fan consumption. Now do I also understand or can I make this analogy that if I -- residential furnaces

were regulated and they would probably have been regulated as a heating efficiency with fan on but now the Department is also regulating the fan within the furnace itself and how is -- or is there a similarity or differences in what was done there?

MS. ARMSTRONG: Can I respond to that? How is the furnace rated -- it is two completely different tests. The AFUE didn't account for the blower energy and so the statute was changed by Congress which directed DOE to specifically set standards and test procedures for just the blower of the furnace and that's what we did.

So now there are two tests for the same product and they are regulated separately.

MR. DIKEMAN: And how were you able to capture the fan energy because it is working in that unique environment wouldn't that be analogous to what we are talking here?

MS. ARMSTRONG: Correct, we wrote a test procedure and it is working and it is being implemented now and yep we were able to do it.

MS. PETRILLO GROH: The key part being you

wrote the test procedure. Right now our products don't test for fan efficiency, we test for energy efficiency and there is no test procedure to collect this information for the wide swath of products that we have been talking about. Sorry this is Laura Petrillo, AHRI.

MR. BOSWELL: There has been somebody standing --

MR. DELANEY: Yeah, Dan Delaney, Regal Beloit. Speaking on behalf of NEMA and obviously we are talking about this wired air concept. It's important and we mentioned -- Mark mentioned here before looking at the efficiency of the components versus a system there is no perfect world when it comes to any point when you look at that total fan definition we had before the motor is tested at a perfect condition so our regulation is that perfect condition obviously doesn't consider all the additional ratings, it's at a 1-0 point. Obviously many of the applications don't run the hours that it was evaluated at, many of them don't run at the loads that it was run at.

So many of these things that you are talking about the motor perspective as well as let's say a motor control, they only consider what can be tested as part of the test definition and I would challenge the fan group to look at that same definition. While it may not be every single application, it does have to be defined within its' let's say "fan type" that you guys already have some definition on.

But one thing I did want to provide some clarity on that fan definition we had talked about this with some AMCA members earlier, the motor group has been working with the control group for many years on this system side and what we call the control and the motor together with upstream and downstream components is a power drive system and what we have come up with, unfortunately was really a little bit too late for the pump side but DOE is using basically the same method that both the Europeans and the U.S. -- it's really a global standard, it's an IEC standard and the 61800 series but the development of that standard really gives you

let's say an efficiency method to provide part load loss data for controls and motors, okay.

So whether a motor manufacturer, a drive manufacturer or a motor driven system and manufacturer could grab, define losses for those components already defined as well as an interpolation, extrapolation method you can get to any one of those points. To everyone's point here you have those let's say perfect conditions of losses defined for motors and controls, each person can still -- let's say get the test method, extrapolate to that loss so you can determine where that appropriate point is and utilize that.

So I would certainly like to volunteer NEMA to work with both of the groups here to let's say utilize that same method or that hard drive system which I think obviously is a system that is not just going to be here in the United States but also globally, thank you.

MR. BOSWELL: Greg?

MR. WAGNER: I'm not sure where we are in all of this but going back to a couple of comments

before we were talking about how do you differentiate products and how do you regulate them and enforce action. The DOE can only really enforce when a product is place in the marketplace and it is found to be not compliant with the standard and so as such it needs to find it from that distribution or other channel and that's the way it is done for all of those things.

There has been some concern about how do you keep imports from having faulty parts and all of that -- well there has been a number of circumstances over the years where there have been air conditioning systems and others that didn't have the appropriate regulatory components or refrigerant or what have you.

They get stopped because they don't comply and that's the way those things are enforced. As far as how do you tell on a production line where a product goes in our case it is very simple, every part has a part number and that's listed on the product and that goes to a customer and those customers have either approved regulated products or

they don't have approved regulated products but we know where those things go and it's not very difficult to track that.

We invoice customers and we have tracking through our system of every single detail, where every part goes -- in fact it is down to the second on that sort of thing so it is easy to track and record that stuff.

The other comments about the run hours and calculating the energy consumption -- DOE has great resources and put together the RECS data for residential. They have considered a model that represents the United States and it takes into account the energy consumption on a residential basis.

I don't know if there exists such a thing for the commercial side. If there does, that is probably the only way that you are going to be able to put together some kind of methodology to calculate what the energy consumption of any given group of fans or set of fans, you know. For example we are hearing in Washington area, depending on what time of

year it is, the demand load on any appliance for heating and air conditioning is going to depend upon the heat calculation and the cooling calculation so usually it is somewhere on the order of half or less what the total energy required during the peak season is, so this time of year you are going to have a light air conditioning load, in the summer you are going to have a peak air conditioning load and it is going to depend upon that load profile to be able to calculate what the total energy consumption is.

And outside of the DOE I don't know who would have that kind of a data base to represent the United States.

MR. BOSWELL: Okay Mark?

MR. FLY: I think another factor that goes in here because this is all going to be intertwined how are we going to regulate fans? Are we going to regulate fans as a peak efficiency so this fan is compliant and therefore it is a compliant fan and available to use or are we going to regulate fans over an operating envelope that this fan is may be compliant here but if I change to this point of

operation it is not compliant any more.

So that is going to factor in to any kind of analysis that we need to do so you know we may have -- it might be prudent to work through some of that to at least know a general direction of which way we are going before we try to put data together that's going to be meaningful.

Because I mean when you start looking at part load, sometimes if you selected a fan at peak efficiency many times you can't run that fan at part load without it tearing itself apart.

MR. BOSWELL: Okay.

MS. ARMSTRONG: Do you want to address that or do you want me?

MR. SMITH: Yeah so this is Wade Smith, so these are all really good questions and it is hard to answer the questions if you don't have a data base which represents the actual market to test those questions against so we -- as fan manufacturers we tested different regulatory schemes against the data base representing the actual market and discovered some things work, some things don't, some things are

practical and pragmatically can be done and there are other things that you would like to do that can't be done.

Some things are not deterministically linked to energy savings for example. You just brought one up. If you have -- if you are focused on peak efficiency of the fan it may not teach you very much about what the operating efficiency of the fan will be or said another way if you change the peak efficiency of the fan, it may or may not cause the efficiency at the operating point to change.

It might cause it to get worse and so if you create the data that's necessary to test some of these ideas then you learn a lot. You can't say what are we going to do and then I'll give you the data, no you have to have the data to decide what you want to do and you know without the data all opinions are just speculation.

If you don't have the data base against which to test ideas two people can have differing opinions in the room and they are both valid. But when you take those two opinions and you test them and you come up with a result now you are arguing

about facts, not opinions and so to bring facts to the table is necessary really, necessary.

MR. BOSWELL: Armin?

MR. HAUVER: Armin Hauer of emb-papst. Some of us manufacturers here have not been regulated in the past and so there is some fear existing currently and maybe the Department of Energy could briefly indicate what they want to see in 2020 on a fan label. Do you expect to see only an indication from the manufacturer that the fan is compliant yes or no, or do you want to see an absolute percentage value, an FEI value, because if you look at the motor efficiency regulation I think this is really pragmatic and streamlined.

The motor manufacturers have an AEDM alternate efficiency determination method and they can basically from a few tests they can determine or verify this theoretical AEDM and then go to the Department and get the registration number so I think it is really pragmatic and if this would be possible in the fan end as well that would be really great, or is a lot of like absolute percentage values and then

tolerance needed on the fan label in the future.

MR. BOSWELL: Ashley did you want to respond to that?

MS. ARMSTRONG: Sure. So I think labeling is on the table for discussion and what the content of the label would look like in terms of whether we do something like motors or whether we do something for pumps, at least as proposed and ultimately as proposed -- as voted on by the working group, they actually wanted numbers.

But I think that's up to us. The Department doesn't have a strong opinion at this point about what the content of the label should look like. I think what the Department is still struggling with though is a more fundamental issue of scope and at the point of the fan manufacturer how do you differentiate.

So you know we -- I don't know what the best thing to do at this point is. I don't know if it's taking a temperature read, I don't know if it's caucusing -- it seems like we have some specific groups on different sides at this point and I'm not

sure we get further resolution without some additional information or without some additional ideas, or without -- I mean that's just my two cents.

I have yet to actually make a decision for the Department. I am not ready to fully vote yet, but I will entertain additional data and we have been working on a list of what I think that data might look like to help inform the decision, happy to provide that to you today. But like I said I think what we essentially -- AMCA essentially eluded to was when we tried to do some of this analysis when we tried to learn more about the market, the fan market when we got into a lot of the details we came up with a lot of questions, some of which are being discussed today.

If you look at the approach that's been published in the draft NODA it's an operating range approach, it's not a single point approach, it's not a foregone conclusion but that is what we have done to date. Obviously that would be part of the discussions here but it is a range so a lot of this stuff I think we have come to -- we have come to a

conclusion that it's really hard to definitively exclude something without some additional information or without some information to make a good decision or based upon that.

So Diane Jakobs wants to speak.

MR. BOSWELL: Okay Diane before I open this up to you, Bill your card has been up do you have a comment so let's let Bill give his comment and then we will have Diane's comment from the web.

MR. SMILEY: Bill Smiley, Trane. I've been trying to comment on all of this stuff for a while. One of the basic questions I have is how long did it take AMCA and its members to come up with all of the data and make all the decisions and judgments on assumptions, to come up with I think you said connected load which isn't really -- it's an indication of what the maximum energy consumption might be, not necessarily what it really is, but how long did it take you guys to come up with all of this stuff, that's a lot of work. Was it two weeks or two years?

MR. SMITH: Yes. We -- this is Wade

Smith. We started debating these questions 4 years ago but the decision to gather data and then analyze different regulatory schemes against that data base -- requests went out to the members in early December and we had answers to I would say I think it was 40 queries against the data base done in the middle of February so I think specific to your question I had a data base that I was analyzing three weeks after I sent out the request.

MR. SMILEY: Yeah but from the time you started to figure out what you were requesting how long did it take for that? I guess the point I am trying to make is --

MR. SMITH: It didn't take long.

MR. SMILEY: A three month assignment here to define what we are going to do. It appears that we are going to be wanting to look at data that has not been generated yet and I wanted to get a feel for how long it took to generate the data? And it sounds like it could be anywhere from three years to three weeks. While I don't believe three weeks is really long enough for --

MR. SMITH: What do you think is reasonable Bill?

MR. SMILEY: Well I don't have any idea because we haven't really discussed -- it's a complicated situation. The goal is to reduce energy consumption but the goal is not to make super-efficient fans although the premise is that we are going to reduce energy consumption by making super-efficient fans right?

Well you know we keep telling you that in applied equipment where you put a fan the super-efficient fan doesn't always give you the least energy consumption in overall unit. So you say okay we need to evaluate that, analyze that, provide some data, provide some proof.

We haven't even started thinking about that as far as I know. You know it's -- and then the second part of that is what number do you say we could improve it to and how do you determine that? Do you just say well we can improve the efficiency of our embedded equipment by 3 percentage points and we are done? You know nobody is going to accept that

fan because we don't know.

You know it's a very complex situation it's not as easy as you guys think it is from my perspective. Now I haven't thought about it a whole lot, we haven't done any work yet, it may not be hard, I don't know.

MS. ARMSTRONG: We don't have a test method for it.

MR. SMILEY: Well whether we have a test method or not, we are trying to determine what the energy consumption of fans is for equipment that use fan as an integral component, an important component but not usually the major energy consumer of that product but it does you know, so I am saying we need time to figure out what we need to do here and then beyond that another question is do the fan manufacturers believe that there are no fans being made today that are as efficient as they could be and how much more do you think there would be and are you assuming you are going to have to redesign every fan you make based on what we come up with for a requirement.

MR. BOSWELL: Okay so can I put --

MS. ARMSTRONG: Can I just ask a question to that end.

MR. BOSWELL: Go ahead.

MS. ARMSTRONG: I mean to the HVAC manufacturers, whether it be Bill or Aniruddh, or Mark in the room, others -- what's the typical wattage of your fan that you use in furnaces? Or what's the typical wattage withdrawal of your fan that you use in your unitary equipment? You can't tell me that you don't know.

MR. SMILEY: 10 watts.

MS. ARMSTRONG: Just period. You know the range off the top of your head. I mean this isn't -- if not can you go ask your engineer, I think that's something that they would know tomorrow. This isn't -- I mean we are not looking for -- we are trying to get order of magnitude here, we are trying to get an informed decision. That information is not hard to come by, you design your products around it and certainly you know what the wattage of your fans are.

MS. JAKOBS: This is Diane do I get a turn?

MR. BOSWELL: Yeah you are next in line. I keep trying to move there so Bill is first so Diane if you want to go ahead and make your comment and then people can either respond directly to Ashley. I I think what would make sense. We have one tent card up it might make sense to caucus so that people who have been you know, talking in the group might want to have a chance to consolidate their thinking and --

MS. JAKOBS: Okay but I don't get to caucus so could I just say one thing?

MR. BOSWELL: We are assuming that's going to be after your comment Diane, I'm just trying to get a gauge in terms of where we are going to move after your comment okay. So would doing a caucus make sense? Okay Diane?

MS. JAKOBS: I just wanted to respond. There was a person I think from the public who asked about can we use a fan manufacturer, and I work for Rheem, fan manufacturer data and the way we design equipment the -- I'm certainly aware of AMCA 210 and the data that comes from AMCA 210 is not helpful as we design our equipment.

I know when we go, I've looked at fan selection programs and those are not helpful. They are -- it's different when we put it in our equipment, the system effects, what everyone has been discussing, we don't look at data from AMCA 210 so that test procedure is not helpful as these designs -- as you are trying to get the whole system efficiency down to meet a certain target.

As a practical sense it is just not helpful. We don't use the selection programs, we don't use AMCA 210 but I do know that we have Rheem -- wow that wasn't a plug -- we have a lot of data on how our equipment runs with the air conditioning, you know, with a compressor running and the fan, and that is an indication of the fan efficiency. I don't know that the -- I don't know that it's not useful information, that efficient stand, when you are running the compressor, it's inefficient when you turn off the compressor and you are just for ventilation. So thank you for that opportunity to talk.

MR. BOSWELL: Thank you Diane, Wade?

MR. SMITH: Well the coverage determination was issued June 28th, 2011 so the questions that are being asked here have as much validity for fans embedded in unregulated equipment as they do in regulated equipment. There's been four years almost of time during which manufacturers of equipment that embed fans have had to engage on this subject.

You know and AMCA has given a lot of encouragement to AHRI and its fan working group to do just that. So with all due respect Bill you know it's -- it would be great if those manufacturers would engage in this process and imagine what they wanted in the regulation because they know -- the first reaction of AMCA members, of everybody when they learn that they are going to be regulated is to say no.

But you have to get past that and say if we are going to be regulated, then how do we want it to be structured to maximize the savings and minimize the impact on us and the answer to that question has not been forthcoming from the AHRI member companies

and that's what is needed. If it takes more time it would be far better to take the time and engage fully then it would be to simply say we don't want to be regulated.

MS. JAKOBS: Our fans have been regulated from the beginning.

MR. SMITH: I will repeat what I said. It's been four years. If the members of the AHRI do not want to be regulated they need to advance the arguments which would support that position. One of those arguments certainly --

MS. JAKOBS: I have --

MR. SMITH: Excuse me, one of those arguments certainly has to be what is the connected load of the fans that we are talking about and regulated equivalent and unregulated equivalent? What are the issues, how do we deal with those issues? How do we want DOE to deal with those issues? How do we want to be regulated, what would be a regulation that would make sense to us?

Those answers are not forthcoming and that's what this working group is all about to

develop those answers and if it takes more time I for one would want to ask for the additional time but I wouldn't come to the table and say we don't want to do it.

MR. BOSWELL: Okay so again I see a couple of people wanting to speak. I'm also just wanting to get a sense of where we are. I'm hearing a lot of responses to one another, I'm not necessarily hearing that much that is necessarily new to what others have said so what I am wondering is if we want to take a temperature check on where people are, I'm not sure exactly how people want to frame that issue. I defer to somebody to decide how they want that question asked, or if it would make sense to break into sub-groups to have people have a chance to compare their thoughts and evaluate what they have heard from others?

MS. PETRILLO GROH: I would like to make a comment on the timeline that was discussed. The framework document was released in February of 2013 which specifically stated that DOE did not think it had authority to regulate fans in a regulated

product.

MS. ARMSTRONG: It did not say that.

MS. PETRILLO GROH: That was part of it actually. In January -- the very beginning of January of this year during an ex parte meeting is where DOE backtracked on that previously published position. So the four years that you are talking about has been consideration for fans in general where it looked like fans and stand-alone products but what we have been talking about here are fans and regulated products where the product efficiency is tested and reported and regulated.

We are grappling with and are willing to look at the points that you have raised for data points of how to measure the fan efficiency of that product during times that are not -- during equipment operating hours that are not captured in heating or cooling mode for five or six different types of equipment. Thank you.

MS. ARMSTRONG: So Wade I think just a clarification. The framework did not say we did not have the authority but besides that I think the real

question is -- is exactly what we have just said, can we get away from no and or if we are going to get to no, we need to do so in a data driven kind of reasonable basis. So you know, I think that's where we are so the reality is are the OEM manufacturers that are around the table willing to come to the table to come up and work -- come to a workable solution outside of the answer of no.

MR. BOSWELL: Greg Wagner?

MR. WAGNER: To get to your question there's a lot that goes there. Back to my question about does DOE have data on commercial industrial fans running time, running hours the statement of opinion that there is a lot of ventilating hours that are caught in the heating and cooling mode where the energy is considered.

As Diane just walked through, all the test methodology, all of the discussion around how to measure performance of fans was only on stand-alone fans, not in a manner that anybody at AHRI measures the equipment that they produced so it was a totally different method.

Their energy that they consume with that fan is part of the entire systems connected load so it is accounted for in the entire system's measured energy use. And depending upon what mode that thing is operating in it will have different fan energy versus the rest of the energy. So there isn't a simple method of saying oh I can go right back to the database and figure out what kind of fan energy is being used.

And you can't just go by nameplate rating or other kinds of methods like that to come up with an answer because those are representative of a point of operation that may or may not be where that thing is operated in that unit. So the question of how to get that data is a rather complex one and it would involve a great deal of time to measure all of those things because it is not in the format that this rulemaking was originally structured and has been talked about from the day one.

Being a fan manufacturer I am used to looking at AMCA 210 data and looking at AMCA 210 type of testing and putting together programs working with

customers to help them reduce energy consumption, but that doesn't mean that it looks at how you would measure for this particular operation, this particular outcome and that's why covered products are different than just stand-alone fans. They have a different kind of method of valuing that energy consumption.

MR. BOSWELL: Okay Meg?

MS. WALTNER: Meg Waltner from NRDC. Ashley I thought I heard you say earlier that you had been working on a list of the type of data that you might need and I'm wondering if whether going over that list before caucus might be a productive thing to do at this point.

It seems to me that there are maybe different levels of data that you would need over the course of the analysis from sort of the most basic -- just getting an estimate of connected load so we understand how big of an issue we are talking about here and then you know more granular data of efficiency levels and market share of those efficiency levels, et cetera that might take longer

to collect but it seems like that just connected load question is a big one from our perspective.

MR. SMILEY: Why do we keep saying connected load, because that is not real world what's considered, that's maximum that might -- I'm sorry this is Bill Smiley, Trane. We always keep talking about connected load which is the maximum energy or power that piece of equipment might consume but that is never where the operator or very rarely do they operate at that point.

So if you just evaluate connected load you are way over estimating the energy consumption.

MR. SMITH: So do something else.

MR. SMILEY: Yes do something else. You know we have to do something else. Say consumed load not connected load.

MR. FERSTROM: Folks this is Gary. I would like to follow on to Meg's point. Ideally we would like to know the energy use and there's a lot of debate going on around how we measure that given the different operating conditions of this equipment. At a minimum if we knew the connected load at least

we would have an idea what the maximum size of the market was.

I don't disagree, I do agree that this equipment doesn't operate all the time at nameplate conditions so connected load is an over statement in a lot of ways but we don't know anything now and if we at least knew the connected load we might have a marginal handle on what the size of the market and opportunity is.

MR. BOSWELL: Laura? Joanna?

MS. MAUER: It seems like one of the questions here is related to the definition of what a fan is. It sounds like one of the concerns that has been raised is the OEM is buying just an impeller and the fan actually can't be tested because it is not a fan until the product is assembled.

In those situations I guess depending on whether the OEM is considered to be a manufacturer of that fan would seem to have an impact on this discussion and I don't know if that's a question that we can answer or have some discussion about now. So for that particular case of where it's not a fan

until it is part of a piece of equipment and therefore never being sold as a stand-alone fan.

MS. ARMSTRONG: So I don't know that I can specifically answer that question directly at least yet. I think what DOE is grappling with is the idea that manufacturers are situated differently. Some may produce impellers themselves, some may import impellers, some may import what I am calling the fan which is the impeller and the housing and the associated components there and some may -- I think what DOE struggles with is it is going to have to provide an equitable regulation irrespective of how that manufacturer is situated.

So what you are hearing from the Department is while Greg I think that's absolutely fantastic that on a second-by-second basis you can track everything in your company, that's really helpful and that would be helpful to the Department. I don't think everyone is situated the same as you.

I think what we are asking you for is something other than a self-declared method. To get to Meg's point about what data you know DOE said you

were working on a list and we have kind of been trying to work on a list over here but at a high level this doesn't just inform the decisions -- I think we are talking about you know a list of OEM equipment incorporating fans.

What's regulated, what's not -- not all of it is regulated. And the same type of fans go into regulated and unregulated equipment. How do you tell the difference? How do you know if a box of impellers is coming in -- if it's ultimately going to be regulated or unregulated?

Typical fan shaft input power at a typical operating point range, or an operating point of the equipment. It's close enough. It doesn't have to be a test procedure. The test procedure we will get to, right? We are just trying to understand impact right? Are we talking 10, are we talking 1 horsepower, where are we? Give us a range and units sold per year. It's really that simple and I think that as an OEM you can go with that. You know your business and you would know that tomorrow.

Now I get that at an aggregation level you

may not want to share that information tomorrow but this isn't an unreasonable ask to help provide the Committee with some data to help inform the decision and I think that's you know, as a Committee it's our due diligence to make informed decisions.

MR. BOSWELL: Greg?

MR. WAGNER: One this is getting energy consumption is totally different. As you well know run time affects dramatically what that energy consumption is. As I have said earlier, DOE has done excellent work, has great data from their REC's analysis of the energy consumption of residences and that's very detailed and you can break it down into region and whatever and you can figure out by product pretty much how much energy is being consumed.

Is there any such thing for commercial? Because that's where it would have to start to figure out what is the energy consumption of anything. Now what the manufacturers don't have is the exact energy consumption of the fan because they look at what the energy consumption of the unit is as a whole and that's how they put together their plans.

I don't know how you know you get to that measurement point but that is certainly something that would need to be worked through to come up with what some energy savings would be, but just looking at nameplate ratings isn't going to get you.

MS. ARMSTRONG: I think that's fair but we are trying to get a picture of the market so perhaps maybe if you didn't like my three bullets of data, what do you have that could help inform this decision easily? Instead of no, what gets us to yes? What is your alternative solution? Because that was one of the things we talked about in day one, that if I am going to say no to something I would have an alternative solution so if you don't have that or you don't think that's the right set of data, I mean to answer specific questions, there is a commercial building survey that EIA does similar to residential, that's there.

MR. WAGNER: Is it broke up by equipment?

MS. ARMSTRONG: It's not -- yeah, by application. It's not as I would say granular maybe as RECS but yes, generally speaking we use it in

commercial analysis and it has some information. We had to do that type of analyses for both the commercial HVAC rule but also --

MR. WAGNER: (Off mic).

MS. ARMSTRONG: Yeah but I'm not the one trying to make the case that I shouldn't be included.

MR. SMITH: In the data that we provided the DOE, we have no idea about the operating hours of the fans I mean -- we are manufacturers of fans. And so when we sat down to take that data and extend it to determining what the terawatt hours were of consumption right -- we had to answer the question what are the operating hours and at what load point?

And the best among us no answers -- so we went to the DOE published data and pulled some of that information and did those calculations ourselves with their data but when we submitted the data to the DOE we didn't submit that data, we submitted the data that we had.

What do we have that could inform the debate becomes the question and we have something -- we have a lot. If you sit down and you think about

that long enough you will come up with a long list of things that you do have which can be used to inform the debate and that's what Ashley is suggesting, don't tell me what you don't have, tell me what you do have that would help to inform the debate.

MR. BOSWELL: Mike?

MR. WOLF: Ashley, would you mind being a scribe at the board there for us. I'm just going to throw out a thought here. If we go back -- and what is your opening slide on your slide deck there?

MS. ARMSTRONG: This one?

MR. WOLF: No the next one.

MS. ARMSTRONG: This one?

MR. WOLF: No, opening the cover. So ASRAC Fan Working Group, we have spent I don't know how many hours this morning and I can't tell you how many hours I have spent personally discussing what we have been discussing here and what we are discussing isn't even on that -- picture on that slide.

So what I would suggest -- propose, if you wouldn't mind going to the white board here is to maybe refocus the discussion here and bucketed in

three areas. First of all let's talk about stand-alone fans, ones that are on that picture right there. Because that apparently is kind of important, it got put on the cover of the slide deck and underneath that particular topic and this is going to be you know, let's figure out what the scope is, what's the definition for fans that are stand-alone, let's figure out what the load is, whether it is connect -- we don't want to use the word connected, what was the word you used Bill?

MR. Smith: Absorbed.

MR. WOLF: Absorbed or consumed load, can we -- no, okay so load is probably good in general terms, what data do we have or do we need to get on -- I guess we could leave that as a broad subject too -- what's the metric we want to use and lastly what's the test method we want to use?

And I would propose, so we have got that for stand-alone fans. The next group that we might want to talk about and have those same sub-topics would be you know if we can't get to any consensus on regulated fans, how about we talk about unregulated

fans? Unregulated product, I'm sorry -- thank you. And my guess is if we can get through discussion of unregulated product, a lot of the same discussions that you know things have happened there, which people shouldn't be threatened by because I think everybody in the room will say, boy we can't have that loophole, we have got to do something with unregulated products because those guys are getting off free.

And if we can get through that discussion, maybe that will help us in the final discussion which we are having right now on regulated products.

MR. WOLF: This is Mike Wolf, Greenheck for the record, this is a joke, you know you made reference to the schoolyard and I said oh I'm the biggest guy in the schoolyard.

MR. BOSWELL: Okay.

MR. WOLF: So I'm sorry so my proposal would be let's take the group's temperature on what I just said.

MR. BOSWELL: Okay, so does this make sense to take -- I guess Ashley you were scribing

that, did you have any thoughts on that process before we take a temperature check on this?

MS. ARMSTRONG: So I think that's a great start. My ask would be by the time that we get to number three that people use their due diligence and collect data on the meantime while we work through one and two.

MS. MAUER: This is Joanna. I don't have a problem with this. My observation would just be that I think part of the challenge is that we can't necessarily define what's in the three buckets but I'm fine with starting with this.

MR. BOSWELL: Duane you have been waiting to speak?

MR. DADDIS: My point would have made sense about thirty minutes ago.

MR. HAUER: Armin Hauer, ebm-papst. I like Mike Wolf's approach very much however the picture that is shown here also includes power roof ventilators, and the power roof ventilators I would consider are unregulated products that have fans inside.

MR. WOLF: That could be argued for every item on there and that's why I think if we can't get past this first item, this other discussion we'll never get there, so that was my reason for starting here because we are going to have that same discussion on what's an embedded fan, what's not an embedded fan, even on the most simple product that you have got on the screen up there.

MR. BOSWELL: Okay Meg?

MS. WALTNER: Yeah so to Ashley's point, this is Meg, you know I am comfortable with this sort of sequence of events too but I would really like to start collecting the data now and to leave today with a sort of clear idea of what is going to be collected and provided to DOE in terms of both non-regulated and regulated products so that we have that information when we get there.

MR. BOSWELL: Okay and I guess just kind of an observation, with respect to that I understand the sequencing that is being proposed but one of the debates that I have been hearing today, this is kind of your discussion is with respect to embedded

products, what data if any does exist and what would be required to define what data might be useful so my only concern is that people might want to think about, I think is piggy-backed here on Meg's comment which is we start kind of a sequential discussion to make sure that since we have three months that people thought about what they need in order to finish the discussion within three months and that's just something I think the group wants to think about.

MR. WOLF: Mike Wolfe, Greenheck. If I could comment what I would propose maybe instead of doing this sequentially we have enough people here, and the more people that we have the less that we will get done. Maybe what we do is we cone off and we break up, you know, maybe we use sorry I keep forgetting names here -- Mr. no, next to Greg, Gary, sorry I knew it was something with a "G", Gary maybe we use your picture from lunch yesterday and we start out with that and we divide everybody you know equally amongst those three groups and we break.

Now what time is it, it is 11 o'clock, 11:30 I mean, this might be a good lunch topic even

you know, if we break into three groups or maybe I'm going to -- what time do you finish today? 3 or 5?

MS. ARMSTRONG: People are leaving starting around 3, so probably 3.

MR. WOLF: Okay well I guess I'm wondering if we could break from now until 1 or 1:30 into three groups, small groups, and come back with -- okay if we have got something we want to get out of you know, let's say number 3, we need data. Define what that data is, come back and say 1:30-2 o'clock and say all right here is what we need, here's what we know but here's what we need.

So at least and at some point today we are given some clear assignments on what needs to be collected or clear on what we already have, because I agree, if we go sequentially yeah -- so just a proposal.

MR. BOSWELL: Wade?

MR. SMITH: Yeah I might suggest that if -- this is Wade Smith. I might suggest that even today right -- if we could get the number of units sold by unit size that have embedded fans and I don't

know if the group is okay with this but any analysis that we have done has always been focused on one horsepower and larger and that eliminates a lot of work because it takes some of the product categories that I know people are concerned about off the table.

If you know the number of units that ship by size you know it's not an unreasonable thing to assign a connected load for the fan in each unit size and it's you know, it's five minute math to figure out, hey on this basis which is inaccurate as Mark will point out -- on this inaccurate basis you know, how big is this market and I unfortunately won't be here this afternoon but it would be great if that would -- if at least that information could come forth so if it is discovered that this is a trivial market segment and not worth worrying about then we can determine that.

MR. WOLF: I guess Wade the question that I would have there is you know, what's the definition of size -- are you looking by horsepower, by diameter?

MR. SMITH: Yeah I mean however the data

exists. So the data exists for unitary product by unit size described as number of tons. For air handlers, again I am sure that there are some breakdown by size, I don't know how it's described in the AHRI statistics but however it is is what it is.

MR. WOLF: Mike Wolf, Greenheck. I'm sorry but I'm anticipating that same discussion is going to come on the first one -- stand-alone fans and if you are leaving at noon I don't think any of the rest of us understand that spreadsheet well enough to extract it without your help.

MR. SMITH: Well I'll just say for the stand-alone fans we provided the data that DOE has, I don't think there's any mystery and to the extent that it is in the public domain we would be happy to reveal it.

MR. BOSWELL: Mark?

MR. FLY: Many of the products in category 3 have multiple fans in there. Multiple fan types, so let's just take a packaged piece of equipment for example. At the minimum it is going to have supply fans, it is going to have condenser fans. Supply

fans, as Gary has pointed out will run in event mode. Condenser fans will never run in event mode so you know the condenser fans are tied to the refrigeration system, will always be measured in the refrigeration efficiency.

Yes there is part of the supply fan part. You add energy recovery, you could add two more fans in there so there's -- you know it's -- like you said it's a very, very complex process you know, Ashley, you know my 510 unit I offer half horsepower to 2 horsepower fans. Now, do I average the two? Say it's a horse and a half or two? It's not data we -- it's data that I can dig out from my company. It is certainly not data that I report to AHRI.

AHRI has fairly good data for at least unitary equipment on 10 inch and number of units in the market and I don't really know what we have got on air handlers and many of the other product classes so yes I think maybe one of the first steps is to start listing equipment that have fans in them. It's many but at least that gives us a scope of the problem.

MR. SMITH: Mark I think it would be a much easier or diminished task if you focused on one horsepower and up only because that would eliminate the condenser fans that you are talking about for the most part. Not to say that there aren't some condenser fans that are drawing more than one horsepower but it is not as prevalent.

And I mean you know, I think the group is looking for the best data that is available and whatever it is, it is. You know, it's better than no data right which is what we have got now.

MR. FLY: Well is DOE okay with eliminating everything under one horsepower?

MS. ARMSTRONG: I would say DOE is as a temperature check much more open to that than regulated equipment as a whole, let's put it that way, so you could strike a deal with that.

MR. BOSWELL: Okay how about --

MS. ARMSTRONG: Like I said you are asking -- show me why, show me data, what does that mean? What does one horsepower mean, what does two horsepower get you, that's what I asked from the

outset. Make your case. Make your case to this Committee as to why, not just no.

MR. BOSWELL: Okay.

MR. SMITH: And I should say on stand-alone fans where we gather the data, we gather the data down to 1/8th horsepower and made a case that below one, as I described earlier, the impact and our member companies in terms of their investment was very, very great. 85% of the fans that are in our data base are below one horsepower, but only 20% of the connected load.

So 85 we are going to invest in redesigns, that's a lot of product to redesign but the benefit is dramatically diminished so you have got an 80/20 rule if you are working in real life and so by focusing on the fans that are one horsepower and greater it just -- you get more bang for the buck.

Somebody asked, Laura asked yesterday what was one horsepower because that's -- we drew the line at one horsepower and above, not above one horsepower right? And so the AMCA members debated that question for a long time. There's a -- it turns out there is

a lot of connective load in the one horsepower group and in the debate we felt that if we can come to reasonable efficiency levels as the regulatory requirement then we would go down to and include one horsepower, but it was -- I should say something here that in our consensus with the advocates that we put in the public domain with the noted response you know, we didn't document any consensus and actually there is not a consensus about what the regulatory requirement ought to be.

AMCA made a proposal, it was not accepted so you know if the regulatory requirement causes us to invest a lot more time, energy, money, capital in redesigns than we would anticipate we might come back and argue for something above one horsepower because we are most sensitive to the impact to our small business member companies and we don't want to put them out of business.

And so, you know, the debate inside is Carnes Company, you know are you okay with this? And they express themselves and from their expression of concern in what was acceptable and unacceptable we

derived our bargaining authority and that's what we are here to exercise.

So all of these things are malleable right? It could go up, it could go down, the standard could go up or it could go down, who knows. But it's hard to evaluate the impact, the savings, it's not possible to make informed decisions for the advocates or for the manufacturers if you don't have the raw fodder to work with and just so at a high level if you just had unit counts, shipped and could assign what you think is a representative horsepower for the fan, that's going to tell you how big the connected load is and after you get DOE's operating hours, you know you might actually calculate what the energy cost is.

MR. BOSWELL: Okay so Greg?

MR. WAGNER: This is Greg Wagner again, one of the things that is not on that list and I don't know where you would put that is other fans for example, construction equipment, vacuum cleaners, material handling, aerospace, there's a wide range of fans that go into other products and I don't see any

representation here at these meetings or a discussion about how that fits into this framework because they certainly would come under the broad definition that has been put forth and I have just listed some of the ones that are out there.

MR. BOSWELL: Gary?

MR. FERSTROM: I have a question for Wade. If I understood you right you made the point that small fans while large in number represent a smaller part of the connected load, is that correct?

MR. SMITH: It -- for stand-alone fans, that's definitely the case yes.

MR. FERSTROM: Okay so I was thinking about the unitary equipment and the hours of operation and might not we speculate that small fans could potentially have a lot higher hours of operation than the larger ones?

MR. SMITH: No.

MR. FERSTROM: Okay thank you.

MS. PETRILLO GROH: I have a question for Wade as well on the database of fans, this is Laura Petrillo from AHRI -- you said 85% of the fans in the

database was below 1 horsepower?

MR. SMITH: That's correct.

MS. PETRILLO GROH: And approximately 12% of the fans were one horsepower?

MR. SMITH: No I think it's approximately 12% of the connected load is at one horsepower.

MS. PETRILLO GROH: Thank you.

MR. BOSWELL: So I want to go back to when Mike was speaking he actually made a proposal and asked that we took a temperature check on that which would be to self-divide into three groups, take a two hour lunch break, reconvene after that during that two hour break those three groups could meet and report back on kind of potential next steps under these three headings. So is that still what people would think of as a good proposal after the subsequent discussion that has taken place?

MR. WAGNER: (Off mic).

MS. ARMSTRONG: I don't think the Department has an opinion about -- has voiced an opinion yet, we usually have opinions but -- at least me -- so I have a question just for Mike and maybe

this is my naive you know, this will show my lack of expertise in the fan industry but with number one as soon as you get the scope and definitions, aren't we having the same conversation?

MR. WOLF: Yes we are but it should be much simpler, simpler discussion and my hope is that if we can get through the simple discussion that might help us with the more complex discussions we are having here.

MS. ARMSTRONG: So my suggestion would be to do break outs, you know, at least around number one if you guys want to come back with a proposal of what that scope -- the scope and definitions look like. We have some slides that might help you with that.

But I think the group needs to have that discussion before we put too much time into two and three. Definitely I think the data should -- people should start collecting data but I'm not so sure the scope and definitions isn't going to turn into the same discussion we are having now because what DOE found at least when it looked at the different

categories of fans was if you are looking at the category of just the fan, you know this fan -- all three of those and that's what we are struggling with.

MR. WOLF: Mike Wolf again, I'm fine with that I just threw it out there.

MS. ARMSTRONG: No I think that's great.

MR. BOSWELL: Wade?

MR. SMITH: So I'll toss out a soft ball or as they said a fast ball right across the middle of the plate. I think this working group should not change the fan definition but should change the scope of the -- should propose the scope of the regulation not include well should include only fans driven by an electric motor, rather than fans driven by some other means which takes a lot of -- I'll call it the oddball stuff, you know like a propeller fan in the front end of my car is a fan but it is not connected to the grid, so maybe the better thing to say is that we should only be dealing here in this regulation with grid connected fans.

MR. FERSTROM: So we touched -- this is

Gary, we touched on this issue yesterday a little bit and I encouraged the group to consider utility connected fans which would be those driven by utilities supplied grid electricity or pipeline gas.

MR. BOSWELL: Okay I guess a question I have for Ashley from your comments, are those things that you think you would like to go over from the slides that DOE prepared that you started to before -- no? So Meg you had a comment?

MS. WALTNER: Yeah I just did in response to Wade's point you know that saying the think I want to think about there is how do we differentiate those fans when you, you know, when Ashley goes to enforce the regulation is there a way to tell the difference just by picking the fan up off the shelf?

MR. SMITH: Yes.

MS. WALTNER: Okay so that's something that we would need to work through.

MR. BOSWELL: Gary did you have another comment? So I know that Greg has an issue about this list, Ashley's raised the point about whether or not one doesn't the others -- I think there's still a

question about or some value is being expressed for people having a two hour period to have lunch, caucus amongst themselves and reconvene on these issues, so why don't we take -- yes Dan?

MR. HARTLEIN: I think, I mean did we actually take a temperature on that because I'm not sure --

MR. BOSWELL: That's what I was about to say.

MR. HARTLEIN: Okay because for me we are here and we are not together, we can caucus tonight, tomorrow, so that would be my opinion is it -- that extended hour for lunch, you know, we are going to have to deal with these issues as a group at some point.

MR. BOSWELL: Armin?

MR. HAUER: Armin Hauer. I have a procedural question. When did we decide that we stop the meeting at 3 o'clock? We had talked about earlier about minimizing costs and impact on manufacturers, some of us have made arrangements to be here until 5 o'clock today and I would have no use

my time until my flight leaves tonight at 11 P.M.

MS. ARMSTRONG: So we can definitely go until 5, I'm going to be here too. It's -- I know that there is a couple of people that mentioned to me that they are leaving before 5 but we can keep going. That's a non-issue. I don't think we are going to be voting on anything this afternoon. In case anybody was worried about that, just to address it up front.

MR. BOSWELL: Okay Meg?

MS. WALTNER: Another procedural question do we need a quorum to proceed with the meeting at all after people leave and so many we should get a clear number of who is leaving.

MR. BOSWELL: We need a quorum to meet.

MS. ARMSTRONG: (Off mic).

MR. BOSWELL: I was going to say if we have less than a quorum -- if we have less than a quorum and the group decided to meet it could be a subgroup of the Committee but I think from the list that I have seen of people that have indicated to us that they are leaving at various times this afternoon, I think that we will probably still have a

quorum.

Those that haven't specified anything will be here until 5.

MR. SMITH: This is Wade, do I understand from the sort of by-laws that we established yesterday that a subgroup can be no more than 15 people?

MS. ARMSTRONG: We would have two. Good thing we have three categories up there. Can I make an ask? Let's do this, let's break for lunch. Let's reconvene though in about an hour, maybe an hour and fifteen if you want more time, but I'm happy to tackle number one first, let's talk about number one, let's talk about scope, let's talk about what those definitions might look like that are definitely in and see where it goes. Is that okay with everyone?

MR. BOSWELL: Okay.

MR. ROY: Aniruddh Roy with Goodman. I would propose that we abstain from voting on any of those until all three are addressed though because there could be implications on category 3 based on the decisions that are made in category 1.

MS. ARMSTRONG: Completely, honestly I don't think anyone is going to be in a position to vote today anyway.

MR. ROY: Thanks.

MS. ARMSTRONG: I mean I think that's just the reality of where we are going to be.

MR. BOSWELL: Okay, any objection to taking a break at this point and reconvening in -- it's 11:50 why don't we reconvene at 1 o'clock.

MS. ARMSTRONG: All right so we want to start back up from lunch. All right.

MR. BOSWELL: Okay so as we get started, Wade Smith has left and his alternate has joined us at the table, so I am just going to ask him for the record to introduce himself so that we have that.

MR. CATANIA: Yes thank you very much. This is Tom Catania, I'm a consultant to AMCA. I probably will sort of just expand a little bit on my introductory background from when I was in the audience just for purposes that people don't know me. I am a retired vice-president of government relations for the Whirlpool Corporation so I participated in

many, many years of standards -- appliance standards negotiations so this is not entirely foreign territory to me.

MR. BOSWELL: Okay thank you. I don't think there is any other changes around the table. So I guess I would turn this to you Ashley to get us started.

MS. ARMSTRONG: So I think one of the things that we -- we talked about doing before we left is to let's talk about a subset. Let's try to start with the smallest and see if we can kind of build from there in terms of getting agreement for some of the fans. So we are going to go to specifics and we are going to talk about what we call the stand-alone category and I am going to get some help from an expert in the industry and we are going to go from there.

MR. WOLF: You say I'm an expert?

MS. ARMSTRONG: That's you. Do you want to start with a specific one?

MR. WOLF: Go to your next slide I think that the one where you have ducted?

MS. ARMSTRONG: This one?

MR. WOLF: Yeah.

MS. ARMSTRONG: Okay.

MR. WOLF: So if I remember -- so this is Mike Wolf, Greenheck. I think this came right out of the NODA did it not?

MS. ARMSTRONG: It did.

MR. WOLF: So these are the definitions that we are using as a baseline for discussion so I think what I propose is that we start here and then you know if we don't like it propose changes or improvements, okay?

So looking at this list, I think the simplest one is probably going to be housed centrifugal backward bladed fan. I am hoping that we can maybe get some consensus around that. So if we go to the you know the flip chart there and we start with the scope and definition, Ashley you have got some other slides that I kind of peeked -- if we talk about a housed centrifugal backward bladed fan, what's the scope and definition for that product, do you have anything else we can reference, somebody had

here a couple of slides.

MS. ARMSTRONG: I don't know if we have a specific definition for just that one. We have a definition for centrifugal fans.

MR. WOLF: Okay so.

MS. ARMSTRONG: So if we want to make it more specific we could you know, we could go there or are all centrifugal fans ultimately?

MR. WOLF: And that's a good question so here's what I would like to do or give some consideration to is trying to develop some sort of a process where we can go through each of these and say all right what is it, what things do we know, what do we not know? So if we start with the definition and I just cut and pasted the definition you had there so that's a centrifugal fan and I don't know if we need to maybe add a category over here then that might reference back to this to say well all right which one is it, okay.

So I think it would be pretty easy -- oh I'm sorry -- okay. So again guys, I'm just throwing this out there as a way to work out a way to this

problem. You know I think we could say that a centrifugal fan, housed centrifugal backward bladed fan would fall under that definition. Can we take a temperature on that? Steve?

MR. DIKEMAN: How are you trying to approach this, Steve Kikeman. How are you trying to approach this Mike because if you get the last sentence with or without a housing now we have jumped from centrifugal in total into the four subsets that you have got on the other page. So do we have one definition for each of the fans if this happened to be a backward curve that would say backward curve it has a housing?

MR. WOLF: I guess I could pull a line out of Ashley's repertoire, what do you want?

MR. DIKEMAN: No, I'm trying to anticipate where you are headed. Centrifugal fan covers things in both columns three in one column, one in the other, the housing captures all of that so at what point do you -- define what --

MR. WOLF: Right.

MS. ASHLEY: So you just mean why the

housing is not necessary?

MR. DIKEMAN: No, why it is.

MR. WOLF: Well I think let's not jump to conclusions, let's work through the process. So the answer to your question I would propose, well say the question again?

MR. DIKEMAN: Your question was about this definition versus what is -- four categories we just talked about in two columns.

MR. WOLF: So what I would suggest Steve is we that we take this definition of a centrifugal fan and we plug in which of those categories fits into this definition that would be my proposal.

MR. DIKEMAN: Okay, okay, no, that's what I was trying to get with you on. So there are there that would fall into that particular --

MR. WOLF: Into this.

MR. DIKEMAN: That particular -- right am I with you Mike?

MR. WOLF: Yes.

MS. ARMSTRONG: The three on the -- (indicating slides)

MR. DIKEMAN: Just those three.

MR. WOLF: Well you have got a centrifugal inline too that's in there.

MR. DIKEMAN: You would, yep.

MS. ARMSTRONG: Well how about we go back and look for a second at these, not that one.

MR. WOLF: So I would say that there is four on that left-hand side.

MR. DIKEMAN: My bad.

MR. WOLF: Yep, we will let it go this time.

MR. HARTLEIN: Yeah, Dan Hartlein, Twin City Fan. The question I have I think you are seeing with or without a housing on the next slide right?

MS. ARMSTRONG: Yes.

MR. HARTLEIN: But everything you have written here says housed.

MS. ARMSTRONG: There is one, there's a right side.

MR. WOLF: Okay so what I would propose there is we create maybe two columns or two headings here under examples or categories, whatever we want

to call it, we say okay what are the ducted examples or categories and what are the un-ducted, that way we get everything pigeon-holed right away here because I have identified a number of other holes with this but I don't want to go there right away, I would like to get some consensus and get us down the path a little further before I start shooting holes in my own plan here.

So again to take a temperature does that seem reasonable to everybody?

MR. DIKEMAN: (Off mic) We have got the housing, with or without housing, so --

MR. WOLF: That was Steve Dikeman.

MS. ARMSTRONG: Okay so let's talk about the examples. Does everyone agree with the examples?

MR. FLY: This is Mark Fly with AAON. I don't think -- I think the point that he is making is not inclusive because it says with or without a housing so you have to have the unhoused centrifugal fans in that also.

MS. ARMSTRONG: And --

MR. FLY: If you are going to go directly

by the definition that's up there on centrifugal fan without altering.

MR. WOLF: Okay so Mike Wolf, would you rather change the definition or --

MR. FLY: I would rather change the definition because I think we are going to run into characteristics that need to be separated.

MR. WOLF: So what is everybody's temperature on that, do we want to start with changing the definition here? Okay I am going to take general head nods as yes. So somebody make a proposal on what should or should not be in that definition.

MR. FLY: I would change the last line to say the impeller may -- I shouldn't say shall have a housing component, or one or two inlets with a housing component I think is what we need to say.

MS. ARMSTRONG: Go ahead you can just talk, it's okay, just identify yourself.

MR. SMILEY: Bill Smiley, Trane. So we are going to have two definitions for centrifugal fans, one unhoused and one housed is that where we

are headed? I have no preference either way I was just asking a question. Now I do have another comment, the air doesn't necessarily exit perpendicular to the shaft but it is in that general direction so I mean how nit-picky do we need to be?

MR. HARTLEIN: Dan Hartlein, I would change the word to predominantly perpendicular I know, I will spell it for her, thank you.

MR. BOSWELL: And Mark?

MR. BUBLITZ: Mark Bublitz, the New York Blower Company. Are we mixing up definitions and fan categories? Because you can define a centrifugal fan like you have it but that doesn't matter, that's inclusive of multiple fan categories as communicated on the slides so you are going to add a lot of complexity up high.

MR. WOLF: I agree Mark, this is Mike Wolf and that's a great question because I'm thinking through the process here, maybe it would behoove us to start with the categories and get agreement on the categories first rather than the definition of at some point we will need a definition for the category

right?

MS. ARMSTRONG: Correct.

MR. WOLF: And right now the definitions don't align to the categories so maybe we start with the categories and define them.

MR. BUBLITZ: Mark Bublitz, New York Blower. That would be the big buckets I think and if we could agree on the buckets then we might be able to --

MR. WOLF: All right so Ashley let's go back.

MR. BUBLITZ: And put detail into what we think belongs in the buckets.

MR. WOLF: So we are going --

MS. ARMSTRONG: Going back to this?

MR. WOLF: Going back to that we are going to talk about a housed centrifugal backward bladed fan and so now we need a definition for that.

MS. WALTNER: Yeah this is Meg Waltner, so AMCA and the advocates have gone back and forth on definitions a lot over the past two years and have different draft definitions I would say, I think for

all of those categories. I don't know if that would be a good place to start.

MS. ARMSTRONG: Where are they?

MS. WALTNER: Some of them are in line with the broader definitions proposed by DOE and some are categories that DOE didn't propose definitions for.

MS. IYAMA: This is Sanaee. Most of the definitions that are on that slide for the fan categories were drafted based on the inputs from the stakeholders, including what was present in the submissions from AMCA.

MS. ARMSTRONG: Okay I think what you are hearing is that if you do have definitions specific to each of these categories we don't have them or at least in that level of detail what you are seeing.

MS. IYAMA: So I think on these slides there is the two categorizations schemes, there's the one used in the NODA and then there's the one presenting the list of categories that AMCA was using when defining what's a ducted or an un-ducted fan.

MR. BUBLITZ: Mark Bublitz here, is the

difference between the NODA and this list just the NODA kind of smashed them together?

MS. IYAMA: They can be directly mapped so we could use either -- and another way to do what you were getting at was I think, and that's sort of the background that we had in mind when we used those definitions that you have on the slides, is that instead of defining what's an actual housed, actual unhoused centrifugal house, centrifugal unhoused, we just defined axial fan, centrifugal fan and then what do we mean by housing and then you can sort of combine in a more modular way instead of defining each sub-category of fan.

MR. BUBLITZ: Mark Bublitz, I'm sorry I forgot your name, did you have a comment on further clarifying Sanaee's comment on what the categories were? Okay.

MR. JASINSKI: No, I don't have them in front of me, that's all.

MS. ARMSTRONG: So if we go back to this slide --

MR. BUBLITZ: Mark Bublitz, New York

Blower. I'm just wondering if you could take a temperature check on if we all looked at that list, do we think there's big holes, do we think if these buckets were set in front of us could I take most of our -- I think we are focusing on stand-alone right, most stand-alone stuff and would it fit in a bucket for the most part?

MS. ARMSTRONG: Sure so this is how we did it for the purposes of the NODA and each of them mapped to how you guys did it, ducted and non-ducted. I don't know that we necessarily care although this is going to be harder for us to ultimately the broader categories are easier for us than incumbent from a regulatory standpoint.

MR. WOLF: So Mike Wolf, Greenheck. Mark let me ask this, what you just said there is you brought up I think you said something about embedded or not embedded.

MR. BUBLITZ: No.

MR. WOLF: What did you just -- that's what I heard so we want to take a temperature check on the general categories.

MR. BUBLITZ: Mark Bublitz, New York Blower. Whether we use the DOE list or this list I was just wondering if we could take a temperature check on do we think that all of our products, we are thinking of all of the things that are stand-alone, is this an acceptable list of buckets and you could -- whether we want to parse the different types of axial fans or could we just take the DOE list as a starting point and say we think this kind of encompasses all of the different fan categories.

MR. WOLF: Okay so the temperature that you want to take is does this list encompass what we feel would be categorized as stand-alone fans?

MR. BUBLITZ: Mark Bublitz, New York Blower. Yes.

MR. WOLF: Okay so what's the temperature, Tom do you have something?

MR. CATANIA: Yeah, yeah before you kind of vote on this or take the temperature, Tom Catania AMCA. I am a little concerned that because we have so much data I'm kind of picking up on Meg's earlier

comment that we have so much data and so much work already memorialized and sort of framework response that then evolved into a second NODA that if we create a new taxonomy that is inconsistent or makes it harder for us to map back to our data, we haven't advanced the ball and I think that when we look at this list of breakdowns that we were working on with the sequence that we do have to have ultimately in a term agreement, we have to get through scope, load, data, metric and all of these items that you have to have the end one in mind as you are creating the categories.

So I think we just have to be really careful that this exercise is advancing the ball and not complicating.

MR. BOSWELL: Dan?

MR. HARTLEIN: Yeah Dan Hartlein, Twin City Fan. I want to 100% agree with that. We have spent a lot of time on these categories and I think they are pretty solid so it almost feels like the question is in general any concerns? Let's move on. I would add a second thought to that and I think the

only place where we may have departed as an industry from the NODA was the concept of ducted and non-ducted and the difference for that is quite simple and that's we believe that static efficiency and static pressure is the right way to measure the non-ducted equipment where total is the right way to measure the ducted.

If it weren't for that differentiating effect I don't think there would be a need to have that split so to me we should look at these categories instead of trying to reinvent them we should say is everybody cool with these, let's go on to the next subject because I think we can be.

MS. ARMSTRONG: Great.

MS. WOLF: So to maybe put words in Mark's mouth I think that is what we are trying to do is to basically ask can we agree on this categorization of fans for stand-alone?

MS. PETRILLO GROH: This is Laura Petrillo Groh from AHRI. I'm not objecting I'm just wanting to point out that there were several people, several people here who were not in the room for a lot of

those discussions and maybe we would benefit from hearing you know what you came up with and why. Maybe this is common, you know across the industry, I just want to make sure we are all on the same page before we vote and go forward or take a temperature and go forward, it would be helpful for me.

MR. WOLF: This is Mike Wolf, Greenheck. I mean I was going to qualify when Dan said we I think the "we" we are referring to is the AMCA group and the energy advocates who have been part of that discussion, is that a fair statement of who "we" is?

MR. HARTLEIN: Yeah.

MR. COTANIA: Well I think it's really important to sort of get on the record that in the AMCA group that participated there are many AHRI members and divisions of AHRI members who are part of that process so I don't know the extent to which this institutional memory of the AHRI participants who participate through subsidiary -- fan subsidiaries illuminate your understanding but --

MR. WOLF: In fairness to Laura though I think it would be -- we can take a few minutes and go

through that.

MS. PETRILLO GROH: Those discussions were closed and no information of it was shared.

MS. ARMSTRONG: It was on the docket.

MS. PETRILLO GROH: Thank you.

MR. WOLF: So would -- I'm not sure where to take that, what -- is there anything specific Laura that you want to ask in bringing us --

MR. HARTLEIN: Dan Hartlein, I'm asking if Mark Bublitz would be comfortable covering the categories and what we did, he is the Chair of the Committee that did a lot of that work.

MR. BUBLITZ: Mark Bublitz --

MR. WOLF: He wasn't when it was done but --

MR. BUBLITZ: Yeah, yeah, thank you for pointing that out Mike.

MS. ARMSTRONG: Welcome to your new position.

MR. BUBLITZ: I'm stepping up. So we started if you scan the list you will see that wheel type got us started so there is backward, forward and

radial mixed flow and axial. And as I scan the list I can't think at the moment of another wheel type that got us started and then we said well sometimes the wheel and the housing together make a specific combination and that got us into the three houses, Dan do you have a comment?

MR. HARTLEIN: Yeah I was just going to add for the benefit of everybody in the room that functionally you will find that axial fans perform better in a high specific speed meaning lots of flow, minimal pressure generation relative to the centrifugal fan which tends to perform better at a lower specific speed which is a higher pressure relative to that flow.

So the specific speed calculations are the basis for those kind of product categories and there is an increasing performance as you move across that specific speed range where suddenly the axial fan becomes the dominant choice from an energy perspective and then there's also the basis of functionality, so there's some functionality in that as well when turning the corner and getting the

performance of an axial fan or a centrifugal fan, excuse me -- may not be afforded in the footprint of the application so in that border range there's sometimes on both ends there's a clear choice from an efficiency perspective.

In the middle it starts to kind of become almost a functional choice.

Okay, so I just wanted to share that.

MR. WOLF: Mike Wolf, Dan maybe for clarification I should know this but I don't, does that same logic apply to forward curved? Because that's a higher pressure fan?

MR. HARTLEIN: I'm not sure, is Greg here? Can you answer that I'm not sure.

MR. WAGNER: Greg Wagner, Morrison. In the realm of looking at fans from a size standpoint it's a higher pressure capability in terms of total pressure.

MR. SMILEY: Bill Smiley, Trane. It's kind of in between the centrifugal BI and radial and the axial. If you look at it on a specific speed relationship.

MR. WOLF: So this is Mike Wolf again, the reason that I bring that up is that I think there's going to be a lot of discussion around that topic later. Forward curves, I think maybe some of you know the Europeans just came out with their second pass of regulation and I can visualize the graph in my head but I don't know what specifically is on it but they have a break where they have an efficient requirement for forward curve fans I think up to a certain pressure and once it gets to that certain pressure they and Geoff maybe you can help me -- they really raised the requirement because that fan is no longer really the best you know, backward incline becomes a better solution than a forward curved and again I don't know all the technicalities of it but does that sound right to you Geoff?

MR. SHEARD: Geoff Sheard, AGS Consulting. My understanding is talking to the policy officer that he would like to see them regulated off the market.

MR. WOLF: Can you be a little more clear?

MR. SHEARD: I think he feels there are

more efficient solutions --

MR. WOLF: I'm just joking.

MR. SHEARD: Oh okay, American humor, not like English.

MR. BOSWELL: Armin?

MR. HAUER: Armin Hauer, ubm-papst. On the present ballot regulation up until 2000 that took effect in January, 2015 there was just a bend in efficiency curve requirement. In 2017 there have been some proposals to indeed have a jump in efficiency but this is not final yet, it is still being negotiated.

MR. WOLF: Thank you Armin. So Mike Wolf again, so do you guys again to move the discussion forward do we feel comfortable with what's -- I'm sorry go ahead Mark.

MR. BUBLITZ: I can finish my point. Okay so we started with let me be more accurate color types and then if you recall the first NODA came out and there were very broad buckets and we took those broad buckets and compared it against the existing AMCA categories which were really mis-mapped and we

rehashed all of that and we said well instead of a centrifugal fan we think there are distinct differences within this category so it really was there was no communication but there was a lot of give and take between what we had in front of us and our existing definitions and put those together and then there was lots and lots and lots of discussion on how application influenced a product definition.

And it's kind of a mish mash of things that are in and out based on application. If you swept with a broad brush you could put everything labeled axial, axial. So the other little -- the other significant strategy or thing we were trying to accomplish was as we understood it we wanted as many characteristics to be visual right, we understood the NODA to be -- to have a recommendation to say I need to walk up to this fan and identify it.

So there was a great -- there was great pressure to remove application descriptions from product categories and I hope I can communicate how long and painful it was for that list to get to where it's at, but I think that's how we got there and I

would be happy to try to take any questions of that process.

MS. PETRILLO GROH: I just want to make sure -- thank you it was a very good background just to make sure I got the thought process correctly. You looked at impeller types, categories based on specific speed, application impact and visual characteristics.

MR. BUBLITZ: This is Mark Bublitz, New York Blower. We wanted to -- we originally had application in there, dust material handling was in there, and then we understood the NODA to request a move to identify product categories visually, so temperature, dust material handling, we displaced those with more visual and whether that comes to be that's just how we understood it and what drove our decision-making.

MR. HARTLEIN: This is Dan Hartlein, Laura I just want to clarify just a little bit and that is that you laid that out almost like we set out with a matrix to solve these and we didn't. We spent lots and lots and lots of hours debating this, throwing

things at it, seeing what would stick and what wouldn't, but it wasn't like we had a definition from anybody to say go answer these questions. So we did it as an industry to say hey what are the holes here, have we covered it, do we have everything, what are the exceptions and so this is kind of where we landed.

MS. PETRILLO GROH: Thanks Dan I didn't mean to be reductionist about the process. It was really just to get some background information on how you all were thinking about it. Not being the fan expert that you guys are is this inclusive of basically all fans, including those --

MR. BUBLITZ: Mark Bublitz, New York Blower. That's the question.

MS. PETRILLO GROH: Okay.

MR. BUBLITZ: We think we got them all.

MS. PETRILLO GROH: Okay.

MR. BUBLITZ: We think you could put everything in a bucket.

MS. PETRILLO GROH: Thank you.

MR. FLY: Mark Fly with AAON so I want to

just throw a couple of things out there. Is a stand-alone fan is an unhoused centrifugal a fan type? From your guys perspective and I guess -- and I'll throw all three -- my three comments out and then are housed centrifugals in your viewpoint ever applied un-ducted? And does it matter if it's a ducted inlet and a ducted outlet or one or the other because I think performance varies with all of those. And are we too much in the weeds trying to define all of that I guess is part of the question.

MR. BUBLITZ: Mark Bublitz, New York Blower. We were in those weeds a long time and we ended up -- we ended up saying yeah there's all kinds of different -- we think that in most cases those categories are applied in those ducting conditions and to get across the finish line we said oh this is the best we have got, so yes there are conflicting pieces, Dan I'll yield the floor.

MR. HARTLEIN: Yeah, Dan Hartlein. I just wanted to add that when we talk about the differences in our opinion of measuring on static efficiency versus the total, we are actually in the non-ducted

outlets so we are specifically referring to yeah -- a non-ducted outlet.

MR. WOLF: So this is Mike Wolf, so Mark are you proposing something different or I'm sorry, this is Mark, Mark Fly?

MR. FLY: Mark Fly, AAON. I'm not proposing anything different, I'm just trying to understand the thought process going forward so you know the reason for the definition between ducted and non-ducted was to be able to rate the fans in either static or total efficiency and draw a line there, that was the primary driver there.

MR. WOLF: Yes.

MR. FLY: Okay.

MS. ARMSTRONG: Not to be difficult.

MR. SMILEY: I have one question.

MS. ARMSTRONG: Oops sorry go ahead.

MR. SMILEY: Bill Smiley, Trane. If you have a housed centrifugal fan that's not connected to a duct but discharges it to a plenum, that would be classified as ducted on this list, would you use the outlet area then of the housing to calculate the

velocity pressure so you could get the total pressure? Is that how you would do it?

MR. BUBLITZ: Mark Bublitz, New York Blower. If you are in the ducted category that is what you would do.

MR. WOLF: Mike Wolf, Greenheck. But Bill let me understand -- that was our assumption and part of that assumption comes, at least in my mind based on AMCA standard 210 as structured right now and the method of test for those different fan categories. And the method of test in 210 and you guys jump in if I am wrong here, because it has been a few years since I have been real close to the testing.

But I believe the way we do that test is we put a duct on the outlet of that fan to be able to regain some of that energy in the testing process. Now you might take that fan and apply it somewhere where it doesn't have a ducted outlet and we are not saying that you are going to make that a non-ducted fan, and test it with no duct on it.

MR. SMILEY: I guess I was not really staying in the stand-alone fan category I'm sorry.

MR. HARTLEIN: The rest of us are trying real hard to -- this is Dan Hartlein, Twin City Fan. I wanted to add one other thought too and that also we had discussed entered into our filtering and thought process was also the potential and ability to actually have a different efficiency level on the different product lines because this kind of gives you a different range of efficiency level. Everything can't be an airfoil centrifugal fan running at peak efficiency so therefore these products kind of step a little bit and it gives us some flexibility in the future rulemaking in order to set by category a different target efficiency level if that became necessary, so that was the other thing that we had in mind as we created this, thank you.

MR. BOSWELL: And Tom did you have a comment?

MR. CATANIA: Yeah I just wanted to expand a little bit on what Dan just said and that is that you do, you know these conversations at the weed level do matter because you have to periodically step out of the weeds and say where are we going and I

think as we go through this exercise we have to continually do that and say okay, okay what is the significance of this distinction for the objectives that we are trying to achieve and that came up a little earlier when we were having our conversation about connected load.

Not so much on -- we had a separate conversation on more detailed making it a more detailed description of how we have been using connected load but the point is how much does it matter to the overall achievement of the overall efficiency objective and where might be the real issues on utility or any of the other dimensions that have to be considered so I do think as we go through this exercise sometimes we find ourselves in the weeds, we do have to step back and say okay what is the purpose of this exercise.

MR. WOLF: Dan?

MR. HARTLEIN: Yeah Dan Hartlein. One other point of clarification as well as I think back to this process -- we also talked quite a bit about the fact that we don't always determine how the fan

is applied when it ships from our factory. So the way that we looked at that as it came to ducted and un-ducted is that if it is shipped in a potentially ducted outlet configuration, we would call that a ducted fan, we would comply with the ducted requirement because we don't -- we simply don't know when the fan ships whether it is going to be applied you know, if it has an outlet flange maybe it is likely but who knows for sure so we just kind of concluded that we would see that as a ducted fan if it is shipped in an outlet configuration that was allowed to be ducted.

It takes the application question out of it right?

MR. WOLF: Joanna?

MS. MAUER: Dan I just want to -- this is Joanna, I just want to make sure that I am understanding what you are saying because I thought we were talking about you know if the fan is in one of the categories below, in the ducted column, it would be test rated as a ducted fan, is that what you are saying?

MR. HARTLEIN: That's essentially what it was.

MS. MAUER: Okay.

MR. HARTLEIN: Sorry, Dan Hartlein, yes.

MR. FLY: Mark Fly, AAON. But there's not a requirement that it be applied as a ducted fan.

MR. HARTLEIN: Dan Hartlein, that's accurate.

MS. ARMSTRONG: I think we will get to the ducted, un-ducted discussion when we talk about potentially a metric and test procedure conditions. One thing you probably have noticed if you took a deep dive into the NODA, DOE didn't differentiate between ducted and un-ducted. At the point of -- I'm not sure we exactly agree we will have that conversation, but let's first talk about these categories to get back to it and can we at least all agree that fans meeting for lack of a better term, the definitions in these categories should be in scope.

MS. WOLF: As stand-alone fans.

MS. ARMSTRONG: Well --

MR. WOLF: We are going to get there, we'll go to Brooklyn trust me. So temperature?

MS. ARMSTRONG: Temperature.

(People holding thumbs up)

According to my friend at the microphone, yes.

MR. WOLF: Okay so --

MS. ARMSTRONG: Okay so it's all thumbs up and one abstained.

MR. BOSWELL: I think two abstained.

MS. ARMSTRONG: Are you abstaining, your thumb is up.

OFF MIC: State the question?

MS. ARMSTRONG: Do we agree that those should be in scope for standards?

(People holding thumbs up).

MS. ARMSTRONG: Okay.

MR. SMILEY: A point of clarification in option one, stand-alone fans?

MR. WOLF: Stand-alone yes.

MR. SMILEY: You didn't state that. Okay, excuse me Bill Smiley, Trane.

MR. WOLF: Sorry Ashley, yes for stand-alone fans, okay. So now to address Ashley's thing maybe what I will propose here is instead of going down the scope of definition load, as long as everything is kind of agreeing on this and did anybody object to this? We had some people that weren't sure, I think probably because they don't know if number one impacts number two or three. So what I would propose take a temperature again is if we can agree that this group of fans should be in scope as we all kind of have it envisioned in our head, there are probably some details that we have got to work out here, trust me there is -- then could we go and start talking about category two, which ones of these fans -- these stand-alone fans potentially get used in non-regulated products?

So they get put in another piece of equipment. Temperature on that would everybody agree with taking that on as the next discussion topic?

MS. PETRILLO GROH: I would actually be more interested in hearing about what's on slide 53 which seems to be the rest of what was discussed

previously with the AMCA members.

MS. ARMSTRONG: You don't have it you are not going to find it.

MS. PETRILLO GROH: Or it's --

MR. FERSTROM: So Ashley this is Gary. By agreeing to including these we are not presuming anything not here is excluded right, thank you.

MS. ARMSTRONG: Correct.

MR. WOLF: Is this is the slide Laura?

MR. HARTLEIN: This is Dan, Gary I would be shocked if there's anything not on that list, but I would be really curious if you find something, it would be interesting. We have been pretty -- I think we have been pretty thorough here.

MR. FERSTROM: I have a little -- Dan, Dan this is Gary. I have a little axial fan powered by battery operated motor on my beanie and I wanted to make sure that it wasn't going to be excluded.

MR. HARTLEIN: This is Dan, I think it depends on if it is a rechargeable battery or not.

MR. WOLF: So --

MS. ARMSTRONG: So I actually think you

should go back to 8 because I think you should proceed with the discussion in terms of are these fans actually embedded products that are unregulated and what should we do for those?

MR. WOLF: So I will go back to that question from a process standpoint would everybody feel comfortable with moving on and discussing this slide relative to fans and fans in non-regulated products?

MR. FLY: And you are saying are all of these included, this is Mark Fly with AAON. Are all of these included? I would agree that they are and I am completely talking out of turn because I don't know anything about it but cross flow fans is one of them that comes up and embedded, unregulated products that isn't in there.

MR. WOLF: Laura, you have got a question or a suggestion or comment?

MS. PETRILLO GROH: I was just curious if the centrifugal powered roof and wall ventilators and the actual powered axial powers roof and wall ventilators were considered fan types or equipment

types, I don't know.

MR. HARTLEIN: This is Dan. An area of great debate for us in that arena and after much, much consideration I think the ability for it to operate independent as a fan kind of put us to the side of saying that's a fan. So we kind of concluded that that was a fan is where we were, that's an -- you know, that's an independently testable piece of equipment as a fan and the parts of it can't work.

MR. WOLF: Laura I guess I would propose we come back to that discussion because I really think that's going to open up a whole other can of worms.

MR. HARTLEIN: It's going to take you down the other path.

MR. WOLF: Yeah.

MS. PETRILLO GROH: Okay so we will look at everything but those.

MR. WOLF: Yeah so maybe if we can just get through and again I'm not trying to force it if you guys have another idea.

MS. PETRILLO GROH: That's fine, I just

want to be clear about what we are talking about.

MR. WOLF: Okay so maybe well okay, all right. So I guess the question I would pose is this group of fans and I don't even -- I mean maybe first of all let's talk about what are non-regulated products? Could somebody give me an example of those or maybe I will start out with giving what my understanding of what non-regulated product is that my company manufactures and I think Nick this is where you jump in too maybe if you want -- like an energy recovery ventilator.

I know this has been a topic with AHRI I think it's one of your product categories right Laura?

MS. PETRILLO GROH: Yes.

MR. WOLF: But it is a non-regulated product right?

MS. PETRILLO GROH: Correct.

MR. WOLF: So okay so correct, so Mark -- Mark Fly you had the comment this morning that an ERV unit we have got two fans. So you know, so we are regulating those fans then in that ERV unit whether

we are or aren't I guess. Let me back up -- that would be an example of a non-regulated -- a fan that would go into a non-regulated product.

Another example that I have would be a piece of equipment that goes on you know most restaurant and kitchen applications. It's a makeup air unit, it has a lot of the same components as some of the unitary stuff I guess that we have been talking about with regard to heating and cooling, sometimes it doesn't.

But to my understanding that's a non-regulated product. Is that -- am I correct on that?

(Only a few thumbs up)

Okay any other examples that would fall into this that we ought to give consideration to as we continue the discussion here?

MS. MAUER: This is Joanna. I think one example would be unitary equipment but that have equipment with capacity that is greater than 760,000 BTU's per hour which are currently covered by DOE standards.

MR. WOLF: So I guess let me ask a point of -- Ashley how do we get these things kind of noted?

MS. ARMSTRONG: Do you want me to type?

MR. WOLF: Yeah please.

(Ms. Armstrong to front to type on slides).

MR. HARTLEIN: This is Dan. I just want to understand the exercise here. So we are going to create a massive list of places where fans are used in another piece of equipment that is unregulated. Might I suggest that that is going to be 90 to 1,000 pages long and we probably should talk about where they are actually regulated because that is a very short list.

MR. WOLF: Okay so this is Mike Wolf so you suggest that we jump to number three first?

MR. HARTLEIN: Well I am just saying that creating this list is going to be huge when you include industrial and commercial applications of a fan inside another piece of equipment, it is going to be a massive list.

MS. PETRILLO GROH: Probably the main discussion is to fans one horsepower and above for this too?

MR. HARTLEIN: That's a good question.

MS. ARMSTRONG: Let's start there we'll see how this goes. So just as a fundamental before we create the list Dan had a good point. We could be here all day creating a list of endless examples. Can we take a temperature? Do people have a fundamental objection to fans that are in unregulated equipment being in scope? So fans that are -- fans that are of these categories then unregulated equipment. Does anyone have an objection to those being in scope for standards?

MR. CATANIA: I have a question there. That doesn't preclude them being then later classified for an exemption if there is some good reason for that particular one to be exempted right? This is just we are starting big and then --

MS. ARMSTRONG: Starting big and go back to -- but as a fundamental big picture because then the list becomes irrelevant. If we all fundamentally

agree with the premise then we can move on, then it really becomes about bucket three.

MS. PETRILLO GROH: This is Laura Petrillo Groh from AHRI. There are a few equipment types that are tied directly to where the fan operation is tied directly to heat rejection that we would -- that we are not going to agree to yet.

MR. FERSTROM: Ashley this is Gary. How would we know which of these fans would be going into non-regulated equipment if they had the potential to be installed in different kinds of equipment, regulated, non-regulated, et cetera?

MS. ARMSTRONG: So I think you just jumped us back to this morning's discussion where we were -- I mean point well taken, I agree right, just generally as a premise it is hard to know from the point of the fan manufacturer where ultimately these things will have to go. So what I think we were trying to do though is talk through some of the finer details and maybe save the more sticky issue for the area where it might only exist.

MR. FERSTROM: Okay well putting that

aspect aside for the moment you asked a good question and I support these categories for unregulated equipment.

MS. ARMSTRONG: Others?

(People's thumbs up).

MS. ARMSTRONG: How about raise your hand if your thumb is not up, Mike is it down or sideways? You're going down, really?

MR. WOLF: I can switch in a heartbeat, trust me.

MS. ARMSTRONG: You are standing very close to me you know.

MR. WOLF: It's a playground.

MS. ARMSTRONG: Okay.

MR. WOLF: Since my thumb is down can I go?

MS. ARMSTRONG: Yeah, thumbs down.

MR. WOLF: Mike Wolf from Greenheck. So this comes back to and since I guess my question to the group is if we go to this product right here as an example all right -- this product I don't -- this product could fall if we go back to the -- so this is

I think everybody can relate to so I can't walk away from the mic and point so if you look at this blower right here I think everybody is -- take a temperature, everybody would recognize that as a scrolled centrifugal blower, would that be a fair statement?

MS. ARMSTRONG: The top one is a laser.

MR. WOLF: The top one? Can you see it I can't see it.

MS. ARMSTRONG: It's right there.

MR. WOLF: I can't see it sorry, I'm color blind I guess. Maybe -- so the question I have relative to this particular product okay because we are you know, Laura you kind of touched on it a minute ago so if you look at the fan over here in my mind I would say that's a power roof ventilator. It goes on a roof, it's got power -- I think we don't have a definition of a power roof ventilator I don't think but in terms of the way I envision it I would say that's a power roof ventilator.

But it is also a centrifugal housed blower so now this piece of equipment right here by our

definition I would say is an unregulated product, okay. So for purposes of regulation the thing that I am unclear of is -- does this get regulated or does a scroll blower get regulated? And what I am hoping is if we could work our way through this exercise and hopefully it is a pretty simple one, it will help us when we get into the further discussions on embedded and regulated products. So what's the yeah Armin?

MR. HAUER: Armin Hauer, ebm-papst. I think it would be easiest if we regulated scroll blower.

MR. WOLF: Mark?

MR. BUBLITZ: Mark Bublitz, New York Blower. In looking at the picture I just ask the question could we say if the fan exists on its own and it becomes the category. But if the fan was -- if that power roof ventilator or if you couldn't pull the fan out unless it was just a pile of parts or the housing was an integral part of the roof ventilator, then that wouldn't be the fan. The whole thing would be the fan.

Is it a free-standing issue, have you guys

struggled with any of those thoughts when looking at your fan categories?

MR. WOLF: So Ashley I think Mark's directing that question to the DOE, have we struggled with that concept before?

MS. ARMSTRONG: Yeah so we can do this a number of different ways. I think one of the things we had on our slides before was we had considered a definition for housing and this is part of the reason why and so to the extent something is not that definition then we could point to a way to regulate that piece of equipment.

MR. WOLF: Do we want to pull that up and look at it?

MS. ARMSTRONG: It's just a fan inside a box, that's all I see.

MR. BUBLITZ: I'm sorry could you be more clear on your comment about housing? I think I know where you are going but --

MS. IYAMA: So this is Sanaee.

MR. BUBLITZ: Thank you Sanaee.

MS. IYAMA: I think one of the ideas behind

listing the basic parts of a fan in the fan definition was to get a sense of what's the physical boundary for a fan. Like is it just the impeller, is it the impeller and shaft and the structure or the housing? And when we say housing, what do we mean? Is the housing also something that serves as a structure for the fan or just something that can be easily removed?

So maybe one thing to consider is what do we define as the basic parts of the fan meaning the parts that need to be here for the fan to be able to be tested.

Maybe that could help sort of deciding whether this is a PRV or not.

MR. WOLF: So this is Mike Wolf, is this a question or suggestion or something we can reference?

MS. IYAMA: It's just a suggestion.

MS. ARMSTRONG: What is the suggestion, I think that's what they are asking?

MS. IYAMA: What?

MS. ARMSTRONG: What are we asking, if we

base it off of this right where we said --

MS. IYAMA: Do we agree on the basic parts?

MS. ARMSTRONG: Yeah so if we agree about the basic components of a fan, are an impeller, shaft, bearings and a structure or housing and then we go forth and say you know the structure is any integral component of a fan necessary to support the impeller and then the housing any integral component of the fan that directs flow into or out of the impeller and/or provides protection to the internal components, a housing serves as a fan structure would that do it? Would that help with this differentiation problem?

It's on slide 49 for those that have the print outs from yesterday. You don't have it because it is in the other -- oh you have the other slides out apparently, 48.

MR. HAUER: This is Armin Hauer speaking. Now with a PRV like that if we define that PRV is a fan and then you have this PRV different versions, maybe for hurricane rating or for a different outage configurations, would you then like to see for PRV's

different minimum efficiency levels based on this exterior arrangements? I think it's really not doable.

MS. ARMSTRONG: I don't think we would want to see that.

MR. WOLF: This is Mike Wolf. I wouldn't want to see that. I mean part of the eloquence of the FER that is in the last NODA is that we can use pretty much the same you know metric across fan types so it keeps it very simple so I think my initial response is no.

MR. HAUER: This means you have to leave the louvers and everything outside of the PRV away from your consideration so it would not be a fan.

MR. WOLF: Well I guess I'm going to defer to somebody here that put these components -- that's a great question I agree, I don't know the answer though.

MS. ARMSTRONG: So this is Ashley from DOE. I mean we do have I think elements in our regulations that could deal with that. I don't think the idea would be for every different combination of

components or accessories or housing structures that are built for different environments would necessarily have to be tested and rated.

I mean we have a variety of different ways we could deal with that but that definitely wasn't the intention, no.

MR. FLY: This is Mark Fly with AAON. So just to kind of push that around and so I get a better understanding of your interpretation, let's take a simple air handler which is a fairly high volume HVAC product that's around the industry and it has a filter, a coil, a fan discharging and so and let's say for the sake of argument that the structure that supports the fan impeller is integral to the cabinet which happens on smaller air handlers many times.

So is the coil included? Is the filter included? Is the whole cabinet from inlet to outlet part of the fan because that's the housing? And I'm talking about and a housed fan, let's say is the discharge -- because you can't pull that impeller and motor out, it falls on the floor by itself.

And I guess I'm asking your interpretation -- how would you see that, or do you know?

MS. ARMSTRONG: I mean I think that's up for discussion right. I think that's part of what this was meant to be. You know it could go either way, obviously I think you have to have some type of a structure there that makes it a fan, now whether it needs to have all of the components that are going in that cabinetry as well, that could be discussed.

MR. FLY: Mark Fly with AAON again. And so if we test it without the components we are testing it in a configuration that will never be reapplied.

MS. ARMSTRONG: I understand.

MR. HARTLEIN: This is Dan Hartlein from Twin City Fan. There's also a range of products called plenum fans that can run obviously independent so it is a fan in and of itself even though it's an unhoused centrifugal fan typically. And then there's the range of product where it's really not a fan until it's built in so my question would be when that happens so if an air handling unit manufacturer buys

a wheel from a fan manufacturer, when does that become a fan at the point that it's testable as a fan so the point of regulation in that case would not be the impeller -- the point of regulation would likely be when it was built into that cabinet is that correct?

MS. ARMSTRONG: (Nodding).

MR. HARTLEIN: Okay thank you.

MR. WOLF: Laura?

MS. PETRILLO GROH: I have a question about the thought exercise that we were going through. Can you go back to the pictures, if we know what slide that is.

MR. WOLF: I'm sorry the picture that --

MS. ARMSTRONG: It's a website.

MS. PETRILLO GROH: Oh I'm sorry it's a website here. So testing of this product which is a -- is that a power roof ventilator?

MR. WOLF: It depends.

MS. PETRILLO GROH: Half of it? So can you test the fan by itself?

MS. ARMSTRONG: Yes.

MS. PETRILLO GROH: And you can test the power roof ventilator too?

MR. WOLF: Yeah.

MR. SMILEY: Bill Smiley, Trane. That would apply to this particular example but all power roof ventilators do not necessarily have a stand-alone fan installed in its entirety and in the closure. Sometimes you have the power roof ventilator impeller, the rest of that unit structure and everything is part of the housing of the entire power roof ventilator. So yes and no.

MR. FERNSTROM: This is Gary, the power roof ventilator is this thing that goes on the roof that sucks the air out of the building and discharges that --

MR. WOLF: Gary, I'm sorry Mike Wolf here. I'm going to stop you there. It doesn't always suck it out of the building, sometimes -- in this particular case, that's why I brought this up this is blowing it back in to the building sorry.

MR. FERNSTROM: Well anyway what I was trying to do is differentiate between the shroud and

the actual air movers inside and you know here you have a sort of a cubicle shroud and one sort of an air mover. As was pointed out earlier you might have the fan being part of the tube and it could be all one piece of equipment.

MS. ARMSTRONG: So I think we could talk all day about potential different variations and configurations thereof and how they could or couldn't be so you brought up this lovely example, how would you test it? How do you want to test it?

MR. WOLF: I guess let me answer this is Mike Wolf, Greenheck. I guess I will answer it two ways, number one the way that it is tested today is we test it as a unit like is shown on the left here okay. So we test it like I would envision testing a power roof ventilator.

For purposes of this regulation to keep life simple for everyone I would propose testing this fan on the right because based on the description of the slide that we just looked at this component here has an impeller, it has some drive components and it has a housing. Now the fact that we put a secondary

housing on it for purposes of utility that's called, because that is all it is there for.

And the utility in this case is we are trying to prevent from sucking rain and snow and debris into the building so it's really a question of utility at that point and the fan itself is this component -- I'm sorry the one on the right. So the answer to your question to ask me what I would suggest or propose for this rulemaking is the fan be regulated at its most basic level and Mark I think that's what you were saying to this earlier.

MS. ARMSTRONG: Yeah so DOE agrees with that.

MR. WOLF : Okay.

MR. HARTLEIN: I would add a little thought to that. Basic I think could be further defined as a basic testable configuration because we have got to -- to comply with the regulation it has got to be testable and provable or some alternative, what do you guys call it, ADEM, EDM I think --

MS. ARMSTRONG: You got it.

MR. HARTLEIN: I'm getting much better at

it.

MR. WOLF: Could somebody define what that is for the people who might not know.

MR. HARTLEIN: That's Alternative Efficiency Determination Method.

MR. WOLF: And what is that and where would it be used and how does it apply to this?

MR. HARTLEIN: Well for example the example I would use is that if you were shipping that fan as a bare-shafted fan meaning no motor and belt drive, there would be an acceptably calculable method that would estimate the wire to air, the conversion of the electrical power to the mechanical power in order to make the fan work, so to me that would be a calculation that would allow us to include the motor and I believe AMCA 207 has been established to do exactly that as an industry standard.

MR. WOLF: Okay so this is Mike Wolf from Greenheck again. So I get that, you wouldn't consider extending that to say housing or casing losses or would we? And I'm thinking of Mark Fly's situation where okay we are going to put this fan in

something, and do I test it with everything in there or can I come up with some generic casing losses to estimate what the performance is going to be.

MR. FLY: This is Mark Fly with AAON. So are the system effects imposed by putting the fan inside of a box in or out of the regulation?

MR. WOLF: Well I'll take -- this is Mike Wolf again, I'll take a shot at answering. Based on what I am hearing right now as long as the fan has the components of an impeller, a drive and housing, allow it to be supported on its own then it would be tested that way. Now if you have got -- let's take this example because everybody can visualize.

Let's say that I don't have this housing here, I actually build the fan into this thing on the right. I built some kind of a drive frame assembly and I figure out how to get rid of all this extra stuff here on the right and cut the cost of this thing by just putting an impeller and a drive mechanism in this outside part now becomes my housing.

Now I would be required to test that fan

that way. I don't know if that answers your question or not Mark but --

MR. HARTLEIN: Mike this is Dan Hartlein, I would add to that as well that typically that that exchange that you just did was a trade of cost for a lower efficiency. So in that situation I would think that would have to apply so we are trading costs for a product that doesn't work as well. It may work well enough but it doesn't work as well so that scroll is specifically designed to effectively capture that energy which is an expansion outward, right? It's a radial expansion that is then captured and channeled into a flow that we can use.

MR. WOLF: So Dan, Mike here again. So I would say you could make that assumption, who knows maybe there's some smart guy in the room here that figures out how to make the fan more efficient without that housing and extra cost and now it's really a case of he's built the better mousetrap and we want to regulate that poor mousetrap.

MR. HARTLEIN: This is Dan Hartlein again. And that the plenum fan industry exists because of

that point. That fan, actually that duty point is more effective than the housed alternative so in that case we have done precisely that, we have made the fan less expensive and, not but -- and more efficient so we have done both.

MR. FLY: I was going to say -- this is Mark Fly with AAON. I was going to the same point so also I have the ability of that particular fan in the work it needs to do and maybe it needs to move air at a lower velocity than would be typical of a housed fan. So -- on the other hand how do you deal typically in an AMCA arrangement you test a plenum fan in a completely open discharge application and I'm not aware of many places where a completely open discharge is the application.

So going back to my air handling example with Ashley, so could I take the discharge plenum off of it and test it because I can test it in a 210 arrangement by just taking the walls off the discharge plenum and it's tested in a 210 un-ducted discharge plenum fan arrangement and it may -- and I won't have to take the outlet losses of having the

exit off of my plenum, so there's lots of ways.

MR. WOLF: So I'm sorry Mike, was that a question to Ashley or is it just a comment that we have to work through?

MS. CATANIA: Tom Catania, AMCA. You know I think that if I'm understanding the functional elements of this shroud here to me the distinction you folks are talking about is the distinction between a component part or housing that performs that has a functional role in the movement of air process as opposed to something nearly protecting against external elements or you know, that sort of thing and if it is part of this core function of using energy from the utility supplied portion of the grid, I guess if you are really going to find distinctions, that's in the sweet spot of what we are trying to address here.

If on the other hand this component is only there for protective purposes or something and is not affecting the conversion of energy into air movement activity, then it would fall outside. My question would be are there any broad categories of

things where you have a large chunk of connected load where there is a real debate as to whether or not that add-on component is being used for functional purposes versus protective purposes.

Because to me that's the only reason to spend any more time on it -- if it is just sitting there like a hat on top of the thing, a rain hat then I don't know why we would want to spend too much time on it.

MR. FINE: Are you saying that you want to limit your definition of a fan to just that which those I guess components or those -- that part of the structure that actually transfers usually electrical energy into moving air?

MR. CATANIA: Well I'm always -- I'm very reluctant to you know, have -- so flippantly offer such a fundamental definition but what I am saying is I am trying to deal with this category of parts that are associated with the fan that don't really play any functional role in the activity of moving air.

MR. FINE: In the fan part.

MS. JAKOBS: This is Diane and those louvers direct the flow into or out of the impeller. You know based on the housing definition they are applicable.

MR. CATANIA: Yeah well I agree with that because that goes to this whole -- I agree with the part of what you just said that goes to the issue of is it part of the role of converting energy into air movement, but that's not the example we had on the screen, the component part we were talking about didn't perform any role like that, if I understood correctly.

MS. JAKOBS: Well it directs the air to the impeller and also the energy consumption would be different with and without the louver.

MR. SMILEY: Not in this case.

MS. ARMSTRONG: Diane not in the picture that was on the screen.

MR. SMILEY: Not necessarily, I mean that could change the way -- Bill Smiley, Trane -- those louvers could change the way the air goes into the inlet of the housing which can change the way that

the impeller interacts with the air.

MS. ARMSTRONG: And so I mean you guys -- we can change this definition. They are talking points, they are a starting point. I think the fact that what we are trying to do though is explain that just functionally from a testing standpoint some type of housing is needed and if that's this integral housing -- I agree with the comments in the room about this idea that and external housing that's added separately, that has a specific utility and the many variations thereof that might be offered with a given fan model that already has its own housing to the fan are extraneous for the point of this regulation.

And I think that's what is important. I mean at least we all fundamentally agree with that point. Yes? Yes, yes, yes.

(People thumbs up)

MR. WHITWELL: So this is Bob Whitwell from Carrier. Just to clarify Ashley so using this example here, this fan and this housed centrifugal fan can be applied in this roof ventilator could be in an

air handler that sits up on a roof, could be in a large rooftop unit. In all of those cases this would be tested with just a fan and the housing I think is what I am hearing as proposed, correct?

MS. ARMSTRONG: If it's included in those other parts with the fan and the housing, does that make sense? The answer is yes as long as -- I think we are fine.

MR. WHITWELL: Yeah so this fan --

MS. ARMSTRONG: As long as all the components on the right are there.

MR. WHITWELL: All the components on the right meaning not the cabinet but meaning that?

MS. ARMSTRONG: Yes.

MR. WHITWELL: And the fan?

MS. ARMSTRONG: Yes.

MR. WHITWELL: So in a non-regulated product this fan would be tested the same way?

MS. ARMSTRONG: Yes and not all the variations thereof that might be applied.

MR. WHITWELL: Right.

MS. ARMSTRONG: Correct. Do you agree

with that? Oh you are not voting.

MR. WHITWELL: Yes unfortunately I'm not voting in this one.

MR. BOTELER: This is Rob Boteler with Nidec. Am I on? This is a little bit and you guys are going to learn this -- this is a term we call basic model and that's where you are headed. And in the motor world we have basic models, we only have 156 of them and then we -- whoops, put different mechanical components on there or we put seals and we still only report back to DOE based on the basic model.

And in motor that's horsepower speed and enclosure, we only have those three caveats that define the basic model. Try to keep the amount of product that you have to manage, the skews that you have to manage once you get going to a minimum, instead of adding all of the mechanical variations that you have.

MR. HARTLEIN: So Rob, this is Dan Hartlein, Twin City Fan. The challenge we have in this room and in this industry frankly is that I don't know of a motor supplier who sells the rotor

and someone else puts it in their housing or their stator. So I know that happens on large equipment but in your -- I don't think -- does that happen in your industry?

MR. BOTELER: We sell thousands of them every week.

MR. HARTLEIN: You do.

MR. BOTELER: Yeah we sell a rotor and a stator to a manufacturer who installs that possibly in a pump or possibly in a fan.

MR. HARTLEIN: Right.

MR. BOTELER: And when that occurs --

MR. HARTLEIN: Okay.

MR. BOTELER: If they still then meet the 9 caveats of what is an electric motor they just became a motor manufacturer.

MR. HARTLEIN: So they are at the point of regulation then.

MR. BOTELER: If they meet the 9 points in the regulation.

MR. HARTLEIN: Right, got it, good thank you, I didn't realize that. I always pictured a

motor as this self-contained --

MR. FERSTROM: This is Gary. I always pictured a fan as this self-contained thing.

MR. HARTLEIN: Point well taken Gary. Little did you know.

MR. WOLF: Well okay --

MS. ARMSTRONG: Go ahead, I mean --

MR. CATANIA: I am happily -- I have some remote intelligence being conveyed to me by people who really know what they are talking about in this area and apparently there are some categories of fans where the weather protection also is not removable and has to be tested that way so I will leave it to you guys to explain that in more detail but we don't want to let that get lost here, it should still be covered, including that piece.

MS. ARMSTRONG: So you guys can't see our notes over here as we are scribbling away but I think we see you know, from a simplicity standpoint and we see kind of two buckets and that is what is what I would call just the fan and this testable configuration that has the impeller et cetera and the

housing and then we see what I would call an embedded product which doesn't, you know, by its parts it's not in a testable configuration and adding additional things to it -- it is actually basic parts and it is not -- it doesn't become a testable configuration until it is actually included in a larger product.

And I think that those are the two categories that we are talking about and there are ways to get to the same answer for both. And so -- and some of it maybe defaults and some of it may be certain type of testing, some may be system losses that are default values, I don't know what the right answer is but I think those are the two buckets that we are talking about.

So really to me it comes down to what is the definition of this testable configuration. What is a testable configuration look like because if a fan has already been tested in a testable configuration and you are just adding additional parts to it for utility reasons or otherwise, you know I think we could have the conversation but generally speaking I don't think we need to test it

in every optional part that may be added to it, at least that's my personal opinion.

I don't see a reason why we wouldn't go down that pathway that would address what was on the screen. It doesn't address all of the issues in terms of when I don't have a testable configuration and I am an actually embedded to get my testable configuration what do I do -- but at least for those that have a testable configuration, regardless of whether they get embedded or not or added to later.

I mean do people agree that those should be in the scope for standards? Temperature check?

(People thumbs up).

MS. PETRILLO GROH: Housed specifically?

MS. ARMSTRONG: It doesn't matter, housed or unhoused as long as they have a testable configuration.

MS. PETRILLO GROH: But I think that takes us back to the previous discussions about embedded products, I'm not entirely sure.

MS. ARMSTRONG: It wouldn't impact the embedded products as long as they had a testable

configuration first. If you are ultimately adding it to -- so it goes back to Bob's example that he just got up -- if I add Mike's unit from if you are looking at the screen to the right -- if I ultimately add that to an air handling unit or something else, it had a testable configuration already. It was tested, it was rated, it was regulated as a whatever that is -- centrifugal house fan.

It otherwise doesn't need to be rated in all the different options that may be offered in the field.

MR. FLY: This is Mark Fly with AAON. So any system effects that happen in application no longer matter is what you are saying.

MS. ARMSTRONG: I think it depends on if it's --

MR. FLY: It certainly simplifies the process.

MS. ARMSTRONG: The systems -- so that's up for discussion but we could argue that the systems' effects could be perhaps not considered for those fans offered as a testable configuration

period. Now for those that aren't we have to talk about system effects.

MR. WOLF: This is Mike Wolf here, let me go back to Laura's question. Laura your question specifically was related to housings so can you repeat the question?

MS. PETRILLO GROH: If I can remember back that far. I just want to see if the temperature that we were taking was for housed fans or embedded fans or bullets at this point because there has been -- there are, at least on slide 51 you know, there are a few fans on that list as a possible scope of negotiations that are unhoused and I don't know then you know, I'm not intimately familiar with the testing of those fans in the unhoused configuration or how that plays into what we have been discussing now.

Is that a testable configuration as an unhoused you know axial unhoused, centrifugal unhoused.

MR. WOLF: This is Mike Wolf again and I hesitate to do this because I feel like we might be

making progress here but to the definition that I just heard you describe Ashley is okay if it is an testable configuration then that is all there is to it.

(Ms. Armstrong nodding yes).

MR. WOLF: Okay so feel free to jump in here if I am out of line anyone.

So I could take the scroll off from this fan and now it's an unhoused centrifugal fan which is one of the categories that we have I think here as an un-ducted --

MS. ARMSTRONG: It's on the next slide.

MR. WOLF: So an unhoused centrifugal fan is going to be the simplest, most basic what was the term you used Rob? Basic model I mean quite honestly that is the basic model for a good portion of what we do. So let me just stop and take the temperature or ask Ashley specifically is that what you were implying, because you just made this thing a whole lot simpler?

MS. ARMSTRONG: I don't think necessarily.

MR. WOLF: I didn't think so.

MS. ARMSTRONG: Yeah so I think it depends -- I would think I was defining testable configuration as inclusive of housing, right that I think that in order to test this thing, but perhaps you can correct me if I am misguided.

MR. WOLF: Okay so let's go back and where's our definition of housing.

MR. CATANIA: And Mike let me try something here. If you can also go back to the picture for a second -- and the general comment while he is bringing that up that I would make and this is Tom Catania from AMCA -- is you have to be really careful about trying to put people into gotcha language here and I'm arguing on behalf of Ashley a little bit here because when you are trying to do this thing on the fly, if somebody makes a very strong declarative statement -- are you saying "x" and then we start writing and then blah you know, this is a complicated industry and there's lots of complicated examples and so you can't declare victory for example if you know, in the press of the moment somebody says yes and then they have to come back the

next day and say oh well somebody explained to me three different variations here where this doesn't apply.

But in the picture that you had, to me what we are talking about here is with the exception of some specialized fans where the weather protection is so connected to the product that has to be tested that way but it doesn't perform any other function other than weather protection, in this kind of situation if somebody came up with a design that said you know, a pyramid shape is a lot better for rain redirection than a flat shape, we are certainly not contemplating that you would have to test you know, this configuration in the diamond shape rain protection versus the flag-shaped rain protection and so forth and it is only in the example you gave where you took otherwise the housing off the of product.

Now we are talking about a functional housing so I think -- I think that's the nature of the distinction that we are talking about here, not you know sort of this categorical definition. I got a little nervous with the way you said it because it

sounded very kind of "gotcha". If you commit to this then I have a whole series of things that I know that you have now agreed to.

MR. FLY: That was not my intention.

MS. ARMSTRONG: Yeah it's definitely not all systems right? I mean that's just clear. It has to do with what we defined as testable configuration it really comes on to those three terms. I don't think it's as simple as just a fan, an impeller let's put it that way. But I also don't think it's every application that a fan may be applied in the field I think we can simplify this, so.

MR. FLY: So this is Mark Fly with AAON. And you know part of what I am trying to get at thinking along the line of basic models which are embedded in my brain you know -- if I have a 15 inch unhoused plenum fan, is that a basic model or is that model different in the 5 boxes that I put it in?

Is that 5 models or 1 model and I'm not trying to get anybody, I'm just -- at the end of the day we have got to draw something explainable that's clear to anybody who was not sitting in the room

during all of this discussion to figure out what it is and so we need a lot of clarify here.

MS. ARMSTRONG: So I think it's hard to have that type of detailed discussion unless we actually agree to what types of fans we are talking about.

MR. SMILEY: Bill Smiley, Trane. If we say okay if you can pull the fan out of the application and test it by itself it meets one level of performance requirement. But if you test it in its application it needs to meet a different level of performance requirement? Because I assume that we are going to define at some point in time, here are the targets that we are shooting for it has to be this or better or why are we doing this.

If you pull a fan out and test it by itself and say okay use this fan because it's really efficient you have to stick that in the unit, you stick it in the unit and it doesn't work as well in the unit as a lesser efficient fan would work in the unit. Would you consider saying okay you can either test the fan by itself or you can test the unit by

itself and whichever is better or whichever meets the target, that's what you go into production.

Because I think that can happen, I have seen it happen where you use a less efficient stand-alone fan in the application and it works better than a more efficient stand-alone fan in that same application.

MS. PETRILLO GROH: I have a question.

MS. JAKOBS: Do you mean for better that it uses less energy?

MR. SMILEY: Less overall energy in the unit which is the whole goal, not just less fan energy but so what I am asking is how are the regulations going to apply in a situation like that because we don't want to have unintended consequences which that could push you into if you are not careful.

MR. WOLF: This is Mike here again, I guess Bill let me just and I know we are way off from what I was proposing but I think what you are describing, you are back into the regulated discussion. If you have a product that does heating

and cooling -- okay right, but okay -- I'll try to summarize what I think I heard you say.

I think Greg you jumped on this this morning a little bit in our break-out session is I could have a fan just for discussion purposes, as one of these fan categories and to take Ashley's description and say okay we are going to define a fan as something that is testable, that's the term that I heard Ashley use. We have a testable configuration for that fan and that's what we are going to regulate.

If it's possible to take that testable configuration, let's take an unhoused plenum fan and I can have an unhoused plenum fan sitting here that's very, very efficient in a testable configuration but put it into something else that now directs the air differently at the inlet outlet and have that fan consume more energy than when it is tested in its DOE regulated testable configuration and that's the unintended consequence here. So --

MR. SMILEY: Yes, Bill Smiley with Trane, and to follow up further if you took a stand-alone

fan tested that was not as efficient as the one that you have just described and put it in the unit and it used less energy than the more efficient stand-alone fan did in that same unit.

MR. WOLF: So this is Mike again I'm going to kind of circle back here because I guess my question is, is that and I don't -- this is probably where we don't have the day, is that an isolated situation? I mean is that a very like move the dial type, if we do this we potentially create an unintended consequence using more energy than before this regulation?

MR. HARTLEIN: Hey Mike?

MR. WOLF: Yeah?

MR. HARTLEIN: Dan Hartlein, Twin City Fan. There's an assumption in this discussion that one of those fans is permitted by the regulation and the other one is not and I haven't seen much yet in this whole process that would suggest that that could be a problem. That's a functional level setting so if the levels are set and both of those alternatives are still available to the market, then that's maybe

some of the weeds that we can avoid, right? I mean it's not necessary.

Now I certainly understand your point that if fan A is regulated out of availability, out of existence and fan B is the only choice and yet it is consuming more energy we have done something wrong, obviously collectively.

MR. WOLF: Right.

MR. HARTLEIN: But I do believe that from what I have seen about where fan efficiencies are and where fans typically perform and the type of level settings that have at least been kicked around in this process through the discussions that we have had with the advocates, I don't believe that's a consequence, I don't believe that is going to happen.

MR. SMILEY: I've seen it.

MR. HARTLEIN: It's a functional level setting so.

MR. SMILEY: Bill Smiley, I guess the point I was making is are we going to be -- is to consider that potential situation so that we don't back ourselves in a corner that is not the right

corner to be in. I have seen it happen in the real world.

MS. MAUER: Bill this is Joanna. I just want to make sure that I understand when you are talking about a more efficient or less efficient fan are you talking about efficiency -- a best efficiency point or efficiency at the operating point?

MR. SMILEY: Bill Smiley, Trane. Either. Either, usually fans typically are not applied exactly at the best efficiency point.

MS. MAUER: Right.

MR. SMILEY: You like to do that but applications are not that definitive.

MS. MAUER: No I understand but you are saying that even if you are looking at efficiency at the point where you will be operating the fan.

MR. SMILEY: That's correct.

MS. MAUER: And when it's more efficient at that point versus one that is less efficient at that point.

MR. SMILEY: So all of those things I think would enter into it, yeah.

MR. WOLF: So this is Mike again. So Joanna I think to answer your question a little differently and maybe to Bill's point to, the question is if I test this fan on the right by itself and then I put it into this component here, into this thing that directs the air into and out of the fan, if the performance is better here on the left -- am I saying that right? No, Bill you are saying it the other way aren't you?

MR. SMILEY: Well either way.

MR. WOLF: Either way. Well let's take a -- I'm trying to think of an example here. If it tests better in this configuration but then I take a fan that's say less efficient than this fan on the right and I put it in here and when I test it in this configuration it is actually worse in the installed or component -- right the extended equipment we have created an unintended consequence of taking a fan that's not efficient standing alone or it's deficient standing alone but then making it less efficient over here so again you are just trying to prevent an unintended consequence that we don't know. Again we

are speculating, we know that that condition exists, we just don't know how prevalent it is.

MR. FINE: Does anyone have an opinion as to what the data says? How likely is it that we don't have data sets or information to show whether this is sort of a hypothetical problem or a real one?

MR. HAUER: I would have an opinion. Armin Hauer. So this is apparently an air system right there's no heat coming through or anything happening here and its physics would defeat the idea that if you put the louvers to it that the system becomes more efficient is just not possible.

But then Bill's approach where he says okay in the heat exchange application, if you have an unfortunate inlet condition it's okay you put the more efficient fan in and then the overall efficiency drops, this might be possible if you have system effects. But here in this example it is impossible.

MR. WOLF: Greg?

MR. WAGNER: Greg Wagner, Morrison. I would agree with what Armin just said but you asked what percentage well virtually all of the embedded

products have a size constraint limitation put upon them by real world constraints i.e. building codes and other things require certain space and construction where you have a big range of buildings that exist today and they all have limitations on the space available.

So any time you put space constraints on a product you are limiting the ability to achieve infinite efficiency if you will because you are constrained by that space.

MR. FLY: Mark Fly with AAON. I think one of the things here that maybe we are talking around a little bit is when we are comparing fan efficiencies and the fan efficiency would drive us to a different type fan, that's for the applicability part of an embedded product to me would really matter. If I'm doing an unhoused plenum fan and I put a more efficient, let's say with same physical size to conform with my space constraint span in there most likely I am going to get more efficiency out of that combination likely.

But if I've got to switch to a house

centrifugal fan from an unhoused plenum fan driven just by a test configuration number because I have to meet some efficiency level, an application that could very well give me -- cause the end product to consume more energy.

MR. WOLF: Okay so this is Mike again. And Ashley do you want to go -- so I guess what we are back to I think, I'll jump in here is what's in the NODA today and again what we are talking about here AMCA has been kicking around for several months and it's a difficult topic. But to bring in a new term that hasn't been used before today, at least I haven't heard it is if we were to define for purpose of the regulation and what falls into the scope here, something called a testable configuration you know, if the basic level that we can -- the housing, the impeller, the drive and the housing and you know we might even need to tweak those definitions but it is basically a stand-alone thing that can move air, can we get to some comfort level that for regulation purposes that's our definition of a regulated fan.

And I guess Tom I am kind of going to

defer to you. I know it's difficult -- how do you move forward without getting somewhat specific on these questions? We don't want to back anybody into a corner to agree to something and then come back and say oh yeah but, I guess I don't know to what level details, but I will defer to somebody that has been through this process before if they want to step in.

MR. CATANIA: Well you know my sense is that I know when the AMCA discussions I don't think we got into as much depth on the significance of housings that have split functions, especially with regard to the configuration in which it is tested.

So I'm a little nervous and I'm looking to some of the other AMCA members here on this as to whether or not we really have you know, we are pretty confident in the definitions that have probably already been submitted, but this is kind of a new variation that I think there may be enough variability, especially with regard to how that product might be tested that we might have to caucus.

MR. HARTLEIN: You know a thought I would add to that, I'm sorry Laura did you want to go

first, I think your card was up first.

MS. PETRILLO GROH: It was but I want -- you know I have had a little trouble following the discussions this morning when it was just based on card up so I was just sort of hoping that we could initiate discussion around a topic or moving on, so if your point is related to this --

MR. HARTLEIN: It's a contribution to Tom's point.

MS. PETRILLO GROH: Then you go ahead.

MR. HARTLEIN: Okay so what I was going to say was that we are doing things in slightly different order than we did in the AMCA room. So in the AMCA room we had a philosophical understanding of what likely regulation levels would look like. Frankly that got us -- this is Dan Hartlein by the way, sorry about that.

That got us substantially out of the weeds because many, many, many circumstances that we are talking about fall away with a reasonable setting of that target efficiency. If the number that we are shooting for is to be regulated, a fan has to hit a

total efficiency of 84%, there's a lot of people in this room that are going to say "oh crap, the weeds really matter."

If the target that we are looking at is somewhere just north of 50, there's going to be a lot of people in the room that say you know, okay let's get this done, right? It's easy. So it's a point of question as to whether or not what we are making, what we are doing much, much more difficult because of the order that we are trying to skin this cat.

So I just raise that as an open question to everything. It would feel differently I think, a lot of these discussions don't matter if the level is set appropriately and they do matter if they are not, so.

MS. PETRILLO GROH: Actually now my point is pretty relevant. This is Laura Petrillo Groh from AHRI. So you have been discussing levels and that helped you clarify things but I think from our perspective other than looking at certification reporting which becomes increasingly burdensome when you are -- when you don't know what configuration or

how many configurations that you have to report, just putting it out there.

Enforcement is our difficulty because right now we are talking about fans. But when we are talking about a fan embedded in a unit and you test that unit with the fan in it, it is not the fan that fails, it is the entire unit. When you are looking at -- when cross referencing that with basic models of regulated products, what then comes off the market and why -- there are some fundamental problems we are having I think with this and I don't know if a level would solve that.

MR. WOLF: This is Mike Wolf. Let me try to rephrase what you just said Laura is and I'm sorry I keep going back and trying to simplify this. If we look at stand-alone fans and we kind of give the thumbs up that these categories cover stand-alone fans, and I'm going to guess that you know, maybe several of these categories, maybe unhoused, centrifugal you know, some of these centrifugal styles over here on the left side get used in AHRI products.

So one of the potential fears here is if we set the -- if we set the regulation at such a point that these fans get taken off of the market, they are no longer available for you guys and you know in the embedded fan and the regulated or unregulated product that can create a real world of hurt, correct? And that would be a big problem.

MS. PETRILLO GROH: I think yeah, anytime you are eliminating utility of any product it is going to impact someone. In this case if you eliminate the utility of a housed centrifugal forward bladed fan, you've impacted a lot of the AHRI members.

MR. WOLF: So I guess I'm going to kind of defer to Ashley on this. You know when I came into this and we probably all came into this with some thought of where we might end up at the end of today, I don't know if we are even going to be close to where I thought but you know I was of the philosophy or desire that we could agree on stand-alone fans.

So again the stuff that is in this picture okay, and you know from what I have heard here so far

we don't have maybe the data we need to evaluate embedded fans in regulated or unregulated products and there's maybe a question of utility, there's just a lot of questions that need to be answered. I'm just trying to figure out how we can move the discussion forward without getting in those weeds.

And again I mean AMCA has speculated on a lot of this stuff over the past several months and I know there is a concern that we don't want to agree to something in number one if it is going to impact number three, so Tom you look like you want to say something.

MS. PETRILLO GROH: Before that I would like to propose that we caucus for a few minutes.

MR. WOLF: Okay.

MR. CATANIA: Can I give you something Laura that you want that is directly related probably to some of this caucusing and stuff that you may be doing, I'm just guessing but I wanted to bring this up kind of at the beginning.

MS. PETRILLO GROH: Sure.

MR. CATANIA: Tom Catania, AMCA. The

general comment I would make about this is that this process to some extent gives this industry collectively the opportunity to make regulation in this area as smart and as balanced as it possibly could be. Now the other option is for you know, somehow Ashley and John to wake up tomorrow morning and say you know what I think we will try another product for a few years and then we will come back to this one, it's very complicated.

I don't think that's an option. So -- and I think that the Department, you know, a very good argument could be made that the Department has the authority to just proceed ahead in this area and you know, people are free to challenge it in whole or in part including in part with like you can't go after embedded fans in regulated products.

But my suggestion, you know I also have the infirmity of being a lawyer so I have to advise companies on strategies like this and I rarely kind of bet my reputation and my advice on winning in court on issues like this, especially when it comes to discretion of administrative agencies of the

government.

And so my thought would be that these extremely challenging questions that everybody in the industry faces is something we have to sort of embrace and say these problems are here, there are issues and we are going to propose a series of solutions that are data driven and we are going to figure out how to do this.

Because we have always got the right to reserve -- we always have the right reserved at the end to vote no at the end of this process and say you know we gave it that old college try where we ended up was unacceptable, we just can't vote for it and if our only remedy is the courts afterwards well that's the way it goes.

But I think that the attitude we all ought to collectively have going forward is to say that we are going to try to make this thing the best regulation it possibly could be because if we don't the Department I think feels compelled to act and it will and we'll get -- there will be a rule, there will be a notice of proposed rule one way or another

so that's where my head is at.

MR. BOSWELL: Okay so how long do people thing it makes sense -- 30 minutes is the request? Any objections to 30 minutes?

(Off mic discussion about break time talking).

(Recess)

MR. BOSWELL: I was just in the other room and I asked them to wrap up their conversations within the next four or five minutes and rejoin us, so hopefully we will be starting soon.

MR. BOSWELL: I have been in there and I have asked them to wrap up in about five minutes and it has not been quite five minutes so they should be in any minute.

MR. BOSWELL: Okay so it looks like we have everyone back. So I guess and I think I mentioned this to several people -- what I think it might make sense to do at this point is to hear from each of the kind of self-identified sub-groups within the room in terms of where their thinking is at this point, where they would like to see us by the

end of the day which is only about an hour away and where they would like to kind of options for moving forward.

And so Laura -- and I didn't say this to you since you had been the one who requested the caucus could I call on you to kind of start that discussion and I'm assuming there might be lots of reactions to what people are hearing but I would like to get through hearing from each group before we break into general discussion, okay?

MS. PETRILLO GROH: Sure thanks this is Laura Petrillo Groh from AHRI. We had a -- you know pretty lengthy discussion back at the luggage closet.

MR. SMILEY: And it's weedy in there.

MR. SHEARD: You have come out of the closet then.

MS. PETRILLO GROH: Yes, yes and now we are here. And you know there's been a lot of discussion thrown around but we do thoroughly intend to collect data. I want to make that clear so that we can look at what is going on in our products.

It's data collection and

trying to look at the situation as closely as possible and to what's already been done. I think it would very much help if we were able to have access to the data collection template with calculations but no data that AMCA has used to collect data for their database.

And we have a few questions -- you know we have a few questions about some of the assumptions that were made to collect that data so you know we could either see what's reasonable for our products or you know when you use it what would be more reasonable for our products. And there was a lot of discussion about housed versus unhoused fans and testable configurations that we didn't really get into and we would like to hear more about, because it sounds like there has been some discussion about this between AMCA members and the advocates that we haven't been party to that might help to bring us up to speed.

So did I miss anything members of my caucus? So that's how we would like to use the last hour but I understand there are other parties, thank

you.

MR. BOSWELL: Okay so and I didn't really ask the other groups if they had a spokesperson that they wanted to identify so the group that I kind of think of as around AMCA is there somebody that would like to speak for that group?

MR. CATANIA: Tom Catania, yeah I can probably handle this one at least with respect to those two questions. I think in general concept certainly sharing a template for collection of data is probably not going to be an issue among the AMCA members. I think that there might be sort of a little formal requirement to the extent that there were representations made to individual AMCA members about the confidentiality, the data and so forth, I think we just have to act consistently with that, Dan?

MR. HARTLEIN: Yes I just wanted to comment. This is Dan Hartlein. We also shared I believe that data with the DOE confidentially. I mean there's some pretty valuable U.S. market information represented there.

MS. PETRILLO GROH: We weren't asking for the data.

MR. HARTLEIN: Okay great.

MR. SMILEY: (Off mic).

MR. CATANIA: So as I said my assumption is other than complying with any agreement with the data providers that to the extent something is going to be disclosed, not necessarily even about the data itself but about the nature of how it is provided I think that AMCA will have to follow whatever it committed to do but you know in concept I don't think any of the other members see an issue with that.

And on the second question I think it's fair to say that even among the AMCA members issues around the housing and so forth were not discussed as robustly as we have started to get into them here so we might even have to have some of our own internal conversations about that. I don't see it as a bad -- I don't think it would have fundamentally changed the analysis on you know the broad categories but we actually would want to have some internal conversations about that as well.

Do you know I think -- I wouldn't say we have a concern that we share but we have conversations of our own to have.

MR. BUBLITZ: Sorry I missed it, Mark Bublitz here, New York Blower Company. I think this idea of a minimal test configuration came out of today or yesterday so we need to wrestle with it but I don't believe there was a previous conversation with the advocates related to that subject, I just want to make that clear, thanks.

MR. BOSWELL: Okay, Ashley do you want to speak?

MS. ARMSTRONG: Oh I can take -- we can take complete credit for this whole testable convert, this configuration thing. It was not one that DOE had ever heard, it was something DOE completely made up in terms of terms and we are just trying to make sense of a very complex market and then DOE regulatory world and so we just make up things -- make up terms for these categories.

Nevertheless I think you kind of hit the nail on the head and some of the discussions we have

had just like the sidebar discussions, we need to translate some of these I think categories -- in my mind, into what we call a DOE regulatory approach. And what that really means is definitions, equipment classes and then testable configuration.

What does that mean, what parts of the unit would you put together for each of those what I will call categories, equipment classes? I'm not sure that all of the categories will remain the same. I don't think we are changing the scope of those categories per se but we may be combining some because of the way our equipment class regulations work, so it's more of a translation of the -- what I would call advocate AMCA approach to date to what that means in DOE's regulatory context and then perhaps talking a little bit more in detail of what does that testable configuration mean for each of those what I will call ultimately equipment classes.

And I think once we do that DOE is going to take it upon itself to give it a first round. We are going to circulate that to the group well in advance of the next meeting. We can even go back and

forth by email or if you guys like share point I can get a share point site, whatever you want to do.

But I think that will help iron out some of the details, it's not going to be everything but I think the idea would be to figure out some of those finer details and then get together again at the next meeting and really decide can we move forward from here. Are we at a place where we can all agree that for these equipment classes, for this testable configuration we can strike a deal for these and move forward talking about more detailed versions -- more details about what the regs -- how the regs would be structured in terms of test procedures and levels.

That's not to say there won't be ongoing discussions for products that may be outside of those original equipment classes, DOE is not ready to forego those yet, but I think at the very least we need to find a subset of the group that we can actually make some progress on and make progress. Because the last thing that I want to do is go back to ASRAC three months from now and say, "yeah we are still talking about what's in the scope". They are

going to say DOE write your NOPR.

You know, that's not the intent of this and that's not why we are all here and that's not what DOE wants, let's be clear. DOE formed this Committee to do just that. You guys help us write a regulation -- a meaningful regulation for a very complex market and we mean that wholeheartedly.

So that's my -- that's my pitch. I don't know -- you guys should react to that, that's my best pitch so let us define some definitions, equipment classes, and this testable configuration idea or Ashley, whatever you want to call it and let you react to that a little bit.

And I think that might help with some things, but I really think it needs you know the Committee as a whole needs to be open-minded. Without that we are really not going to make any progress and I would hate for that to be the case.

MR. FERSTROM: And this is Gary I just wanted to make a quick comment to the extent -- this is great news, to the extent the template is shared and AHRI collects some data, that's wonderful. I

would encourage some attention to smaller equipment because when we the environmental folks opened our discussion with the fans people, we had in mind a lower limit and if we are going to consider fans that are utilized in unitary equipment, maybe we might want to look at equipment below one horsepower.

MR. BOSWELL: Laura?

MS. PETRILLO GROH: Responding to Ashley. Thank you, I think that looking at it in terms of the enforcement or DOE's enforcement language would be very helpful. Do you think that -- so the next meeting is on the 18th and 19th of May, I think that would help facilitate a lot of our conversations with our members and help us get to a point where we might be able to bring more proposals forward to the table. Do you think we would be able to do that before that next meeting?

MS. ARMSTRONG: So I think DOE is going to plan on circulating something next week, it's not going to be the end of next week, it's probably not going to be Monday given that today is Thursday. I think it is reasonable that we will probably

circulate something -- give us a couple of days but midweek right.

Now to the extent that you can get your members to get on the phone and start talking, I expect some feedback. Now whether you want to bring the feedback back to the meeting, whether people want to write back, I expect a lot of questions. Because the reality is we are going to use the DOE language and we are going to try to explain to you what that means, but it is just that, it is DOE language.

And unless you are engrossed in it like I am every day, it doesn't mean a whole lot to the real world. So it will come to mean a lot too, over time but like I said you should look at that as not necessarily DOE's opinion, that's going to be DOE's translation of where we are today and what this will look like in a reg and kind of some issues that we see, there may be some questions.

Honestly I think testable configuration is something that we are going to need some input from the manufacturers and so we will give it our best guess but the fan guys, the OEM, the embedded guys --

you guys are the experts so you should feel free to chime in with feedback, that's what this process is all about.

MS. PETRILLO GROH: Tom, do you think that we might be able to get the spreadsheet before Wednesday of next week?

MR. CATANIA: Yeah my assumption is that we can get whatever releases we need from the members very promptly so I'm just not anticipating any significant issues there. The other thing that I would say is that -- is one of the -- this is Tom Catania of AMCA by the way, one of the other admonishments I would give to all of us here, and this is such a challenge but the phrase that keeps coming to mind to me and we have referred to it as the weeds sometimes, but I think you know, we have to avoid making the perfect the enemy of the good here.

And we've all -- those of us who have been involved with product regulation over an extended period of time have seen all the imperfections that emerge over time, but the regulation of a product category typically doesn't start there and I wouldn't

say that we should expect a loose initial regulation, but I think we can make it almost impossible for ourselves to get to the goal line if we keep finding that isolated example after example where we can't quite figure out how that particular configuration exactly is going to be tested.

So we are going to have to all challenge ourselves to figure out how good is good enough in some of these areas and then know that over time as this becomes effective, we will fix it. The other thing to keep in mind is that there would be an extended period of time between any effective date of this regulation and this implementation date too.

I'm not encouraging us not to be diligent or careful or to be sloppy in any respect but we will just not get done if we constantly focus on trying to achieve the perfect regulation right out of the gate.

MR. BOSWELL: Just the one thing that I kind of would add on to Tom's comments is I think you remember where we started off yesterday talking about the consensus process was part of that process is usually a recognition that you don't end up with your

ideal but what you are striving for is something that everyone can live with and you are trying to reach consensus amongst a very diverse group in terms of what level you need for everyone to live with and move forward with, which I think is consistent with what Tom was just saying. So I'll add that as my infomercial.

Other thoughts?

MS. PETRILLO GROH: I think it also might be beneficial to go through the metric in more detail as it was proposed in the second NOPR.

MS. ARMSTRONG: Now?

MS. PETRILLO GROH: Sure.

MS. ARMSTRONG: We have a slide on it, you know are we talking really metric because the metric is just a function of you know, the fan with I would say the motor and controls -- it's a function of those green pictures that were on the first slide. It's really what I would call a system based metric, I mean that's all the metric is.

And I'm not sure the metric is so much of the issue as the regulatory approach -- at least what

I would call that. But what is it exactly that you would like to talk about with regards to the metric?

MS. PETROLLO GROH: There has been you know discussion of several different metrics and you know, whether it is the FEI, it's in this or the PBER which means the same thing as -- and I don't know just knowing a little bit more might help us be able to avoid some of the -- it's more about how the testing would work that you are looking at that.

MS. ARMSTRONG: So I'm going to do this in a high level type thing I think at this point and perhaps I'm going to do it mainly based on pumps. But part of this is that I think we will work through some of these finer details and I think they may be a little bit different for -- depending on which category we end up kind of talking about but you know the way we structure this was more of a system based type metric.

Now we have moved to something of like an index -- indexing, which is what we did for pumps. I'm not sure that's a foregone conclusion at this point we should have that discussion when we get

there about whether the index is the right way to go or we should just keep it as like more of a metric or a more conventional type metric I would say, you can feel free to add to any of this if you would like, if you want to, do you want to plug it in I don't know, do you want to use this or no? The next time right?

MR. JASINSKI: (Off mic) But I can kind of present them as --

MS. ARMSTRONG: That's fine.

MR. JASINSKI: This is Sam Jasinski from Navigant Consulting and Sanaee feel free to jump in if I mischaracterize anything. But essentially the index that Ashley was referring to is like she said something we took from pumps, but it is essentially the major factors in that are an energy consumption metric over a standard -- a target energy consumption.

And the energy consumption which AMCA and the advocates presented as PBER is equivalent to what we were calling FER in the second, the most recent NODA that was published. And FER is --

UNIDENTIFIED SPEAKER: FEI.

MR. JASINSKI: Yes but one of the factors used to calculate FEI was FER which is equivalent to the PBER which no longer exists. Anyway so ignoring --

MS. ARMSTRONG: This is why this metric discussion --

MR. JASINSKI: Right so ignoring the index for a second, FER is simply a function of the flow and pressure over the fan efficiency, transmission efficiency, but it also accounts for driver losses and control losses which allows for a wire to air metric.

MS. IYAMA: So in very simplistic terms it is just your electrical input power at a specific flow end pressure point, that's all and then compared to a --

MS. ARMSTRONG: So that's for discussion right, it's whether we index against the standard or not. Really that's a division.

MR. JASINSKI: Right and the only other thing I would add is that the metric allows for multiple scenarios depending upon which of the

components we have identified are there so you can use default values or test values to get to that.

MS. ARMSTRONG: So this is the one thing I think Dan eluded to in his beginning, some of the talk maybe at the beginning and something we did in pumps and perhaps a good exercise before the next meeting is to take a look at pumps because what we did there is if you don't have certain components that you would need for the full system, we would provide you with what I would call nominal values for you to be able to build up your full system metric from there.

And those nominal values are based on something like Dan said, in pumps we develop them based on a methodology that was more or less agreed to in the working group but it has also been tweaked in response to some things we know coming down the pike with regards to motor drive types. The motor stuff is based on our motor regs and scaling off of those for those that don't know motors.

I would envision a similar thing happening here, that's what we have done. You can also for

specific references to fan stuff, look at the AMCA white paper, that really describes it and I think that's what is implemented in the NODA.

MS. PETRILLO GROH: A quick question, Laura Petrillo Groh from AHRI again. So I think and please do so if I'm wrong, the goal for the pumps regulation was to improve the hydraulic efficiency of --

MS. ARMSTRONG: The goal of the pumps regulation was to improve the efficiency of the pump as defined by the working group, which is more broad than that. Now what they ultimately agreed to in terms of levels is reflective of something you can get by just improving the hydraulic efficiency.

But I wouldn't say that's necessarily -- I mean the goal was to -- if somebody wanted to do a -- there's nothing in the level that says you have to do it by hydraulic efficiency, let's put it that way. If somebody wanted to do a wire to water test and needed by different motors or a different control system, they could very well do that.

They ultimately agreed to a level for

which DOE has subsequently proposed wholesale which could be met by just increasing the hydraulic efficiency, let's put it that way, I think that's the better way to say it.

MS. PETRILLO GROH: Thank you.

MS. ARMSTRONG: But it also allowed a system based metric. System based representations, system based label for which they ultimately wanted and system based incentive programs and I think that's important -- I can't speak for the fan industry, but I think that's important to the fan industry as well.

That's like the high level metric stuff. I mean I will expect that we will get into the nitty-gritty details but if we can't get passed scope, we can't really get to metric and test procedure and levels so we are hoping that we can really get to the scope equipment classes, testable configuration into a happy place to move forward with some of the more finer details of the test procedure, the metric and then ultimately allow us to run different scenarios for you guys to consider in your

negotiating of standards.

MR. CATANIA: So I have a question, Tom Catania, AMCA. In the absence of you know, an agreement on scope or a successful outcome of this process would it be fair to say that DOE would look at something similar to this methodology to address what it saw as the scope of its authorized regulation and sort of a foundation of how it would approach the issue if left to its own device?

MS. ARMSTRONG: I don't think I can pre-judge the outcome of a proposed rule. Unfortunately I think what you have seen in the NODA is that DOE has implemented a regulatory approach that it thinks is workable with the DOE regulations and the statutory limitations as they exist. Now with that being said, there has been some feedback at this working group and to the extent people submit, you know, we didn't ask for specific comments on the NODA per se, we just said bring them to the working group, both members of the public and otherwise.

To the extent the discussions here would influence that but I think you have seen us issuing

the NODA is an indication but at least what we have done in the NODA the approach is something that we would consider as informing our proposal as a regulatory approach, but I can't prejudge the outcome of a NOPR.

MS. PETRILLO GROH: Ashley the other thing that we would ask you to start doing would be to start revising the LCC and all the accompanying analysis to include the impact on the HVAC OEM's.

MS. ARMSTRONG: And I think we are more than happy to start working on those types of revisions. We are going to need some data for you guys and some discussions about what that would look like in order to do that.

MS. PETRILLO GROH: What kind of data do you need for that?

MS. ARMSTRONG: We will get that. Let's start with data number 1, data request number 1. There's two --

MS. PETRILLO GROH: There will be two different groups working on it though I think it might be beneficial to work on it side by side.

MS. ARMSTRONG: Okay, that's fine.

MS. PETRILLO GROH: Okay we can work offline on that I suppose.

MS. ARMSTRONG: Sure.

MS. PETRILLO GROH: Okay.

MS. ARMSTRONG: So as we kind of come to a close of the first couple of days, I mean it's 4:15 we do have 45 minutes to the extent we want to discuss -- I do think DOE needs a little bit of time, more than ad hoc trying to figure out this testable configuration thing any further, but is there anything else anybody wants to discuss while we are here and together before the next meeting?

One thing I will ask that I mentioned to a couple of people just as I was walking by, if you haven't looked at the NODA, please look at the NODA. If you haven't looked at the results, please look at the results, the data, the assumptions. If there is anything that you think we should revise, know thatthe next meeting would be the time to bring that to the table so that we could get working on another set of data and analysis to help the committee.

These analyses can't be run overnight unfortunately so happy to revise them based on feedback by some additional data, based on additional scope, but please take a look at them.

MR. HARTLEIN: Dan Hartlein, Twin City Fan. Ashley just a quick question -- I wonder if maybe that your Navigant team could comment on this but we had put -- we had differentiated between total pressure and static pressure and I noticed in the NODA that you don't. I just wonder if you could maybe pontificate or give us a little of insight as to why that was done, what your thinking was around that.

MS. ARMSTRONG: Go ahead. Do you want to?

MS. IYAMA: Can I think for a minute?

MS. ARMSTRONG: You can think.

MS. IYAMA: I mean okay, this is Sanaee.

MR. HARTLEIN: We can park that for the next meeting if you want?

MS. IYAMA: No I think in terms of the analysis, anything could be analyzed. In terms of the metric I think there is still not really a good

understanding of the justification for using static pressure for an un-ducted fan. It seems like most of the concerns we have heard from the industry were based on selection practices and installation practices rather than the performance of the product itself.

MS. ARMSTRONG: I think from DOE's point of view, it is really important to have a metric that can be comparable across classes. So this is going to become important when we talk about equipment classes and structure and to the extent the difference in pressure results in unequitable readings across classes I think we have some concerns.

That's not to say that levels can't be set at different -- meaningful for different classes -- that's a completely different conversation. I think generally speaking though let's put it this way -- we haven't been convinced that from a regulatory standpoint from a regulatory metric standpoint that there needs to be that differentiation in pressures.

You don't have to answer it now, but you

can.

MR. WOLF: This is Mike Wolf, Greenheck. I will try to answer and others feel free to jump in here. I think the reason you know, part of it is the selection practice that is out there but the other part of it, to use the terms that we have kind of started to use today, testable configuration -- if you get an un-ducted fan, an un-ducted test configuration, you don't have the benefit of the velocity pressure at the outlet of that fan and therefore you have to use static pressure unless you make assumptions or you include some calculation regarding the outlet area of the fan.

And now if we want to start trying to define outlet area of the fan maybe we can back up and talk about proxy votes and all of that good stuff and again that was a joke for the record because that question becomes almost as complex as you know, it seems like it should be simple but it is not, so that was the reason we decided to go ducted and un-ducted and use a -- I'm sorry Greg go ahead.

MR. WAGNER: I would like to give a simple

example it helps with that discussion and then this came from one of your colleagues actually. When you look at an axial fan the external air flow coming from it, if I have an 18 inch or I have a 30 inch, the velocity pressure is going to look totally different between the two of them and it is going to look like that 18 inches is much more effective even though it is actually less effective in most cases than a 30 inch one in terms of the energy consumption.

But because you use the total pressure, you count the velocity pressure, that component would unnecessarily reward the 18 inch one.

MR. HARTLEIN: And Dan Hartlein. Quite the contrary, I mean yes I agree. In addition to that it actually leads to the unintended consequence of using more energy as opposed to less so that metric led to what we ran into in looking at total, is that actually in those products quite often resulted in the wrong decision being made from an energy perspective so we would ask you to go back and maybe look at that and if we need to put our ducks

back in a row and help with some more analysis, some more data then we would be happy to do that I'm sure, but that was the reason that we had to do it because we could not escape the unintended consequence of the wrong fan from an energy consumption perspective actually becoming the selected fan, so it gave us the wrong answer too often and we weren't anticipating that.

I think when we embarked on it as well, we were total, total, total until we ran into the situation but we would be glad to maybe share some more information there if it helps, okay.

MR. WOLF: I'm sorry Mike Wolf, can I just piggy-back on this thing. We actually attempted in our first pass at this to simplify it by just using static pressure because we wanted to keep it simple and to have a comparable across all products and we ended up seeing that was not right either, so.

MR. BOSWELL: Armin?

MR. HAUER: It's Armin Hauer. On the analysis of the second NODA I defined that the engineers from Navigant found that AMCA 210 indicates

that always the fan total pressure is determined first and then static pressure is calculated. But we -- now AMCA members, a few have realized that this is not actually the case. Most usually it is the static efficiency and static pressure that is measured and then on occasion you go the extra step in determining the total efficiency and total pressure.

So we are going to -- I put in a request to change AMCA 210 to amend it and then the second point regarding the NODA. I opened the big spreadsheet that engineering analysis and there are some missing links, it didn't open for me, I downloaded it twice, it didn't open for me --

MS. ARMSTRONG: We can check it out.

MR. HAUER: Thank you.

MR. BOSWELL: Ashley it sounded like you were going to respond to what Mike had been saying.

MS. ARMSTRONG: Well I'm not sure that we are going to come to a resolution on this today. We will go back and look at it. The NODA does it both ways, so that's something to look at. We have implemented ---

(Ms. Armstrong and Ms. IYAMA conferring)

So we have done it, the public versions with the total pressure I have just been told we have done it the other way if you guys want it for next week we can have that for the meeting. With that being said we should probably also make sure that we are understanding that the data elements that we are getting to pull are the actual data elements that we thought we were -- at least pressure is pressure, static is static, that kind of stuff.

But anyways, we can have those discussions, I don't think that's an issue.

MR. HARTLEIN: Dan Hartlein, just to kind of -- we 100% agree that we should can and will I'm sure, I just want to you know put a little exclamation point on that. This was really a contentious point for us. It was a long, long hard fought discussion with a lot of smart mind and several PhD's in the room before we actually landed on the fact that the reality was what we had to do here was get the right answer from an energy savings and that's what ultimately led us to where we were

so, but I'm sure that we can get to that with the data that we have so.

MR. BOSWELL: Okay good, thank you.

MS. ARMSTRONG: Anything else that anybody wants to bring up before the next slide? Oh you have a card up?

Do you want to do closing remarks from the podium? You did so well earlier.

MR. CATANIA: The last time he did that --

MS. ARMSTRONG: For his own proposal. Well I mean I think in closing we would just like to thank you guys for coming for the past two days. Some of the past two days has been more productive than I think more enjoyable than others, but we are making progress. We have some homework and hopefully when we get together next time we can make even more progress and actually move to having a scope and having some definitions and having some workable equipment classes and really starting to talk about the details and move forward, okay, have safe travels home.

(Adjourned)

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